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November 13, 2015

Ms. Judith A. Enck
United States Environmental Protection Agency
290 Broadway
New York, NY 10007-1866

Subject: Risk-Based Disposal Application for the Toxic Substances Control Act
Former Anaconda Wire & Cable Plant (NYSDEC Site No. 3-60-022)
Hastings-On-Hudson, New York

Ms. Enck:

On behalf of Atlantic Richfield Company, please find enclosed the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application for polychlorinated biphenyls (PCBs) for the Former Anaconda Wire and Cable Plant site located at 1 River Street in Hastings-on-Hudson, New York (Site). The Site is also listed as New York State Department of Environmental Conservation (NYSDEC) Site No. 3-60-022, and PCB remediation at the Site is to be conducted pursuant to two Records of Decision issued by NYSDEC in 2012. The first, a Modified Record of Decision for Operable Unit 1, governs the remediation of the uplands portion of the Site while the second Record of Decision, for Operable Unit 2, governs remediation of the sediments. In 2013, Atlantic Richfield (AR) entered into a Consent Order with NYSDEC committing AR to the performance of the remediation. Since that time, AR has been conducting further pre-design investigation and the results of that investigation are reflected in this application.

Under NYSDEC's RODs and the Consent Order, the remedy for the uplands or OU-1 portion of the Site consists of:

- Excavation of soil greater than 10 mg/kg PCB to a maximum depth of 9 or 12 feet and of surface soil (0 to 12 inches) greater than 1 mg/kg PCB.
- Bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL.
- Construction and operation of a post-remedy recovery system for PCB DNAPL.
- Installation of a site cover to allow for restricted residential use.
- Implementation of institutional controls.

NYSDEC's RODs and Consent Order also require the following remedy for the sediments or OU-2 portion of the Site:

- Removal of sediment that contains PCB concentrations greater than 1 mg/kg to a maximum depth of 6 feet below the mud-line within areas of re-suspension controls.
- Backfilling of nearshore dredge areas with clean material and isolation capping where residual contamination remains above background concentrations.
- Subject to evaluation and further investigation, removal of sediment outside of re-suspension controls that contain PCB concentrations greater than 50 mg/kg, to a maximum depth of 6 feet below the mud-line.

This TSCA application was prepared pursuant to 40 CFR 761.61(c) and is being submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA for approval.

The purpose of this application is to provide information regarding the nature and extent of PCB contamination, the proposed remediation, and the basis for leaving any PCBs in-place within environmental media at the Site and to demonstrate, through the use of human health and ecological risk assessments, that PCBs left in place after remediation will not pose unacceptable risks to human health or the environment. This demonstration provides verification that the remedial requirements stipulated in the New York State Department of Environmental Conservation (NYSDEC) Records of Decision (RODs) are protective for human health and the environment.

Additionally, as is required by §761.61(a)(3)(i)(E), all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the site, will be available for EPA inspection upon request. A certification by the contractor will be provided after that party has been selected and prior to construction of the final remedy.

If you have any questions or comments on this submittal, please feel free to contact me at 832.619.5825.

Sincerely,

Paul G. Johnson
Operations Project Manager
Atlantic Richfield Company (Site Owner)

Enclosure

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File

VOLUME 1

Application

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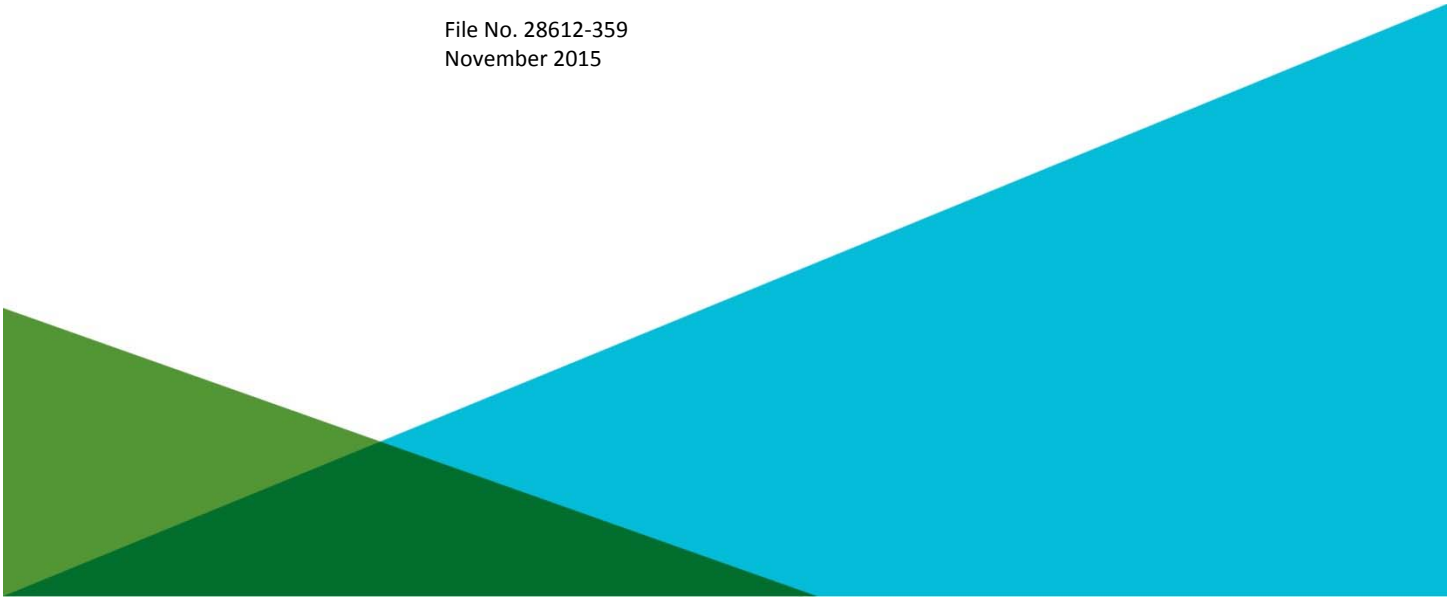
VOLUME 1
TOXIC SUBSTANCES CONTROL ACT (TSCA)
RISK-BASED DISPOSAL APPLICATION

FORMER ANACONDA WIRE & CABLE PLANT SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

By **Haley & Aldrich of New York**
Rochester, New York

For **Atlantic Richfield Company**
Naperville, Illinois

File No. 28612-359
November 2015



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1. Introduction

This document presents the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application (RBDA) for polychlorinated biphenyls (PCBs) at the Former Anaconda Wire Project site located in Hastings-on-Hudson, New York (Site). The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and is being submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA.

40 CFR 761.61 provides three options for cleanup of PCB remediation waste: 761.61(a) *Self-implementing*; 761.61(b) *Performance-based*; and 761.61(c) *Risk-based*. The self-implementing option (761.61(a)) is not applicable to freshwater or marine sediments, and performance-based criteria (761.61(b)) are applicable to contaminated surfaces. Although 761.61(a) or 761.61(c) may be used for soil, risk-based approval is the only method that can be used for sediments. Therefore, risk-based cleanup is the approach selected for this application.

Obtaining risk-based approval is conducted by submitting to USEPA, in writing, a plan that describes the nature and extent of PCB contamination, the proposed remediation, and the basis for leaving any PCBs in-place within environmental media at the Site. The objective of this RBDA is to provide this information and demonstrate through the use of human health and ecological risk assessments that PCBs left in place after remediation will not pose unacceptable risks to human health or the environment. That finding, in turn, provides verification that the remedial requirements stipulated in the NYSDEC RODs are protective for human health and the environment.

The Site has undergone extensive investigation under the regulatory oversight of the New York State Department of Environmental Conservation (NYSDEC; NYSDEC Site #3-60-022), which culminated in issuance of final Records of Decisions (RODs) for the Site in 2012. The RODs require implementation of remedial activities to address PCBs onshore and offshore. As declared by NYSDEC, implementation of the remedial activities stipulated in the ROD will ensure protection of human health and the environment. Although the Site is regulated by NYSDEC and PCB releases at the Site occurred prior to 1978, the requirements of 40 CFR 761.61 is being considered.

As required in the RODs, additional data have been collected including PCBs in soil, groundwater, sediment, surface water, pore water, and biota to establish a baseline to evaluate the success of the remedy, and to provide data needed to design the remedy (e.g.., define excavation limits). These recent data were also used to support a detailed evaluation of current and future potential risks to human health and the environment, as described herein.

The RBDA for the Site is comprised of a four volume set of documents that include:

- Volume 1, *Application (this volume)*, which provides a summary of the project scope and objectives, investigation activities, human health and ecological risk assessments, and conclusions that are documented in detail in Volumes 2-4.
- Volume 2, *Basis for Remedial Approach and Design*, which documents investigation activities including nature and extent of PCB contamination, provides the proposed remedial design, and identification of anticipated post-remedial conditions (i.e., residual PCBs).
- Volume 3, *Human Health Risk Assessment (HHRA)*, which provides the human health risk assessment, including methodology, calculations, and results.

- Volume 4, *Ecological Risk Assessment (ERA)*, which provides the ecological risk assessment, including methodology, calculations, and results.

USEPA Region 1 TSCA has published a check list describing expectations for the content of an RBDA. The Region 1 checklist has been used as a guide to help ensure that this RBDA contains information necessary to allow review by USEPA Region 2 TSCA. Appendix A of this volume provides the checklist and a description of where in the RBDA the check list items can be located.

The proposed remedial action presented in this application is based on extensive investigation that provides the basis for the formal design process. Specifically, the Pre-Design Investigation Data Summary Report presents delineation of both soil and sediment removal as well as the evaluation of and recommendation for removal of sediments that are outside the limits of resuspension controls. The Pre-Design Investigation Data Summary Report was submitted to NYSDEC in August, 2015. Currently, Atlantic Richfield Company (ARC), through its wholly owned subsidiary ARCO Environmental Remediation, LLC. (AERL) is awaiting comments and/or approval of the design aspects contained within Pre-Design Investigation Data Summary Report.

As this project moves through the formal design process, we anticipate that NYSDEC will work cooperatively with both ARC and EPA such that any subsequent changes to the information presented in this document will not necessitate a TSCA reapplication, assuming the proposed remedy as described in this application is sufficient to meet the requirements of the Toxic Substances Control Act.

1.1 SITE DESCRIPTION

The Site is a 28-acre former industrial property located on the eastern bank of the Hudson River along the village of Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The Site is located at river mile 21, approximately five miles south (downstream) of the Tappan Zee Bridge. The site is bounded on the north and west by the Hudson River, including a former marina to the north, to the south by the Tappan Terminal site and to the east by a commuter railroad adjacent to the Village of Hastings-on-Hudson. At the location of the Site, the lower Hudson River is nearly a mile wide (approximately 4800 feet bank to bank). The deepest portion of the river cross-section is approximately 50 feet. The Hudson River is primarily used as a navigational/shipping lane with large vessels typically traveling near the middle of the river. The shoreline consists of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting. Figure 1 provides a site location and Figure 2 identifies key features of the site that are referenced throughout this document.

The site is zoned general industrial and has primarily been used as an industrial facility for well over a century with much of the site formerly covered with buildings; currently there are no active operations at the site. One permanent building remains at the site (Building 52) while most of the remaining portion of the site is covered by pavement or concrete building slabs. Currently, only three temporary trailers are in use for site security and to support remedial activities. Presently, there is no habitat for environmental receptors.

The proposed remedial action allows for restricted-residential use (which allows for residential, commercial, and/or industrial use but includes restrictions which prohibit single family housing and vegetable gardens) as described in NYSDEC 6 NYCRR Part 375-1.8(g). In addition, remedial action includes mitigation for construction required within the river which is expected to create habitat. Future development of the site has not been determined.

1.2 SITE HISTORY

During World War II, Anaconda Wire and Cable Company (AWC) was awarded contracts from the U.S. Navy (Navy) to manufacture electric cable for shipboard use. The Navy required the insulation of shipboard cable to be heat and flame resistant to avoid fire damage and to withstand heat generated from conducting high electric currents. PCB mixtures were used to make these products for the Navy. The material was used exclusively during the World War II-era and PCB use in the manufacturing of cable was suspended after AWC's contracts with the Navy were fulfilled at the end of the war, as there was no civilian market for these products. After World War II, AWC produced electrical and television cable until it ceased operations in 1975. ARC purchased AWC in 1977, never operated the plant, and then sold the Site in 1978. Since 1978, several owners and tenants subsequently occupied the Site. In 1998, Atlantic Richfield Company's affiliate, ARCO Environmental Remediation, LLC.(AERL), purchased the Site in order to facilitate environmental investigation and remediation efforts. Volume 2 of this application provides additional details on site description and history including site geology and hydrogeology, historic and current land use, and future land use.

2. Remedial Investigations

2.1 SUMMARY OF INVESTIGATIONS

Wire manufacturing operations during a portion of the operating period caused the release of PCBs and metals to site soil, groundwater and sediments. A site investigation was performed in 1986-87 in connection with a potential real estate development which led to the discovery of high levels of PCBs beneath the Northwest Corner of the site.

Several geotechnical and environmental investigations were conducted at the site which involved soil sampling and analysis. In particular, the December 1987 "Site Investigation Report" summarized the results of surface and subsurface soil samples, groundwater monitoring, and building sump samples. Based on this report, the U.S. Environmental Protection Agency (EPA) issued a Preliminary Assessment for the site in January 1989. Additional investigations were conducted during 1989, resulting in the October 1989 "Environmental Investigation Report." These investigations revealed the presence of PCBs, petroleum hydrocarbons and metal contaminants in surface and subsurface soils. These contaminants were also found in groundwater beneath the site at levels exceeding water quality standards. The maximum concentration of PCBs found during these investigations prior to 1990 was 4,100 parts per million (ppm) in subsurface soils in the Northwest Corner of the site. In July 1989, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

The site was divided into two operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Operable Unit 1 (OU-1) is the upland soils area west of the railroad tracks. OU-2 is the adjacent area of the Hudson River.

Numerous remedial investigations of OU-1 and OU-2 were completed. The purpose of the various remedial investigations (RI) was to define the nature and extent of contamination resulting from previous activities at the site and included the following:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected during the remedial investigation activities included data for groundwater, surface water, soil, sediment, and surface soil.

2.2 NATURE AND EXTENT OF PCB CONTAMINATION

The results of the investigations identified contaminants of concern including polychlorinated biphenyls (PCBs) in soil, sediment, and groundwater. The primary PCB mixture found at the Site was Aroclor 1260, with lesser amounts of Aroclor 1254. The highest levels of Aroclor 1260 found at the site were associated with an elastic material that resembles rubber cement. This elastic material ranged from small hair-like filaments to a 2-inch separate layer within the soil column. This elastic material is believed to be the Aroclor wire-insulating mixture that was formulated in the Northwest Corner of the site. The liquid elastic material was found to contain traces of the solvent in which it was originally dissolved. This material had apparently leaked or released and had migrated beneath the site. As the solvent carrier dissolved from the mixture into the groundwater, the PCB component became more viscous and, ultimately, resinous. Isolated occurrences of this material have also been observed in sediment samples. A liquid form of this elastic material, highly viscous in consistency, was also found in monitoring wells in the Northwest Corner of the site at depths of greater than 30 feet below ground surface (bgs).

Onshore

Soil: PCBs were detected in soils in various areas of the site as well as groundwater. These areas demonstrated somewhat different contamination characteristics and are discussed separately below.

- Northwest Corner: where total PCB concentrations up to 380,000 mg/kg were measured and the extent of PCBs approaches 40 feet below ground surface bgs in some areas; dense non-aqueous phase liquid (DNAPL) containing PCBs was identified beneath the Northwest Corner.
- Water Tower Area: where analytical results indicate the presence of PCBs in light non-aqueous phase liquid (LNAPL). The LNAPL was attributable to a release of heating fuel oil from an above ground storage tank near the water tower. Waste characterization of the LNAPL indicates that total PCBs exceed 50 mg/kg.
- Building 52: In 2006 and 2009, discrete concrete samples indicate the presence of PCBs in the top 1 to 2 inches at concentrations that exceed 50 mg/kg at two locations. Soil samples collected from beneath the slab contain PCBs measured to be up to 657 mg/kg. Supplemental investigations will be required for soil beneath the slab of this building after demolition of the above ground structure. Currently, concrete slab sampling to delineate areas greater than 50 mg/kg is intended to support the future demolition.
- Other Northern Areas: where PCB contamination is believed to be related to the storage of wire reels and other materials in open areas of this part of the site, which included portions of two former buildings, Buildings 52A and 52B. Contamination in this area is not as deep or as concentrated as in the Northwest Corner and along the shoreline typically does not exceed 20 feet bgs. The elastic matrix was found in some soil borings taken from areas along the shoreline, including a sample at a depth of 9 feet.
- Central and Southern Areas: where PCBs were found at various isolated locations in these parts of the site. PCBs were found at relatively lower concentrations and shallower depths with a few exceptions near former process areas with concentrations greater than 10 mg/kg at depths approaching 12 feet bgs.
- Building Outfalls: Outfalls from Building 52 and Building 15 were suspected to have conveyed process waste water to the Hudson River during the time when PCBs were used in

manufacturing processes. Supplemental investigations completed after remedy selection indicated most of the Building 52 outfalls did not require further investigation due to their presence within excavation areas that will be removed to depths below the outfall pipe. The Building 15 outfall did not require further investigation due to its presence within an area that will be removed to depths below the outfall pipe.

Groundwater: Samples collected from the Fill Unit were analyzed in both filtered and unfiltered forms to determine the influence of suspended fine particles on contaminant levels. The majority of unfiltered samples contained PCBs at levels that exceed the New York State Ambient Water Quality Standard for drinking water of 0.09 µg/L. Filtered samples contained much lower levels of PCBs, with a maximum measured value of 1.0 µg/L. Groundwater samples taken from the deeper Basal Sand Unit did not contain detectable levels of PCBs.

Supplemental upland investigations were completed using low flow sampling techniques at 3 upgradient and 3 downgradient locations. Results of 2015 unfiltered samples were consistent with previously collected filtered samples with all total PCB results less than 1.0 µg/L.

Offshore

Sediment: samples were collected during the remedial investigation activities from the Hudson River and at locations upstream, adjacent and downstream of the Site along the Hudson River. The samples were collected to assess the potential for impacts to river sediment from the site-related contaminants. The results indicate that sediment in the Hudson River exceed NYSDEC sediment cleanup guidelines for PCBs and various metals. The highest PCB concentrations in shallow and deeper sediment were found offshore of the Northwest Corner of the property.

The OU-2 portion of the site is divided into different areas which has been useful to define the nature and extent of contamination and evaluate alternatives. These areas are described below and are labeled on Figure 2. Areas include the Nearshore Area, Backwater Area, and Deepwater Area. Remedial alternatives in these areas are partially determined by whether sediment re-suspension controls can be implemented. Generally, in this portion of the Hudson River, re-suspension controls can be used when the depth of surface water is 15 feet or less (i.e., shallow water areas), whereas re-suspension controls cannot be used when the depth of surface water exceeds 15 feet (i.e., deepwater areas).

- Nearshore Area: The area of sediments along the shore defined by the feasible limit of re-suspension controls on the west and the existing bulkhead between OU-1/OU-2 boundaries on the east. This area is generally within 60 to 80 feet from the shoreline and is within the shallow water area. Recent sampling indicated that total PCB concentrations in the top three feet of sediment varied from non-detect up to 110 mg/kg. There were four detections greater than 50 mg/kg total PCBs (58 to 110 mg/kg) and were found at depths ranging from 0.5 to 5 ft below mud line (bml).
- Backwater Areas: These sediment areas include the Old Marina (adjacent land parcel), North Boat Slip, and South Boat Slip and are areas within the limit of re-suspension controls but have lower river velocities and increased sediment deposition because they are out of the main flow of the river. These areas are therefore discussed separately. Recent sampling indicated that total PCB concentrations in the upper three feet of sediment are less than 5 mg/kg. There was one detection greater than 50 mg/kg total PCBs (170 mg/kg) which was found in the Old Marina (VC-501) at a depth of 5 to 6 ft bml.

- Deepwater Areas: These sediment areas are beyond the feasible deployment of re-suspension controls. The furthest extent of contamination is approximately 600 feet west (at its furthest point) of the OU-1 shoreline, 300 feet north of the OU-1 northern property boundary, and proximate to the OU-1 southern boundary. Depth of water in these areas approaches 40 feet. The Deepwater Area contains two separate areas. One deep water area required investigation to collect data in order to evaluate the nature and extent of contamination (Deepwater Evaluation Area). The other area (Deepwater Northwest Area) adjacent to the Northwest Extension Area was focused on delineation of dredge extents where removal was anticipated by the ROD as being required as part of the remedial action.
    - Deepwater Evaluation Area: Total PCB concentrations in the upper three feet of sediment were near background with few exceptions. Recent sampling indicated that there were six detections greater than 50 mg/kg total PCBs (71 to 1,100 mg/kg) but were found at depths ranging from 3 to 4 ft bml except for one at a depth of 2 to 3 ft bml.
    - Deepwater Northwest Area: Area is located off-shore immediately west and southwest of the Northwest Extension Area portion of OU-2 up to approximately 225 feet from the shoreline. Areas of PCB results greater than 50 mg/kg are sporadic throughout the sampling area and vary by depth, thickness, and concentration. Recent sampling indicated that total PCB concentrations up to approximately 10,000 mg/kg with extents of PCBs exceeding 6 ft bml.

- Northwest Off-shore Area (Northwest Extension Area): This area is characterized by rip-rap fill that extends approximately 60 to 75 feet off-shore from the shoreline and is estimated to be up to approximately 22 feet thick. The rip-rap that is visible along the shore consists of boulder-size pieces of rock or concrete and transitions to sediment with occasional cobbles and boulders further from shore. Where borings could be advanced, the fill and sediment had PCBs detected to more than 30 feet deep with a maximum PCB concentration of 9,200 mg/kg. PCB concentrations greater than 1,000 mg/kg were found at depth ranging from near mudline to deeper than 20 feet below mudline (bml). Semi-Solid PCB material was found in various locations. Although liquid DNAPL was present in the adjacent area to the east (Northwest Corner) it was not found where borings could be advanced. However, sampling near the shoreline is not practicable due to the rip-rap. This area is later referred to as the Northwest Extension Area in the ROD.

Surface Water: Recent sampling (late 2013 to early 2015) included ten monthly surface water sampling events and included locations adjacent to the site as well as upriver reference locations. Findings from this investigation did not indicate that surface waters were impacted by site specific PCBs. Total PCBs went undetected in the majority of the surface water samples tested with minimum reporting limits that ranged between 0.010 and 0.018 µg/L. When PCBs were detected, concentrations were generally near the detection limit and the Aroclors that were identified (e.g. Aroclor 1242 or 1248) are not site specific. Results suggest that background levels of PCBs in Hudson River surface water are greater than the New York State Ambient Water Quality Standard of 0.000001 µg/L. Based on these data, NYSDEC approved the cessation of this monitoring program.

Porewater: Two separate events measured PCBs in porewater in the vicinity of the site with the 2013 event including reference samples. In 2013, porewater was collected at seven locations. Only one of six

Site porewater samples was positive for PCBs at a reporting limit of less than 0.010 µg/L and the types of Aroclors observed in that sample (1248 and 1254) are not strong indicators of site-related PCBs. These results appear to indicate that PCBs are strongly bound to the sediment and have little propensity to partition into porewater.

Volume 2 of this application provides additional details on remedial investigations, remedy evaluation, nature of contamination, and extent of contamination.

2.3 INTERIM REMEDIAL MEASURES

The remedial investigations prompted various interim remedial measures (IRM) at the site to address sources of contamination or exposure pathways that could be effectively addressed before completion of the RI/FS. The following IRMs were conducted:

- Building 14 Sump and Trench Cleanout: An IRM was performed in December 1997 at Building 14 to pump out water and sediments, steam clean the surfaces of these structures, and backfill them with clean sand.
- Light Non-Aqueous Phase Liquid (Onshore): In June 1998, LNAPL recovery devices were installed in four monitoring wells in the vicinity of the water tower. Several modifications have been made to the method and frequency of removal, and currently PCB LNAPL is being passively removed on a quarterly basis and disposed of properly at a permitted off-site facility. Through September 2015, approximately 688 gallons of LNAPL have been recovered, and this IRM will continue until the remedy is implemented.
- Northwest Corner Interim Cover: In June 1998, the top 2 inches of surface soils from the Northwest Corner of the site were found to contain up to 4,400 mg/kg of PCBs. In July 1998, an interim cover of four inches of gravel was placed over exposed soils, and a fence was erected around areas of contamination.
- Shoreline Bulkhead: To prevent the further release of contaminated fill and PCBs to the river, ARC installed a sheet pile bulkhead as an IRM along the southern portion of the shoreline, where the deterioration of the existing bulkhead was most severe. This work was completed in December 2000.
- Dense Non-Aqueous Phase Liquid (Onshore): As described above, PCB DNAPL was identified in the Northwest Corner of the site during the RI. A mobile recovery system periodically removes DNAPL from approximately five recovery wells. Through September 2015, approximately 1,900 gallons of DNAPL have been recovered and disposed of properly at a permitted off-site facility. This operation will continue at a frequency of 10 times per year until implementation of the remedy.

Volume 2 of this application provides additional details on interim remedial measures.

3. Proposed Remediation

3.1 EVALUATION OF REMEDIAL ALTERNATIVES

Extensive evaluation of remedial options have been considered through multiple feasibility studies, and evaluated by NYSDEC and the public since 1998. Evaluations included the following criteria:

- Overall Protection of Human Health and the Environment
- Compliance with Standards, Criteria and Guidance (SCGs)
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short Term Impact and Effectiveness
- Implementability
- Cost Effectiveness
- Land Use
- Community Acceptance

Alternatives considered No Further Remedial Action alternatives, Removal to Feasible Limits and an extensive number of other remedial alternatives for all aspects of the remedy. Soil and sediment removal depths, groundwater controls and isolation approaches were among the options considered. A final remedy was selected at the end of these evaluations and was documented in the NYSDEC RODs.

3.2 REQUIREMENTS OF THE NYSDEC RODS

The initial remedial investigation activities described in Section 2 were sufficient to characterize the nature and extent of contamination such that feasibility studies could be completed. The feasibility studies culminated in NYSDEC issuing final RODs for the Site in 2012. The RODs require specific remedial actions for media including soil, DNAPL, and river sediments to be protective of human health and the environment. The RODs also required completion of several investigation activities to help refine remedial design, and to gauge success of the remediation. Those investigation activities have largely been completed, and the remedial design is in progress; remediation as required by the ROD has not yet been initiated.

3.3 ROD SUMMARY

The following is a synopsis of the remedial components that are directly related to addressing the PCB contamination found in soil and sediment at the site as well as containment of the PCB DNAPL.

<u>OU-1</u>

- Excavation of soil greater than 10 mg/kg PCB to a maximum depth of 9 or 12 feet.
- Excavation of surface soil (0-12 inches) greater than 1 mg/kg PCB. Note however, that PCBs in surface soil will be isolated by the application of a cover system over the entire site. Therefore, only excavation of soil greater than 10 mg/kg PCB is required as stated above.
- Building 52 outfalls will be addressed.

- Bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest On-shore Area of the site and the Northwest Extension Area.
- Construction and operation of a post-remedy recovery system for PCB DNAPL.
- Installation of a site cover will be required to allow for restricted residential use of the site. Soil cover in areas not otherwise covered by the development at the site (e.g., buildings, pavement, etc.) will consist of two feet of clean soil over a demarcation layer. Note that the preliminary design currently plans to install a cover system over the entire site, including a shoreline protection system along the river.
- Implementation of institutional controls which will manage soil excavation activities and prohibit use of groundwater.

OU-2

- Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the Northwest Corner of the site and the Northwest Extension Area.
- Removal of sediment that contains PCB concentrations greater than 1 mg/kg to a maximum depth of 6 feet below the mud-line within areas of re-suspension controls (i.e., shallow water sediment in Nearshore Area, and Backwater Area).
- Nearshore dredge areas will be backfilled with clean material. Isolation capping will be provided where residual contamination remains above background concentrations. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer of which natural deposition may provide up to 12 inches where a reasonable time frame for deposition can be demonstrated.
- Subject to evaluation and further investigation, removal of sediment outside of re-suspension controls that contain PCB concentrations greater than 50 mg/kg, to a maximum depth of 6 feet below the mud-line. Note that these areas are discussed as the Deepwater Evaluation Area and Deepwater Northwest Area. Dredged areas will be backfilled based on final design requirements.

3.4 PRE-REMEDY CONDITIONS

An overview of the current conditions at Site as they relate to the remedial actions is provided below.

- Surface Conditions: The site as shown below is predominantly covered by former building slabs. The site is gated and provides no habitat for environmental receptors.

- Building 52: This building is the only remaining structure on the site. Currently, only three temporary trailers are in use for site security and to support remedial activities.
- Northwest Corner: This portion of the site is a gravel area that was subject to an Interim Cover IRM and is currently the site of the DNAPL removal IRM that periodically extracts PCB DNAPL from deep below the surface. This area also has extensive riprap located along the shoreline.

- River and Shoreline Conditions: Example photos below show the existing conditions of the shoreline with the IRM bulkhead wall in the bottom of the photo on the left and an example of the shoreline shown on the right.

3.5 POST-REMEDY CONDITIONS

Based on the requirements of the RODs for OU-1 and OU-2, the anticipated Site conditions will be as follows once remediation has been completed:

- Surface Soil: PCBs in surface soil will be isolated by the application of a cover system over the entire site. This cover system will isolate residual PCBs in soil thereby preventing contact by human and environmental receptors and allowing for restricted residential use. The cover system will include an erosion protection layer along the shoreline which will prevent potential migration and subsequent exposure to residual PCBs. Institutional controls will ensure that soil cover system is maintained.

- Subsurface Soil: PCBs in subsurface soil will be isolated by the application of the cover system described above. Residual PCBs beneath the cover system will be reduced to 10 mg/kg or less by excavating and back-filling with clean soil as follows: In the Northwest Corner and along the Northern Shoreline, soils in excess of 10 mg/kg will be excavated to 9 ft bgs and backfilled with clean soil; Outside of these areas, soils in excess of 10 mg/kg will be excavated to a maximum depth of 12 ft bgs and backfilled with clean soil. Institutional controls will ensure that future excavation of soil containing residual PCBs is properly managed.
- Groundwater: Institutional controls will prohibit use of groundwater as a potable water source.
- Shallow water sediment: Sediments beneath 15 feet or less of surface water (i.e., sediments in the Nearshore and Backwater Areas) will contain PCBs at background conditions (i.e., approximately 1 mg/kg or less). This will be accomplished by excavating sediments in these areas with PCBs greater than approximately 1 mg/kg to a depth of 6 feet and backfilling with clean material that will isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.
- Deepwater sediment: The surficial deepwater sediments will consist of native sediment or clean backfill material with PCBs near background (approximately 1 mg/kg or less). Deepwater sediments (i.e., those beneath more than 15 feet of surface water) that exceed 50 mg/kg and for which sufficient native cover is not present will be removed to a maximum depth of 6 feet and backfilled with clean material that will isolate remaining contamination. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.
- Migration controls: Migration of contaminated soil particles and DNAPL will be prevented through installation of migration controls. The shoreline will either be a steel bulkhead or a sloped shoreline with a cover system designed to prevent the migration of contaminated soil particles into the Hudson River and to resist erosion. The sheet pile wall in the vicinity of the PCB DNAPL will prevent mobilization of DNAPL and migration of PCBs in groundwater.
- Institutional controls: Institutional controls will include an environmental easement that will:
  - require the remedial party or site owner to complete and submit to NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
  - allow the use and development for restricted-residential use only (which allows for residential, commercial, and/or industrial use)
  - restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;
  - prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and
  - require compliance with a Department approved Site Management Plan.

4. Supplemental Investigation Activities

Historical investigations completed through 2011 were generally adequate to describe the nature and extent of site constituents of concern. However, as required in the RODs, two supplemental investigations were necessary to provide additional information. These investigations provided the following data requirements as discussed hereafter.

Pre-Design Investigation (PDI) – Section 4.1

- Evaluate site features that could impact design and constructability (e.g. obstructions, outfalls, former sumps, etc.);
- Pre-delineate excavation and dredge extents;
- Collect data to support the design the Northwest Extension Area bulkhead wall and select its final alignment;
- Determine the nature and extents of contamination in certain deepwater areas.

Baseline Sampling and Analysis Plan (BSAP) – Section 4.2

- Define baseline conditions at the site for comparison after remedial action;
- Provide adequate data to support detailed human and environmental risk assessments for this TSCA application.

Each investigation and its findings are provided below along with a summary of quality assurance measures applicable to these investigations.

4.1 PRE-DESIGN INVESTIGATION (PDI)

Based on historic site investigations and the remedy described in the OU-1 and OU-2 RODs, a Remedial Design Work Plan (RDWP) was completed and NYSDEC approved in accordance with the OU-1 and OU-2 RODs, 6 NYCRR Part 375, and DER-10 Technical Guidance for Site Investigation and Remediation as well as the Amended Order on Consent. The RDWP described data collection required to support the remedial design process and associated acquisition methods.

Specifically, the RDWP identified additional environmental, geotechnical, and miscellaneous (i.e. utility surveys) data required to supplement existing data to support the remedial design. The RDWP included details regarding a Pre-Design Investigation (PDI) to acquire the necessary data. PDI activities specific to PCB-related issues included:

- Evaluate site features that could impact design and constructability:
  - Potential source areas (e.g. former sumps, outfalls) were assessed and delineated for removal as required. The evaluation included five potential Building 52 outfalls and one outfall from former Building 15 which were evaluated through historical document review and field investigations. Results of the outfall investigation concluded that the majority of outfalls were within the limits of planned excavation or data collected in the vicinity of select outfalls was sufficient to be evaluated during design of the remedy.
  - Details are presented in Volume 2.

- Pre-delineate excavation and dredge extents:
  - Delineation of the extents of PCBs in onshore soils, to determine the maximum extents of required excavation of PCBs that exceed 10 mg/kg prior to implementation of the remedy.
  - Offshore pre-delineation to delineate PCBs in sediments located in the Nearshore, Backwater, and Deepwater Northwest Areas, to determine the maximum extents of required dredge of PCBs that exceed removal criteria prior to implementation of the remedy.
  - Soil and Sediment delineation methodology is provided in Section 4.1.1.
  - Results of the pre-delineation sampling program are presented in Volume 2.

- Collect data to support the design the Northwest Extension Area bulkhead wall and select its final alignment:
  - Probes were installed along the potential bulkhead and deadman alignments to determine if obstructions were present.
  - Probes were also reviewed for PCB Material which would affect the final alignment.
  - An acceptable corridor was identified and details are presented in Volume 2.

- Determine the nature and extents of contamination in a Deepwater Evaluation Area.
  - Offshore investigation to determine the nature and extents in a specific deepwater area that contained PCBs that exceed 50 mg/kg outside the Deepwater Northwest Area.
  - Evaluate the nature and extents to determine the appropriate remedial action with criteria indicated in the OU-2 ROD.
  - The results and associated evaluation are presented in Section 4.1.2 and Volume 2.

4.1.1 Pre-Delineation Methodology

Soil

The vertical and lateral extents of each area was developed using guidance for excavation verification sampling requirements described in NYSDEC DER-10 5.4(b)5ii. Samples were generally collected at a frequency of one per 30 feet of linear sidewall collected at the bottom of the sidewall and additionally, if relevant, at concentration horizons; there was also one sample per 900 square feet collected from the excavation bottom area. Based on this guidance and analytical results, the maximum excavation depth of each area was determined based on the deepest interval in which an exceedance of removal criteria was reported (e.g. in a given boring, if a sample from 6 to 8 feet was reported to exceed criteria, however the deeper sample from 8 to 10 feet did not exceed criteria, a maximum excavation depth of 8 feet would be assigned). Incomplete areas of delineation at the time of remedial construction will be completed following this approach. Waste characterization sampling has not yet been performed for soil.

Sediment

Nearshore and Backwater sediment delineation primarily followed a grid system and delineated sediment up to 8 feet below mudline throughout the entire area. The PDI sampling program employed

a sampling grid in order to fill historical data gaps. The sample spacing of approximately 80 feet on centers produces uniform data to understand the distribution of contaminants in the sediment and provides a basis for design of the remedy. Backwater areas north of the Old Marina area have not been sampled due to property access.

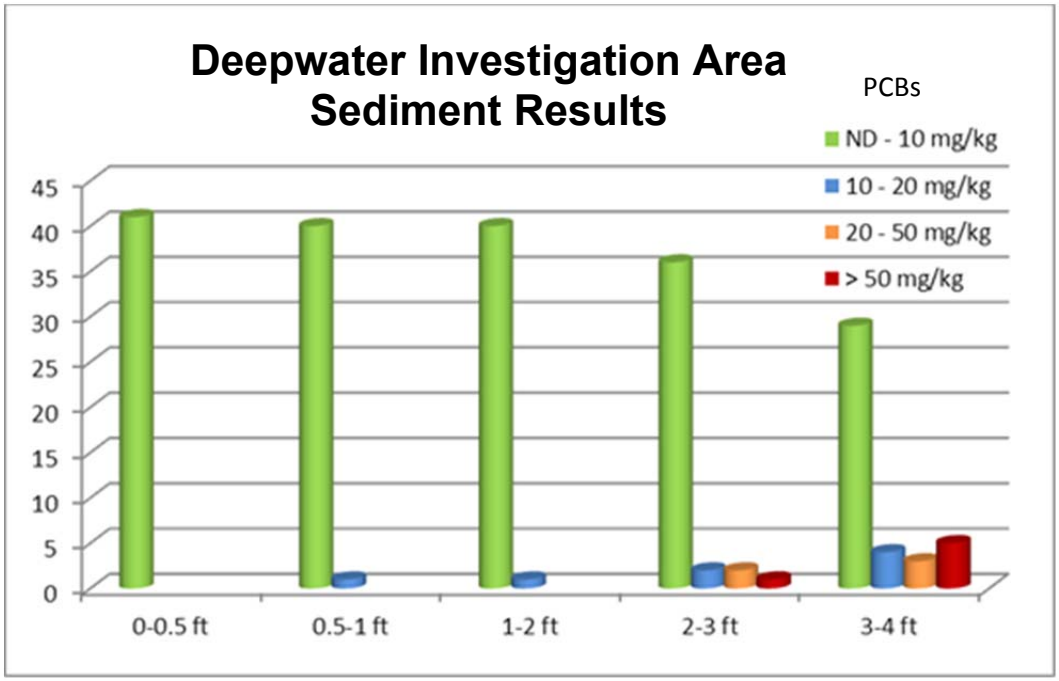
Deepwater Northwest Area near the north end of the Site, , were delineated using a 30 foot grid system. Initial PDI sample locations were established on a step-out system where three to four locations were sampled within approximately 25 feet of the historical sampling locations with concentrations greater than 50 mg/kg. Additional step-out sample locations were added throughout the program with locations selected based on results and proximity to other samples. Due to river dynamics and debris in the vicinity of the sampling, final locations varied from proposed. For the purposes of evaluation of remedial action and delineation of dredge areas, a grid system with cells measuring 30 ft by 30 ft was applied to these data.

Delineation of Soil and sediments is presented in Volume 2.

4.1.2 Deepwater Investigation in Area Outside of Northwest Area

The purpose of the PDI deepwater sediment sampling was to gather additional data where PCBs in excess of 50 mg/kg are known or suspected to be present, for making decisions regarding design of the remedy and to provide information for delineation of dredge areas. The investigation program employed a 160-foot triangulation grid for investigation areas and an 80-foot triangulation grid for delineation of extents of contamination. This grid system creates hexagonal areas referred to as Investigation Units and Decision Units, with areas of approximately 0.5 and 0.13 acres, respectively.

Variability was considered for the entire investigation area by reviewing all decision units. The histogram below provides a summary of the findings:



Variability near the surface is very low and generally increases with depth. Only a very small fraction of samples greater than 10 mg/kg PCBs in the upper 3 feet of sediment with only one results greater than 50 mg/kg PCBs. There appears to be more variability in the 3-4 ft interval but the results do not indicate a uniform layer of contamination at this depth interval in this part of OU-2.

An evaluation of the collected data is provided below to determine the appropriate remedial action and define any removal that may be required. Actions are based on the primary sample results for each decision unit unless otherwise specified to include variability sampling. The following factors for determining the appropriate remedial action are specified in the ROD and considered hereafter:

"The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs."

- *Depth of PCB contamination*

  Five of the six sample results that exceeded 50 mg/kg were isolated to within the 3-4 foot interval. The sampling results indicated PCB concentrations greater than 50 mg/kg were found in only one shallower location (VC-108 at 2 to 3 ft).

- *Type of environment (erosional or depositional)*

  The Hudson River Estuary Sediment Environment Map (NYS DEC, 2006) determined that the majority of OU-2 is within a depositional area. This report defined the area adjacent to the site as thick deposition meaning a layer of sediment accumulation greater than 50 centimeters (cm) in thickness. The limits of the dynamic areas (where both erosional and depositional events occur) and depositional areas (sediment accumulation greater than 50 cm thick) with respect to deepwater sediment sampling locations are shown on PDI Figure 4.3A (Appendix B).

- *Contiguous areas of contamination*

  Areas of PCB results greater than 50 mg/kg are isolated except for the 3-4 ft interval. There are two separate areas where there are adjoining decision units greater than 50 mg/kg. The first location is VC-130 & VC-139 where concentrations are 1,090 and 857 mg/kg PCBs, respectively. The second location is VC-103 & VC-123 where concentrations are 70.6 and 108 mg/kg PCBs, respectively. Variability sampling location VC-103C lies between VC-103 and VC-123 and was < 1 mg/kg PCBs at the 3-4 ft interval, indicating the lack of a uniform layer of contamination at this depth interval in this part of OU-2. Approximately 425 ft south to north, separate VC-130 and VC-103. Each of these two areas (VC-130/139 and VC 103/123) accounts for approximately 0.25 acres.

- *Thickness of clean sediment above the PCB contamination*

  All 6 decision units with PCB contamination greater than 50 mg/kg have a minimum of 2 feet of sediment cover that is less than 50 mg/kg and are located within a depositional area. Specifically, cover sediment sample results between the surface and 2 ft were less than 1.7 mg/kg PCBs. Results are summarized below:

	Depth Intervals (feet)					
Sample Locations Results in mg/kg	0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6
VC-103	0.75	0.80	1.7	1.3	71	9.9
VC-108	0.15	0.19	0.40	490	11	-
VC-110	0.21	0.27	0.36	0.57	110	9.0
VC-123	0.32	0.16	0.45	2.3	380	ND
VC-130	0.80	0.25	0.36	0.97	1,100	32
VC-139	0.17	0.20	0.33	1.5	860	0.11

- *Duration of dredging and associated potential for migration of re-suspended sediments*

  These Decision Units are located in water depths of 30-35 feet and as indicated in the Revised Feasibility Study 2011, *"Effective turbidity control in deepwater is not feasible and dredging without turbidity control will result in mobilizing contaminated sediments to extensive areas located downstream. While the intent of dredging is to remove contaminated sediments from the Deepwater Area, the long-term impact of the suspended sediment migration poses a more significant threat than the in-situ sediments because the resulting areas impacted would far exceed the existing extents of Deepwater Area contaminated sediments. This increase of areal distribution would result in increased short- and long-term impacts to biota from ingestion/direct contact with sediments, [potentially] causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain."* The ROD acknowledged that *"dredging without turbidity control … could mobilize contaminated sediment to other areas"* The ROD acknowledged that "dredging without turbidity control … could mobilize contaminated sediment to other areas" and therefore potential for migration of re-suspended sediments remains an important factor in determining the remedial action that is most protective of human health and the environment.

- *Area weighted surface concentrations of PCBs*

  Area weighted surface concentrations were calculated over the entire investigation area with all sediment samples being equally weighted since each sample characterizes a decision unit and decision units are of equal area.

  Surface samples (0-0.5 ft) are near background conditions with an Area Weighted Average (AWA) concentration of 0.44 mg/kg PCBs. Additionally, PDI Figure 3.6I (Appendix B) provides results for all historical surface samples throughout the Deepwater Area for review and consideration.

  Samples in the upper sediments (0.5 - 2 ft) AWA concentrations of 0.98 mg/kg PCBs for the 0.5-1 ft interval and 1.34 mg/kg PCBs for the 1-2 ft interval. Additionally, it can be noted that average PCB concentrations in sediments for the 2-3 ft interval are significantly less than 50 mg/kg regardless of whether VC-108 is included in the average.

In addition to those factors evaluated above, consideration should also be given to the Baseline Habitat Assessment, the Human Health Risk Assessment and the Ecological Risk Assessment. These assessments provide additional lines of evidence in evaluating the appropriate remedial action for these sediments.

- *Baseline Habitat Assessment*

  The Benthic Habitat Condition Survey at Hastings on Hudson provided information on both shallow and deepwater sediments. This survey included multiple stations specifically in deeper

water areas to assess if there were negative impacts expressed by the biota in these areas. The evaluation used both state-of-the-art and traditional methods to assess the habitat. The resulting report concluded that "neither the SPI [Sediment Profiling Imagery] nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site."

- *Human Health Risk Assessment*

  As presented in Volume 3: Collectively, the results of the HHRA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are unacceptable when compared to ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Deepwater Northwest Areas that exceed background conditions.

- *Ecological Risk Assessment*

  As presented in Volume 4; collectively, the results of the BERA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are appreciably different than ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Deepwater Northwest Areas that exceed background conditions.

<u>Conclusion</u>

The basis for selection of the Remedy in the OU-2 ROD states that "The majority of targeted PCB dredging areas identified in the deepwater are within the top two feet. Therefore, the targeted dredging will remove sediments which have the highest levels of PCBs and the greatest potential to migrate and be an ongoing source to the environment." Additional discussion about the remediation of deepwater sediments is found in Response 62 of the OU-2 ROD.

Based on the guidance above and an evaluation of the six factors discuss previously, dredging in this specific area is not consistent with the basis for remedy selection, and may pose a greater risk to the environment than leaving the limited number of isolated sediments in place. Therefore removal is not recommended as the remedial action for the portion of the Deepwater Northwest Area. This conclusion is further supported by the various assessments that have been conducted at the Site.

The following evaluation factors specifically support this conclusion:

1. Sediments greater than 50 mg/kg PCBs are at least 2-3 feet below the sediment surface and are well below the bioturbation layer.
2. All of these Decision Units are located in a thick deposition zone and have already been buried by natural deposition.
3. Impacted sediments are found only in small isolated areas that are well below the surface.
4. There is at least 2-3 feet of cover less than 50 mg/kg PCBs at all of these locations with most samples below 2 mg/kg PCBs.
5. Potential for migration of re-suspended sediments poses a threat to the environment that currently does not exist as buried impacted sediments would be sequestered in perpetuity.
6. Area-weighted surface concentrations of PCBs are at or near 1 mg/kg for the upper two feet of the investigation area.

Additionally, these assessments support this conclusion:

A. The habitat assessment does not show any adverse effect based on the existing conditions.
B. Human Health Risk assessments are within acceptable criteria based on the existing conditions.
C. Ecological Risk assessments are within acceptable criteria based on the existing conditions.

4.2 BASELINE SAMPLING

A Baseline Sampling and Analysis Plan (BSAP) and related Baseline work plans were approved by NYSDEC and implementation began in 2013. The overarching goal of the Baseline Sampling and Analysis Plan is to provide a benchmark against which post-construction performance monitoring can be compared in order to determine if there is a post-remedy decrease in PCBs and metals (copper, lead and zinc) in sediment, biota, surface water and porewater. The BSAP also provides data necessary to evaluate human health and ecological risks, as described in Sections 5 and 6. The BSAP was prepared in accordance with DER-10, applicable USEPA guidance and the Record of Decision (NYSDEC, 2012) for OU-2 which requires data to support a Site Management Plan.

Reference sampling was included in the baseline sampling in recognition that the Hudson River sediments contain background levels of PCBs, and that the site is located downriver from the Upper Hudson River PCB Superfund Site, which extends from Hudson Falls to the Federal Dam in Troy. The BSAP sampling included locations up-river and down-river from OU-2 to help identify anthropogenic sources of PCBs that are unrelated to the Site. To help evaluate if conditions within OU-2 may differ from locations outside of OU-2, surface water, sediment, and biota were sampled from locations adjacent to the Site, one to two miles up-river of the Site (reference area), and one-half mile down-river of the Site.

Specifically, the BSAP included evaluation of bathymetry, surface water, surficial sediment, fish and shellfish, benthic macroinvertebrates, habitat characterization, porewater, and air. In addition to the BSAP, groundwater was also evaluated from upland locations. These investigations provided the following data requirements:

- Define baseline conditions at the site for comparison after remedial action
- Provide adequate data to support detailed human and environmental risk assessments for this TSCA application.
- Details for each of the following components of baseline sampling are presented in Volume 2.

4.2.1 Baseline Sampling Components

- *Bathymetry*

  The bathymetry survey was completed by Ocean Surveys Inc. who conducted a high resolution multi-beam hydrographic survey to document depths, bottom features and mudline elevation as well as laser scanning to document shoreline features.

- *Surface Water*

  There were a total of ten monthly surface water sampling events: two in 2013, seven in 2014 and one in 2015. PCBs were generally not detected in surface water samples; sporadic detections in three of ten sampling events were at concentrations between 0.010 and 0.025

µg/L and were generally also detected in upriver samples. None of these events suggest an on-going site specific contribution of PCBs to surface water. Note that the current feasible laboratory detection limit is much greater than the New York State Ambient Water Quality Standard of 0.000001 µg/L.

- *Surficial Sediment*

  There was no apparent upstream/downstream trend in PCBs in surficial sediment. All but one sample was generally at or below 1 mg/kg with twelve of sixteen samples below 0.5 mg/kg total PCBs. Additional surficial sediment sampling was completed during the PDI and a summary of the sediment sampling and associated results can be found in the PDI Data Summary Report (Haley & Aldrich, 2015).

- *Fish and Shellfish*

  Fish and shellfish were collected during sampling events in 2013 and 2014 and PCBs were analyzed in whole body and fillet tissue. The data clearly show that levels in fish caught North, Adjacent to and South of OU-2 are below historical levels. Although some species such as American eel and white perch appear to have more elevated tissue concentrations adjacent to the Site than those caught in the north segment, the relative levels have significantly improved when compared to values recorded in the NYSDEC fish tissue database.

- *Benthic Macroinvertebrates*

  Benthic Macroinvertebrates were obtained for evaluation of abundance and diversity from sediment samples at 16 locations deemed as optimal based on real-time images from the Sediment Profiling Imagery (SPI) process completed during the habitat characterization (below). Both the Site and the Reference stations were very similar and dominated by pollution tolerant organisms (amphipods, small mollusks and worms). None of the organisms identified in their study could be classified as 'sensitive' to pollution and no 'rare, threatened or endangered' species were present. There are no apparent differences between the Site and reference stations.

- *Habitat Characterization*

  Habitat characterization utilized the Sediment Profile Imaging (SPI) imagery which provided direct visual information at over 200 locations about sediment grain size, demarcation between oxic and anoxic sediments (e.g. the apparent 'redox potential discontinuity'), types of organisms, presence of debris, and presence of methane gas bubbles. The study concluded that "neither the SPI nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site."

- *Porewater*

  Porewater samples were collected by collecting sediment samples at seven locations and sending them to the laboratory for centrifugation to extract porewater. Only one of six Site porewater samples was positive for PCBs at a reporting limit of less than 0.010 µg/L and the types of Aroclors observed in that sample (1248 and 1254) are not strong indicators of site-related PCBs. These results appear to indicate that PCBs are strongly bound to the sediment and have little propensity to partition into porewater.

- *Groundwater*

  Baseline groundwater sampling was completed at upland locations to monitor shallow groundwater prior to remedial construction from three upgradient wells and three Site wells using low flow sampling techniques. The first yearly groundwater sampling was conducted in 2014. Results from two downgradient and one of the presumed upgradient wells indicated concentrations of PCBs that exceeded the New York State Ambient Water Quality Standard for drinking water of 0.09 µg/L. Baseline groundwater sampling will continue annually until the beginning of construction.

- *Air*

  Baseline air monitoring was implemented to determine baseline concentrations of PCBs in ambient air prior to commencement of remedial construction activities. The baseline air monitoring program was conducted from 18 June 2015 through 18 August 2015, in accordance with the approved Baseline Air Monitoring Plan. All samples were non-detect and reporting limits were below comparison concentration of 0.11 µg/m3.

4.3 QUALITY ASSURANCE

Laboratory methods to analyze environmental media for PCBs included:

- Soil/Sediment: EPA 3545A (pressurized fluid extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP)
- Biota: EPA 3540C (soxhlet extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP) NE331_01-rev.01 (tissue Preparation)
- Surface water, Pore water, & Groundwater: EPA 3535A (solid phase extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP)

QA/QC samples were collected at a rate of 1 field duplicate per 10 samples and 1 MS/MSD per 20 samples for each media. All field and laboratory procedures were completed in accordance with the approved Quality Assurance Project Plan (QAPP). Analytical data used for delineation was collected using Standard Operating Procedures and Quality Assurance Procedures that included the following:

- Holding Time and Sample Preservation Compliance
- GC/MS Instrument Performance Check (where applicable)
- Initial Calibration and Continuing Calibration Procedures
- Field/Method/Preparation Blank Sample Analysis
- System Monitoring Compound Recoveries (where applicable)

- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Internal Standard Recoveries (where applicable)
- Field Duplicate Sample Analysis
- ICP Interference Check Sample Performance (where applicable)
- ICP Serial Dilution Replicate Percent Difference (where applicable)

Data validation was subcontracted to a third party (Environmental Standards, Inc.). Based on Data Usability Reports (DURs) provided to date, data validation has resulted in only minor changes in results or flags. Final remedial design will be based upon validated data. The analytical data that supports the risk assessment and delineation was determined to be useable for those purposes.

Further description of the procedures used for data validation and evaluation is presented in Volume 2.

5. Human Health Risk Assessment

The overall objective of the Human Health Risk Assessment (HHRA) is to determine whether the remedial action requirements of the ROD will be protective of human health. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place under the conditions summarized in Section 4 and described in detail in Volume 2, will not pose unacceptable risks to human health.

The HHRA was completed following standard USEPA guidelines, and evaluated risks under future land use conditions which consider re-development of the Site as restricted residential or commercial use property *after* remediation has been completed. The HHRA evaluates risks under post-remedial conditions because the remedial actions stipulated in the ROD issued by NYSDEC will be performed independent of the results of the HHRA; i.e., even if the results of the risk assessment were to indicate that remedial actions are not required to maintain acceptable risks, remedial actions will still be performed. The exception to this concerns characterization of potential exposures and risks for fish ingestion associated with recreational angling. For that exposure pathway, fish tissue PCB concentrations representative of the *current* conditions are used to estimate risks. Risks based on current conditions provide a conservative assessment of possible future risks because they do not reflect the planned remediation of sediment, which will reduce PCB concentrations in the food chain.

Conceptually, the HHRA uses information concerning land uses at the Site and activities associated with those land uses, to define *who* may use or access the Site and for what purposes. That information, combined with the location of PCB-containing media, provides information on *where* and *how* potential exposures to PCBs could occur, as well as *how much* exposures to PCBs could occur. The *who*, *how*, and *where* of this analysis are collectively referred to as an exposure pathway. The quantification of *how much* exposure can occur is used with toxicity values to estimate potential health risks. Exposure pathways are only complete if all elements are present: there must be PCBs present at a location where human contact can occur in order for an exposure pathway to be complete. When any one of these elements is not present, the exposure pathway is incomplete and therefore poses no unacceptable health risks. At this Site, the remediation that will be performed pursuant to the requirements of the ROD render several exposure pathways incomplete. Specifically:

- Direct contact (dermal contact and incidental ingestion) and inhalation of dust from soil will not be a complete exposure pathway under future conditions because residual PCBs in soil will be covered and excavation into soil containing residual PCBs will be subject to a Site Management Plan.

- Direct contact with groundwater will not occur because groundwater beneath the Site is not used as a source of potable water. Groundwater will not be used as a source of potable water in the future because public drinking water is supplied to the Site and surrounding area, and institutional controls will prohibit the installation of potable wells. Excavation activities beneath the soil cover system will be subject to a Site Management Plan.

- Inhalation of vapors from soil or groundwater will not be a complete exposure pathway because PCBs are not associated with enough volatility to pose a potential vapor concern and airborne distribution of soil particulates containing PCBs will be precluded due to the soil cover system.

- Direct contact with surface water will not be a complete exposure pathway under future conditions because PCBs were detected infrequently in surface water, and at maximum concentrations less than the federal drinking water standard of 0.0005 mg/L. Therefore, any potential exposure pathways to PCBs in surface water would be less than levels considered safe for drinking water. In addition, remediation of soil and construction of the migration barrier will ensure that soil, non-aqueous phase liquids (NAPL), and groundwater will not become sources to surface water in the future.

- Direct human contact with sediment is an incomplete or insignificant pathway; direct human contact for kayakers or those wading in shallow waters near the site is incomplete due the fact that surface sediments are generally at background conditions or access is restricted. Under future conditions, surface sediment that is beneath 15 feet or less of surface water (i.e., shallow water sediment) will be remediated such that PCBs will be near background, and sediment that is beneath more than 15 feet of water (i.e., deepwater sediment) cannot be contacted due to the depth of the water. PCB concentrations associated with background (less than 1 mg/kg) are considered by USEPA to be associated with no unacceptable risks for direct contact under unrestricted use conditions.

Although no recreational or commercial fishing is known to occur at the Site, recreational angling occurs throughout the lower Hudson River. Exposures to PCBs can occur if people catch and eat fish which have accumulated PCBs in their edible tissues. The remediation that will be performed (as described in Section 4) essentially renders all exposure pathways incomplete, except for fish ingestion. Therefore, the HHRA focused on quantifying potential exposures and risks associated with consumption of fish during recreational angling.

The primary mechanism for uptake of PCBs from environmental media into fish is ingestion of benthic invertebrates or aquatic vegetation that has accumulated PCBs via partitioning from sediment to porewater. Direct absorption of PCBs from surface water may also contribute to PCB body burdens in fish. However, the following lines of evidence suggest that these pathways may not be significant at OU-2:

- PCB concentrations in the bioactive zone (i.e., surficial sediment in the top six inches) across the majority of OU-2 are consistent with up-river ambient concentrations (approximately 1 mg/kg or less, as documented in Volume 2), indicating that there is no significant source of PCBs within the sediment horizon inhabited by benthic invertebrates. The exception to this is in the Northwest Corner Off-Shore Area, where a portion of surficial sediment contains PCBs at concentrations in excess of ambient background.

- PCB concentrations in pore water samples were non-detect in all but one sample, and that sample did not correlate with areas of the highest sediment PCB concentrations.

- There is no aquatic vegetation in the vicinity of OU-2.

- PCBs were generally not detected in surface water samples; sporadic detections in three of ten sampling events were at concentrations between 0.010 and 0.025 µg/L and were generally also detected in upriver samples. None of these events suggest an on-going site specific contribution of PCBs to surface water.

- PCB concentrations in biota collected at OU-2 were generally similar to the reference location with some exceptions; OU-2 samples were statistically significantly greater than the reference location only for American eel (whole body and fillet), white perch (whole body only), and blue crab (Hepatopancreas only). However, no spatial correlation between tissue body burden and sediment concentration could be identified.

Potential human exposures to PCBs associated with recreational angling were quantified by calculating intakes for hypothetical recreational anglers and crabbers who consume fish (finfish and eels) and shellfish (blue crab) caught from OU-2. Potential fish ingestion intakes are influenced by:

- the types of fish that people catch and eat, in the vicinity of the Site;
- the amount of fish that people eat, that are caught in the vicinity of Site;
- fish trimming and cooking methods; and
- the PCB concentrations in fish near the Site

Surveys conducted by NYSDEC, which identified characteristics of recreational anglers, were used to identify the types of fish that recreational anglers harvest (i.e., catch and keep) from the lower Hudson River. That information, combined with the Baseline Sampling and Analysis Plan (BSAP) investigation results, indicated that white perch, American eel, and blue crab are the only species that:

- lower Hudson River anglers are known to harvest;
- occur at the Site at sufficient enough population to allow for angling with a reasonable level of effort; and
- potentially exhibit a Site-related uptake of PCBs due to their home range.

Other species such as striped bass and blue fish, which anglers on the lower Hudson River are known to target, are transient and any PCB body burdens carried by those species would not be indicative of potential uptake from OU-2, but rather a multitude of sources within the Hudson River. The absence of aquatic vegetation near OU-2 limits the species habitat. Therefore, other species that are harvested by lower Hudson River anglers and that could potentially exhibit a localized uptake of PCBs, such as catfish and blue gill, are infrequently present at OU-2. While not documented as a targeted species for anglers, Oyster Toadfish is potentially harvested for consumption. However, since fillet PCB concentrations in Oyster Toadfish were primarily non-detect, potential consumption of that species would not result in a health risk of concern.

Risks associated with ingestion of fish and crabs caught recreationally were calculated assuming that an adult who engages in these activities brings home fish or crabs to share with children and adolescents who live in the household. Fish and shellfish ingestion rates were derived from Site-specific information which included the typical size of white perch, American eel, and blue crab harvested from the lower Hudson River, angling effort (number of fish harvested per fishing trip) as reported in the NYSDEC angling surveys, and a range of recreational angling trips per year. The calculated adult ingestion rates range from 1.6 g/day to 6.9 g/day of white perch and American eel, and 0.9 g/day to 1.8 g/day of blue crab. The fish ingestion rate estimates are generally consistent with the average recreational angling fish ingestion rate derived from a survey of New York State anglers of 4 g/day.

To provide a range of risk estimates for this HHRA, each of the exposure scenarios were evaluated for three different fish ingestion rates (a reasonable maximum exposure (RME) of 4 g/day, a central

tendency exposure (CTE) of 1.6 g/day, and an upper-bound exposure of 31.9 g/day) and three different blue crab ingestion rates (an RME of 1 g/day, a CTE of 0.9 g/day, and an upper-bound of 1.8 g/day). These adult ingestion rates were scaled for application to young children and adolescents based on their smaller body weights.

The upper-bound fish ingestion rate was based on the 90th percentile ingestion rate from the 1991 New York State anglers survey and is based on total consumption of all recreationally caught fish. This fish ingestion rate is applied in this HHRA solely for use as a bounding estimate, in that - for several reasons - it is not plausible that any angler would derive 100% of his or her fish diet from OU-2. First, given the limited species present at the Site, anglers would not exclusively fish at the Site. Therefore, it is most realistic to adjust the ingestion rate by the percentage of fish diet derived from OU-2. Second, the habitat at OU-2 does not sustain fish species that would be of a size or variety that reflect the number of recreationally-caught fish meals per year on which the upper-bound ingestion rate is based. Even at the RME ingestion rate, the fish population at OU-2 could not reasonably provide enough meals for the adult angler *plus* members of their family. Furthermore, there are no known Native American or ethnic populations in the vicinity of the Site that would use the area around OU-2 for subsistence fishing, and the demographics of Hastings-On-Hudson, combined with the availability of much better shoreline fishing spots within a few miles of the Site, suggest that fishing with the primary objective of providing food is very unlikely at OU-2. Use of the upper-bound ingestion rate is useful only as a bounding estimate and to provide a baseline from which the results of this HHRA could be compared to other HHRA's which used upper-bound estimates of fish consumption.

Consistent with USEPA guidance, PCB concentrations in fish tissue that could be consumed by recreational anglers (i.e., the PCB exposure point concentrations [EPCs]) were calculated using 95% upper confidence limit (UCL) concentrations of total PCBs measured in fish tissue during sampling completed during the BSAP. The fish tissue EPCs, therefore, reflects the current pre-remedial conditions at OU-2. Cooking and trimming loss during food preparation was also considered for PCBs. The EPCs were then used with the fish ingestion rates and toxicity values for PCBs published by USEPA to derive estimates of excess lifetime cancer risk (cancer risk) and hazard index (HI). The significance of cancer risk and HI values was evaluated using risk management criteria published in the National Contingency Plan (NCP), which indicate that cancer risks in excess of 10^{-4} or an HI value of 1 generally require a response action, while cancer risks less than 10^{-6} or an HI value of 1 do not require response actions, and risks within the range of 10^{-6} to 10^{-4} may require a response action on a case-by-case basis.

Incremental risk in excess of reference conditions is critical for risk management decision making because, in accordance with USEPA guidance, response actions are generally not required to address risks that are associated with ambient background conditions (i.e., cleanup of a site does not need to result in post-remedial conditions with constituent concentrations lower than ambient background levels). This is particularly the case when total site risks are contributed by constituents which are not related to releases at the site. At OU-2, surficial sediment PCB concentrations across most of the area are presently similar to upriver sediment PCB concentrations, and PCB concentrations in edible fish tissue for all species other than American eel are essentially equal between those harvested adjacent to the Site and those harvested in the North Area (up-river). This indicates that it is important to differentiate between risks that could be associated with OU-2 from those associated with background (up-river) conditions in the river.

The results of the HHRA indicate that cancer risks for all recreational fishing and crabbing scenarios, i.e. the three different fish ingestion rates, were within the range of 10^{-6} to 10^{-4}. HI values for the RME recreational fishing scenario were greater than unity (1) for fish harvested both adjacent to the Site and up-river, while the incremental HI value was 0.5 (i.e., calculated as the site HI minus the background HI). Similarly, HI values for the upper-bound exposure recreational fishing scenario were greater than unity for fish harvested both adjacent to the Site and up-river, while the incremental HI value was equal to unity. The HI values for the recreational fishing central tendency exposure scenario did not exceed unity, and the HI values for the recreational crabbing scenarios (all ingestion rates) were generally all less than unity. The difference in risks between OU-2 and the reference area is not indicative of unacceptable health risk, as cancer risks are within the range of 10^{-6} to 10^{-4} and HI values do not exceed unity.

Collectively, the results of the HHRA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are unacceptable when compared to ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Northwest Corner Off-Shore Areas that are in excess of background conditions. The use of measured fish tissue concentrations that reflect these existing conditions, to estimate long-term risks, is very conservative because the remediation described in Section 4 will remove sources of PCBs in sediments and eliminate transport of PCBs from upland areas to river sediments. These actions will materially improve sediment quality from the pre-remediation conditions, ultimately resulting in surficial sediment concentrations that are; on average, consistent with up-river background conditions (i.e., averaging 1 mg/kg or less). As a result, post-remedy fish and crab tissue PCB concentrations will decline for any species that are local to the Site, and risks associated with consumption of such fish in the future will be lower than those estimated in the HHRA.

In conclusion, the results of the HHRA support the conclusions of the NYSDEC ROD, which indicate that implementation of the remedies described in Section 4 will be protective of human health.

Volume 3 of this application provides the HHRA.

6. Ecological Risk Assessment

The overall objective of the Baseline Ecological Risk Assessment (BERA) is to determine whether the remedial action requirements of the ROD will be protective of the environment. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place at the remediation levels specified in the ROD will not pose unacceptable risks to the environment.

The BERA was completed following standard USEPA guidelines, and evaluated risks under existing land use conditions which *do not* consider remediation of sediments in OU-2 as stipulated in the ROD. Although the BERA considered all data obtained from all media sampled in OU-2 during the BSAP conducted in 2013 and 2014, the assessment principally relied on analysis of PCBs in fish targeted for that baseline study.

There is no terrestrial habitat at the Site and the post-remedial conditions will include installation of a clean cover system over the entire Site, thereby preventing any direct exposure to or migration of residual PCBs in soil. Consequently, are no complete exposure pathways to PCBs in the upland environment under current and post-remedial conditions. Therefore, the BERA focused on the aquatic habitat within OU-2. The BERA evaluated the following populations of environmental receptors:

- Benthic invertebrates which could be exposed to PCBs in sediment via interstitial porewater;
- Fish, which could be exposed to PCBs via uptake from surface water and prey (e.g., benthic invertebrates or aquatic vegetation);
- Mammals, which could be exposed to PCBs via consumption of fish that have accumulated them via surface water and prey;
- Birds, which could be exposed to PCBs via consumption of fish that have accumulated them via surface water and prey.

Benthic invertebrates were evaluated using a two-pronged approach to assess habitat and the benthic community by conducting a comprehensive Sediment Profile Imagery (SPI) study (~220 locations imaged) that was augmented by traditional benthic grabs which obtained taxonomic information that is not possible to obtain using the SPI alone. These studies concluded that there is no real difference between the Site and reference stations in benthic community structure, thereby indicating that OU-2 does not pose an ecological risk of significance to benthic invertebrates. These conclusions are conceptually supported by the general lack of PCB detections in porewater, and surficial sediment PCB concentrations across most of OU-2 that are similar to upriver sediment PCB concentrations.

Risks to fish (based on PCB concentrations in fish tissue) were evaluated and determined to have hazard quotients of less than unity (1). The lack of aquatic vegetation adjacent to the Site places constraints on the habitat; herbivorous birds and mammals and species that require habitats with aquatic vegetation are not present at OU-2 and if habitat were to change in the future, the remedy would have addressed any PCB exposures. Therefore, the BERA focused on characterizing potential risks to fish-eating wildlife (piscivorous birds and mammals); these species would not be expected to inhabit OU-2, but rather use the aquatic environment at OU-2 as a foraging area.

Mammal and bird evaluation focused on representative species. The BERA evaluated three piscivorous birds (Great blue heron, bald eagle, and double-crested cormorant) and one piscivorous mammal (river

otter). Risks were quantified by using the 95% UCL concentrations of total PCBs in whole body fish tissue with parameters that describe the ingestion rates and body weights of the indicator species to derive total PCB intakes. The intakes were then used with toxicity values that describe the PCB dose that would preclude lack of survivability, decrease in growth or impairment of reproduction. Overall, the parameters used to model exposures and the toxicity values were consistent with those used in the Revised Upper Hudson River BERA.

The results of the BERA indicate that hazard quotients for the river otter, Great Blue heron, double-crested cormorant and bald eagle are well less than unity for realistic exposure assumptions modelled in the BERA. These results indicate that ecological risks meet the USEPA acceptable risk benchmarks under the existing (pre-remedial) Site conditions.

Collectively, the results of the BERA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are appreciably different than ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Deepwater Northwest Areas that are in excess of background conditions. The use of benthic invertebrate metrics and measured fish tissue concentrations that reflect these existing conditions, to estimate future risks, is very conservative because the remediation described in Section 4 will remove sources of PCBs in sediments and eliminate any transport of PCBs from upland areas to river sediments. These actions will materially improve sediment quality from the pre-remediation conditions, ultimately resulting in surficial sediment concentrations that are, on average, consistent with up-river background conditions (i.e., averaging 1 mg/kg or less). Moreover, habitat substrate that will be created in the near shore areas will be constructed over sediments that have been remediated and backfilled with clean substrate, indicating that exposure pathways to PCBs in nearshore sediments will be incomplete. As a result, post-remedy PCB concentrations in biota will decline for any species that are local to the Site, and risks associated with food chain exposures in the future will be lower than those estimated in the BERA.

In conclusion, the results of the BERA support the conclusions of the NYSDEC ROD, which indicate that implementation of the remedies described in Section 4 will be protective of the environment.

Volume 4 of this application provides the BERA.

7. Post-Remedial Conditions

The results of the PDI were used to develop excavation and dredging limits to comply with the remedial requirements in the RODs. The PDI and historical RI data that are representative of areas outside of the remedial boundaries define the residual (post-remediation) PCB concentrations that will remain following remediation. The results of the BSAP, in conjunction with the residual (post-remediation) conditions, were used to support the human health and ecological risk assessments.

7.1 SOIL

Remedial action in the form of soil excavation and off-site disposal will be performed in areas with complete delineation as shown on Figure 3 which also presents residual PCB concentrations in soil following remediation.

Additional pre-delineation sampling may be completed in select areas after structures are moved (e.g., site job trailers), demolished (e.g., Building 52), or upgraded (e.g., sanitary force main). The design will specify requirements for confirmation or documentation sampling during remediation of areas without complete pre-delineation. Documentation sampling for removal adjacent to property boundaries will be completed during construction where results in close proximity to property boundaries are not available.

7.2 SEDIMENT

Remedial action in the form of sediment removal and off-site disposal will be performed in areas as follows:

- Nearshore shallow water sediments, including the North Boat Slip and potentially the Old Marina, will be removed as shown on Figure 4. Sediment in the areas shown will be removed up to six feet bml. Figure 4 also presents residual PCB concentrations that will exist in sediment following remediation. Within the shallow water sediment areas, residual PCBs will be approximately 1 mg/kg or less in sediment. Removal areas will be backfilled with clean material.

  Removal is still under evaluation in the Old Marina area. Concentrations of PCBs in the Old Marina are generally less than or near background in the sediments at and near the surface. Samples in deeper sediments, between three and six feet below mud line, have PCB concentrations near 4 mg/kg. Further evaluation and potential additional sampling may be warranted in this area. Therefore, determination of remedial action is deferred to Preliminary Design. Factors for further evaluation include presence of depositional sediments with concentrations less than or near background throughout the near-surface sediments, potential collection of additional data north and/or west of the PDI data, and sediments in the proximity to VC-501 near the potential Building 52 outfall.

  Within the nearshore and backwater areas, average residual PCB concentrations are summarized in the following table.

Average PCB concentrations (mg/kg)

	Nearshore		North Boat Slip		Old Marina	
Depth	*Existing*	*Residual*	*Existing*	*Residual*	*Existing*	*Residual*
0 - 0.5 (ft)	1.4	< 1	0.6	< 1	0.6	< 1
0.5 - 1 (ft)	6.8	< 1	0.7	< 1	0.9	< 1
1 - 2 (ft)	8.8	< 1	1.0	< 1	1.2	TBD
2 - 3 (ft)	2.6	< 1	1.0	< 1	2.0	TBD
3 - 4 (ft)	3.0	< 1	1.9	< 1	3.2	TBD
4 - 5 (ft)	7.6	< 1	2.6	< 1	5.7	TBD
5 - 6 (ft)	2.8	< 1	8.6	< 1	13.8	TBD
6 - 8 (ft)	2.2	2.2	4.8	4.8	5.9	5.9
0 - 3 (ft)	*4.4*	*<1*	*0.8*	*< 1*	*1.2*	*TBD*

- Within the Deepwater Northwest Area, where PCBs are greater than 50 mg/kg within the top 2 feet bml, removal will occur to a depth of up to 6 feet bml. Additionally, for cells that do not provide a minimum of three feet of cover, removal of sediments is recommended up to a depth where results are no longer greater than 50 mg/kg or up to a maximum depth of 6 feet; noting that backfill provides at least three feet of cover. Sediment removal areas are shown on PDI Figure 4.4A (Appendix B). Figure 4 and Figure 5 present residual PCB concentrations that will exist in sediment following remediation.

  Within the Deepwater Northwest Area, average residual PCB concentrations by depth interval are summarized in the following table. Although not an area weighted computation, this provides a reasonable approximation of residual concentrations.

Average PCB concentrations (mg/kg)

Depth	Samples	Existing	Residual [(a)]
0 - 0.5 (ft)	64	7.9	2.7
0.5 - 1 (ft)	65	52	1.4
1 - 2 (ft)	66	49	2.9
2 - 3 (ft)	62	110	3.8
3 - 4 (ft)	50	310	19
4 - 5 (ft)	40	240	70
5 - 6 (ft)	32	870	800
6 - 8 (ft)	14	580	580
0 - 3 (ft)	*~ 64*	*64*	*2.9*

(a) Concentration based on removal of sediment as defined above.

It should be noted that the Deepwater Northwest Area is not yet fully delineated. Additional sampling areas are recommended to resolve data gaps including sampling near RB-19, VC-344, and VC-336. Remedial actions will be extended to these areas, as appropriate, based on the approach used for the Deepwater Northwest Area.

7.3 MIGRATION CONTROLS

The BSAP sampling has demonstrated that, although PCB concentrations in groundwater at two monitoring wells exceed drinking water standards (maximum groundwater concentration of 0.98 µg/L compared to an EPA drinking water standard of 0.5 µg/L), PCB detections in pore water and surface water are infrequent and well below drinking water standards. The information supports a conclusion that migration of PCBs from soil or DNAPL to groundwater and subsequent discharge to surface water is not detectable, and, furthermore, that partitioning of PCBs from sediment to pore water and subsequent dissolved phase migration to surface water is insignificant. The HHRA and BERA indicate that potential exposures to pore water and surface water are associated with insignificant risks. Use of groundwater will be prohibited by an institutional control, indicating that there are no unacceptable risks associated with groundwater.

Potential migration of residual on-shore PCBs to the river will be mitigated through construction of bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest On-Shore Area of the site and the Northwest Extension Area. In addition, a recovery system for PCB DNAPL will be operated. Finally, remediated areas along the shoreline will be covered with a protective stone armoring to prevent potential erosion of clean cover soil.

8. Resulting Basis for Risk-Based Disposal Application

The NYSDEC RODs conclude that the remedies stipulated are protective of human health and the environment, comply with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and use permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable, to satisfy the preference for remedies that reduce toxicity, mobility, or volume as a principal element. The New York State Department of Health (NYSDOH) concurs that the remedy for the Site is protective of human health.

Based on the analysis provided in this RBDA, it is concluded that the proposed remedy for the Site, as stipulated in the NYSDEC RODs and further refined with recent data, is protective of human health and the environment because:

- Residual PCBs in soil will be at 10 mg/kg or less in soils shallower than 9 to 12 ft bgs, and a soil cover system and institutional controls will prevent any uncontrolled exposure to soil.

- The proposed remedy for the Site will reduce PCB concentrations in the near shore sediments to 1 mg/kg or less. The proposed remedy will reduce deepwater surficial sediments in the Northwest Corner off-shore area that are potentially accessible to biota and food chain transfer (i.e., 0 to 1 foot below mudline) to approximately 2.0 mg/kg. Backfilling the dredge areas, combined with the generally depositional environment, will ensure that residual PCBs in excess of 50 mg/kg in sediments deep beneath the mud line will continue to remain covered and isolated.

- Migration controls in the form of outfall removal, bulkhead extension installation, DNAPL recovery system, and stone armoring of the shoreline will prevent any migration of residual PCBs to the Hudson River.

- Institutional controls will prevent use of groundwater for potable purposes.

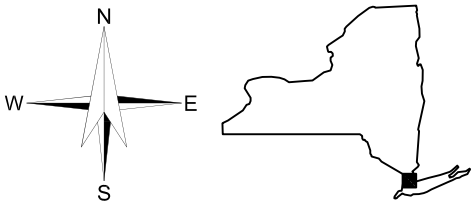
- A Site Management Plan for future soil handling will be provided as part of the remedy.

- PCBs in sediment under current (pre-remedial) conditions do not pose risks to human health or the environment that are appreciably greater than those associated with up-river ambient background conditions; risks associated with PCBs attributable to OU-2 are within acceptable ranges as established by USEPA.

- Existing PCB concentrations in fish collected from OU-2 are already within the range of fish tissue PCB concentrations that USEPA targeted for post-remedial conditions at the Upper Hudson River Site. Upon post-remedial conditions, PCBs in the upper foot of sediment at OU-2 will be consistent with upstream ambient background conditions, and the depositional environment of OU-2 will ensure that PCBs in deeper sediments will become more isolated in the future. The remedy will facilitate reductions in PCB concentrations in fish at OU-2, thereby reducing risks to human health and the environment to levels that are indistinguishable from ambient background levels.

FIGURES

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY ALDRICH

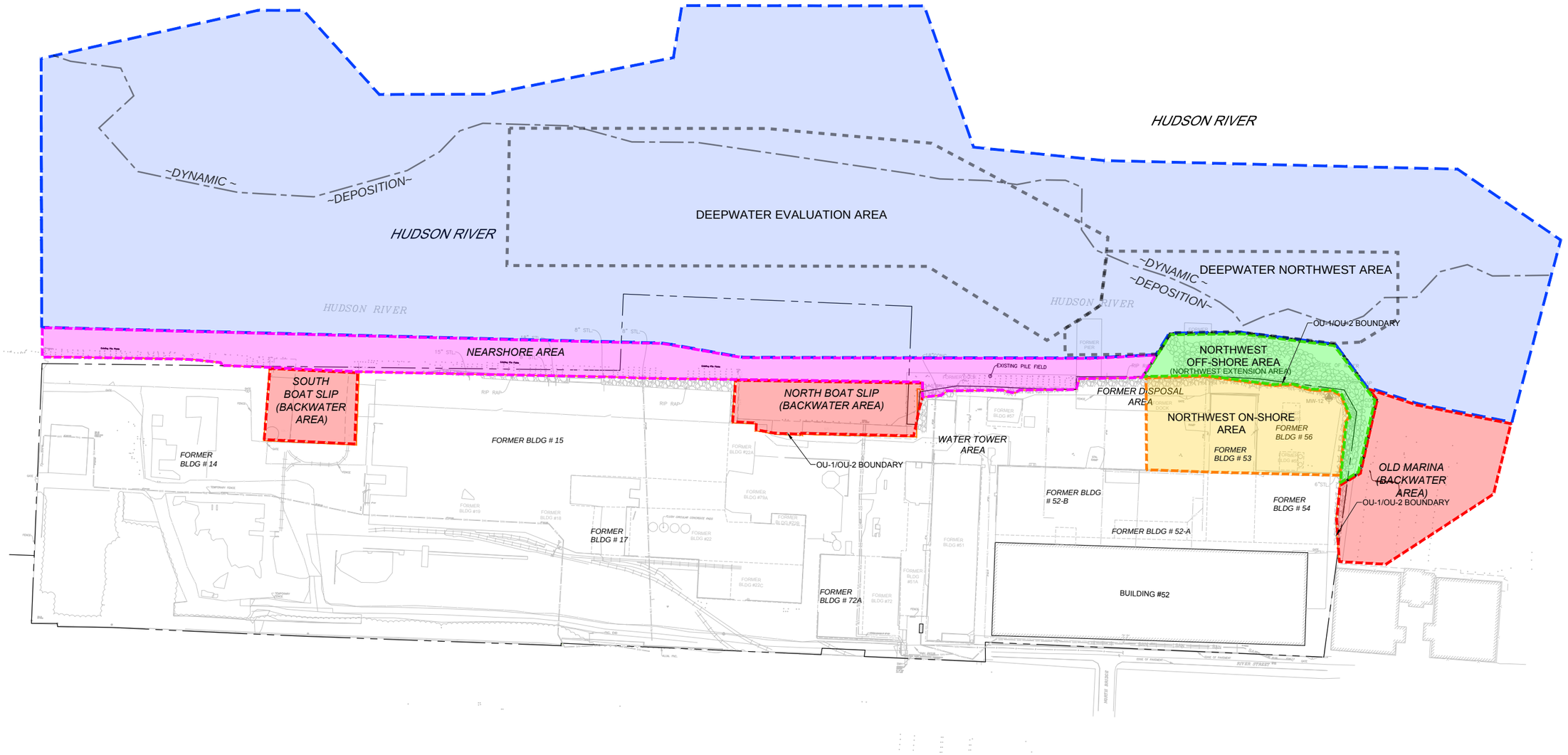
OU-1 REMEDIATION
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

SCALE: 1:24000
NOVEMBER 2015

FIGURE 1

G:\PROJECTS\28612 HASTINGS\H&S MASTER\HASPS\258_BUILDING 52 ASBESTOS\FIGURES\28612-LOCUS.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- EXISITNG STORM SEWER
- EXISITNG SANITARY SEWER
- RIP-RAP
- RIVER ENVIRONMENT BOUNDARY BETWEEN DEPOSITION AND DYNAMIC (DEPOSITION/EROSION)
- MONITORING WELL
- DEEPWATER AREA
- NEARSHORE AREA
- NORTHWEST OFF-SHORE AREA
- NORTHWEST ON-SHORE AREA
- BACKWATER AREA

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
3. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
4. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
5. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
6. THE OU-2/OU-1 BOUNDARY IS LOCATED AT THE MHW.

N

0 100 200 300 400

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE FEATURES

SCALE: AS SHOWN
NOVEMBER 2015

FIGURE 2

These locations will be removed as a result of the slopeback construction

Resampled with SG-006

S-1 5 FT
S-2 7 FT
S-3 6 FT
S-4 2 FT
S-5 12 FT
S-6 4 FT
S-8 4 FT
S-9 2 FT
S-10 4 FT
S-12 8 FT
S-13 12 FT
S-14 10 FT

LEGEND

PDI SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

REMOVAL AREA
PROPERTY LIMITS
DELINEATION COMPLETE
ADDITIONAL REMOVAL & DELINEATION REQUIRED
N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH
SAMPLES REMOVED BY EXCAVATION
RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

SHEET 1
SHEET 2

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 1 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM

Removal Areas S-15,S-16,S-17,S-18,S-20: Additional excavation and delineation is required where results are >10 mg/kg at edge of the shown removal area.

Residual below max. removal depth of 12 ft.

S-15 12 FT
S-16 6 FT
S-17 8 FT
S-18 8 FT
S-19 12 FT
S-20 8 FT
S-14 4 FT

SHEET 1
SHEET 2
SHEET 2
SHEET 3

LEGEND

PDI SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

- REMOVAL AREA
- PROPERTY LIMITS
- DELINEATION COMPLETE
- ADDITIONAL REMOVAL & DELINEATION REQUIRED
- N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH
- SAMPLES REMOVED BY EXCAVATION
- RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 2 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM

Residual below max. removal depth of 9 ft. (typ.)

Residual below max. removal depth of 12 ft.

Resampled with SP-201

Below existing building slab (typ.)

BUILDING 52

JOB TRAILERS

SHEET 2

SHEET 3

SHEET 3

SHEET 4

LEGEND

PDI SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- REMOVAL AREA
- PROPERTY LIMITS
- DELINEATION COMPLETE
- ADDITIONAL REMOVAL & DELINEATION REQUIRED
- N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH

HISTORIC SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- SAMPLES REMOVED BY EXCAVATION
- RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 3 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM

Residual below max. removal depth of 9 ft. (typ.)

Below existing building slab (typ.)

Removal Areas N-8,N-10,N-12,N-16,N-17,N-18,N-28: Additional excavation and delineation is required where results are >10 mg/kg at edge of the shown removal area.

JOB TRAILERS

BUILDING 52

SHEET 3

SHEET 4

LEGEND

PDI SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

- REMOVAL AREA
- PROPERTY LIMITS
- DELINEATION COMPLETE
- ADDITIONAL REMOVAL & DELINEATION REQUIRED
- N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH
- SAMPLES REMOVED BY EXCAVATION
- RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 4 OF 4

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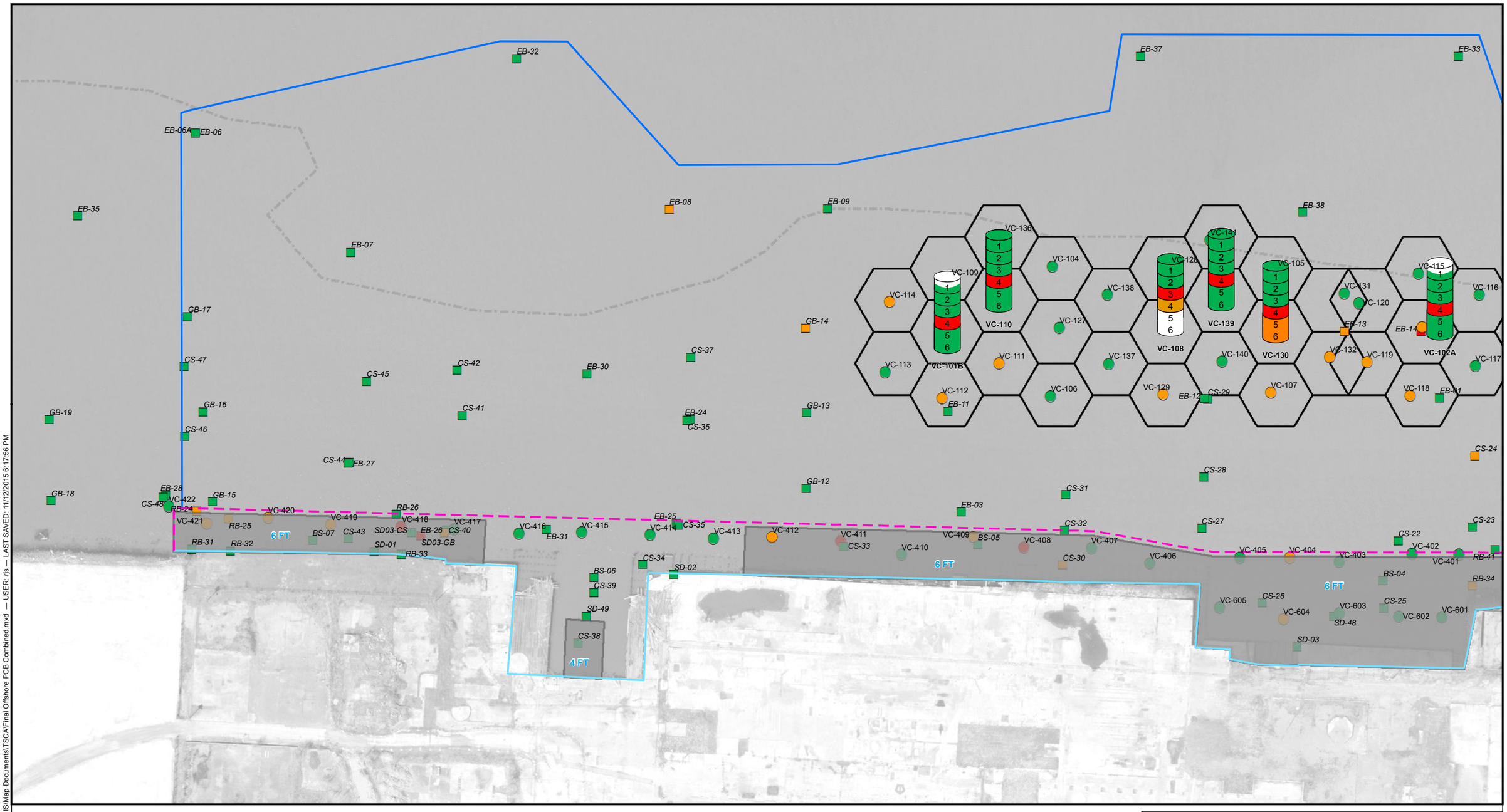

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Offshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 6:17:56 PM

LEGEND

PDI SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- SAMPLES REMOVED BY DREDGE

HISTORIC SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- RESIDUALS > 10 mg/kg (below removal depth)

- NW EXTENSION
- DECISION UNIT
- REMOVAL/BACKFILL AREA
- AREA WITH COVER

- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- RIVER ENVIRONMENT BOUNDARY

SAMPLE INTERVALS (PCBs in mg/kg)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- Not Sampled or Not Analyzed

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

0 120 240
SCALE IN FEET

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OFFSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 4
SHEET 1 OF 2

Additional Delineation Required

SEE FIGURE 5 FOR DETAIL

6 FT

LEGEND

PDI SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- SAMPLES REMOVED BY DREDGE

HISTORIC SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- RESIDUALS > 10 mg/kg (below removal depth)

- NW EXTENSION
- DECISION UNIT
- REMOVAL/BACKFILL AREA
- AREA WITH COVER

- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- RIVER ENVIRONMENT BOUNDARY

SAMPLE INTERVALS (PCBs in mg/kg)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- Not Sampled or Not Analyzed

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

0 120 240
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OFFSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 4
SHEET 2 OF 2

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Offshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 6:17:56 PM

Residual below cover (typ.)

Resampled with VC-319

Residual below max. removal depth of 6 ft.

Residual below removal depth of 3 ft.

Residual below removal depth of 3 ft.

Residual below max. removal depth of 6 ft.

Contained within the Northwest Extension (typ.)

LEGEND

PDI SAMPLES (MAX PCBs)
- >50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- SAMPLES REMOVED BY DREDGE

HISTORIC SAMPLES (MAX PCBs)
- >50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- RESIDUALS > 10 mg/kg (below removal depth)

- NW EXTENSION
- DECISION UNIT
- REMOVAL/BAKFILL AREA
- AREA WITH COVER
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- RIVER ENVIRONMENT BOUNDARY

SAMPLE INTERVALS (PCBs in mg/kg)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- Not Sampled or Not Analyzed

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 40 80
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OFFSHORE PROPOSED REMEDY AND RESIDUALS NW OFFSHORE

NOVEMBER 2015

FIGURE 5

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCANWC Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 7:21:22 PM

APPENDIX A

APPLICATION CHECK LIST

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

RISK-BASED CLEANUP AND DISPOSAL APPROVAL § 761.61(c) CHECKLIST

I. Risk-Based Cleanup and Disposal Request to EPA with the following:

☐ Cover letter stating purpose of the submission and signed by the Site owner or operator, or by the party responsible for conducting the cleanup, such as a former Site owner.

Included in Volume 1

☐ A plan which includes the following information:

☐ Site background and history. This should include a discussion of past activities (e.g. use of PCBs and/or PCB equipment, storage, manufacturing, etc.), site ownership, and current or proposed site uses. This section should also include information on any cleanups/remediation that have occurred at the Site.

Included in Volume 2

- ***Section 2 - Site Description and History***
  - ***Section 2.1 - Location***
  - ***Section 2.3 - Historic and Current Land Use***
  - ***Section 2.4 - Future Land Use***

☐ The nature of the contamination, including the kinds of materials contaminated (§ 761.61(a)(3)(i)(A)).

Included in Volume 2

- ***Section 3.0 - Site Contamination***
  - ***Section 3.1 - Operable Units***
  - ***Section 3.2 - Remedial Investigations***
    - ***Section 3.2.1 - Nature of Contamination (Basis of Selected Remedy)***
- ***Appendix B - 2004 OU-1 Record of Decision***
  - ***Section 5.1.2 - Nature of Contamination***
- ***Appendix C - OU-2 Record of Decision***
  - ***Section 3.4 - Nature of Contamination***
  - ***Exhibit A - Nature and Extent of Contamination***

☐ A summary of the standard operating procedures (SOPs) employed during characterization of the Site, including a table and/or cleanup site map showing PCB concentrations measured in pre-cleanup characterization samples. The SOPs must include information on the sample collection procedures and extraction/analytical procedures. Copies of the laboratory analytical reports should be provided to document the extraction/analytical dates and methods and laboratory QC (§ 761.61(a)(3)(i)(B)).

If extensive, the laboratory analytical reports may be provided on a CD-ROM.

Included in Volume 1

- ***Figure 3 – Onshore Proposed Remedy and Residuals***
- ***Figure 4 – Offshore Proposed Remedy and Residuals***
- ***Figure 5* – Offshore Proposed Remedy and Residuals - *NW Offshore Detail***

Included in Volume 2

- ***Section 4.5.1 - Field Procedures***
- ***Section 7 - Supplemental Data Quality Assurance***
- ***Appendix I - Laboratory Reports (on DVD)***

☐ A Site map showing the PCB sampling locations cross-referenced to the sample identification numbers provided as part of the characterization information. The extent of the identified PCB contaminated area(s) must be clearly identified (§ 761.61(a)(3)(i)(C)).

Included in Volume 1

- ***Figure 3 – Onshore Proposed Remedy and Residuals***
- ***Figure 4 – Offshore Proposed Remedy and Residuals***
- ***Figure 5* – Offshore Proposed Remedy and Residuals - *NW Offshore Detail***

☐ A cleanup plan for the Site, including the proposed disposal technology and approach, and a cleanup schedule. ***The plan must include contingency plans in the event that higher PCB concentrations and/or a wider distribution of PCBs are identified during the cleanup*** (§ 761.61(a)(3)(i)(D)).

Basis of Design is provided in the following:

Included in Volume 2

- ***Section 4.4 - Design and Construction Schedule***
- ***Section 4.3 - Summary of PCB Specific Elements in the Selected Remedy***
- ***Section 8 - Preliminary Remedial Design and Conclusions***

☐ Evaluation of PCB Cleanup Alternatives – An evaluation of PCB cleanup alternatives must be submitted for the following:

- Sites that may not be cleaned up under the self-implementing procedures (see § 761.61(a)(1)(i)), or

- Sites where the proposed cleanup involves leaving PCBs at concentrations greater than the cleanup criteria established under § 761.61(a).

The evaluation should include an alternative to achieve the prescriptive cleanup standard(s) under § 761.61(a). The evaluation should clearly state the reasons why the provisions available under § 761.61(a) cannot be implemented.

Included in Volume 2

- ***Section 3.4 - Evaluation of PCB Cleanup Alternatives***
- ***Appendix B – 2004 OU-1 Record of Decision***
  - ***Section 8 - Summary of the Selected Remedy***
- ***Appendix C - OU-2 Record of Decision***
  - ***Exhibit D - Summary of Selected Remedy***

☐ If a cleanup will involve the use of an engineered cap, the cap design specifications and a cross-section showing the design should be provided. Please insure that it is clear where the engineered cap will be used. *Please note: the use of an engineered cap will require a deed notation documenting this fact and the limitations on the use of the Site. Financial assurance*[1] *and a long-term monitoring and maintenance plan for the cap will be required. In addition, long-term groundwater monitoring may be required to document no migration of PCBs from the Site* (§ 761.61(a)(7)).

Basis of Design is provided in the following:

Included in Volume 1

- ***Section 3.3 - ROD Summary***

Included in Volume 2

- ***Section 4.1 - OU-1 Record of Decision***
  - ***Element 8 -***
  - ***Element 10***
- ***Section 4.2 - OU-2 Record of Decision***
  - ***Element 9***
  - ***Element 11***
- ***Section 8.2 - Post-Remedy Conditions***
- ***Appendix D – RFS Appendices (Select Reports)***
  - ***RFS Appendix B - Shoreline Protection***
  - ***RFS Appendix B - Subaqueous Cap Stability***
  - ***RFS Appendix I - Subaqueous Cap Effectiveness***

☐ If a cleanup will involve encapsulation of PCBs on a building or structure, please provide the MSDS of the proposed encapsulant and a discussion of the effectiveness of this product for encapsulation of PCBs based on the Site and the receptors at the Site. *Please note: the use of an encapsulant under § 761.61(c) will require a deed notation documenting this fact and the limitations on the use of the Site. Financial assurance*[1] *and a long-term monitoring and maintenance plan for the encapsulant(s) will be required.*

Not Applicable

---

1 For certain public entities (cities, towns, and municipalities) documentation of financial assurance generally will not be required.

☐ A written certification, signed by: 1) the owner of the property where the cleanup site is located, and 2) the party conducting the cleanup, that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental/chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site, are on file at the location designated in the certificate, and are available for EPA inspection (§ 761.61(a)(3)(i)(E)).

Included in Volume 1

☐ Subpart Q alternative method: If an alternative method of extraction and/or analysis is/will be used, the certification shall include a statement to this fact and that a comparison study which meets or exceeds the requirements of Subpart Q has been completed prior to the verification sampling. In the event that the alternative extraction and/or analytical method was previously validated under Subpart Q using materials from other projects, the laboratory must provide a certification that the sample types used during that comparison study are similar to (e.g., % organic content, grain size, etc.) the sample types that will be cleaned up under the Notification. A copy of the Subpart Q comparison study should be included in the Notification (§ 761.61(a)(3)(i)(E)).

Not Applicable

☐ QA/QC plan for documenting that the cleanup levels have been achieved (e.g. confirmatory sampling/analysis QA/QC, initial testing of encapsulated surfaces, etc). The QA/QC plan should at a minimum include information on the types and numbers of samples; extraction and analytical methods; MS/MSDs (both frequency and acceptance criteria), etc. The QA/QC plan should also discuss data validation.

Pre-Delineation QA/QC procedures are provided in the following:

Included in Volume 2

- ***Section 7 - Supplemental Data Quality Assurance***

Remedial Design will include a Remedial Action Monitoring Plan that will be inclusive of QA/QC requirements for documenting clean up levels

☐ Human Health Risk Assessment and Ecological Risk Assessment. A Human Health Risk Assessment (HHRA) may be required to support a Risk-Based Disposal Request under § 761.61(c) where PCB concentrations above the prescriptive PCB standards at § 761.61(a) are left in-place[2]. The HHRA should evaluate site exposures and provide a justification as to the controls proposed to address these exposures. An Ecological Risk Assessment will be required in the event that wetlands, water bodies, sediments, or other similar matrices are impacted with PCBs regulated under 40 CFR Part 761.

Included in Volumes 3 and 4

2 A determination on the requirement for submittal of an HHRA will be determined based on the site and the remedial approach.

☐ In the event that the party conducting the cleanup is not the Site owner, EPA will require documentation that the party conducting the cleanup legally has the authority to access the Site and to conduct the proposed PCB cleanup activities. This documentation for example may be in the form of a Site Access Agreement stating this fact or perhaps in a lease agreement or a property transfer agreement.

Not Applicable

II. EPA Review of § 761.61(c) submittal

- EPA will review and provide comments on any deficiencies and/or questions it has regarding any information submitted under the § 761.61(c) process. Once EPA has determined that all deficiencies and/or questions have been addressed, EPA may require public notice and comment. EPA may determine that public notice/comment is not required based on the proposed PCB cleanup standards and plan (see Section III).

  Please note: The 30-day EPA review timeframe specified under § 761.61(a) does not apply under *§ 761.61(c).*

III. Public Participation

- For § 761.61(c) requests, EPA may conduct a 30-day public notice/comment period. *As indicated above, based on the proposed PCB cleanup standards, the remediation plan itself, and/or the public participation that may have been ongoing as part of a state and/or federal program requirement (such as the 401 Water Certification or Conservation Commission process), EPA may determine that adequate public participation has occurred. If EPA deems public participation is necessary, EPA will work with the Site owner to develop an acceptable public participation process for the Site*.

  For schools, EPA may require an outreach plan for school users, including parents. This outreach plan will be required when PCBs at greater than (>) 1 part per million will remain at a school site, when a cleanup is being conducted while school is in session, or if EPA determines that such a plan may be appropriate.

IV. EPA Approval

- Following the 30-day public notice/comment period, if warranted, EPA: will respond to pertinent written comments received on the risk-based plan; or will respond to pertinent written comments received on the risk-based plan and will issue the approval with/without modifications; or will not issue the approval, but will require additional information supporting the request to be submitted.

  As an additional point of clarification, please note that EPA has issued § 761.61(c) approvals to both single party and multiple parties. This determination is made based on the Site ownership as well as the proposed risk-based plan and is determined on a case-by-case basis.

IMPORTANT:

Please note that this checklist provides only a summary of the information that Region 1 recommends be included in a risk-based request for sampling, cleanup, or disposal of PCB remediation waste other than prescribed under § 761.61(a) or § 761.61(b), or for storage of PCB remediation waste other than prescribed under § 761.65. It is for reference only and does not supercede the regulations.

The requestor may include any additional information that supports the proposed PCB cleanup and disposal activities, such as information regarding state regulations, community involvement (especially for schools), and environmental justice communities. In addition, any documentation that has been developed for a state regulatory agency, such as a remedial investigation report, may be submitted to support the pertinent required documentation in lieu of generating a new document.

PLEASE BE AWARE THAT AS SPECIFIED AT 40 CFR § 761.61(c), A RISK-BASED CLEANUP ACTIVITY MAY NOT BE CONDUCTED WITHOUT APPROVAL FROM THE EPA REGIONAL ADMINISTRATOR OR HIS/HER DESIGNEE.

APPENDIX B

SELECT FIGURES FROM
PDI DATA SUMMARY REPORT

Figure 3.6I - NEARSHORE & BACKWATER -
PDI PCB RESULTS -
SURFACE TO 0.5 FOOT (3 sheets)

Figure 4.3A - RIVER ENVIRONMENT
DEPOSITION/DYNAMIC AREAS
WITH PDI SAMPLE LOCATIONS

Figure 4.4A - NORTHWEST AREA
SEDIMENT REMOVAL EVALUATION
OVERVIEW

EB-06
EB-08
EB-09
EB-38
EB-07
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-114
VC-110
VC-138
VC-139
VC-120
GB-17
GB-14
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
CS-37
CS-47
CS-42
VC-113
VC-111
VC-137
VC-140
VC-132
VC-119
CS-45
EB-30
VC-112
VC-106
VC-129
CS-29
EB-12
VC-107
GB-16
CS-41
GB-13
CS-36
EB-24
CS-46
CS-44
EB-27
GB-12
CS-28
CS-31
SHEET 1
SHEET 2
CS-48
EB-28
VC-422
GB-15
RB-24
EB-03
VC-420
RB-26
VC-421
RB-25
VC-419
VC-418
SD03-CS
VC-417
CS-35
EB-25
VC-409
CS-32
CS-27
VC-416
EB-31
VC-415
VC-414
VC-413
VC-412
VC-411
BS-05
VC-408
VC-407
BS-07
CS-43
SD03-GB
CS-40
EB-26
CS-33
VC-410
RB-31
RB-32
SD-01
RB-33
CS-34
CS-30
VC-406
VC-405
VC-404
VC-403
SD-02
BS-06
CS-39
VC-605
CS-26
VC-603
VC-604
CS-38
SD-03

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 1 OF 3

AUGUST 2015

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SHEET 1

SHEET 2

SHEET 2

SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

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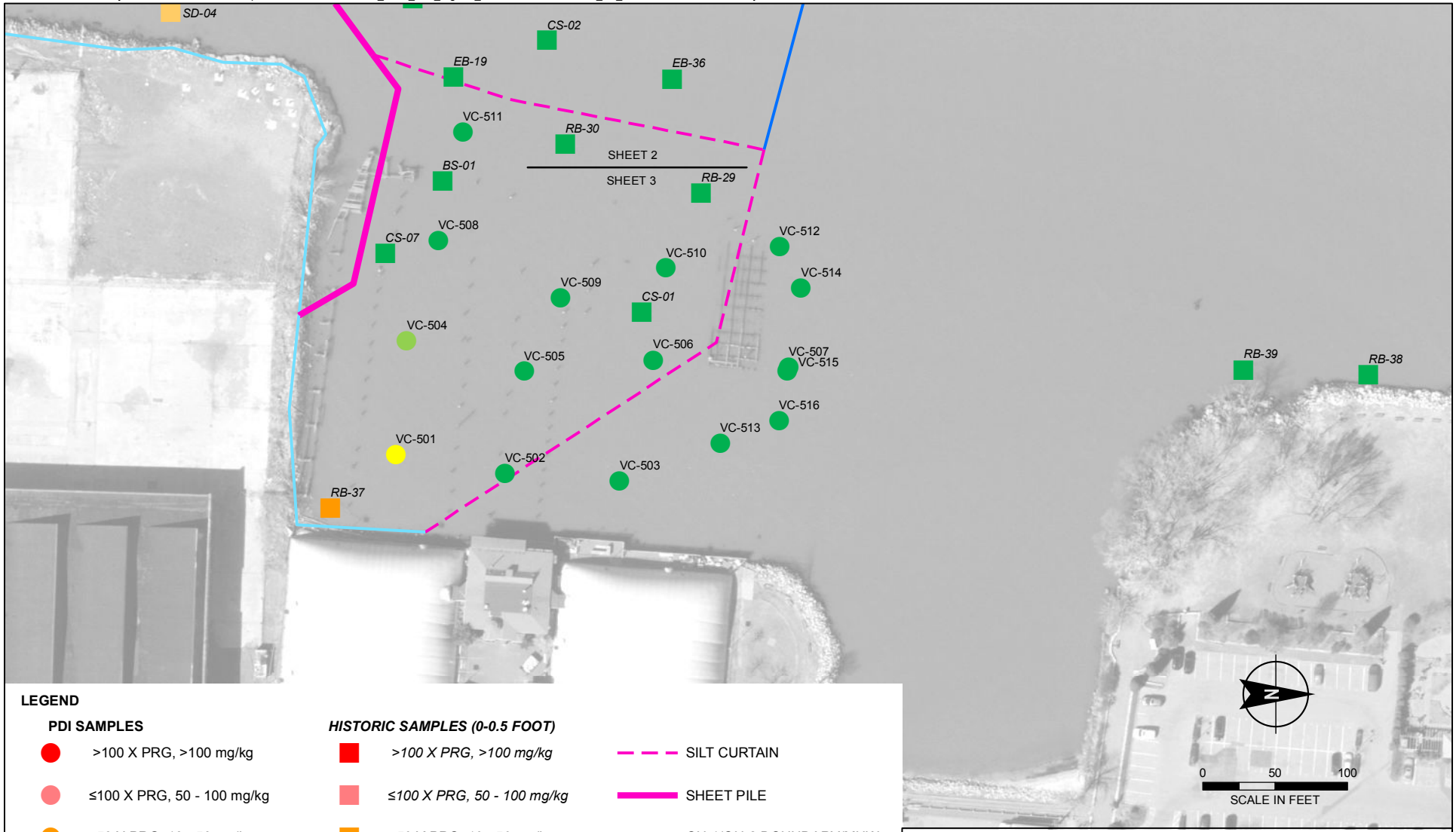
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 2 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6I_PCBOM00-05Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:09:37 PM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

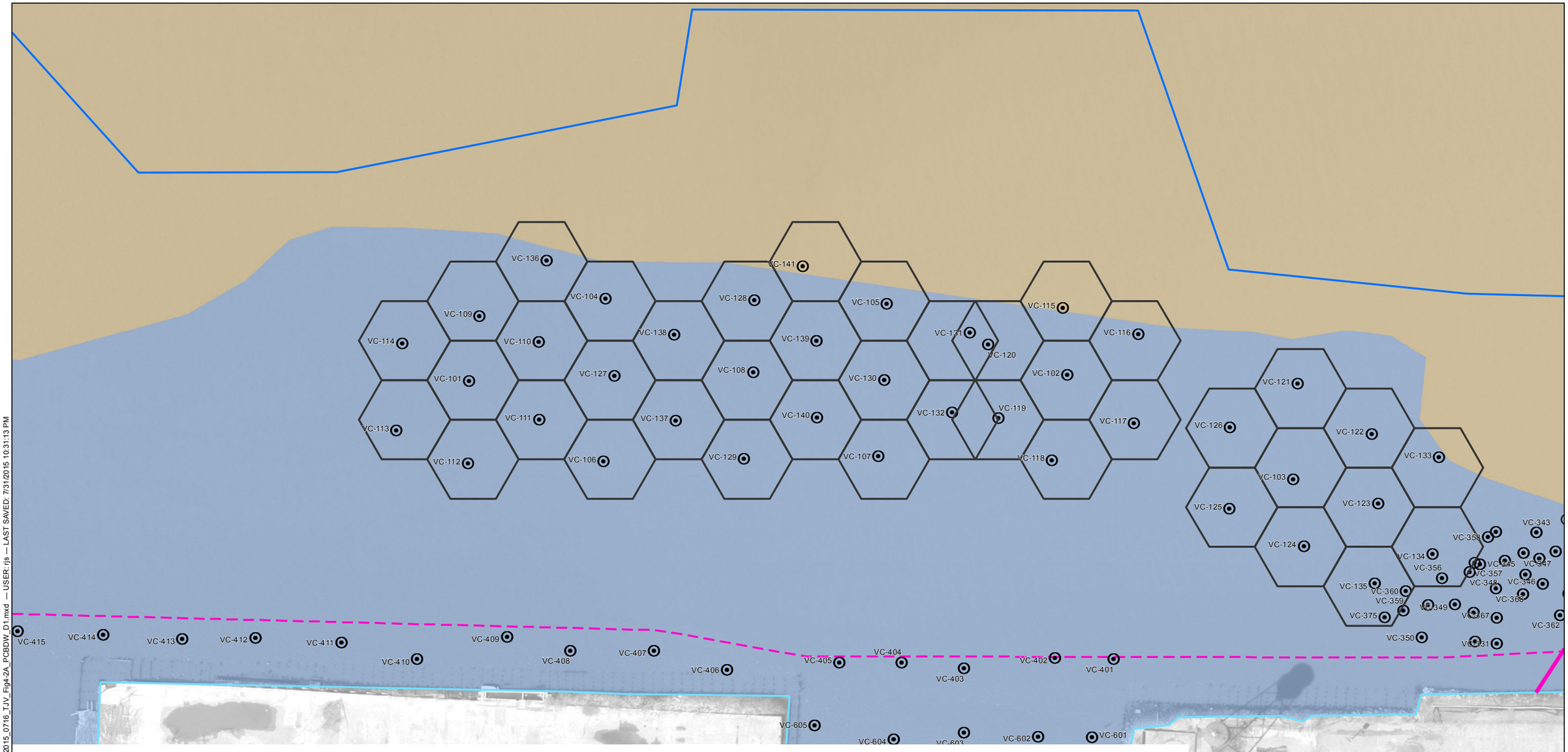
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 3 OF 3

AUGUST 2015



LEGEND

- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- PDI SAMPLE LOCATION
- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

RIVER ENVIRONMENT DEPOSITION/DYNAMIC AREAS WITH PDI SAMPLE LOCATIONS

JULY 2015

FIGURE 4.3A

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0716_TJV_Fig4-2A_PCBDW_D1.mxd — USER: rjs — LAST SAVED: 7/31/2015 10:31:13 PM

VC-344 0-4 FT Cover
VC-347 0-4 FT Cover
VC-329 0-3 FT Cover
VC-328 0-5 FT Cover
VC-345 0-2 FT Removal
VC-346 0-5 FT Cover
VC-327 0-3 FT Removal
VC-363 0-4 FT Cover
VC-322 0-2 FT Removal
VC-321 0-2 FT Removal
VC-339 0-3 FT Removal
VC-361 0-2 FT Removal
VC-341 0-5 FT Cover
VC-317 0-4 FT Cover
VC-318 0-3 FT Removal
VC-315 0-3 FT Cover
VC-316 0-3 FT Removal
VC-370 0-3 FT Cover
VC-311 0-5 FT Cover
VC-337 0-2 FT Removal
VC-312 0-3 FT Removal
VC-309 0-6 FT Removal
VC-307 0-2 FT Removal
VC-308 0-2 FT Removal
VC-336 0-2 FT Removal
VC-306 0-6 FT Removal
VC-304 0-3 FT Removal
VC-305 0-5 FT Removal
VC-303 0-3 FT Removal
VC-301 0-6 FT Removal
VC-302 0-4 FT Removal
VC-359 0-3 FT Removal
VC-355 0-4 FT Removal
VC-349 0-3 FT Cover
VC-332 0-4 FT Removal
VC-330 0-4 FT Removal
VC-122
VC-123
VC-133
VC-103C
VC-134
VC-135
VC-379
VC-377
VC-356
VC-357
VC-348
VC-358
VC-343
VC-372
VC-325
VC-353
VC-352
VC-351
VC-354
VC-323
VC-320
VC-319
VC-324
VC-365
VC-340
VC-364
VC-369
VC-326
VC-368
VC-313
VC-373
VC-374
VC-366
VC-371
VC-335
VC-334
VC-376
VC-360
VC-378
VC-375
VC-367
VC-362
VC-314
VC-350
VC-383
VC-331
VC-333
VC-380
VC-381
VC-382
EB-29
EB-16
EB-21
EB-22
CS-16
CS-14
CS-13
CS-15
CS-18
CS-05
CS-10
CS-04
CS-11
CS-09
CS-03
CS-08
CS-02
RB-17
RB-18
RB-19
RB-16
RB-42
RB-22
RB-27
RB-07
RB-15
RB-02
RB-20
RB-03
RB-06
RB-08
RB-04
RB-30
RB-40
RB-13
RB-05
RB-01
RB-36
SD02-CS
SD02-GB
SD-42
SD05-CS
SD-44
SD-43
SD-45
SD05-GB
SD-50
SD04-GB
SD-04
SD-41
SD01-CS
SD01-GB
SD04-CS
BS-02
HA-219
HA-218
HA-217
HA-211
HA-209
HA-206
HA-205
HA-203B
HA-203
HA-201
HA-221
HA-216
HA-215
VC-1
VC-2A
VC-2B
VC-3
VC-4
EB-19
RB-09
SD-34
VC-511
GB-04

LEGEND

PDI SAMPLES (MAX 0-6 FT)

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (MAX 0-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- SHALLOW REMOVAL (2 FT)
- DEEPER REMOVAL (UP TO 6 FT)
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
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HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION OVERVIEW

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FIGURE 4.4A

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EB-29 GB-04 CS-16 VC-122 CS-14 CS-13 EB-16 VC-133 VC-353 VC-103C VC-352 VC-351 CS-05 RB-18 RB-17 VC-321 VC-354 VC-323 CS-10 CS-15 VC-123 VC-325 RB-14 VC-322 CS-04 VC-372 CS-12 VC-320 VC-319 RB-19 VC-344 VC-358 VC-343 VC-324 VC-365 VC-340 VC-339 VC-361 SD01-CS CS-18 VC-134 SD02-CS VC-373 VC-374 RB-16 VC-347 VC-342 VC-357 VC-345 VC-329 VC-328 VC-369 VC-366 SD01-GB VC-379 VC-377 VC-348 VC-364 VC-341 VC-318 VC-338 VC-313 VC-337 CS-11 VC-336 CS-09 VC-135 VC-356 RB-42 VC-326 SD05-CS VC-346 VC-317 SD02-GB VC-370 VC-306 VC-335 VC-368 VC-376 VC-360 VC-327 VC-363 RB-21 VC-315 SD-42 VC-309 VC-307 SD-53 VC-303 VC-334 VC-355 VC-316 VC-311 VC-371 RB-23 VC-304 SD04-CS CS-03 VC-359 VC-349 VC-332 VC-314 RB-22 VC-312 VC-308 VC-305 RB-11 VC-378 VC-375 VC-362 RB-12 BS-02 SD-52 VC-302 RB-27 VC-367 VC-301 SD-50 EB-22 RB-07 SD-43 RB-02 VC-350 RB-40 VC-333 VC-330 VC-331 RB-43 RB-20 RB-15 SD-45 HA-219 HA-218 SD04-GB RB-13 SD05-GB RB-05 RB-01 RB-06 CS-08 HA-216 SD-04 RB-08 SD-41 RB-36 CS-02 VC-1 EB-19 RB-09 VC-2A VC-2B SD-34 VC-3 VC-511 RB-04 RB-30 VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

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HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION SURFACE TO 2 FOOT

AUGUST 2015

FIGURE 4.4B

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 2 TO 3 FOOT

AUGUST 2015

FIGURE 4.4C

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LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- INTERVAL BELOW REMOVAL
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 3 TO 4 FOOT

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FIGURE 4.4D

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\Evaluation\2015_0715_TJV_Fig4-4E_PCB4-5NWAreaEvaluaiton_BL_D1.mxd — USER: tvogler — LAST SAVED: 8/10/2015 10:54:43 AM

EB-29
EB-16
VC-122
VC-133
VC-103C
VC-123
VC-353
VC-352
VC-351
VC-354
VC-323
VC-321
VC-325
RB-14
VC-322
VC-372
VC-319
VC-320
VC-344
VC-358
VC-343
VC-324
VC-365
VC-340
VC-339
VC-361
VC-347
VC-342
VC-134
VC-357
VC-345
VC-329
VC-328
VC-369
VC-373
VC-374
VC-379
VC-364
VC-341
VC-317
VC-318
VC-338
VC-366
VC-377
VC-348
VC-313
VC-337
CS-11
VC-336
VC-356
VC-326
RB-42
VC-346
VC-368
VC-363
VC-315
RB-21
VC-335
VC-135
VC-306
VC-303
VC-376
VC-360
VC-327
SD-42
VC-370
VC-309
VC-307
VC-334
VC-355
VC-316
VC-311
SD-53
VC-371
VC-304
VC-349
VC-359
VC-332
EB-21
RB-12
VC-312
VC-305
VC-308
VC-378
VC-375
VC-367
SD-44
VC-362
VC-314
SD-52
VC-302
EB-22
SD-43
RB-02
RB-07
VC-350
VC-301
SD-50
VC-333
VC-330
VC-331
RB-20
RB-15
SD-45
HA-219
HA-218
RB-13
HA-217
HA-211
HA-206
HA-221
HA-216
HA-215
RB-05
RB-01
HA-209
RB-03
RB-06
HA-203B
HA-205
RB-08
SD-41
HA-203
HA-201
CS-02
VC-1
EB-19
VC-2A
VC-2B
SD-34
VC-3
VC-511
RB-04
VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 4 TO 5 FOOT

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FIGURE 4.4E

EB-29
EB-16
VC-122
VC-133
VC-103C
VC-123
VC-353
VC-352
VC-351
VC-354
VC-323
VC-321
VC-325
RB-14
VC-322
VC-372
VC-319
VC-320
VC-344
VC-358
VC-343
VC-324
VC-365
VC-340
VC-339
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VC-317
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VC-366
VC-379
VC-377
VC-356
VC-313
VC-337
CS-11
VC-336
VC-135
VC-326
RB-42
VC-346
VC-368
VC-315
VC-370
VC-309
VC-307
VC-335
VC-376
VC-360
VC-327
VC-363
SD-42
RB-21
VC-316
VC-371
SD-53
VC-303
VC-334
VC-355
VC-349
VC-311
RB-12
VC-312
VC-304
VC-305
VC-359
EB-21
VC-314
VC-308
VC-332
SD-44
VC-362
VC-367
SD-52
VC-302
VC-378
VC-375
VC-301
SD-50
RB-07
EB-22
SD-43
RB-02
VC-350
VC-333
VC-330
VC-331
RB-20
RB-15
SD-45
HA-219
HA-218
RB-13
HA-217
HA-211
HA-206
HA-221
HA-216
HA-215
RB-05
RB-01
HA-209
RB-03
RB-06
HA-203B
HA-205
RB-08
SD-41
HA-203
CS-02
HA-201
VC-1
EB-19
VC-2A
VC-2B
SD-34
VC-3
VC-511
RB-04
VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 5 TO 6 FOOT

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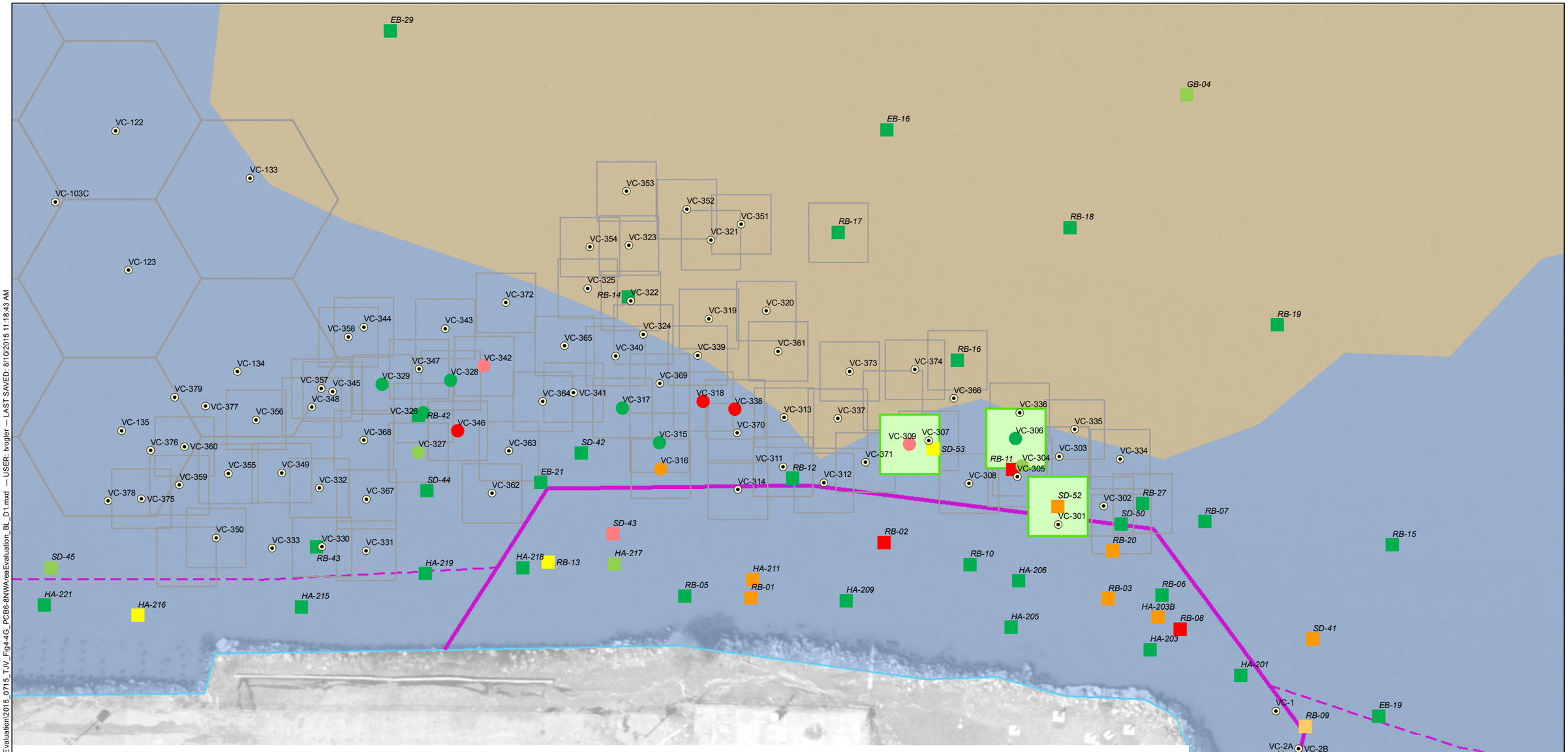
FIGURE 4.4F



LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (6-10 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

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HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 6 TO 8 FOOT

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FIGURE 4.4G

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VOLUME 2

Basis for Remedial Approach and Design

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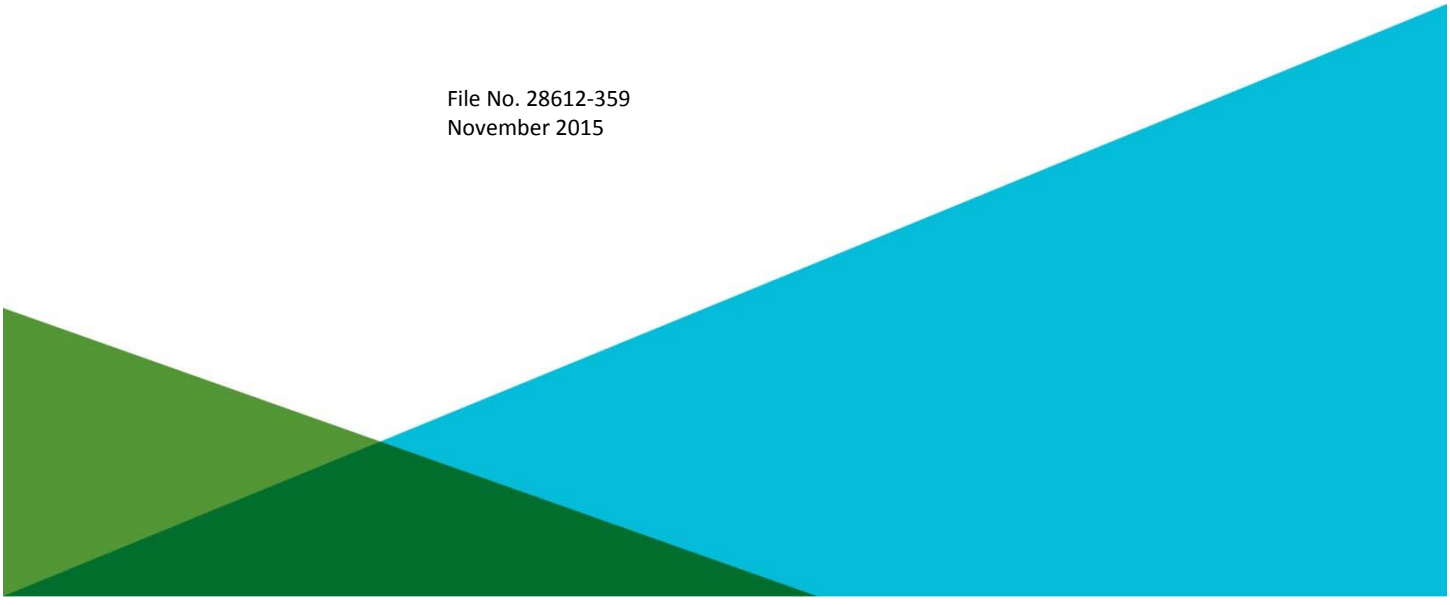
VOLUME 2
TOXIC SUBSTANCES CONTROL ACT (TSCA)
RISK-BASED DISPOSAL APPLICATION
BASIS FOR REMEDIAL APPROACH AND DESIGN

FORMER ANACONDA WIRE & CABLE PLANT SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

By **Haley & Aldrich of New York**
Rochester, New York

For **Atlantic Richfield Company**
Naperville, Illinois

File No. 28612-359
November 2015



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1. Introduction

This Basis for Remedial Approach and Design Report is a component of the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application (RBDA) for the Former Anaconda Wire Project Site located in Hastings-on-Hudson, New York currently owned by Atlantic Richfield Company (ARC) through its wholly owned subsidiary ARCO Environmental Remediation, LLC. (AERL). The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and is being submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA.

40 CFR 761.61 provides three options for cleanup of PCB remediation waste: 761.61(a) *Self-implementing*; 761.61(b) *Performance-based*; and 761.61(c) *Risk-based*. The self-implementing option (761.61(a)) is not applicable to freshwater or marine sediments, and performance-based criteria (761.61(b)) are applicable to contaminated surfaces. Although 761.61(a) or 761.61(c) may be used for soil, risk-based approval is the only method that can be used for sediments. Therefore, risk-based cleanup is the approach selected for this application.

Obtaining risk-based approval is conducted by submitting to USEPA, in writing, a plan that describes the nature and extent of PCB contamination, the proposed remediation, and the basis for leaving any PCBs in-place within environmental media at the Site. The objective of this RBDA is to provide this information and demonstrate through the use of human health and ecological risk assessments that PCBs left in place after remediation will not pose unacceptable risks to human health or the environment. That finding, in turn, provides verification that the remedial requirements stipulated in the NYSDEC Record of Decision (ROD)s are protective of human health and the environment.

The Site has undergone extensive investigation under the regulatory oversight of the New York State Department of Environmental Conservation (NYSDEC; NYSDEC Site #3-60-022), which culminated in issuance of final RODs for the Site in 2012. The RODs require implementation of remedial activities to address PCBs onshore and offshore. As declared by NYSDEC, implementation of the remedial activities stipulated in the ROD will ensure protection of human health and the environment. Although the Site is regulated by NYSDEC and PCB releases at the Site occurred prior to 1978, the requirements of 40 CFR 761.61 is being considered.

As required in the RODs, additional data have been collected including PCBs in soil, groundwater, sediment, surface water, pore water, and biota to establish a baseline to evaluate the success of the remedy, and to provide data needed to design the remedy (e.g.., define excavation limits). These recent data were also used to support a detailed evaluation of current and future potential risks to human health and the environment, as described herein.

The RBDA for the Site is comprised of a four volume set of documents that include:

- Volume 1, *Application*, which provides a summary of the project scope and objectives, investigation activities, human health and ecological risk assessments, and conclusions that are documented in detail in Volumes 2-4.
- Volume 2, *Basis for Remedial Approach and Design (this volume)*, which documents investigation activities including nature and extent of PCB contamination, provides the proposed remedial design, and identification of anticipated post-remedial conditions (i.e., residual PCBs).

- Volume 3, *Human Health Risk Assessment (HHRA)*, which provides the human health risk assessment, including methodology, calculations, and results.
- Volume 4, *Ecological Risk Assessment (ERA)*, which provides the ecological risk assessment, including methodology, calculations, and results.

More specifically, this document provides the following:

- A site description including its location, an overview of geology and hydrogeology, and information regarding development and operations related to the site.
- A summary of site contamination including a summary of investigations and remedy evaluation between 1986 and 2011 which provided the basis for the nature and extent of contamination used to develop the proposed remedy.
- The remedy selected by NYSDEC in 2012 and declared to be protective of human health and the environment, a summary of those elements directly applicable to addressing the PCB contamination in various media, the NYSDEC required schedule for implementing the remedy, and the approach to collection of design data.
- 2012-2015 supplemental onshore and offshore investigation results that provide data for remedial design including procedures for predefining extents of contamination removal. Supplemental investigation also included the collection of baseline data to provide a benchmark against which post-construction performance monitoring can be compared.
- A synopsis of the remedial design and applicable conclusions from the supplemental onshore and offshore investigations, including the anticipated post-remedial conditions (PCB residuals). This data serves as the basis for the Human Health and Ecological Risk Assessments.
- A discussion regarding data validation of information used to develop the proposed remedy.
- Select recent work plans and data summary reports are appended for reference.

2. Site Description and History

2.1 LOCATION

The Site is a 28-acre former industrial property located on the eastern bank of the Hudson River along the village of Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The Site is located at river mile 21, approximately five miles south (downstream) of the Tappan Zee Bridge. The site is bounded on the north and west by the Hudson River, including a former marina to the north, to the south by the Tappan Terminal site and to the east by a commuter railroad adjacent to the Village of Hastings-on-Hudson. At the location of the Site, the lower Hudson River is nearly a mile wide (approximately 4800 feet bank to bank). The deepest portion of the river cross-section is approximately 50 feet. The Hudson River is primarily used as a navigational/shipping lane with large vessels typically traveling near the middle of the river. The shoreline consists of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting. Figure 1 provides a site location and Figure 2 identifies key features of the site that are referenced throughout this document.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

The site was constructed from man-made fill that was placed into the Hudson River. The upper Fill Unit ranges in thickness from 10 to 20 feet along the eastern boundary of the site, to 20 to 40 feet along the river shoreline. The fill is comprised of sand, silt, gravel, brick, concrete, ash, cinder, slag and other debris. The Fill Unit is moderately permeable, with hydraulic conductivities estimated to be 10^{-3} to 10^{-5} centimeters per second (cm/s).

The Fill Unit is underlain by the Marine Silt Unit, which represents the original Hudson River sediments. This material occurs as soft, plastic, low permeability clayey silt, with an estimated hydraulic conductivity of 10^{-5} to 10^{-7} cm/s. The Marine Silt ranges in thickness from 10 feet on the eastern side of the site, to 40 feet along the Hudson River. Because of its low hydraulic conductivity, the Marine Silt serves as a confining unit between man-made fill (above) and a confined aquifer in the Basal Sands Unit (below). Structurally, the Marine Silt is highly compressible and has low shear strength, which results in this unit being unsuitable as a bearing surface for structures.

Below the Marine Silt is the Basal Sand which is a unit of medium to dense coarse sands and gravels that vary in thickness from 10 feet on the eastern side of the site to 70 feet along the river. Because this unit provides structural support for pile-supported structures at the site, it is also referred to as the “bearing sands” unit. Bedrock beneath the site occurs from approximately 50 feet below grade in the eastern portion of the site, to 100 feet or more below grade along the river.

Groundwater beneath the site is present in two productive units, the man-made Fill Unit, and the Basal Sand Unit. These units are separated by the Marine Silt layer. Shallow groundwater in the Fill Unit originates from precipitation and infiltration through the land surface east of the site, flows westward through the fill, and discharges into the Hudson River. Except along the southern shoreline, groundwater in the Fill Unit flows unrestricted into the river. The modern shoreline bulkhead along the southern part

of the site provides a watertight barrier to groundwater flow. Along this portion of the shoreline, groundwater is diverted around the bulkhead before discharging to the river. The groundwater table in the Fill Unit ranges from 2 to 8 feet below grade, and varies in the western part of the site with the tidal fluctuations of the Hudson River.

Groundwater in the Basal Sand Unit originates to the east of the site, as part of the regional flow of groundwater from the upland areas of the Hudson River Valley towards the river. Because this groundwater originates at higher elevations along the river and is confined by the Marine Silt, it occurs under artesian conditions beneath parts of the site. That is, the water level in certain deep wells is higher than the ground surface. Groundwater in the Basal Sand Aquifer flows westward beneath the site and discharges to the Hudson River.

2.3 HISTORIC AND CURRENT LAND USE

The site is referred to as the Former Anaconda Wire and Cable Company, which ceased operations in 1974. Wire manufacturing operations during a portion of the operating period caused the release of PCBs and metals to site soil, groundwater and sediments. A site investigation was performed in 1986-87 in connection with a potential real estate development which led to the discovery of high levels of PCBs beneath the Northwest Corner of the site. A summary of all remedial investigations at the site is provided in subsequent sections of this report. A timeline of operations related to the site is provided below.

1850 to 1919 - The on-shore portion of the Site (OU-1) was created by filling into the Hudson River between the mid-1800s and the early 1900s with the placement of uncontrolled fill. The western edge of the fill progressively utilized a series of bulkhead walls of various construction types. Companies at the site included the National Conduit and Cable Company, the Hastings Pavement Company and the American Brass Company.

1919 to 1945 - The site was owned and operated by the Anaconda Wire and Cable Company for the manufacture of copper wire, lead covered cable, high voltage cable and insulated wire. During World War II, Anaconda Wire and Cable Company (AWC) was awarded contracts from the U.S. Navy (Navy) to manufacture electric cable for shipboard use. The Navy required the insulation of shipboard cable to be heat and flame resistant to avoid fire damage and to withstand heat generated from conducting high electric currents. PCB mixtures were used to make these products for the Navy. These PCB mixtures were prepared in the northwest corner of the site, and the wrappings were impregnated and dried in the western water tower area (see Figure 2). Unmixed Aroclors were also stored in Building 54 prior to use. The material was used exclusively during the World War II-era and PCB use in the manufacturing of cable was suspended after AWC's contracts with the Navy were fulfilled at the end of the war, as there was no civilian market for these products.

1946 to 1977 – After World War II, AWC produced electrical and television cable until it ceased operations in 1975. In 1977, Anaconda was acquired by the Atlantic Richfield Company, never operated the plant, and then sold the Site in 1978.

1978 to 1998 - Several owners and tenants occupied the property, the most notable owner being Harbor at Hastings Associates. From 1988 through 1992, Building 15 was leased to Age Carting for operation as a construction and demolition (C&D) transfer station. During this period, an estimated 150,000 cubic

yards of C&D waste was disposed in Building 15 and elsewhere on the property. Under a Court Order, this material was removed from the property by 1998.

1998 to present - In September 1998, Atlantic Richfield Company's affiliate, AERL, purchased the Site in order to facilitate environmental investigation and remediation efforts. During this period, all buildings on this site were demolished, except Building 52, with only the slabs remaining. Additionally, site security was improved, and all subleases were terminated. The property is fenced and gated, and on-site security personnel control access to the site.

The site is zoned general industrial and has primarily been used as an industrial facility for well over a century with much of the site formerly covered with buildings; currently there are no active operations at the site. Currently, only three temporary trailers are in use for site security and to support remedial activities. The site provides access to the Tappan Terminal site to the south and contains an active sewer pump station. Presently, there is no habitat for environmental receptors.

2.4 FUTURE LAND USE

The proposed remedial action allows for restricted-residential use (which allows for residential, commercial, and/or industrial use but includes restrictions which prohibit single family housing and vegetable gardens) as described in NYSDEC 6 NYCRR Part 375-1.8(g). In addition, remedial action will include mitigation for construction required within the river which is expected to create habitat. Future development of the site has not been determined.

2.5 REGULATORY PROCESS

Since 1998, ARC has implemented remedial investigations, Interim Remedial Measures (IRM) and demolition activities as part of the remedial process. The Site was divided into two Operable Units (OUs), with OU-1 designated as the upland portion of the Site, and OU-2 designated as the river portion of the Site. NYSDEC issued a Record of Decision (ROD) for the OU-1 portion of the Site in March 2004 (NYSDEC, 2004). In March 2003 the Final Feasibility Study Report (FS) for OU-2 was prepared and submitted by Earth Tech of New York, Inc. (Earth Tech) (Earth Tech, 2003) based on the December 2000 Remedial Investigation Report (RI) for OU-2 (Earth Tech, 2000).

In October 2003, NYSDEC issued the Proposed Remedial Action Plan (PRAP) for OU-2 (NYSDEC, 2003). Subsequent investigations completed by Parsons lead to the necessity for updating the 2003 OU-2 FS. The Supplemental Feasibility Study Report for Operable Unit No. 2 (SFS) was completed and submitted to NYSDEC in April 2006 (Parsons, 2006). In 2009, a Modified Feasibility Study Report (MFS) was prepared and submitted to NYSDEC (Haley & Aldrich, 2009), which incorporated additional new data and analyses with the intent to fully integrate OU-2 and OU-1 remedial activities. In 2011, a Revised Feasibility Study (RFS) was submitted (Haley & Aldrich, 2011) to address proposed amendments to the OU-1 ROD and the integrated remedies for OU-1 and OU-2.

Based on the above regulatory process, on 30 March 2012 NYSDEC issued an amended ROD for OU-1 and a ROD for OU-2. The Amended Order on Consent was signed 6 November 2013.

3. Site Contamination

The sections herein describe the nature and extent of PCB impacts based on remedial investigations completed through 2011 which was the basis for remedy evaluation and culminated in the remedy selected by NYSDEC. A Pre-Design Investigation (PDI) was completed between 2012 and 2015 for which data was collected to pre-delineate removal areas and addressed limited data gaps identified in the RODs. Supplemental data is discussed in Section 5 of this report.

3.1 OPERABLE UNITS

An operable unit represents a portion of a remedial program for a site that, for technical or administrative reasons, can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The site is divided into two operable units defined as: Operable Unit 1 (OU-1) is the upland soils area west of the railroad tracks. OU-2 is the adjacent area of the Hudson River. While the site is separated into two operable units, remedial approaches are interdependent based on the complex interface between them, namely the shoreline.

3.2 REMEDIAL INVESTIGATIONS

A timeline of remedial investigation (RI), feasibility studies and alternative evaluations is provided below with results of the nature and extent of contamination discussed in subsequent sections. Lists of major historical site investigations and reports are provided in Table 1 and Table 2, respectively for reference.

1976 to 1989 - Several geotechnical and environmental investigations were conducted at the site which involved soil sampling and analysis. In particular, the December 1987 "Site Investigation Report" summarized the results of surface and subsurface soil samples, groundwater monitoring, and building sump samples. Based on this report, the U.S. Environmental Protection Agency (EPA) issued a Preliminary Assessment for the site in January 1989. Additional investigations were conducted during 1989, resulting in the October 1989 "Environmental Investigation Report." These investigations revealed the presence of PCBs, petroleum hydrocarbons and metal contaminants in surface and subsurface soils. These contaminants were also found in groundwater beneath the site at levels exceeding water quality standards. The maximum concentration of PCBs found during these investigations prior to 1990 was 4,100 milligram per kilogram (mg/kg) in subsurface soils in the Northwest Corner of the site. In July 1989, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

1990 to 2011 – Between 1990 and 2008, numerous remedial investigations of OU-1 and OU-2 were completed and summarized in the Conceptual Site Model (CSM) (Haley & Aldrich, 2008). The purpose of the various RIs was to define the nature and extent of contamination resulting from previous activities at the site and included the following:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,

- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

As described in the RI reports, many soil, sediment, surface water, and groundwater samples were collected to characterize the nature and extent of contamination at the site. The data have identified contaminants of concern including polychlorinated biphenyls (PCBs) in soil, sediment, and groundwater. While the site contamination includes other categories of contaminants (i.e. metals), the following summary focuses on PCBs. The nature and extents of PCBs derived from these investigations was the basis for remedy selection.

3.2.1 Nature of Contamination (Basis of Remedy Selection)

PCBs are a group of 209 different synthetic organic chemicals that were used in industry due to their resistance to heat and electrical insulating properties. PCBs have low solubility in water, low volatility in air, and tend to adsorb to oils, fats and carbon-rich materials, if available. In the environment, PCBs are relatively persistent, and are degraded only under certain highly favorable conditions. PCBs bio accumulate in animals and concentrations in portions of the food chain can be 100,000 times higher than the levels found elsewhere in the environment. PCBs were typically formulated into "Aroclor" mixtures, which was a trade name used by the manufacturer (Monsanto), and one in which the degree of chlorination varied depending on the use of the product. The primary PCB mixture found at the Harbor at Hastings site was Aroclor 1260, with lesser amounts of Aroclor 1254. In pure form, Aroclor 1260 is 60% chlorine by weight, and is one of the heaviest, most viscous, and most persistent PCB mixtures. Aroclor 1260 is described in the technical literature as a "sticky resin." When it was used to impregnate the paper wrapping for high voltage cables, it was reportedly dissolved in a petroleum-based solvent.

DNAPL (reported as "rubbery matrix") was encountered during the RI activities conducted in 1998 by IT Corporation (IT, 2000) and was observed to contain the highest levels of Aroclor 1260 found at the site. In the 2007 and 2008 investigations, the material was observed in three different physical states designated as: Liquid PCB Material (DNAPL), Semi-Solid PCB Material (resembles rubber cement), and Trace PCB Material (hair like filaments). This material is collectively referred to as PCB Material (PCBM). This elastic material ranged from small hair-like filaments to a 2-inch separate layer within the soil column. Semi-Solid PCB Material was generally observed to be more viscous than Liquid PCB Material and appeared grayish-brown in color. Based on visual observations, Semi-Solid PCB Material had more string-like consistency. Trace PCB Material, when observed, was intermingled with the soil and more difficult to discern. Like the Semi-Solid PCB Material, the Trace PCB Material had a string-like consistency and appeared gray in color. The variation in the physical state of the material may represent weathering changes since the time the material was released.

Elastic Material Containing High Levels of PCBs

Hair-like Filament of Elastic Material

The elastic material is believed to be the Aroclor wire-insulating mixture that was formulated in the Northwest Corner of the site. The liquid elastic material was found to contain traces of the solvent in which it was originally dissolved. This material had apparently leaked or released and had migrated beneath the site. As the solvent carrier dissolved from the mixture into the groundwater, the PCB component became more viscous and, ultimately, resinous. Isolated occurrences of this material have been observed in sediment samples. A liquid form of this elastic material, highly viscous in consistency, was also found in one monitoring well in the Northwest Corner of the site.

Supplemental investigations completed after remedy selection (Section 5) did not provide any new information about the nature of contamination.

3.2.2 Extent of Contamination (Basis of Remedy Selection)

Extents of PCB contamination are discussed for onshore and offshore including details for soil, groundwater, sediment, and PCB Material. The extents discussed below were sufficient to select a remedy, albeit one which requires some further data collection. Data gaps were addressed during the supplemental investigations completed after remedy selection (Section 5). The CSM report contains detailed information about sample quality.

3.2.2.1 Onshore

PCBs were detected in soils in various areas of the site as well as groundwater. These areas demonstrated somewhat different contamination characteristics and are discussed separately below. Extents of soil contamination used to select the remedy showing PCB analytical results from the various RIs completed through 2008 are shown in CSM Figures 7A, 7B, & 7C (Appendix A). Extents of DNAPL are shown in ROD Figure 3 (Appendix A). PCBs present in groundwater are shown in CSM Figure 13A (Appendix A).

Supplemental investigations were completed after remedy selection and provided additional data to support excavation pre-delineation and support remedial design. Additional analytical results used for

pre-delineation are shown in Figure 3 sheets 1-4 and show the proposed excavation areas along with analytical results. Supplemental investigation data was consistent with RI data unless noted.

Northwest Corner

The highest PCB detections and greatest depth of migration were found in the Northwest Corner, where PCBs were historically mixed and used. The elastic matrix of highly concentrated Aroclor 1260 was found in several investigatory borings performed in the Northwest Corner of the site. Adjacent to the Hudson River, the liquid form of the elastic matrix (DNAPL) has been observed, pooled in a depression in the surface of the Marine Silt at a depth of approximately 35 feet. The PCB concentration of this material was measured to be up to 380,000 mg/kg. PCB contamination extends to at least 30 feet beneath the Northwest Corner. In some locations, the depth of contamination approaches 40 feet. Additional investigations were completed to design and install an IRM for the removal of DNAPL (Section 3.3.5).

Water Tower Area

Light non aqueous phase liquid (LNAPL) is present in the Water Tower area and analytical results indicate the presence of PCBs in the LNAPL. Potential sources of the LNAPL are the former 100,000-gallon above ground storage tanks (ASTs) containing heating oil that served the boiler system in Building 57, north of the water tower. The ASTs and associated auxiliary piping may have been compromised and allowed for leaking of oil to the surrounding subsurface.

Building 52

Composite (~6 inches) and discrete (~0.5 inch) concrete samples of the concrete slab within Building 52 were collected in 2006 and 2009, respectively. In two locations, discrete concrete samples indicate the presence of PCBs in the top 1 to 2 inches at concentrations that exceed 50 mg/kg. Soil samples collected from beneath the slab contain PCBs measured to be up to 657 mg/kg.

Supplemental investigations will be required for soil beneath the slab of this building after demolition of the above ground structure. Currently, concrete slab sampling to delineate areas greater than 50 mg/kg is planned to support the future demolition.

Other Northern Areas

PCB contamination is believed to be related to the storage of wire reels and other materials in open areas of this part of the site. This open area included portions of two former buildings, Buildings 52A and 52B as shown on Figure 2, which were constructed after 1954. Contamination in this area is not as deep or as concentrated as in the Northwest Corner. Contamination along the shoreline typically does not exceed 20 feet below ground surface. The elastic matrix was found in some soil borings taken from areas along the shoreline, including the sample containing the highest PCB concentration at a depth of 9 feet below ground surface.

Central and Southern Areas

PCBs were found at various isolated locations in these parts of the site. PCBs were found at relatively lower concentrations and shallower depths with a few locations greater than 10 mg/kg at depths approaching 12 feet. PCBs observations included near former Building 72A, which was Anaconda's former laboratory building and near former Building 17, which appeared to contain below grade trenches. The extents near Building 17 were significantly updated during supplemental investigations

(Section 5) and indicated much higher concentration levels of PCBs that extend to depths greater than 12 feet bgs. Currently, this excavation area has not been fully pre-delineated.

Building Outfalls

Outfalls from Building 52 and Building 15 were suspected to have conveyed process waste water to the Hudson River during the time when PCBs were used in manufacturing processes. Outfalls were identified but not fully evaluated prior to remedy selection in 2012 but assumed to be addressed by the remedy. Supplemental investigations completed after remedy selection (Section 5) indicated the following:

- Most of the Building 52 outfalls did not require further investigation due to their presence within areas that will be removed to depths below the outfall pipe.
- One suspected Building 52 outfall was identified as potentially being outside excavation areas and pipe bedding PCB results were 53 mg/kg. Based on observations and historical document review, the piping is likely not a Building 52 outfall.
- The Building 15 outfall did not require further investigation due to its presence within the area of shoreline removal for final sloped shore configuration.

Groundwater

Historical groundwater samples collected from upland locations within the Fill Unit were analyzed in both filtered and unfiltered forms to determine the influence of suspended fine particles on contaminant levels. The majority of unfiltered samples contained PCBs at levels that exceed the New York State Ambient Water Quality Standard for drinking water of 0.09 micrograms per liter (µg/L). One unfiltered groundwater sample contained PCBs at 390 milligrams per liter (mg/L), which is more than 100 times greater than the reported solubility of Aroclor 1260 (2.1 µg/L). This sample was taken from the well containing "liquid elastic matrix", and it is likely that particles of this matrix were collected with the water sample. Filtered samples contained much lower levels of PCBs, with a maximum measured value of 1.0 µg/L. Groundwater samples collected from the Basal Sand Unit did not contain detectable levels of PCBs. Supplemental investigations were completed after remedy selection (Section 5) using low flow sampling techniques at 3 upgradient and 3 downgradient locations. Results of 2015 unfiltered samples were consistent with previously collected filtered samples with all results less than 1.0 µg/L.

3.2.2.2 Offshore

Sediment samples were collected from the Hudson River and at locations upstream, adjacent and downstream of the site. The results indicate that sediment is impacted with PCBs and various metals. The highest PCB concentrations in sediment (shallow and deep) were found offshore of the Northwest Corner of the site. The samples included PCB material identified as Semi-Solid PCB material.

The OU-2 portion of the site is divided into different areas which has been useful to define the nature and extent of contamination and evaluate alternatives. These areas are described below and are labeled on Figure 2. Areas include the Nearshore Area, Backwater Area, and Deepwater Area. Remedial alternatives in these areas are partially determined by whether sediment re-suspension controls can be implemented. Generally, in this portion of the Hudson River, re-suspension controls can be used when the depth of surface water is 15 feet or less (i.e., shallow water areas), whereas re-suspension controls cannot be used when the depth of surface water exceeds 15 feet (i.e., deepwater areas). Extents of PCB

sediment contamination from results of the various RIs completed through 2008 used to select the remedy are shown in ROD Figure 5 (Appendix A).

Supplemental investigations were completed after remedy selection and provided additional data to support dredging pre-delineation and support remedial design. Additional analytical results used for pre-delineation are shown in Figure 4 sheets 1-2 and Figure 5, which show the proposed dredge areas along with analytical results. Supplemental investigation data was consistent with RI data unless otherwise noted.

Nearshore Area:

The area of sediment along the shore is defined by the feasible limit of resuspension controls in the Hudson River and the existing bulkhead between OU-1/OU-2 boundaries on the east. This area is generally within 60 to 80 feet of the shoreline. This area does not include the Backwater Area or the Northwest Extension Area (NEA). In the Nearshore Area of the Hudson River, total PCBs were found in relatively lower concentrations and at shallower depths. PCB concentrations are typically less than 10 mg/kg with only a few exceptions.

Backwater Areas:

These sediment areas include the Old Marina (adjacent land parcel), North Boat Slip, and South Boat Slip and are areas with lower river velocities and have been identified to have increased sediment deposition because they are out of the main flow of the river. Therefore these areas are therefore discussed separately. Similar to Nearshore Areas, PCB concentrations are typically less than 10 mg/kg with only a few exceptions.

Deepwater Area:

These sediment areas are beyond the feasible deployment of re-suspension controls. The furthest extent of contamination is approximately 600 feet west (at its furthest point) of the OU-1 shoreline, 300 feet north of the OU-1 northern property boundary, and proximate to the OU-1 southern boundary. Depth of water in these areas approaches 40 feet. The Deepwater Area contains two separate areas. One Deepwater Area required investigation to collect data in order to evaluate the nature and extent of contamination (Deepwater Evaluation Area). The other area (Deepwater Northwest Area) adjacent to the Northwest Extension Area was focused on delineation of dredge extents where removal was anticipated by the ROD as being required as part of the remedial action.

- Deepwater Evaluation Area: Total PCB concentrations in the upper three feet of sediment were near background with few exceptions. Recent sampling indicated that there were six detections greater than 50 mg/kg total PCBs (71 to 1,100 mg/kg) but were found at depths ranging from 3 to 4 ft bml except for one at a depth of 2 to 3 ft bml.
- Deepwater Northwest Area: Area is located off-shore immediately west and southwest of the Northwest Extension Area portion of OU-2 up to approximately 225 feet from the shoreline. Areas of PCB results greater than 50 mg/kg are sporadic throughout the sampling area and vary by depth, thickness, and concentration. Recent sampling indicated that total PCB concentrations up to approximately 10,000 mg/kg with extents of PCBs exceeding 6 ft bml.

Northwest Off-Shore Area (Northwest Extension Area):

This area is characterized by rip-rap fill that extends approximately 60 to 75 feet off-shore from the shoreline and is estimated to be up to approximately 22 feet thick. The rip-rap that is visible along the shore consists of boulder-size pieces of rock or concrete and transitions to sediment with occasional cobbles and boulders further from shore. Where borings could be advanced, the fill and sediment had PCBs detected to more than 30 feet deep with a maximum PCB concentration of 9,200 mg/kg. PCB concentrations greater than 1,000 mg/kg were found at depth ranging from near mudline to deeper than 20 feet below mudline (bml). Semi-Solid PCB material was found in various locations. Although liquid DNAPL was present in the adjacent area to the east (Northwest Corner) it was not found where borings could be advanced. However, sampling near the shoreline is not practicable due to the rip-rap. This area is later referred to as the Northwest Extension Area in the ROD.

Surface Water

Surface water samples were collected during the RI from upstream and on-site locations in the Hudson River. The samples were collected to assess the surface water conditions on- and off-site. The results indicate that PCBs in surface water at the site exceed the New York State Surface Water Quality Standards. Levels of PCBs in Hudson River surface water were higher than the New York State Ambient Water Quality Standard of 0.001 ng/L or 0.001 part per trillion in all of the 5 samples taken. The highest level, 62.4 ng/L, was found in the North Boat Slip area of the site. Elevated levels were also found in samples taken offshore of Dobbs Ferry, the background location (57.0 ng/L), in the former marina area (52.7 ng/L), and offshore of the Northwest Corner (46.6 ng/L). The sample taken offshore of Dobbs Ferry was significantly more turbid than the others, and elevated levels seen there may have resulted from suspended material in the sample. A much lower level (18.0 ng/L) was found in the south boat slip.

Supplemental investigations completed after remedy selection (Section 5) included ten monthly sampling events that included locations adjacent to the site and upriver reference locations. Findings from the additional investigation did not indicate that surface waters were impacted by site specific PCBs. Total PCBs went undetected in the majority of the surface water samples tested with minimum reporting limits that ranged between 10 and 18 ng/L. When PCBs were detected, concentrations were generally near the detection limit and the Aroclors that were identified (e.g. Aroclor 1242 or 1248) are not site specific.

Porewater

Porewater samples were collected offshore of the Northwest Corner (SD-01, -02, -04 and -05) and in the vicinity of the South Boat Slip (SD-03) during the RI. The results presented in the table below show that only Aroclor 1248, 1254 and 1260 were detected and, with the exception of SD-05, had relatively low aqueous concentrations of total PCBs ($\leq$0.2 ug/L). Results are provided in the table below.

Sample Location	PCB Aroclors						
	1016	1221	1232	1242	1248	1254	1260
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SD01	ND	ND	ND	ND	0.019	0.013	ND
SD02	ND	ND	ND	ND	ND	ND	ND
SD03	ND	ND	ND	ND	0.036	0.053 J	0.19 J
SD04	ND	ND	ND	ND	0.014	ND	ND
SD04 REPLICATE	ND	ND	ND	ND	0.019	0.013	ND
SD05	ND	ND	ND	ND	0.12	0.17 J	0.2

A supplemental investigation for porewater was completed after remedy selection (Section 6). The scope of recent the event was similar except that the 2013 event included reference samples. In 2013, porewater was collected at seven locations. Only one of six Site porewater samples was positive for PCBs at a reporting limit of less than 0.010 µg/L and the types of Aroclors observed in that sample (1248 and 1254) which are not strong indicators of site-related PCBs. These results appear to indicate that PCBs are strongly bound to the sediment and have little propensity to partition into porewater.

3.2.2.3 PCB Material (Onshore and Offshore)

Sixty six on- and off-shore borings and monitoring wells were completed in in 2007 and 2008. Borings were advanced along the shore in the Northwest Corner and Former Disposal Area to determine horizontal and vertical extent of impacted material.

Based on these investigations, with limited exceptions, the depth of PCB migration in both OU-1 and OU-2 is controlled by the marine silt layer, which is present between 30 and 42 feet beneath the site. The surface of the marine silt, which generally tilts towards the Hudson River, is also characterized by troughs and ridges. These features may be directing the migration of the liquid PCB material beneath the site, creating preferential pathways and depressions where the material may pool. Several field testing methods were used to verify the presence of the PCB Material and to provide information on the physical nature of the material, including: Laser Induced Fluorescence (LIF), adhesion testing, and pull testing when appropriate.

The highest levels of PCBs at the site were found in the vicinity of the Northwest Corner and were associated with separate phase PCB material that varies in consistency from a fluid DNAPL to Semi-Solid PCB material. This PCB material is the Aroclor wire-insulating mixture that was formulated in the Northwest Corner On-Shore Area of the property in former Building 56. This material apparently migrated through the soil beneath the property in its fluid form and was also discharged into the Hudson River either through outfalls, by runoff, or eroded surface soil from areas where wire reels were dried or stored on the site.

Key findings of PCB Material include:

- PCB Material occurs in varying states of viscosity ranging from flowable DNAPL to rubber-like Semi-Solid PCB material.

- PCB Material is an approximately 40% polychlorinated mixture (PCBs, Polychlorinated Naphthalenes, Polychlorinated Terphenyls) within an aromatic solvent.
- DNAPL is primarily located in the Northwest Corner, generally at depths where future human or animal contact is unlikely (the Fill-Marine Silt interface).
- DNAPL observed in the Northwest Corner is believed to result from spills and leaks during operations material handling during World War II.
- Limited occurrences of Semi-Solid and Trace PCB Material were observed in the Northwest Corner, Former Disposal Area and off-shore.
- The data collection for DNAPL also provided improved understanding of the contours of the Fill-Marine Silt interface.

Supplemental investigations completed after remedy selection (Section 5) did not provide significantly different information about the nature or extents of PCB Material contamination, but rather provided further refinement of the extents.

3.2.3 Analytical Data quality

During the completion of the Modified CSM (Haley & Aldrich, 2008), a database was constructed in order to manage the over 70,000 historic samples. In order to construct the database, many sources were used including, but not limited to, partial historical databases and historical reports. A review of the historical databases included: sample location names, chemical names, sample dates, matrix codes, validation qualifiers, and chemical abstract service registry numbers (CASRN).

Data was checked against lab reports when available or data summary tables. Out of the 72,525 compiled records, 24,782 records consisting mainly of legacy data (pre-2004) were hand checked against these reports.

Supplemental data, as described in Section 5 of this report, was data-validated by a third party. Based on Data Usability Reports (DURs) provided to date, data validation has resulted in only minor changes in results or flags. Final remedial design will be based upon validated data.

3.3 INTERIM REMEDIAL MEASURES

The remedial investigations prompted implementation of various interim remedial measures (IRM) at the site to address sources of contamination or exposure pathways that could be effectively addressed before completion of the RI/FS.

3.3.1 Building 14 Sump and Trench Cleanout

Building 14, located in the southern portion of the site, had been used as a boiler house and for electrolytic processing. Certain samples of standing water and sediment from three sumps and a trench were found to be contaminated with PCBs. An IRM was performed in December 1997 to pump out water and sediments, steam clean the surfaces of these structures, and backfill them with clean sand.

3.3.2 Light Non-Aqueous Phase Liquid

Several temporary monitoring wells were installed within the vicinity of former 100,000-gallon aboveground storage tanks (ASTs) (adjacent to the Water Tower) during the 1996 RI. Two monitoring wells indicated the presence of LNAPL on the water table near the water tower. The thickness of this layer ranged from a sheen to 1½ inches; and the PCB LNAPL was determined to contain PCBs. Waste characterization of the LNAPL indicates that total PCBs exceed 50 mg/kg.
An IRM (Fluor Daniel, 1997) was implemented to monitor and recover LNAPL within the vicinity of former ASTs located south of Building 57 and the Water Tower. In June 1998, PCB LNAPL recovery devices were installed in four monitoring wells. PCB LNAPL was removed from them on a weekly basis until 2007 when the devices were removed and replaced with absorbent socks. Currently, the socks are inspected and changed as required on a quarterly basis and properly disposed of at a permitted off-site facility. Through September 2015, approximately 688 gallons of LNAPL have been recovered, and this IRM will continue until the remedy is implemented. LNAPL will be removed during the remedial action through excavation of this area to depths that extend below the water table.

3.3.3 Northwest Corner Interim Cover

In June 1998, the top 2 inches of surface soils from the Northwest Corner of the site were found to contain up to 4,400 mg/kg of PCBs. Because Buildings 53 and 54 are located adjacent to this area, and were occupied by a manufacturing operation, concerns were raised for potential exposure of workers to contaminated dusts. In July 1998, an interim cover of four inches of gravel was placed over exposed soils, and a fence was erected around areas of contamination.

3.3.4 Shoreline Bulkhead

To prevent the further release of contaminated fill and PCBs to the river, ARC installed a sheet pile bulkhead with sealed joints as an IRM along the southern portion of the shoreline, where the deterioration of the existing bulkhead was most severe. This work was completed in December 2000.

3.3.5 Dense Non-Aqueous Phase Liquid (DNAPL)

Investigations beginning in 2006 identified locations onshore at which liquid PCB Material is present in the vicinity of the Northwest Corner in monitoring wells. DNAPL has not been observed offshore. DNAPL was observed to be amber in color and less viscous than the Semi-Solid or Trace PCB Material. The physical state of the DNAPL is flowable and tacky with a viscosity up to 10,000 centipoise (cP). A DNAPL IRM Final Evaluation Report (Haley & Aldrich, 2010) was completed which evaluated DNAPL removal technologies. The results of the evaluation indicated that removal of DNAPL via recovery well was the most viable and constructible technology.

An investigation was completed in 2011 and 2012 to determine the extents of the recovery well network in the Northwest Corner. ROD Figure 3 (Appendix A) shows a conceptual model of PCB DNAPL in the subsurface in the Northwest Corner of the site Area.

Upon completion of the recovery well network, a mobile DNAPL recovery system was designed and constructed for the IRM The IRM removes material 10 times per year from up to five recovery wells Through September 2015, approximately 1,900 gallons of DNAPL have been recovered and properly

disposed of at a permitted off-site facility. This operation will continue at a frequency of 10 times per year until implementation of the remedy. Specifics of the system operation are discussed in the Design Basis Memorandum – DNAPL IRM System Design (Haley & Aldrich, 2011). Upon completion of construction of the bulkhead wall as part of the remedy, additional investigation and/or DNAPL recovery may be initiated in areas currently inaccessible due to the presence of large rip rap on the shore line.

3.4 EVALUATION OF PCB CLEANUP ALTERNATIVES

Various feasibility studies were completed to evaluate the remedial investigations including NYSDEC evaluations within the Proposed Remedial Action Plans and Record of Decisions. (A complete summary of reports is provided in Table 2.)

Site wide

- 1996 Remedial Investigation Report (Site wide) (Golder, 1996)
- 1998 Feasibility Study (Site wide) (Fluor Daniel GTI, 1998)

OU-1

- 1998 Proposed Remedial Action Plan (OU-1) (NYSDEC, 1998)
- 2002 Final FS (OU-1) (Haley & Aldrich, 2002)
- 2003 Proposed Remedial Action Plan (OU-1) (NYSDEC, 2003a)
- 2004 NYSDEC Record of Decision (OU-1) (NYSDEC, 2004)

OU-2

- 2000 Remedial Investigation Report (OU-2) (Earth Tech, 2000)
- 2003 Feasibility Study (OU-2) (Earth Tech, 2003)
- 2003 Proposed Remedial Action Plan (OU-2) (NYSDEC, 2003b)
- 2006 Supplemental FS (OU-2) (Parsons, 2006)

Site wide & Proposed Remedy

- 2009 Modified FS (OU-1 and OU-2) (Haley & Aldrich, 2009)
- 2011 Revised FS (OU-1 and OU-2) (Haley & Aldrich, 2011)
- 2012 Proposed Remedial Action Plan (OU-2) (NYSDEC, 2012)
- 2012 Record of Decision (OU-2) (NYSDEC, 2012a)
- 2012 Record of Decision Amendment (OU-1) (NYSDEC, 2012b)

Extensive evaluation of remedial options have been considered through multiple feasibility studies, and evaluated by NYSDEC and the public since 1998. Evaluations included the following criteria:

- Overall Protection of Human Health and the Environment
- Compliance with Standards, Criteria and Guidance (SCGs)
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short Term Impact and Effectiveness
- Implementability
- Cost Effectiveness
- Land Use
- Community Acceptance

Alternatives considered No Further Remedial Action alternatives, Removal to Feasible Limits and an extensive number of other remedial alternatives for all aspects of the remedy. Soil and sediment removal depths, groundwater controls and isolation approaches were among the options considered. A final remedy was selected at the end of these evaluations and was documented in the NYSDEC RODs.

Specifically, a list of alternative, their evaluations, and conclusions can be found in the Record of Decisions as well as the 2011 Revised FS (OU-2) and 2002 FS (OU-1). During the process, onshore and offshore approaches were considered together to ensure that remedies were mutually constructable. These documents also explain the reasons for the selected remedy including the justification for leaving residual PCBs on site.

4. Selected Remedy

Based on the nature and extents of site constituents of concern, resulting from investigations and engineering evaluations completed through 2011, a remedy was selected by NYSDEC. Based on this remedy, the OU-1 and OU-2 RODs were completed in 2012 and a Consent Order executed in 2013. The remedy as described in the RODs are provided below and the full documents are included in Appendix B (OU-1) and Appendix C (OU-2).

Additionally, during completion of the remedial action, dewatering and excavation activities will require that soil and groundwater be processed prior to disposal. Soil will be bulked to reduce water content prior to placing in waste containers and transported to a TSCA approved disposal facility and groundwater will be treated prior to discharge to storm. Discharge water quality will be determined by fulfilling the substantive requirements of a State Pollutant Discharge Elimination System (SPDES) permit as required by NYS DER-10. Details of the bulking process, mode of transportation, disposal facility, and groundwater treatment will be completed during the Remedial Design.

4.1 OU-1 RECORD OF DECISION

Based on the OU-1 ROD Amendment, *"The elements of the amended remedy listed below are identified as unchanged, modified or new when compared to the original 2004 ROD:*

> *"The elements of the amended remedy listed below are identified as unchanged, modified or new when compared to the original 2004 ROD:*

1. *A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:*

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the Long term;
    - Reducing direct and indirect greenhouse gas and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - Maximizing habitat value and creating habitat when possible;
    - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
    - Integrating the remedy with the end use where possible and encouraging green and sustainable redevelopment (modified)

2. *At the Northwest Corner of the site and along the Northern Shoreline, excavation of surface soil (0- 12 inches) contains greater than 1ppm PCB and subsurface soil containing greater than 10*

ppm PCB to a maximum depth of 9 feet. Outside of the Northwest Corner and the Northern Shoreline areas, excavation of surface soil (0-12 inches) containing greater than 1ppm PCB and subsurface soil contains greater than 10 ppm PCB, to a maximum depth of 12 feet. (modified)

3. *Outfalls and associated pipe bedding from Building 52 that are potential PCB source areas will be excavated, sampled and removed, or decommissioned as approved by the Department. (new)*

4. *Excavation of shallow soils from the southern portion of the site that are identified as "lead hotspots". These correspond to lead levels between 2,160 ppm and 43,200 ppm. (unchanged)*

5. *In conjunction with OU2, installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of PCB DNAPL onshore and offshore of the northwest corner of the site. The location and alignment of the proposed sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River. The area behind the sheet pile wall will be filled with soil and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater discharging to the river. (new)*

6. *The shoreline south of the northwest area will either be a steel bulkhead or construction of a sloped shoreline cover system. The sloped shoreline cover system will be designed and constructed such that no additional fill material will be placed into the Hudson River, and will require the removal of sediment or fill below the current sediment or water elevation for placement of a cover system. The sloped shoreline cover system will be designed with the following layers: an isolation layer of soil or geotextile designed to prevent the migration of contaminated soil particles into the Hudson River; an erosion protection layer; and a habitat/surface substrate layer. The habitat/surface substrate layer will be designed to restore aquatic, intertidal and stream bank habitats while taking into account erosional forces, such as waves and currents. (new)*

7. *Construction and operation of a recovery system for PCB DNAPL, consisting of a series of wells and an active pumping system to remove fluid PCB material as it collects. (new)*

8. *A site cover will be required to allow for restricted residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). However, pile-supported structures will not be permitted in any areas where PCB material is potentially present. Where the soil cover is required, it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer with appropriate natural species. (modified)*

9. *Imposition of an institutional control in the form of an environmental easement for the controlled property, that will:*

a. *require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);*
b. *allow the use and development of the controlled property for restricted-residential, uses as defined by Part 375-1.8(g) which are consistent with the remedial elements, although land use is subject to local zoning laws;*
c. *restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;*
d. *prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and*
e. *require compliance with the Department approved Site Management Plan. (new)*

10. *A Site Management Plan will be required, which includes the following:*
    a. *an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:*

       Institutional Controls: The Environmental Easement discussed in Paragraph 9 above.

       Engineering Controls: The soil cover discussed in Paragraph 8; groundwater treatment system; and PCB DNAPL recovery system.

       This plan includes, but may not be limited to:
       i. *an Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination;*
       ii. *descriptions of the provisions of the environmental easement including any land use, groundwater and/or surface water use restrictions, which include a prohibition on pile supported structures over areas with PCB material;*
       iii. *provisions for the management and inspection of the identified engineering controls;*
       iv. *maintaining site access controls and Department notification; and*
       v. *the steps necessary for the periodic reviews and certification of the institutional and engineering controls.*
    b. *A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:*
       i. *monitoring groundwater quality and elevation to assess the performance and effectiveness of the remedy;*
       ii. *soil cover system inspection and maintenance as necessary to ensure its function is not impaired by erosion or activities at the site;*
       iii. *shore protection system (sheet pile and sloped areas) will be periodically monitored for erosion, corrosion, damage or deterioration; shoreline elevation; and*
       iv. *a schedule of monitoring and frequency of submittals to the Department;*

c. *An Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of for any mechanical or physical components of the remedy. The plan includes, but is not limited to:*
    i. *compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;*
    ii. *maintaining site access controls and Department notification; and*
    iii. *providing the Department access to the site and O&M records (modified)"*

4.2 OU-2 RECORD OF DECISION

Based on the OU-2 ROD, *"The elements of the selected remedy are as follows:*

1. *A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:*

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gas and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - Maximizing habitat value and creating habitat when possible;
    - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
    - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development

2. *Installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of liquid PCB DNAPL offshore of the northwest corner of the site. The location and alignment of the northwest extension area (NEA) sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River while enabling effective DNAPL containment and recovery and maintaining stability of the site. It is estimated that this area of fill will encompass 0.88 acres. The area behind the sheet pile wall will be filled with soil and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater before discharge to the river.*

3. *Mitigation of fill placed into the Hudson River to replace the aquatic habitat that will be lost as a result of the NEA. Mitigation will involve the creation and/or restoration of river habitat in accordance with a Department-approved plan.*

4. *Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the northwest corner of the site and the NEA.*

5. *Removal of sediment and fill that contains PCB concentrations greater than 1 ppm and/or copper, zinc and lead concentrations above the background concentrations listed in Table 2 of Exhibit A, to a maximum excavation depth of 6 feet within the area where sediment resuspension controls, such as a fixed silt curtain, are feasible. This area generally corresponds to a water depth of 15 feet and a distance from the shoreline into the river of approximately 60 to 80 feet and along approximately 2000 feet of shoreline.*

6. *The specific area where fixed sediment resuspension controls can be feasibly deployed will be evaluated during design based on the water depth and velocity conditions at the site. Alternative designs for fixed resuspension controls will be evaluated to increase the depth of feasible resuspension controls. Designs for mobile resuspension controls will also be evaluated and developed for dredging in deeper water, if necessary.*

7. *Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to a maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging.*

8. *On-site dewatering of dredged and excavated sediments for off-site transportation and disposal or onsite reuse, as appropriate. On-site reuse of sediments will be evaluated during design. Water removed from the sediment will be treated and discharged back to the river in compliance with regulatory requirements.*

9. *Backfill of dredged areas with Department-approved material. Dredged areas within the resuspension controls will be backfilled with clean material to isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. In nearshore areas which have contamination remaining above background concentrations, isolation capping will be placed following dredging. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer. The isolation and armoring layer thicknesses and materials of the cap will be established in the remedial design. As part of the design, a river flow and deposition study will be conducted to determine approximate sedimentation rates and the acceptability that up to 12 inches of the habitat layer may fill in by natural deposition within a reasonable duration of time after installation of the remainder of the isolation cap. Additional backfill needed to reach bathymetry requirements will be placed between the erosion protection layer and habitat layer. The habitat layer will be designed to restore aquatic habitat. Dredged areas that are outside the near shore area will be backfilled with appropriate river substrate to within 12 inches of the pre-dredge elevation provided that the sedimentation study demonstrates that sufficient deposition will occur within a reasonable time frame. All activities associated with the excavation and restoration of Hudson River sediments will meet the requirements of 6NYCRR Part 608.*

10. *Imposition of an institutional control in the form of an environmental easement for the NEA which will be included with the environmental easement for OU1 that will:*
    a. *require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);*
    b. *allow the use and development of the controlled property for restricted residential uses as defined by Part 375-1.8(g), consistent with the OU1 ROD, as amended,, although land use is subject to local zoning laws;*
    c. *restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;*
    d. *prohibit agriculture or vegetable gardens on the controlled property; and*
    e. *require compliance with the Department approved Site Management Plan.*

11. *A Site Management Plan is required, which includes the following:*
    a. *an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:*

       Institutional Controls: The Environmental Easement discussed in Paragraph 10 above.

       Engineering Controls: The sediment containment system and cover discussed in Paragraphs 2 and 9.

       This plan includes, but may not be limited to:

        i. *Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination and includes a prohibition on the construction of pile-supported structures within the Northwest Extension Area;*
        ii. *descriptions of the provisions of the environmental easement including any land use, groundwater, and surface water use restrictions;*
        iii. *provisions for the management and inspection of the identified engineering controls;*
        iv. *maintaining site access controls and Department notification; and*
        v. *the steps necessary for the periodic reviews and certification of the institutional and engineering controls.*

    b. *a monitoring plan to assess the performance and effectiveness of the remedy. The plan will be designed to measure PCB and metals concentrations and evaluate the long-term contaminant trends in the affected media (biota, sediment, water). One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. The plan includes, but may not be limited to:*

i. *baseline sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and habitat characterization;*

ii. *long-term sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and restoration success to assess the performance and effectiveness of the remedy; and*

iii. *a schedule of monitoring and frequency of submittals to the Department.*

c. *an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:*

i. *compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;*

ii. *providing the Department with required notifications and access to the site and O&M records."*

4.3 SUMMARY OF PCB-SPECIFIC ELEMENTS IN THE SELECTED REMEDY

The following is a synopsis of the remedial components that are directly related to addressing the PCB contamination found in soil and sediment at the site as well as containment of the PCB DNAPL.

OU-1

- Excavation of soil greater than 10 mg/kg PCB to a maximum depth of 9 or 12 feet.
- Excavation of surface soil (0-12 inches) greater than 1 mg/kg PCB. Note however, that PCBs in surface soil will be isolated by the application of a cover system over the entire site. Therefore, only excavation of soil greater than 10 mg/kg PCB is required as stated above.
- Building 52 outfalls will be addressed.
- Bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest Corner of the site and the Northwest Extension Area.
- Construction and operation of a post-remedy recovery system for PCB DNAPL.
- Installation of a site cover will be required to allow for restricted residential use of the site. Soil cover in areas not otherwise covered by the development at the site (e.g., buildings, pavement, etc.) will consist of two feet of clean soil over a demarcation layer. Note that the preliminary design currently plans to install a cover system over the entire site, including a shoreline protection system along the river.
- Implementation of institutional controls which will manage soil excavation activities and prohibit use of groundwater.

OU-2

- Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the Northwest Corner of the site and the Northwest Extension Area.
- Removal of sediment that contains PCB concentrations greater than 1 mg/kg to a maximum depth of 6 feet below the mud-line within areas of re-suspension controls (i.e., shallow water sediment in Nearshore Area, and Backwater Area).
- Nearshore dredge areas will be backfilled with clean material. Isolation capping will be provided where residual contamination remains above background concentrations. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer of which natural deposition may provide up to 12 inches where a reasonable time frame for deposition can be demonstrated.
- Subject to evaluation and further investigation, removal of sediment outside of re-suspension controls that contain PCB concentrations greater than 50 mg/kg, to a maximum depth of 6 feet below the mud-line. Note that these areas are discussed as the Deepwater Evaluation Area and Deepwater Northwest Area. Dredged areas will be backfilled based on final design requirements.

Feasibility and design data relating to the offshore engineered cap from the 2012 Revised Feasibility Study are included in Appendix C

4.4 DESIGN AND CONSTRUCTION SCHEDULE

A Consent Order between Atlantic Richfield Company and ARCO Environmental Remediation, LLC. and NYSDEC was signed in November of 2013. The consent order required the development of a Remedial Design Work Plan (RDWP). A schedule was established by the RDWP and clarified by the Pre-Design Investigation Data Summary Report to be as follows:

- Complete Pre-Design Investigation 270 days following approval of the work plan (approved on 14 July 2014, field work completed on 9 April 2015).
- Submit an initial PDI Data Summary Report 120 days following completion of the PDI (10 August 2015).
- Submit the Preliminary Design 180 days following submittal of the approved Final PDI Data Summary Report (TBD).
- Submit Final Design incorporating Preliminary Design review (TBD).
- Complete Remedial Action (TBD); the current duration is estimated to be 5 years.

4.5 SUPPLEMENTAL INVESTIGATION ACTIVITIES

Historical investigations completed through 2011 were generally adequate to describe the nature and extent of site constituents of concern. However, as required in the RODs, two supplemental investigations were necessary to provide additional information. Select sections of the RDWP Pre-Design Investigation and Baseline programs, that define relevant scope, are included in Appendix E and Appendix F. These programs provided the following data requirements as discussed hereafter.

Pre-Design Investigation (PDI) – Section 5.1 and Section 5.2

- Evaluate site features that could impact design and constructability (e.g. obstructions, outfalls, former sumps, etc.);
    - Building 17 former sump/trench
    - Building Outfalls
- Pre-delineate excavation and dredge extents;
    - Soil Pre-Delineation of Soil Excavation
    - Pre-Delineation of Sediment Removal
- Collect data to support the design the Northwest Extension bulkhead wall and select its final alignment;
    - Wall Alignment and PCBM
- Determine the nature and extents of contamination in select parts of the Deepwater Area.
    - Deepwater Evaluation Area

Baseline Sampling and Analysis Plan (BSAP) – Section 5.3

- Define baseline conditions at the site for comparison after remedial action;
    - Bathymetry
    - Surface Water
    - Surficial Sediment
    - Fish and Shellfish
    - Benthic Macroinvertebrates
    - Habitat Characterization
    - Porewater
    - Groundwater
    - Air
- Provide adequate data to support detailed human and environmental risk assessments for this TSCA application.

Each investigation and its findings are provided below along with a summary of quality assurance measures applicable to these investigations.

Details on Field Procedures and Delineation Approach that are applicable to these investigations are provided below.

4.5.1 Field Procedures

Field operating procedures used to collect environmental media for PCB analysis are listed below.

- OP2000 - Monitoring Field Explorations
- OP2001 - Identification and Description of Soils Using Visual-Manual Methods
- OP3001 - Preservation and Shipment of Environmental Samples
- OP3003HOH – Subsurface Soil Sampling
- OP3004 - Sediment Sampling
- OP3007 - Surface Water Sampling
- OP3012 - Low Flow Groundwater Sampling
- OP3026 - Chain of Custody

- OP3027 – Decontamination Procedure
- OP3029 – Field Data Recording
- OP3030 - Field Instruments: Use and Calibration

All field and laboratory procedures were completed in accordance with approved Quality Assurance Project Plans (QAPP).

4.5.2 Pre-Delineation Methodology

Soil

The vertical and lateral extents of each excavation area was developed using guidance for excavation verification sampling requirements described in NYSDEC DER-10 5.4(b)5ii. Samples were generally collected at a frequency of one per 30 feet of linear sidewall collected at the bottom of the sidewall and additionally, if relevant, at concentration horizons; there was also one sample per 900 square feet collected from the excavation bottom area. Based on this guidance and analytical results, the maximum excavation depth of each area was determined based on the deepest interval in which an exceedance of removal criteria was reported (e.g. in a given boring, if a sample from 6 to 8 feet was reported to exceed criteria, however the deeper sample from 8 to 10 feet did not exceed criteria, a maximum excavation depth of 8 feet would be assigned). Incomplete areas of delineation at the time of remedial construction will be completed following this approach. Waste characterization sampling has not yet been performed for soil.

Sediment

Nearshore and Backwater sediment delineation primarily followed a grid system and delineated sediment up to 8 feet below mudline throughout the entire area. The PDI sampling program employed a sampling grid in order to fill historical data gaps. The sample spacing of approximately 80 feet on centers produces uniform data to understand the distribution of contaminants in the sediment and provides a basis for design of the remedy. Backwater areas north of the Old Marina area have not been sampled due to property access.

The Deepwater Area adjacent to the Northwest Extension Area, referred to as the Deepwater Northwest Area, was delineated using a 30 foot grid system. Initial PDI sample locations were established on a step-out system where three to four locations were sampled within approximately 25 feet of the historical sampling locations with concentrations greater than 50 mg/kg. Additional step-out sample locations were added throughout the program with locations selected based on results and proximity to other samples. Due to river dynamics and debris in the vicinity of the sampling, final locations varied from proposed. For the purposes of evaluation of remedial action and delineation of dredge areas, a grid system with cells measuring 30 ft by 30 ft was applied to these data.

5. PDI Data Results & Interpretation

Based on historic site investigations and the remedy described in the OU-1 and OU-2 RODs, a RDWP was completed and NYSDEC approved in accordance with the OU-1 and OU-2 RODs, 6 NYCRR Part 375, and DER-10 Technical Guidance for Site Investigation and Remediation as well as the Amended Order on Consent. The RDWP described data collection required to support the remedial design process and associated acquisition methods.

The RDWP was organized into a series of "Appendices" that described procedures to collect various forms of data. These RDWP Appendices are located in Appendix E of this document.

Specifically, the RDWP identified additional environmental, geotechnical, and miscellaneous (i.e. utility surveys) data required to supplement existing data to support the remedial design. The RDWP included details regarding a Pre-Design Investigation (PDI) to acquire the necessary data. PDI activities specific to PCB-related issues included:

- Evaluate site features that could impact design and constructability:

  RDWP Appendix 2: OU-1 Supplemental Investigation Plan:
  Among other tasks, this appendix outlined the process required to investigate Building 52 Outfalls and baseline groundwater sampling (described in the Baseline Sampling section). The objective of this investigation was to determine the locations of Building 52 outfalls and determine if they represent a source of PCB contamination. Additionally, an outfall from Building 15 was also investigated.

  - Building 17 former sump/trench [Section 5.1.1]
  - Building Outfalls [Section 5.1.2]

- Pre-delineate excavation and dredge extents:

  RDWP Appendix 3: OU-1 Excavation Pre-Delineation Plan:
  This appendix outlined the process required to pre-delineate the extents of PCBs in onshore soils. The objective of this investigation was to determine maximum extents of required excavation of PCBs that exceed 10 mg/kg prior to implementation of the remedy.

  - Pre-Delineation of Soil Excavation [Section 5.1.3]

  RDWP Appendix 6: Offshore Pre-delineation Plan;
  This appendix outlined the process required to pre-delineate the extents of PCBs in offshore sediments located in the Nearshore, Backwater, and Deepwater Northwest Areas. The objective of this investigation was to determine maximum extents of required dredge of PCBs that exceed 1 mg/kg in Nearshore/Backwater or 50 mg/kg in deepwater prior to implementation of the remedy.

  - Pre-Delineation of Sediment Removal [Section 5.2.2]

- Collect data to support the design the Northwest Extension Area bulkhead wall and select its final alignment:

  RDWP Appendix 4: Extension Alignment Investigation Plan:
  This appendix outlined the process required to determine the optimal alignment of the bulkhead and deadman systems. The objective of this investigation was to identify alignments free of obstructions (i.e. large rocks, etc.) and PCBM.

  - Wall Alignment and PCBM [Section 5.2.3]

- Determine the nature and extents of contamination in a certain deep water area.

  RDWP Appendix 5: Deepwater Investigation Plan:
  This appendix outlined the process required to determine the nature and extents of areas that contain PCBs at concentrations that exceed 50 mg/kg in select locations in the Deepwater Area. The objective of this investigation was to determine the nature and extents of PCBs at concentrations that exceed 50 mg/kg in the deep water and determine maximum extents of required dredge (if any) prior to implementation of the remedy.

  - Deepwater Evaluation [Section 5.2.1]

The following information provides results, interpretation and conclusions for each of these investigations below with complete information is provided in the PDI Data Summary Report (Appendix G).

5.1 PDI – ONSHORE

5.1.1 Building 17

As described in the work plan, a concrete core sample (completed in 2009) exhibited concentrations of PCBs greater than 10 mg/kg. Historic drawings indicated the presence of former wastewater conveyances (trenches) in this former building; however historic soil borings had not been completed in this area. During the PDI, two soil borings were completed adjacent to these former trenches. Analytical results from both soil sampling locations indicated the presence of PCBs greater than 10 mg/kg. Based on these results, the area was added to the OU-1 Excavation Pre-delineation investigation, and offsets and step outs were completed to delineate PCBs in this area.

5.1.2 Building Outfalls

During the PDI, five potential Building 52 (1 through 5) outfalls and one outfall (6) from Building 15 were evaluated through historical document review and field investigations. The Building 52 outfall investigation was performed in July 2014 by AEAC and Haley & Aldrich. Results of the outfall investigation are described below (from north to south) and shown on PDI Figure 3.2F (Appendix A).

- Outfall 5 – Based on results of the OU-1 Excavation Pre-delineation Investigation, the entire outfall alignment will be removed during remedial construction; therefore further investigation via test pitting of this outfall was not completed.

- Outfall 4 - Investigation of this outfall included a document review to confirm the location of the outfall alignment. Previous document reviews indicated a single discharge pipe from Building 52, which was the basis of the work described in the work plan. However, an additional historical document review, completed as part of this investigation, indicated the presence of two pipes in close proximity in the vicinity of Outfall 4. Based on this review, one outfall appears to be sewerage from the Former Building 53 wash house and extends from the east edge of Building 53 west to the Hudson River (labeled Outfall 4). This does not appear to be an outfall associated with process waste from Building 52 and a test pit was not completed. A second outfall appears to extend from the former locker rooms within Former Building 52A, west to the edge of the Building 52 pad, then south to connect with Outfall 3, which may have been a historical source of PCBs and is designated as Outfall 3A and is further described below.
- Outfall 3A – As described above, Outfall 3A was identified based on a historical drawing review. The sufficiency of OU-1 Excavation Pre-Delineation investigation data to characterize this pipe will be evaluated during the design. Therefore a test pit was not completed at this newly identified outfall.
- Outfall 3– Based on results of the OU-1 Excavation Pre-Delineation investigation, the entire outfall alignment will be removed during remedial construction; therefore an investigation via test pitting of this outfall was not completed.
- Outfall 2 – A test pit (TP-6) was completed on 1 July 2014 by AEAC and Haley & Aldrich, to locate the potential Building 52 Outfall 2. Three pipes were identified in the test pit depths ranging from 14 inches bgs to 4.5 feet bgs. During completion of the test pit, the bedding associated with the pipe identified as being the most likely Building 52 outfall was sampled; results indicated the presence of PCBs at 56 mg/kg. This area was subsequently added to the OU-1 Excavation Delineation investigation program.

  Further historical document evaluation indicated that two of the pipes encountered in TP-6 (the southernmost 6-inch cast iron pipe and northern 4-inch cast iron pipe identified on the log) appear to be associated with the abandoned cooling water system from equipment located in Building 52B. This system was installed in 1956 (after cessation of PCB manufacturing operations at the site) and therefore these outfalls are not associated with process wastewater. Additional historical document evaluation indicated the following regarding the third pipe (identified at the time the test pit as the potential Building 52 outfall):

  - This pipe appeared in historical documents in 1918 and appears to be connected to a building labeled as “water closet”.
  - The location of the Former Saturant House is north of the former “water closet” which was identified in the 1918 drawing.
  - Design drawings associated with Building 59 (Saturant Pump House) did not indicate discharge lines.

  Based on these observations and historical document review, the piping designated as Outfall 2 identified in OU-1 Supplemental Investigation is likely not a Building 52 outfall.
- Outfall 1– Based on results of the OU-1 Excavation Pre-Delineation investigation, the entire outfall alignment will be removed during remedial construction; therefore an investigation via test pitting of this outfall was not completed.

- Outfall 6 – The footprint of this outfall is likely within the excavation that will be required during remedial construction to establish the sloped shore in this location; therefore the proposed OU-1 Supplemental Investigation in this area was not completed.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. The sufficiency of OU-1 Excavation Pre-delineation data to characterize Outfalls 3 and 3A will be evaluated during design of the remedy.

5.1.3 Pre-Delineation of Soil Excavation

The purpose of the PDI OU-1 soil sampling was to pre-delineate on-shore excavation areas which will be completed during remedial construction. Excavation limits were delineated in both lateral and vertical directions, to determine where PCBs exceeded removal criteria. Establishing excavation limits (area and depth) in this manner allows for a focused design, reduced uncertainty and increased worker safety during construction, as well as reducing changes in the field which may result from completing excavation confirmation sampling during remedial construction.

Approximately 500 borings were completed and over 2,500 samples were collected and analyzed to determine PCB concentrations including quality control samples analyzed to comply with the QAPP. PCB analytical results are summarized and shown in PDI Table 3.3A (Appendix A) and Figure 3.

5.1.3.1 OU-1 Excavation Pre-Delineation investigation

The approach to delineate the extents of onshore excavation was to initially identify known data points with PCBs at concentrations that exceed removal requirements and then delineate. The removal criteria for PCBs is 10 mg/kg in soils with excavation up to a maximum depth of 9 or 12 feet based on location. This criteria is also applicable to soils between surface and two feet since surface soils will not be present after the remedy-implemented site cover, thus precluding the need to delineate surface soils to 1 mg/kg. In general, delineation was completed surrounding existing historical data points where PCB concentrations exceeded removal criteria.

At select locations, new borings were completed to resample existing locations if existing data was incomplete (i.e. total boring depth was not sufficiently deep) or the historical sample intervals needed to be refined. These resample locations are summarized in the PDI Data Summary Report (Appendix G) and results replaced the historical data for the purposes of pre-delineation. In addition to previously known locations, two investigation areas were added to the Excavation Pre-Delineation program based on findings of other PDI investigations.

Delineation of areas within OU-1 that that exceeded removal criteria was performed following the pre-delineation methodology as described in Section 4.5 and summarized as follows. The vertical and lateral extents of these areas were developed using guidance for excavation verification sampling requirements described in DER-10 5.4(b)5ii (one sample per 30 feet of linear sidewall and one sample per 900 square feet of excavation bottom area). Based on this guidance and analytical results, the maximum excavation depth of each area was determined based on the deepest interval in which an exceedance of removal criteria was reported.

Many excavation areas have been completed, by satisfying both sidewall and bottom area minimum sampling frequency requirements as per DER-10. In a few select areas, these requirements were not met due to either the forced lateral termination of excavation (e.g. excavation abuts a building or other structure), or the lack of adequate data to bound an excavation side wall. In cases where the excavation will not extend laterally due to the existence of a building or other obstruction, documentation sampling, as defined by DER-10 5.4(b)1, will be conducted during remedial implementation. Other areas of partial delineation are described below.

5.1.3.2 Partial Delineation Areas

Areas in which the maximum extents of excavation could not be delineated due to insufficient or unavailable data are summarized below. In most of the cases of partial delineation, delineation could not be completed due to exceedances of criteria in samples determined after demobilization was complete upon release of hold samples (and, therefore, offsets were not completed), or to inaccessibility to complete offsets. These areas are summarized below.

- Areas west of Building 52 (Figure 3 sheet 4): This area is currently occupied by semi-permanent job trailers and is not yet fully delineated due to the inability to advance borings below or in close proximity to the trailers.
- Area east of Building 52 (Figure 3 sheet 4): Proposed locations not completed because they were deferred based on anticipated construction activities associated with an upgraded sanitary force main.
- Areas adjacent to Building 52 (Figure 3 sheet 3 & 4): Areas directly adjacent to Building 52 are not yet fully delineated due to the inability to advance borings below or in close proximity to the building.
- Central Excavation Area S-15 (Figure 3 sheet 2): Equipment was demobilized prior to complete delineation.
- Central Excavation Area S-24 (Figure 3 sheet 3): The area north excavation area S-24 is not yet fully delineated due to the existence of subsurface vaults, the size and extents of which are unconfirmed. Delineation is deferred to design or implementation and is recommended to extend to the southern edge of the vault and then be terminated.
- North Excavation Area N-28 (Figure 3 sheet 4): The area north of excavation area N-28 is not yet fully delineated and requires further sampling at perimeter location WC-103 due to criteria exceedances at depths between surface and 2 feet bgs.

Additionally, PCBs are present at concentrations that exceed removal criteria beneath Building 52, as identified on CSM Figure 7B (Appendix A). In the event that soil remediation under Building 52 is determined to be required, additional delineation will be completed.

Pre-delineation sampling may be completed in these areas after structures are moved (i.e. site job trailers), demolished (i.e. Building 52), or upgraded (i.e. sanitary force main). The design will specify requirements for confirmation or documentation sampling during construction for areas without complete pre-delineation.

5.1.3.3 Excavation Boundary Suitability

The lateral excavation area limits, developed using the method as described in DER-10 5.4(b)5ii, established sufficient delineation for calculation of a minimum excavation volume for remediation. Lateral area boundary geometry may be modified during design of the remedy to realize construction efficiencies while maintaining extents of recommended removal.

5.1.3.4 On Shore Conclusions

Remedial action is recommended in areas with complete delineation as shown on Figure 3. Remedial action would be removal of soils within each delineation area up to the depth specified.

Additional pre-delineation sampling may be completed in select areas after structures are moved (i.e. site job trailers), demolished (i.e. Building 52), or upgraded (i.e. sanitary force main). The design will specify requirements for confirmation or documentation sampling during construction for areas without complete pre-delineation. Documentation sampling for removal adjacent to property boundaries will be completed during construction where results in close proximity to property boundaries are not available.

5.2 PDI - OFFSHORE

As discussed previously and shown on Figure 2, offshore areas were separated into Nearshore, Backwater and Deepwater Area. Backwater areas are further divided into three areas (Old Marina, North Boat Slip, and South Boat Slip). The Deepwater Area was also divided into two separate areas. One deep water area required investigation to collect data in order to evaluate the nature and extent of contamination (Deepwater Evaluation Area). The other area (Deepwater Northwest Area) adjacent to the Northwest Extension Area was focused on delineation of dredge extents where removal was anticipated by the ROD as being required as part of the remedial action.

The Deepwater Evaluation Area investigation is discussed first, followed by the pre-delineation of Nearshore, Backwater, and Deepwater Northwest Areas.

5.2.1 Deepwater Evaluation Area

The purpose of the PDI deepwater sediment sampling in this area was to gather additional data where PCBs in excess of 50 mg/kg are known or suspected to be present, for making decisions regarding design of the remedy and to provide information for delineation of dredge areas. This investigation addressed areas in the proximity of existing exceedances at locations CS-19, EB-10, and EB-14 and the areas between existing locations EB-10 and EB-14, and used a phased approach to refine contamination extents to further understand lateral and vertical PCB contamination.

As discussed in previous sections and in the work plan, the investigation program employed a 160-foot triangulation grid for investigation areas and an 80-foot triangulation grid for delineation. This grid system creates hexagonal areas referred to as Investigation Units and Decision Units, with areas of approximately 0.5 and 0.13 acres, respectively.

This grid system was applied uniformly because the investigation area is not directly adjacent to suspected on-shore point sources and the sediment is uniform across this site. Previous grain size

analysis data indicated that sediments are predominantly fine grained material of similar properties and direct observations of sediments during the PDI were consistent with these data.

The investigation results are summarized below and included the following four tasks.

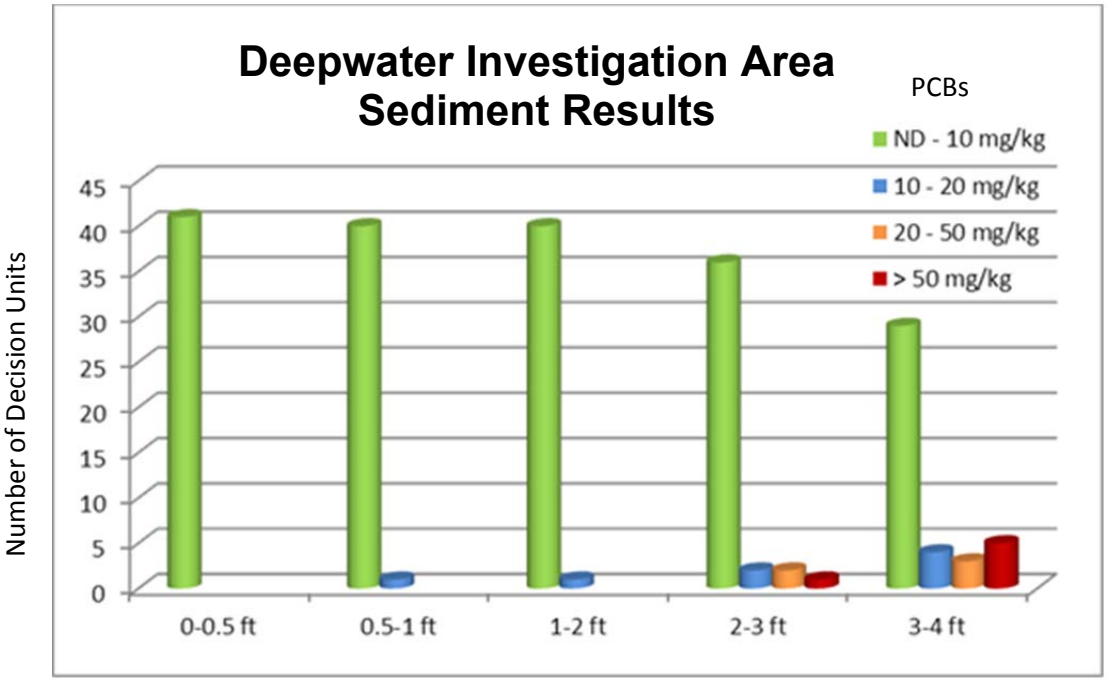
- *Resampling* (EB-10, EB-14, CS-19) - Results indicated the following:
  - PDI resamples at intervals corresponding to historical results greater than 50 mg/kg PCBs ranged from only 0.2 to 1.3 mg/kg.
  - PCBs were detected at concentrations in excess of 50 mg/kg in one of the three vibracore locations (VC-103 at 3-4 ft) collected but at an interval deeper than the corresponding historical sample (CS-19 at 2.0-3.2 ft).
  - These data points provide replacement results of the historical data for the purposes of removal evaluation and provide similar depth intervals that can be evaluated uniformly throughout the data set.
- *Investigation Unit Sampling* - PCBs were detected at concentrations in excess of 50 mg/kg in one of the five vibracore locations (VC-108 at 2-3 ft).
- *Decision Unit Sampling* - In addition to VC-103 and VC-108 (see above), PCB concentrations in excess of 50 mg/kg were detected in four of the thirty three additional vibracore locations (VC-110, VC-123, VC-130, and VC-139) and only at the 3-4 ft bml interval.
- *Variability Sampling* - PCBs were detected at concentrations in excess of 50 mg/kg in the 3-4 ft interval at three of the nine vibracore locations (VC-101B, VC-102A, and VC-103B) and at the 4-6 ft interval at VC-103B.

PCB analytical results are summarized and shown in PDI Tables 3.5A and 3.5B (Appendix A), PDI Figures 3.5G and 4.3A (Appendix A), and Figure 4.

Variability Evaluation

Locations selected for variability analysis advanced three additional borings in close proximity to the location to be evaluated. The variability sampling within the surface to 3 ft intervals showed PCB concentrations consistent with VC-101, VC-102 and VC-103. The variability sampling at the 3-4 ft interval and the 4-6 ft interval at VC-103 showed varied concentrations with some results that exceed action limits. However, if the samples are averaged, the PCB concentration at each location is less than 50 mg/kg PCBs.

Variability was considered for the entire investigation area by reviewing all decision units. The histogram below provides a summary of the findings:



Variability near the surface is very low and generally increases with depth. Only a very small fraction of samples greater than 10 mg/kg PCBs in the upper 3 feet of sediment with only one results greater than 50 mg/kg PCBs. There appears to be more variability in the 3-4 ft interval but the results do not indicate a uniform layer of contamination at this depth interval in this part of OU-2. The following is a summary of these results:

- Surface to 3 ft interval of sediment: 96% of results are less than 10 mg/kg PCBs.
- Surface to 4 ft interval of sediment: 98% of results are less than 50 mg/kg PCBs.
- While there is an increase in variability in the 3 to 4 foot depth interval, greater than 70% of results are less than 10 mg/kg PCBs.

Decision Unit Data Evaluation

An evaluation of the collected data is provided below to determine the appropriate remedial action and define any removal that may be required. Actions are based on the primary sample results for each decision unit unless otherwise specified to include variability sampling. The following factors for determining the appropriate remedial action are specified in the ROD and considered hereafter:

"The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs."

- *Depth of PCB contamination*

Five of the six sample results that exceeded 50 mg/kg were isolated to within the 3-4 foot interval. The sampling results indicated PCB concentrations greater than 50 mg/kg were found in only one shallower location (VC-108 at 2 to 3 ft).

- *Type of environment (erosional or depositional)*

  The Hudson River Estuary Sediment Environment Map (NYS DEC, 2006) determined that the majority of OU-2 is within a depositional area. This report defined the area adjacent to the site as thick deposition meaning a layer of sediment accumulation greater than 50 centimeters (cm) in thickness. The limits of the dynamic areas (where both erosional and depositional events occur) and depositional areas (sediment accumulation greater than 50 cm thick) with respect to deepwater sediment sampling locations are shown on PDI Figure 4.3A (Appendix A).

- *Contiguous areas of contamination*

  Areas of PCB results greater than 50 mg/kg are isolated except for at the 3-4 ft interval. There are two separate areas where there are adjoining decision units greater than 50 mg/kg. The first location is VC-130 & VC-139 where concentrations are 1,090 and 857 mg/kg PCBs, respectively. The second location is VC-103 & VC-123 where concentrations are 70.6 and 108 mg/kg PCBs, respectively. Variability sampling location VC-103C lies between VC-103 and VC-123 and was < 1 mg/kg PCBs at the 3-4 ft interval, indicating the lack of a uniform layer of contamination at this depth interval in this part of OU-2. Approximately 425 ft south to north, separate VC-130 and VC-103. Each of these two areas (VC-130/139 and VC 103/123) accounts for approximately 0.25 acres.

- *Thickness of clean sediment above the PCB contamination*

  All 6 decision units with PCB contamination greater than 50 mg/kg have a minimum of 2 feet of sediment cover that is less than 50 mg/kg and are located within a depositional area. Specifically, cover sediment sample results between the surface and 2 ft were less than 1.7 mg/kg PCBs. Results are summarized below:

	Depth Intervals (feet)					
Sample Locations Results in mg/kg	0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6
VC-103	0.75	0.80	1.7	1.3	71	9.9
VC-108	0.15	0.19	0.40	490	11	-
VC-110	0.21	0.27	0.36	0.57	110	9.0
VC-123	0.32	0.16	0.45	2.3	380	ND
VC-130	0.80	0.25	0.36	0.97	1,100	32
VC-139	0.17	0.20	0.33	1.5	860	0.11

- *Duration of dredging and associated potential for migration of re-suspended sediments*

  These Decision Units are located in water depths of 30-35 feet and as indicated in the Revised Feasibility Study 2011, *"Effective turbidity control in deepwater is not feasible and dredging without turbidity control will result in mobilizing contaminated sediments to extensive areas located downstream. While the intent of dredging is to remove contaminated sediments from the Deepwater Area, the long-term impact of the suspended sediment migration poses a more significant threat than the in-situ sediments because the resulting areas impacted would far*

exceed the existing extents of Deepwater Area contaminated sediments. This increase of areal distribution would result in increased short- and long-term impacts to biota from ingestion/direct contact with sediments, [potentially] causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain." The ROD acknowledged that *"dredging without turbidity control … could mobilize contaminated sediment to other areas"* and therefore potential for migration of re-suspended sediments remains an important factor in determining the remedial action that is most protective of human health and the environment.

- *Area weighted surface concentrations of PCBs*

  Area weighted surface concentrations were calculated over the entire investigation area with all sediment samples being equally weighted since each sample characterizes a decision unit and decision units are of equal area.

  Surface samples (0-0.5 ft) are near background conditions with an Area Weighted Average (AWA) concentration of 0.44 mg/kg PCBs. Additionally, PDI Figure 3.6I (Appendix A) provides results for all historical surface samples throughout the Deepwater Area for review and consideration.

  Samples in the upper sediments (0.5 - 2 ft) have AWA concentrations of 0.98 mg/kg PCBs for the 0.5-1 ft interval and 1.34 mg/kg PCBs for the 1-2 ft interval. Additionally, it can be noted that average PCB concentrations in sediments for the 2-3 ft interval remains significantly less than 50 mg/kg regardless of whether VC-108 is included in the average.

In addition to those factors evaluated above, consideration should also be given to the Baseline Habitat Assessment, the Human Health Risk Assessment and the Ecological Risk Assessment. These assessments provide additional lines of evidence in evaluating the appropriate remedial action for these sediments.

- *Baseline Habitat Assessment*

  The Benthic Habitat Condition Survey at Hastings on Hudson provided information on both shallow and deep water sediments. This survey included multiple stations specifically in deeper water areas to assess if there were negative impacts expressed by the biota in these areas. The evaluation used both state-of-the-art and traditional methods to assess the habitat. The resulting report concluded that "neither the SPI [Sediment Profiling Imagery] nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site."

- *Human Health Risk Assessment*

  As presented in Volume 3: Collectively, the results of the HHRA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are unacceptable when compared to ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Northwest Extension Areas that exceed background conditions.

- *Ecological Risk Assessment*

  As presented in Volume 4; Collectively, the results of the Baseline Ecological Risk Assessment (BERA) demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are appreciably different than ambient background conditions. These

results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Northwest Extension Areas that exceed background conditions.

Conclusions

The basis for selection of the Remedy in the OU-2 ROD states that "The majority of targeted PCB dredging areas identified in the deepwater are within the top two feet. Therefore, the targeted dredging will remove sediments which have the highest levels of PCBs and the greatest potential to migrate and be an ongoing source to the environment." Additional discussion about the remediation of deepwater sediments is found in Response 62 of the OU-2 ROD.

Based on the guidance above and an evaluation of the six factors discuss previously, dredging in this specific area is not consistent with the basis for remedy selection, and may pose a greater risk to the environment than leaving the limited number of isolated sediments in place. Therefore removal is not recommended as the remedial action for the portion of the Deepwater Northwest Area. This conclusion is further supported by the various assessments that have been conducted at the Site.

The following evaluation factors specifically support this conclusion:

1. Sediments greater than 50 mg/kg PCBs are at least 2-3 feet below the sediment surface and are well below the bioturbation layer.
2. All of these Decision Units are located in a thick deposition zone and have already been buried by natural deposition.
3. Impacted sediments are found only in small isolated areas that are well below the surface.
4. There is at least 2-3 feet of cover less than 50 mg/kg PCBs at all of these locations with most samples below 2 mg/kg PCBs.
5. Potential for migration of re-suspended sediments poses a threat to the environment that currently does not exist as buried impacted sediments would be sequestered in perpetuity.
6. Area-weighted surface concentrations of PCBs are at or near 1 mg/kg for the upper two feet of the investigation area.

Additionally, these assessments support this conclusion:

A. The habitat assessment does not show any adverse effect based on the existing conditions.
B. Human Health Risk assessments are within acceptable criteria based on the existing conditions.
C. Ecological Risk assessments are within acceptable criteria based on the existing conditions.

5.2.2 Pre-Delineation of Sediment Removal

The purpose of this Off-shore Pre-Delineation evaluation was to examine the various off-shore areas where PCBs were known or suspected to be present in excess of removal criteria. Sample collection in these areas provided supplementary data for making decisions regarding remedial action and to provide information for delineation of dredge areas. Off-shore sediment sampling was conducted in three separate areas at the Site: Nearshore Area, Backwater Areas, and Deepwater Northwest Area.

PCB analytical results are summarized and shown in PDI Tables 3.6A and 3.6B (Appendix A), PDI Figures 4.4H & 4.4J (Appendix A), and Figures 4 and 5.

Interpretation of the data provides a basis for recommended remedial action or identifies the need for additional delineation which may be completed as part of the design or remedial construction. An evaluation is discussed for each of the three investigation areas.

5.2.2.1 Nearshore Area

The nearshore portion of the program consisted of sampling in the areas along the site shoreline bounded by the expected silt curtain alignment on the west and the OU-1/OU-2 boundary on the east (i.e., river area where mudline is shallower than El. -15). However, Backwater Areas consisting of the two boat slips and the old marina were evaluated separately. Historical information was sufficient in the Nearshore Area north of the North Boat Slip to indicate that removal to the maximum depth of six feet would be recommended. Samples were collected in areas adjacent to and south of the North Boat Slip in order to provide more uniform sampling information on which to base remedial action. Additional information about the sampling grid is provided below.

Sampling

The sampling program employed a sampling grid in order to fill data gaps or address uneven distribution of existing data. Sample spacing of approximately 80 feet on centers produces uniform data to better understand the distribution of contaminants in the sediment and provide a basis for design of the remedy. Twenty two vibracore borings were advanced in the Nearshore Area.

Analysis

The sampling results indicated that PCB concentrations ranged from Non-Detect to over 100 mg/kg. The average concentration was approximately 5 mg/kg between the surface and six feet below mudline for the 22 VC-400 series sample locations. A calculated average at individual locations over the depth of the boring (0-6 ft bml) resulted in PCBs measured between less than 1 mg/kg up to approximately 20 mg/kg PCBs with about one third of the locations having an average concentration of less than 2 mg/kg between the surface and 6 feet below mudline. There were three samples collected having results greater than 50 mg/kg PCBs.

Sampling results for locations VC-413 through VC-416, just west of the South Boat Slip, were near background for all contaminants of potential concern for sediments between the surface and 3-4 feet below mudline.

Conclusions

Removal is the recommended remedial action in the Nearshore Area between VC-401 and the proposed bulkhead alignment based on the results of historical sampling. Removal is also recommended at locations VC-401 thru VC-412 and VC-417 thru VC-422 based on PDI sample results. Removal of these sediments up to the maximum depth of six feet is warranted. Remedial action is not recommended at locations VC-413, VC-414, VC-415 and VC-416 near the South Boat Slip based on 1) PCB and metals results being less than or near background for samples between the surface and three feet bml and 2) results being near background for calculated averages over the depth of the boring (0-6 ft bml) at each individual location. Recommended removal areas are shown on PDI Figure 4.4H (Appendix A) and Residuals are shown on Figure 4 where applicable.

5.2.2.2 Backwater Areas

This portion of the program consisted of sampling in the Old Marina, North Boat Slip, and South Boat Slip. The Backwater Areas are characterized by slower river velocities and increased deposition. Samples were collected in portions of each of the Backwater Areas with additional borings added to the program as needed to delineate the extents of known or suspected contamination and in order to provide more uniform sampling information on which to base remedial action. Additional information about sampling, analysis and conclusions is provided below for each area.

Old Marina

Sampling

A uniform grid was applied to this area with samples spaced at approximately 80 feet on center. Eleven Old Marina delineation sampling locations were chosen based on existing sampling locations and data, the potential source of criteria exceedance located in the southeastern portion of the Old Marina area near a potential Building 52 outfall and where data gaps have been identified within this area. Specifically, historical sample location RB-37 at the southeast corner of the Old Marina had PCB results higher than other samples collected in this area and was proximate to the potential Building 52 outfall. PDI sample location VC-501 was also located in the southeast corner of the Old Marina and likewise had PCB results higher than any other location. Five additional locations were added to the grid based on results from VC-503, VC-507 and VC-510.

Analysis

Concentrations of PCBs and metals are generally less than or near background in the sediments near the surface. Samples in deeper sediments between three and six feet bml have PCB concentrations predominantly less than 10 mg/kg with an overall average near 4 mg/kg excluding VC-501 which has a PCB concentration greater than 50 mg/kg at a depth interval of 5 to 6 feet. PDI Figure 4.4J (Appendix A) provides a depiction of all PDI PCB results within the Old Marina with values provided in PDI Table 3.6B (Appendix A).

Conclusions

Further evaluation and potential additional sampling may be warranted in this area. Therefore, determination of remedial action is deferred to Preliminary Design. Factors for further evaluation include potential future use, presence of depositional sediments with concentrations less than or near background throughout the near-surface sediments, potential collection of additional data north and/or west of the PDI data, and sediments in the proximity to VC-501 near the potential Building 52 outfall.

North Boat Slip

Sampling

A uniform grid was applied to this area parallel to the Nearshore Area sampling with locations spaced at approximately 80 feet on center. Initially, three delineation sampling locations were chosen to focus on the northern portion of this boat slip. Two additional locations were added to the grid based on results from VC-603 and VC-604 sequentially.

Analysis

Sampling results showed PCBs and metals are generally less than or near background in the sediments near the surface with slightly higher concentrations in the north portion of the boat slip as anticipated based on historical results nearby. Concentrations increase with depth until they consistently exceed background at five to six feet bml. Samples in sediments between three and six feet bml have PCB concentrations predominantly less than 10 with an overall average near 3 mg/kg excluding VC-604 which has a PCB concentrations of 25 mg/kg at a depth interval of 5 to 6 feet. PDI Figure 4.4I (Appendix A) provides the location of each sample with values provided in PDI Table 3.6B (Appendix A).

Conclusions

Remedial action is recommended in the entirety of the North Boat Slip consistent with the removal recommended for adjacent Nearshore Area locations VC-601 thru VC-605. Removal of these sediments up to the maximum depth of six feet is warranted. Recommended removal area is shown on Figure 4.

South Boat Slip

Additional sampling was completed in the South Boat Slip due to lead concentrations in sediment. Vibracore borings VC-701 through VC-705, were advanced in the south boat slip area to delineate the extents of lead exceedances. Remedial action is recommended for a portion of this backwater area as shown on PDI Figure 4.4H (Appendix A).

5.2.2.3 Deepwater Northwest Area

Note that the Deepwater Northwest Area is outside the limits of turbidity control so the higher PCB criteria of 50 mg/kg applies. The purpose of this sediment sampling was to gather additional data for delineation where dredging was specified by the ROD due to the presence of PCBs in excess of 50 mg/kg. This investigation addressed areas in close proximity of existing exceedances, resulting in the use of offsets - rather than Investigation/Decision Units - to provide further delineation. Approximately seventy eight vibracore borings were advanced during this investigation.

Sampling

The Deepwater Northwest Area is located off-shore immediately west and southwest of the Northwest Extension Area portion of OU-2 up to approximately 225 feet from the shoreline, as shown in the ROD, and was further divided into the two following areas:

- **Shallow Contamination Area (up to 2 feet)** – Where historical results indicated the need to dredge approximately 2 feet of sediment. These areas were evaluated to a 3 foot depth and further delineated for PCB concentrations greater than 50 mg/kg.
- **Deep Contamination Area (up to 6 feet)** – Where historical results indicated the need to dredge up to 6 feet of sediment. These areas were evaluated up to an 8 foot depth and further delineated for PCB concentrations greater than 50 mg/kg.

Resampling was completed at historical locations with results greater than 50 mg/kg to confirm depth and concentration data, to provide reference for additional sampling, and to provide a more accurate representation of current conditions. Initial sample locations were established on a step-out system where three to four locations were sampled within approximately 25 feet of the original impacted

sampling locations. Additional step-out sample locations were added throughout the program with locations selected based on results and proximity to other samples. Due to river dynamics and debris in the vicinity of the sampling, final locations varied from proposed. For the purposes of evaluation of remedial action and delineation of dredge areas, a grid system with cells measuring 30 ft by 30 ft was applied to the data.

Inconsistencies in results were encountered between the historic sample locations and resampled locations, potentially due to sediment deposition since the previous sampling at some locations.

Analysis

An evaluation of the collected data is provided below to determine the appropriate remedial action and define any removal that may be required. Actions are based on the sample results for each grid cell. Similar to other deepwater areas, the following factors for determining the appropriate remedial action were considered as specified in the ROD:

"The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs."

Sample cells with PCB results greater than 50 mg/kg within the top 2 ft are recommended to be removed and are excluded from the following more specific evaluation. These sample locations, that do not provide at least 2 feet of sediments less than 50 mg/kg, were evaluated with the same process used to evaluate the Deepwater Evaluation Area as discussed in Section 5.2.1 which included the the six factors described above.

- Depth of PCB contamination

  Approximately half of the sample locations contained results greater than 50 mg/kg. These results were found at all depth intervals as followings:

	Depth Intervals (feet)							
	0-0.5	**0.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-6**	**6-8**
Results > 50 mg/kg out of total samples	1 of 64	4 of 65	8 of 66	15 of 62	13 of 50	11 of 40	7 of 32	5 of 14

- T

  ype of environment (erosional or depositional)

  The Hudson River Estuary Sediment Environment Map (NYS DEC, 2006) determined that the majority of OU-2 is within a depositional area. This report defined the area adjacent to the site as thick deposition meaning as a layer of sediment accumulation greater than 50 centimeters (cm) in thickness. The limits of the depositional area with respect to sediment sampling locations in shown on PDI Figure 4.4A (Appendix A). Some locations are near the transition between depositional and dynamic river environments.

- Contiguous areas of contamination

Areas of PCB results greater than 50 mg/kg are sporadic throughout the sampling area and vary by depth, thickness, and concentration.

- Thickness of clean sediment above the PCB contamination
  - There are 13 locations that have 2 ft of sediment cover over samples greater than 50 mg/kg as shown in the excerpt of PDI Table 3.6A (Appendix A) below. It should be noted that while sampling locations VC-312 and VC-339 are overlain by 2 ft of sediment cover, both locations are in the dynamic river environment and should be further reviewed if removal is not recommended for these areas.

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
	VC-302	0.21	0.29	0.77	58	130	23	-	-
	VC-303	0.27	4.7	1.7	1000	44	340	31	-
	VC-304	3.4	4.5	12	330	6400	250	3.3	1.1
	VC-305	0.79	2.1	24	560	6200	5900	49	-
	VC-306	0.23	0.46	11	1500	560	110	200	0.92
	VC-309	6.3	16	38	470	800	430	2100	59
	VC-312	1.1	0.17	0.23	120	39	-	-	-
	VC-316	0.83	1.4	9.4	770	12	3.1	0.91	46
	VC-318	2.1	0.26	0.44	720	13	0.2	110	1000
	VC-327	1.2	0.54	3.7	310	0.38	1.8	ND	1.3
	VC-332	0.47	21	25	58	270	29	-	-
	VC-355	4.1	4.3	27	590	140	1.1	-	-
	VC-359	0.27	1.6	2.9	83	16	-	-	-

  - There are 14 locations with at least 3 ft of sediment cover over samples greater than 50 mg/kg PCBs as shown in the excerpt of PDI Table 3.6A (Appendix A) below and are all located in the depositional river environment.

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
	VC-329	0.15	0.2	0.4	0.47	53	5.6	0.27	ND
	VC-349	-	6.6	11	21	370	0.24	-	-
	VC-315	4.3	1.1	1.1	3.2	61	85	0.11	ND
	VC-370	0.39	0.21	0.53	0.78	58	93	-	-
	VC-317	1.1	0.46	3.7	1	20	530	0.068 J	ND
	VC-344	0.16	0.33	1	4.1	6.1	100	-	-
	VC-347	0.87	0.35	1.2	23	0.72	1200	0.14	-
	VC-363	3.2	0.98	0.75	0.56	11	200	0.21	-
	VC-328	0.28	0.33	1.2	0.72	1.8	13	6900	0.61
	VC-311	0.53	2.1	15	20	2.2	ND	9800	-
	VC-341	33	0.41	0.28	0.79	0.73	41	55	-
	VC-346	14	0.97	0.92	0.93	6.7	27	8500	6300
	VC-338	0.39	ND	ND	9.9	0.63	0.17	ND	700
	VC-342	9.6	6.2	1	0.37	0.34	0.33	ND	66

- Duration of dredging and associated potential for migration of re-suspended sediments

  While the duration of dredging cells is not insignificant, it is also not a driving factor for consideration. However, some cells are located in water depths of up to 35 feet and as indicated in the Revised Feasibility Study 2011, "Effective turbidity control in deepwater is not feasible and dredging without turbidity control will result in mobilizing contaminated sediments to extensive areas located downstream. While the intent of dredging is to remove contaminated sediments from the Deepwater Area, the long-term impact of the suspended

sediment migration poses a more significant threat than the in-situ sediments because the resulting areas impacted would far exceed the existing extents of Deepwater Area contaminated sediments. This increase of areal distribution would result in increased short- and long-term impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain." The ROD acknowledged that "dredging without turbidity control … could mobilize contaminated sediment to other areas" and therefore potential for migration of re-suspended sediments remains an important factor in determining the remedial action that is most protective of human health and the environment.

- Area weighted surface concentrations of PCBs

  Average concentrations were calculated by depth interval over the entire investigation area with all sediment samples being equally weighted for simplicity. For comparison, the average concentrations for each depth interval near the surface are provided for two potential dredging options. Option 1 evaluates dredging sample cells that do not provide at least 2 feet of cover, while Option 2 evaluates dredging sample cells that do not provide at least 3 feet of cover. For both options, removal is recommended to continue up to the maximum depth of six feet as needed to remove sediment concentrations greater than 50 mg/kg or until an interval is reached that is less than 50 mg/kg in which case the backfill provides the minimum cover needed.

Average PCB concentration (mg/kg) by depth interval

Depth	Samples	Existing	Option 1	Option 2
0 - 0.5 (ft)	64	7.9	3.1	2.7
0.5 - 1 (ft)	65	52	2.2	1.4
1 - 2 (ft)	66	49	5.3	2.9
2 - 3 (ft)	62	110	110	3.8
0 - 3 (ft)	*~ 64*	*64*	*40*	*2.9*

Existing conditions based on the PDI data indicate that surface results (0-0.5 ft) are less than 50 mg/kg PCBs except at VC-337 (280 mg/kg). Average concentration for this depth interval is 7.9 mg/kg PCBs as shown in the table above and would be reduced by either option to approximately 3 mg/kg PCBs. PDI Figure 3.6A (Appendix A) provides results for surface samples.

Existing conditions based on the PDI data indicate that upper sediments (0.5 - 2 ft) are less than 50 mg/kg PCBs at all except 9 cell locations. Average concentration for this depth interval is near 50 mg/kg PCBs and would be reduced by either option to o less than 10 mg/kg PCBs.

For option 2, the residual contamination in the 2-3 ft interval would be reduced to less than 10 mg/kg PCBs.

Conclusions

Remedial action is recommended in areas with PCBs greater than 50 mg/kg within the top 2 ft. Additionally, based on the evaluation of the six factors discuss previously, remedial action is recommended for cells that do not provide a minimum of three feet of cover. Remedial action would be removal of sediments within each cells up to a depth where results are no longer greater than 50 mg/kg and where backfill provides at least three feet of cover to isolate residuals and provide erosion protection. Dredge would extend up to a maximum depth of 6 ft.

Recommended removal is shown on Figure 5. Average residual PCB concentrations by depth interval are summarized in the following table. Although not an area weighted computation, this provides a reasonable approximation of residual concentrations.

Average PCB concentrations (mg/kg)

Depth	Samples	Existing	Residual
0 - 0.5 (ft)	64	7.9	2.7
0.5 - 1 (ft)	65	52	1.4
1 - 2 (ft)	66	49	2.9
2 - 3 (ft)	62	110	3.8
3 - 4 (ft)	50	310	19
4 - 5 (ft)	40	240	70
5 - 6 (ft)	32	870	800
6 - 8 (ft)	14	580	580
0 - 3 (ft)	*~ 64*	*64*	*2.9*

It should be noted that the Deepwater Northwest Area is not yet fully delineated. Additional sampling areas are recommended to resolve data gaps including sampling near RB-19, VC-344, and VC-336. These areas would be evaluated during remedial design or specified to be addressed during remedy implementation.

5.2.3 Wall Alignment and PCBM

The purpose of the PCBM and obstruction probes was to evaluate the presence of both PCBM and obstructions along the alignments of the proposed bulkhead extension wall and deadman. To accomplish this, a phased approach of land and water based probes was completed in the vicinity of the proposed bulkhead extension wall and deadman. The remedial purpose of the bulkhead wall is to provide a barrier to migration of PCBM toward the river and isolate known PCBs in sediment that are beneath the shoreline riprap.

Results of the probes are described briefly below. Refer to the PDI Data Summary Report (Appendix G) for details.

Off-shore Probe Explorations

Forty one water-based probes (locations designated WP) were completed during 2013 and 2014. Seven probes encountered obstructions at various depths. The obstructions encountered consisted of probable concrete, riprap, rubble, and cobbles, as interpreted by the driller based on drilling action. In most cases, the roller bit was able to be advanced through the obstructions. When refusal was encountered, an alternative location was completed to better define the obstruction. The probes were generally terminated at least 5 ft below top of Marine Silt depending on whether obstructions or semi-solid PCBM were encountered. Results of the probes included:

- Five probes encountered semi-solid PCBM;
- Six probes encountered trace PCBM;
- No liquid PCBM (DNAPL) was encountered;
- Four probes encountered refusal on wood and/or riprap obstructions; and

- Fourteen of the water-based probes encountered obstructions at various depths.
- Petroleum-like odor was also observed at some locations, which generally coincided with probes where PCBM was observed.

Old Marina Vibracore Explorations

Vibracores were drilled in the Old Marina to obtain PCBM information as close as possible to the ARC property line. The vibracores were advanced using a small vessel which was able to gain closer access to the shoreline, compared to a drilling barge.

Eight vibracore explorations, designated VC-1A, VC-2B, and VC-4A to VC-9A as shown on PDI Figure 3.4A (Appendix A), were drilled in the area of the Old Marina during October 2014. Results of the probes included:

- Two vibracores along the extension wall alignment encountered semi-solid PCBM;
- None of the vibracores along the Old Marina encountered PCBM; and
- No liquid PCBM was encountered.

On-Shore Probe Explorations

Seventeen land-based probes (locations designated LP and PLP) were drilled along the approximate deadman and extension wall continuation alignments, and along the north property line, to detect visual evidence of PCBM. The property line probes were drilled at an angle from the horizon starting south of the property line. The location and angle of each probe was determined with the objective that the Fill/Marine Silt interface would be encountered about 5 feet inboard from the location of the wooden bulkhead that is suspected to exist along the property line. Results of the probes included:

- Six probes encountered semi-solid PCBM;
- Three probes encountered trace PCBM; and
- No liquid PCBM was encountered.
- Petroleum-like odor and/or oily material (two locations) were observed at some locations, which mostly did not coincide with the probes where PCBM was observed.

Conclusions

PDI Figure 3.4A (Appendix A) shows the currently assumed bulkhead wall and deadman anchor alignment, based on the results of the probe explorations completed in 2013 and 2014. The exploration markers are color-coded depending on the conditions encountered (e.g., blue for trace PCBM, gray for no PCBM or obstructions).

Note that the potential alignment shown on PDI Figure 3.4A (Appendix A) passes through VC-311B, where semi-solid PCBM was observed to a depth of 8 feet. It also passes through some locations where obstructions were encountered. The current assumption is that excavation of PCBM and obstructions is

feasible in these locations and could be removed prior to construction of the bulkhead. The preference is to avoid further outboard alignment adjustments while avoiding obstructions and PCBM.

Based on the findings of the extension alignment investigation, a corridor has been identified where no PCB Material (either as DNAPL or semi-solid), or obstructions exist. Along the Old Marina, explorations were limited by the physical site access restrictions (such as the existing piles and dock structures). The Preliminary Design will identify any additional information that may be required prior to construction or additional data collection that may be planned during construction.

The potential wall and deadman alignments, while sufficiently defined for design (at least along the western edge), are still subject to change during Final Design and construction, based on construction tolerances and actual conditions encountered (such as large obstructions which may exist but were not located during the pre-design explorations).

6. Baseline Data Results

A Baseline Sampling and Analysis Plan (BSAP) and related Baseline work plans were approved by NYSDEC and implementation began in 2013. The overarching goal of the Baseline Sampling and Analysis Plan is to provide a benchmark against which post-construction performance monitoring can be compared in order to determine if there is a post-remedy decrease in PCBs and metals (copper, lead and zinc) in sediment, biota, surface water and porewater. The BSAP also provides data necessary to evaluate human health and ecological risks, as described in Volumes 3 and 4 of this application. The BSAP was prepared in accordance with DER-10, applicable USEPA guidance and the Record of Decision (NYSDEC, 2012) for OU-2 which requires data to support a Site Management Plan.

Reference sampling was included in the baseline sampling in recognition that the Hudson River sediments contain background levels of PCBs, and that the site is located downriver from the Upper Hudson River PCB Superfund Site, which extends from Hudson Falls to the Federal Dam in Troy. The BSAP sampling included locations up-river and down-river from OU-2 to help identify anthropogenic sources of PCBs that are unrelated to the Site. To help evaluate if conditions within OU-2 may differ from locations outside of OU-2, surface water, sediment, and biota were sampled from locations adjacent to the Site, one to two miles up-river of the Site (reference area), and one-half mile down-river of the Site.

Specifically, the BSAP included evaluation of bathymetry, surface water, surficial sediment, fish and shellfish, benthic macroinvertebrates, habitat characterization, and porewater. Refer to the BSAP (Appendix F) for details. In addition to the BSAP, groundwater was also evaluated from upland locations. These investigations provided the following data requirements:

- Define baseline conditions at the site for comparison after remedial action
- Provide adequate data to support detailed human and environmental risk assessments for this TSCA application.

Details for each of the following components of baseline sampling are presented below:

- Bathymetry
- Surface Water
- Surficial Sediment
- Fish and Shellfish
- Benthic Macroinvertebrates
- Habitat Characterization
- Porewater
- Groundwater
- Air

The following information provides results, interpretation and conclusions for each of these components below with complete information is provided in the Baseline Data Report Year 1 & 2 (Appendix H).

6.1 BATHYMETRY

Ocean Surveys completed a multi-sensor marine geophysical survey that included a high resolution map based on the acquisition of multibeam soundings, shoreline laser scanning, and subbottom profiling data. Water depths ranged from approximately 0 - 50 feet. Besides the obvious armoring of the shoreline (rip rap, pilings, and a sheetpile wall), the riverbed appeared "generally featureless" with soft muds underlain by "gaseous sediments". Several features were observed "that could potentially be problematic to remediation or removal of contaminated sediments", principally a large number of wooden pilings, sunken pier decking, and a "sunken barge approximately 100 feet by 25 feet" north of the Northwest Corner along the edge of the adjacent Old Marina property. The high resolution maps were also instrumental in identifying stations for the baseline sampling of surface water, porewater, sediment, benthic macroinvertebrates and sediment profiling described in this report.

6.2 SURFACE WATER

PCB analytical results are summarized and shown in Baseline Table 4 and Baseline Figure 2 (Appendix A).

There were a total of ten monthly surface water sampling events: two in 2013, seven in 2014 and one in 2015. Data collection included analytical water quality parameters and conventional water quality parameters that support aquatic life (dissolved oxygen, temperature, specific conductivity, turbidity and pH) using grab samples and digital measurements.

Measurement of conventional water quality parameters in the field demonstrated that OU-2 meets the standards promulgated by NYSDEC that ensure the protection of macroinvertebrates, fish and wildlife. Although TOC was, overall, slightly higher than DOC, the differences were so slight that it can be assumed that most of the natural organic matter in the waterbody is in the dissolved form. There appears to be little variability in TSS within any sampling event, but there was variability between sampling events. The measurement of TSS is sufficient to support criteria for use during construction.

Total PCBs were generally not detected in surface water samples; sporadic detections in three of ten sampling events were at concentrations between 0.010 and 0.025 µg/L and were generally also detected in upriver samples. None of these events suggest an on-going site specific contribution of PCBs to surface water. Note that the current feasible laboratory detection limit is much greater than the New York State Ambient Water Quality Standard of 0.000001 µg/L. Based on these data, NYSDEC approved the cessation of this monitoring program.

6.3 SURFACE SEDIMENT

PCB analytical results are summarized in Baseline Table 6 and locations shown on Baseline Figure 3 (Appendix A).

There was no apparent upstream/downstream trend in PCBs in sediment. All but one sample (SS-007) was generally at or below 1 mg/kg and twelve of sixteen samples were below 0.5 mg/kg total PCBs. The distribution of Aroclors is variable.

Additional surficial sediment sampling was completed during the PDI and a summary of the sediment sampling and associated results can be found in the PDI Data Summary Report (Haley & Aldrich, 2015).

6.4 POREWATER

PCB analytical results are summarized and shown in Baseline Table 8 and Baseline Figure 4 (Appendix A).

Porewater samples were collected by collecting sediment samples at seven locations and sending them to the laboratory for centrifugation to extract porewater. Only one of six Site porewater samples was positive for PCBs at a reporting limit of less than 0.010 µg/L and the types of Aroclors observed in that sample (1248 and 1254) are not strong indicators of site-related PCBs. These results appear to indicate that PCBs are strongly bound to the sediment and have little propensity to partition into porewater.

6.5 FISH AND SHELLFISH

PCB analytical results are summarized and shown in Baseline Tables 12 and 13 and Baseline Figure 5 (Appendix A).

In order to interpret the baseline sampling results from this project, it is helpful to understand the historical context of the river system. NYSDEC has regularly measured PCB levels in fish from the Hudson River. Elevated PCB levels were found in collections of many fish species during the 1970s. During the early program, sampling results indicate that PCB concentrations in fish tissue were highest near Hudson Falls and Ft. Edward. Fish tissue levels in the river (principally black bass, brown bullhead, yellow perch and American eel) dropped quickly in the first three years following cessation of direct manufacturing discharges from upgradient manufacturing plant sites in 1977, but decreased much more slowly thereafter and have remained relatively stable since the early 1980s (USEPA, 2000). In 1996, PCB concentrations averaged 12 mg/kg for fish in the upper Hudson River and 3 mg/kg in the lower Hudson River (USEPA, 1996).

A greatly expanded sampling project was undertaken in 1999 which focused on documenting the temporal trends in PCB concentrations in selected species of fish from selected locations along the length of the river from above Glens Falls to New York City (NYSDEC, 1999). The principal objective was "to evaluate the spatial relationships of contaminant concentrations in fish and to relate the results to source conditions, in so far as possible." Although the tables and graphs from this report provide fairly apparent trends in total (and lipid-adjusted) PCBs in various fish species, they also present a "species smash" technique in which concentrations of different species of fish are averaged at different mile points along the river. This technique is not apparently used in any other fishery report and would not be considered a scientifically-robust method because a) different species of fish bioaccumulate PCBs at different rates and b) the inclusion of "outliers", even within a species/class (as is also evident from data in this report) would markedly bias a data point for a particular location.

The data presented in the Baseline Data Report Year 1 & 2 clearly show that levels in fish caught North, Adjacent to and South of OU-2 are below historical levels. Although some species such as American eel and white perch appear to have more elevated tissue concentrations adjacent to the Site than those caught in the north segment, the relative levels have significantly improved when compared to values recorded in the NYSDEC fish tissue database.

Fish and shellfish were collected during sampling events in 2013 and 2014 with PCBs analyzed in whole body and fillet tissue. A summary of the results and conclusions are provided below for each species of fish collected. Additional details are presented in the Baseline Data Report Year 1 & 2 Report.

American Eel

Based on the results, the weight vs. length relationships were highly consistent with data obtained from previous monitoring studies and there were no differences between average weights or lengths for eels caught north, adjacent to and south of the site. Averages for total PCBs were more than two times less than historical levels; lipid-adjusted PCBs were more than four times less than concentrations measured by NYSDEC in the past. Average total PCBs adjacent to the site were statistically higher than average levels in fish caught upstream of OU-2 (north segment).

White Perch

Based on the results, the weight vs. length relationships were highly consistent with data obtained from previous monitoring studies and there were no differences in average weights or lengths for perch caught north, adjacent to and south of the site. Averages for total PCBs were less than historical levels; lipid-adjusted PCBs were about two times less than concentrations measured by NYSDEC in the past. Average total PCBs adjacent to the site were statistically higher than average levels in whole body white perch caught upstream of OU-2 (north segment). Additional analysis completed for the risk assessment indicated that for fillet, average total PCBs adjacent to the site were not statistically different than average levels in fish caught upstream of OU-2 (north segment).

Blue Crab

Based on the results, the weight vs. length relationships were highly consistent with data obtained from previous monitoring studies and there were no differences in average weights or lengths for blue crabs caught north, adjacent to and south of the site. Total PCBs for whole body were more than eight times below the historical average; lipid adjusted PCBs were more than four times lower than concentrations measured in past studies (1999 – 2011). For whole body tissue, there was no statistical difference in average total PCBs adjacent to the site vs. the average for those caught upstream (north) of OU-2. For Hepatopancreas, average total PCBs and lipid-adjusted PCBs adjacent to the site were not statistically different than average levels in fish caught upstream of OU-2 (north segment).

Oyster Toadfish

Based on the results, there were no apparent differences in average weights or lengths for toadfish caught north, adjacent to and south of the site. An interesting result for this species of fish, which is a bottom dweller and feeder, is that the fillet tissue had only trace levels of PCBs in its tissue. The lipid-normalized values were also low relative to the other species of fish. Calculated whole body averages for total and lipid-adjusted PCBs in tissues of toadfish caught adjacent to the site were not statistically different than average levels in fish caught upstream or downstream of OU-2 (north and south segment).

Hogchoker

For this species of fish, there are no historical allometric data against which the weight vs. length measurements can be compared. Based on the results, comparisons of average weights and lengths showed no apparent differences between fish caught north, adjacent to and south of the site. There

were no significant differences between average total PCB concentrations when comparing all three sampling areas.

Other Species

In 2013, spot croaker was caught and tissues were analyzed for PCBs so that it could be evaluated for further consideration as a potential target forage fish. Levels of PCBs were similar to other fish but only three fish were obtained in the North reach despite the extensive placement of gill nets. Spot were not caught during the 2014 sampling event and therefore have not been added to the target list.

Other forage fish, such as mummichog, Atlantic silverside and young-of-year (YOY) striped bass were either not collected or had insufficient numbers to allow for analysis in either 2013 or 2014 despite efforts to collect them. Collection of forage fish will be attempted again during the 2015 sampling event.

Other non-target species that were caught but not analyzed because of two few specimens and/or too little mass to analyze include largemouth bass, channel catfish, white catfish and grass shrimp.

6.6 BENTHIC MACROINVERTEBRATES

Analytical results are summarized in the report completed by Germano & Associates, Inc. The report "Benthic Habitat Condition Survey at Hastings on Hudson" is included as Attachment B within Appendix H. Sample locations are shown on Baseline Figure 3 (Appendix A).

Benthic Macroinvertebrates were obtained for evaluation of abundance and diversity from sediment samples at 16 locations deemed as optimal based on real-time images from the Sediment Profiling Imagery (SPI) process completed during the habitat characterization (below).

The metrics used to define the abundance and diversity of the benthic community for OU-2 and the interpretation of that data showed the same general conclusions that were reached in the 2000 RI (EarthTech, 2000): Both the Site and the Reference stations were very similar and dominated by pollution tolerant organisms (amphipods, small mollusks and worms). None of the organisms identified in their study could be classified as 'sensitive' to pollution and no 'rare, threatened or endangered' species were present. Although the species composition has changed slightly since 2000, the overall conclusion - that there are no apparent differences between the Site and reference stations - is the same.

6.7 HABITAT CHARACTERIZATION

Analytical results are summarized in the report completed by Germano & Associates, Inc. The report "Benthic Habitat Condition Survey at Hastings on Hudson" is included as Attachment B within Appendix H. Investigation locations are shown on Baseline Figures 6A and 6B (Appendix A).

Habitat characterization utilized the SPI imagery which provided direct visual information at over 200 locations about sediment grain size, demarcation between oxic and anoxic sediments (e.g. the apparent 'redox potential discontinuity'), types of organisms, presence of debris, and presence of methane gas

bubbles. The SPI study was a comprehensive evaluation of the infaunal benthic habitat along transects that spanned over three miles of shoreline.

Overall, the SPI showed featureless muds composed of fine grained silts and clays. The visual changes in the demarcations between oxygenated and reduced muds revealed that the sediment disturbance appeared to be related to water depth which, in turn, is most likely affected by regular ship traffic. The study concluded that "neither the SPI nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site."

6.8 GROUNDWATER

PCB analytical results are summarized and shown in Baseline Table 14 and Baseline Figure 7 (Appendix A).

Baseline groundwater sampling was completed at upland locations to monitor shallow groundwater prior to remedial construction from three upgradient wells and three Site wells using low flow sampling techniques. The first yearly groundwater sampling was conducted in 2014. Results from two downgradient and one of the presumed upgradient wells indicated concentrations of PCBs that exceeded the New York State Ambient Water Quality Standard for drinking water of 0.09 µg/L. Baseline groundwater sampling will continue annually until the beginning of construction.

6.9 AIR MONITORING

PCB analytical results are summarized and shown in Baseline Table 15 and Baseline Figure 8 (Appendix A).

A baseline air monitoring program was implemented in OU-1 to determine baseline concentrations of PCBs in ambient air prior to commencement of remedial construction activities. The baseline air monitoring program was conducted from 18 June 2015 through 18 August 2015, in accordance with the approved Baseline Air Monitoring Plan. All samples were non-detect and reporting limits were below comparison concentration of 0.11 µg/m^3.

7. Supplemental Data Quality Assurance

Laboratory methods to analyze environmental media for PCBs included:

- Soil/Sediment: EPA 3545A (pressurized fluid extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP)
- Biota: EPA 3540C (soxhlet extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP) NE331_01-rev.01 (tissue Preparation)
- Surface water, Pore water, & Groundwater: EPA 3535A (solid phase extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP)

Sample locations with a cross-reference to their specific laboratory reports are included on a master table along with the laboratory reports in Appendix I.

QA/QC samples were collected at a rate of 1 field duplicate per 10 samples and 1 MS/MSD per 20 samples for each media. All field and laboratory procedures were completed in accordance with the approved QAPP. Analytical data used for delineation was collected using Standard Operating Procedures and Quality Assurance Procedures that included the following:

- Holding Time and Sample Preservation Compliance
- GC/MS Instrument Performance Check (where applicable)
- Initial Calibration and Continuing Calibration Procedures
- Field/Method/Preparation Blank Sample Analysis
- System Monitoring Compound Recoveries (where applicable)
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Internal Standard Recoveries (where applicable)
- Field Duplicate Sample Analysis
- ICP Interference Check Sample Performance (where applicable)
- ICP Serial Dilution Replicate Percent Difference (where applicable)

Data validation was subcontracted to a third party (Environmental Standards, Inc.). Based on Data Usability Reports (DURs) provided to date, data validation has resulted in only minor changes in results or flags. Final remedial design will be based upon validated data. The analytical data that supports the risk assessment and delineation was determined to be useable for those purposes.

Below is a brief description of the procedures used in the evaluation and example corrective actions implemented as a result of the assessment. The intent of this summary is to assist the data user with an understanding of the data qualification procedures implemented for their use in the evaluation of the current site conditions.

Sample Data Reporting Procedures

The reported results for each project sample were provided in a NYSDEC Analytical Services Protocol (ASP) Category B deliverables format. The data reporting format was evaluated within each Sample Delivery Group (SDG) and when found to be non-compliant with the project data quality objectives

(DQOs) additional documentation was requested and received from the laboratory as part of the validation process.

Holding Time and Sample Preservation Compliance

Maximum allowable holding times, for each parameter, were measured from the time of sample collection to the time of sample preparation or analysis for each project sample. When a project sample was identified as analyzed after the expiration of the USEPA recommended maximum holding time, the reported sample results were qualified with a "J" as estimated and non-detected parameters were qualified with an "R" as rejected.

PCB sample analysis hold time specified in the QAPP was conservatively specified as six months. However, the analytical method guidance allows holding times of up to approximately one year after collection. Based on the extensive nature of the pre-delineation process and extended timeframe of the sampling events, some hold times were exceeded at some locations. Specifically, some samples were released after the QAPP-specified six month hold time but within one year after collection. Refer to Section 5.2 for further information.

GC/MS Instrument Performance Check

GC/MS instrument performance checks were evaluated to ensure proper tuning of the instrument for mass resolution, compound identification, and sensitivity. It was determined that the analysis of the instrument performance solutions was performed at the beginning of each 12-hour period during which samples or standards were analyzed, and that the instrument performance check met the ion abundance criteria specified by the promulgated USEPA method. In all instances, the GC/MS instrument performance checks for the instruments used in the analysis of project samples fell within method specific criteria without exception.

Initial Calibration and Continuing Calibration Procedures

Instrument calibration procedures for the analysis of project samples were evaluated based on the requirements of the National Functional Guidelines and/or prescribed by the laboratory standard operating procedures (SOPs) when not directly addressed by the guidelines. Generally, the calibration procedures implemented by the laboratory were consistent with USEPA guidance. However, during the analysis of organic parameters by EPA Methods 8260B and 8270C, the continuing calibration acceptance criteria for several target compounds were greater than the EPA guidance criteria of 25 percent difference (%D) from the initial calibration relative response factor (RRF).

In cases where target compounds were detected and reported using a RRF from a non-compliant continuing calibration standard, the result was flagged with a "J" and the reporting limits for non-detect samples were flagged with a "UJ" indicating that the reported values and reporting limits are estimated.

Field/Method/Preparation Blank Sample Analyses

The presence of target compounds in associated method and/or trip blank samples prepared and analyzed concurrently with the project samples was determined as part of each laboratory sample data

package. If target compounds were reported at a concentration greater than the method detection limit (MDL) for organic parameter analyses or the instrument detection limit (IDL) for inorganic parameter analyses, the associated sample results were qualified.

In the case of method blank samples for organic parameter analyses, if the target compound detected was identified as a "common laboratory contaminant" by the USEPA Functional Guidelines, an action level of 10 times (10x) the blank contamination level was calculated. For all other parameters an action level of 5 times (5x) the blank contamination level was calculated. In the case of inorganic method blank sample analyses, an action level of 10 times (10X) the blank contamination level was calculated. In accordance with EPA guidance, if the detection of the blank contaminant in the associated project samples was reported at a concentration between the MDL and the action level, the result was flagged with a "U". This data qualification indicates that the parameter was not present in the sample at a concentration greater than the adjusted reporting level.

System Monitoring/Surrogate Compound Recoveries

System monitoring/surrogate compounds were added to each sample prior to analysis of organic parameters by EPA Method 8082 to confirm the efficiency of the sample preparation procedures. The calculated recovery for each surrogate compound was evaluated to confirm the accuracy of the reported results.

Generally, the calculated recovery of these compounds fell within the laboratory specific quality control criteria. In a few instances, sample extracts prepared for the analysis of PCBs by EPA Method 8082 required dilution prior to analysis. This dilution procedure was implemented by the laboratory to enable quantification of the detected target analytes within the instrument calibration range. Where applicable, the laboratory qualified the reported results indicating the system monitoring compound recovery could not be calculated due to a sample extract dilution.

In cases where the surrogate recovery fell outside the laboratory acceptance criteria, the results greater than the reporting limit were qualified "J", and the reporting limits for non-detect samples were flagged "UJ", as estimated.

Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries

Analytical precision and accuracy were evaluated based on the laboratory control (LCS) and matrix spike (MS/MSD) sample analyses performed concurrently with the project samples. For LCS analyses, after the addition of a known amount of each target analyte into laboratory reagent water, the LCS was analyzed to confirm the ability of the analytical system to accurately quantify the target analytes. For MS/MSD samples, after the addition of a known amount of each target analyte to the sample matrix, the MS/MSD samples were analyzed to confirm the ability of the analytical system to identify the target analytes within the sample matrix.

The percent recovery calculated for each target analyte was evaluated for compliance with method specific criteria. Generally the reported recovery of MS and LCS analyses fell within the laboratory QA acceptance criteria. However, if the LCS recovery fell below the acceptance criteria, the result for the non-compliant target analyte from the project samples analyzed concurrently was qualified with a "J" as estimated or "UJ" if reported as non-detect.

Internal Standard (IS) Compound Recoveries

Internal Standard (IS) compounds were added to each sample prior to the analysis of organic parameters by EPA Methods 8260B, and 8270C to quantify the amount of the target compounds detected within the sample matrix. The response of each IS compound was confirmed to be within the QA/QC criteria of +100% and – 50% of the corresponding 12 hour continuing calibration verification (CCV) standard. If the IS response fell below the –50% acceptance criteria, the target compound concentrations calculated within this sample were qualified with a "J" as estimated. If the IS response fell to below –90% the corresponding CCV standard, the reported results in the project sample were flagged with an "R" as rejected.

Field Duplicate Sample Analysis

Field duplicate samples were collected and analyzed to determine the precision for the sampling and analysis process through calculation of the relative percent difference (RPD) between the original and duplicate sample target analyte concentrations. If the calculated RPD for analytes detected at concentrations greater than five times (5X) the reporting limit exceeded the RPD criteria, the reported results were qualified "J" as estimated.

ICP Interference Check Sample Performance

The results of the ICP Interference Check Samples analyzed concurrently with the project samples were evaluated versus an acceptance criteria prescribed by USEPA guidance. If the calculated recovery an analyte fell outside these criteria, the analyte result for the project samples analyzed concurrently within the analytical batch was flagged with a "J" as estimated.

ICP Serial Dilution Replicate Percent Difference (RPD)

The results of the ICP Serial Dilution samples analyzed concurrently with the project samples were evaluated for compliance with the USEPA protocol criteria of less than 10% replicate percent difference (RPD) between the diluted and undiluted sample, if the analyte concentration was greater than fifty times (50X) the method detection limit in the original sample. If an analyte exhibited a serial dilution RPD greater than 10%, the corresponding sample result was qualified with a "J" as estimated.

Validation Completeness

While validation is not yet complete, based on data usability reports provided by ESI to date, data validation has resulted in only minor changes in results or flags. Upon completion of validation, updated tables will be provided. Any changes to conclusions or interpretations resulting from completion of the validation process will also be provided.

8. Preliminary Remedial Design and Conclusions

8.1 CONCLUSIONS REGARDING THE SELECTED REMEDY

Pre-delineation of soils and sediments has been completed for most of OU-1 and OU-2. Building 52 outfalls were evaluated, the bulkhead wall alignment has been established, and sediment removal outside of resuspension controls (Deepwater Area) has been investigated and evaluated.

The design will incorporate the results of the PDI and include all remedial elements including:

OU-1

- Excavation of soil greater than 10 mg/kg PCB to a maximum depth of 9 or 12 feet.
- Excavation of surface soil (0-12 inches) greater than 1 mg/kg PCB. Note however, that PCBs in surface soil will be isolated by the application of a cover system over the entire site. Therefore, only excavation of soil greater than 10 mg/kg PCB is required as stated above.
- Building 52 outfalls will be addressed.
- Bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest Corner of the site and the Northwest Extension Area.
- Construction and operation of a post-remedy recovery system for PCB DNAPL.
- Installation of a site cover will be required to allow for restricted residential use of the site. Soil cover in areas not otherwise covered by the development at the site (e.g., buildings, pavement, etc.) will consist of two feet of clean soil over a demarcation layer. Note that the preliminary design currently plans to install a cover system over the entire site, including a shoreline protection system along the river.
- Implementation of institutional controls which will manage soil excavation activities and prohibit use of groundwater.

OU-2

- Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the Northwest Corner of the site and the Northwest Extension Area.
- Removal of sediment that contains PCB concentrations greater than 1 mg/kg to a maximum depth of 6 feet below the mud-line within areas of re-suspension controls (i.e., shallow water sediment in Nearshore Area, and Backwater Area).
- Nearshore dredge areas will be backfilled with clean material. Isolation capping will be provided where residual contamination remains above background concentrations. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer of which natural deposition may provide up to 12 inches where a reasonable time frame for deposition can be demonstrated.
- Subject to evaluation and further investigation, removal of sediment outside of re-suspension controls that contain PCB concentrations greater than 50 mg/kg, to a maximum depth of 6 feet below the mud-line. Note that these areas are discussed as the Deepwater Evaluation Area and Deepwater Northwest Area. Dredged areas will be backfilled based on final design requirements.

Feasibility and design data relating to the offshore engineered cap from the 2012 Revised Feasibility Study are included in Appendix D.

A summary of PDI findings and conclusions is provided below.

Data collected to date is sufficient to establish extents of remedial actions and complete the Preliminary Design with the exception of two areas in which structures inhibited access to complete explorations (beneath site trailers and within Building 52). Additional data will be collected once the structures are demolished or relocated. ARC plans to begin the Preliminary Design as required by the ROD.

8.1.1 On-shore Excavation Pre-Delineation

The purpose of the PDI OU-1 soil sampling was to pre-delineate on-shore excavation areas for samples greater than 10 mg/kg PCBs to either 9 ft or 12 ft bgs, depending on geographic location on the Site. (Note the surface soil target of 1 mg/kg will be met by installation of a 2 ft cover over the entire site.) Excavation limits were delineated in both lateral and vertical directions, to determine where PCB and/or lead exceeded removal criteria. Establishing excavation limits (area and depth) in this manner will allow a focused design, reduce uncertainty and increase worker safety during construction, and reduce changes in the field which may result from completing excavation confirmation sampling during remedial construction.

The results of the investigation indicate that vertical and horizontal extents of PCBs have been delineated in general accordance with DER-10 with only limited exceptions. Deviations from DER-10 were generally due to relocating borings due to field conditions and deviations which generally are a result of excavations adjacent to property boundaries or in the vicinity of active utilities. Delineation of three areas of the site could not be completed due to the presence of structures: within Building 52, underneath existing site trailers, or were in the vicinity of an active utility. Additionally, one excavation area was not investigated due to potential upgrades to the County of Westchester New York wastewater force main. These areas will be further investigated either during design of the remedy or during construction.

Based on data collected and evaluations conducted, delineations described in this report adequately describe the required limits of remedial action and will be the basis of excavation design.

8.1.2 Extension Alignment Investigation

The purpose of the PCBM and obstruction probes was to evaluate the presence of both PCBM and obstructions along the alignments of the proposed bulkhead extension wall and deadman. Confirmation that semi-solid or liquid PCBM does not exist along the alignment is important since this material could be dragged down to the Basal Sand aquifer during construction of the wall. Confirmation that obstructions do not exist along the alignment is important since they could impede the ability to construct the wall. Land- and water-based probes were completed in the vicinity of the proposed bulkhead extension wall and deadman anchor.

Fifty-one probes were completed off-shore (41 using mud rotary and 10 using vibracore (PCBM evaluation only)) and 17 probes were completed on shore. Based on the findings of the extension

alignment investigation, a corridor has been identified where no PCB Material (either as DNAPL or semi-solid), or obstructions exist. This corridor will be the basis of the alignment during the design.

8.1.3 Deepwater Evaluation Area

The goal of this investigation was to examine sediment locations in the Deepwater Evaluation Area where PCBs in excess of 50 mg/kg are known or suspected to be present in order to gather data for making decisions regarding remedial action.

The following factors were considered for the evaluation of the deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area-weighted surface concentration of PCBs.

In addition to those factors, consideration was also given to the Baseline Habitat Assessment, the Human Health Risk Assessment and the Ecological Risk Assessment. These assessments provided additional lines of evidence in evaluating the remedial action that is appropriate for these sediments.

Based on the guidance above and an evaluation of the six factors discuss previously, dredging in the Deepwater Evaluation Area is not consistent with the basis for remedy selection, and may pose a greater risk to the environment than leaving the limited number of isolated sediments in place. Therefore removal is not recommended as the remedial action for this portion of the deep water area. This conclusion is further supported by the various assessments that have been conducted at the Site.

The following evaluation factors specifically support this conclusion:

1. Sediments greater than 50 mg/kg PCBs are at least 2-3 feet below the sediment surface and are well below the bioturbation layer.
2. All of these Decision Units are located in a thick deposition zone and have already been buried by natural deposition.
3. Impacted sediments are found only in small isolated areas that are well below the surface.
4. There is at least 2-3 feet of cover less than 50 mg/kg PCBs at all of these locations with most samples below 2 mg/kg PCBs.
5. Potential for migration of re-suspended sediments poses a threat to the environment that currently does not exist as buried impacted sediments would be sequestered in perpetuity.
6. Area-weighted surface concentrations of PCBs are at or near 1 mg/kg for the upper two feet of the investigation area.
7. The habitat assessment does not show any adverse effect based on the existing conditions.
8. Human Health Risk assessments are within acceptable criteria based on the existing conditions.
9. Ecological Risk assessments are within acceptable criteria based on the existing conditions.

8.1.4 Off-shore Pre-Delineation

The purpose of this Off-shore Pre-Delineation investigation was to examine the various off-shore areas where PCBs in excess of remedial criteria are known or suspected to be present (as specified in the ROD), in order to gather supplementary data for making decisions regarding remedial action and to provide information for delineation of dredge areas. The following conclusions were made based on an evaluation of additional data collected

- Nearshore: A majority of the nearshore sediments will be removed to a maximum depth of depth of 6 ft.
- Old Marina: Determination of remedial action is deferred to design of the remedy and the results of additional sampling, potential future use, and presence of deposition below or near background throughout the sediments near the surface. If required, sampling north of the Old Marina will require coordination with the property owner. Design of the remedy will specifically address the sediments in the proximity to VC-501 based on the fact that they are greater than 50 mg/kg.
- North Boat Slip: Remedial action is recommended in the entirety of the North Boat Slip consistent with the removal recommended for adjacent nearshore locations VC-401 thru VC-405. Removal of these sediments up to the maximum depth of six feet will be completed.
- South Boat Slip: Remedial action is recommended for a portion of this backwater to address lead concentrations in sediment.
- Deepwater Northwest Area: For this portion of the deepwater, remedial action is recommended to remove sediments greater than 50 mg/kg up to three feet bml and deeper where contiguous contamination greater than 50 mg/kg exists up to a maximum depth of 6 ft. Locations with sediments greater than 50 mg/kg but having three feet of cover were evaluated with the six factors and recommended to remain in place. No additional deepwater delineation was required outside the Deepwater Northwest Area based on the recommended remedial action (Section 8.3.1.).

8.2 POST-REMEDY CONDITIONS

The results of the PDI were used to develop excavation and dredging limits to comply with the remedial requirements in the RODs. The PDI and historical RI data that are representative of areas outside of the remedial boundaries define the residual (post-remediation) PCB concentrations that will remain following remediation. The results of the BSAP, in conjunction with the residual (post-remediation) conditions, were used to support the human health and ecological risk assessments.

Based on the requirements of the RODs for OU-1 and OU-2, the anticipated Site conditions will be as follows once remediation has been completed:

8.2.1 Soil

- Surface Soil: PCBs in surface soil will be isolated by the application of a cover system over the entire site. This cover system will isolate residual PCBs in soil thereby preventing contact by human and environmental receptors and allowing for restricted residential use. The cover system will include an erosion protection layer along the shoreline which will prevent potential

migration and subsequent exposure to residual PCBs. Institutional controls will ensure that soil cover system is maintained.

- Subsurface Soil: PCBs in subsurface soil will be isolated by the application of the cover system described above. Residual PCBs beneath the cover system will be reduced to 10 mg/kg or less by excavating and back-filling with clean soil as follows: In the Northwest Corner and along the Northern Shoreline, soils in excess of 10 mg/kg will be excavated to 9 ft bgs and backfilled with clean soil; Outside of these areas, soils in excess of 10 mg/kg will be excavated to a maximum depth of 12 ft bgs and backfilled with clean soil. Institutional controls will ensure that future excavation of soil containing residual PCBs is properly managed.

Remedial action in the form of soil excavation and off-site disposal will be performed in areas with complete delineation as shown on Figure 3 which also presents residual PCB concentrations in soil following remediation.

Additional pre-delineation sampling may be completed in select areas after structures are moved (e.g., site job trailers), demolished (e.g., Building 52), or upgraded (e.g., sanitary force main). The design will specify requirements for confirmation or documentation sampling during remediation of areas without complete pre-delineation. Documentation sampling for removal adjacent to property boundaries will be completed during construction where results in close proximity to property boundaries are not available.

8.2.2 Sediment

- Shallow water sediment: Sediments beneath 15 feet or less of surface water (i.e., sediments in the Nearshore and Backwater Areas) will contain PCBs at background conditions (i.e., approximately 1 mg/kg or less). This will be accomplished by excavating sediments in these areas with PCBs greater than approximately 1 mg/kg to a depth of 6 feet and backfilling with clean material that will isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.
- Deepwater sediment: The surficial deep water sediments will consist of native sediment or clean backfill material with PCBs near background (approximately 1 mg/kg or less). Deepwater sediments (i.e., those beneath more than 15 feet of surface water) that exceed 50 mg/kg and for which sufficient native cover is not present will be removed to a maximum depth of 6 feet and backfilled with clean material that will isolate remaining contamination. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.

Remedial action in the form of sediment removal and off-site disposal will be performed in areas as follows:

- Nearshore shallow water sediments, including the North Boat Slip and potentially the Old Marina, will be removed as shown on Figure 4. Sediment in the areas shown will be removed up to six feet bml. Figure 4 also presents residual PCB concentrations that will exist in sediment

following remediation. Within the shallow water sediment areas, residual PCBs will be approximately 1 mg/kg or less in sediment. Removal areas will be backfilled with clean material.

Removal is still under evaluation in the Old Marina area. Concentrations of PCBs in the Old Marina are generally less than or near background in the sediments at and near the surface. Samples in deeper sediments, between three and six feet below mud line, have PCB concentrations near 4 mg/kg. Further evaluation and potential additional sampling may be warranted in this area. Therefore, determination of remedial action is deferred to Preliminary Design. Factors for further evaluation include presence of depositional sediments with concentrations less than or near background throughout the near-surface sediments, potential collection of additional data north and/or west of the PDI data, and sediments in the proximity to VC-501 near the potential Building 52 outfall.

Within the Nearshore and Backwater Areas, average residual PCB concentrations are summarized in the following table.

Average PCB concentrations (mg/kg)

	Nearshore		North Boat Slip		Old Marina	
Depth	*Existing*	*Residual*	*Existing*	*Residual*	*Existing*	*Residual*
0 - 0.5 (ft)	1.4	< 1	0.6	< 1	0.6	< 1
0.5 - 1 (ft)	6.8	< 1	0.7	< 1	0.9	< 1
1 - 2 (ft)	8.8	< 1	1.0	< 1	1.2	TBD
2 - 3 (ft)	2.6	< 1	1.0	< 1	2.0	TBD
3 - 4 (ft)	3.0	< 1	1.9	< 1	3.2	TBD
4 - 5 (ft)	7.6	< 1	2.6	< 1	5.7	TBD
5 - 6 (ft)	2.8	< 1	8.6	< 1	13.8	TBD
6 - 8 (ft)	2.2	2.2	4.8	4.8	5.9	5.9
0 - 3 (ft)	*4.4*	*<1*	*0.8*	*< 1*	*1.2*	*TBD*

- Within the Deepwater Northwest Area, where PCBs are greater than 50 mg/kg within the top 2 feet bml, removal will occur to a depth of up to 6 feet bml. Additionally, for cells that do not provide a minimum of three feet of cover, removal of sediments is recommended up to a depth where results are no longer greater than 50 mg/kg or up to a maximum depth of 6 feet; noting that backfill provides at least three feet of cover. Sediment removal areas are shown on PDI Figure 4.4A (Appendix A). Figure 4 and Figure 5 present residual PCB concentrations that will exist in sediment following remediation.

  Within the Deepwater Northwest Area, average residual PCB concentrations by depth interval are summarized in the following table. Although not an area weighted computation, this provides a reasonable approximation of residual concentrations.

Average PCB concentrations (mg/kg)

Depth	Samples	Existing	Residual [(a)]
0 - 0.5 (ft)	64	7.9	2.7
0.5 - 1 (ft)	65	52	1.4
1 - 2 (ft)	66	49	2.9
2 - 3 (ft)	62	110	3.8
3 - 4 (ft)	50	310	19
4 - 5 (ft)	40	240	70
5 - 6 (ft)	32	870	800
6 - 8 (ft)	14	580	580
0 - 3 (ft)	*~ 64*	*64*	*2.9*

(a) Concentration based on removal of sediment as defined above.

It should be noted that the Deepwater Northwest Area is not yet fully delineated. Additional sampling areas are recommended to resolve data gaps including sampling near RB-19, VC-344, and VC-336. Remedial actions will be extended to these areas, as appropriate, based on the approach used for the Deepwater Northwest Area.

8.2.3 Migration Controls

- Migration controls: Migration of contaminated soil particles and DNAPL will be prevented through installation of migration controls. The shoreline will either be a steel bulkhead or a sloped shoreline with a cover system designed to prevent the migration of contaminated soil particles into the Hudson River and to resist erosion. The sheet pile wall in the vicinity of the PCB DNAPL will prevent mobilization of DNAPL and migration of PCBs in groundwater.

The BSAP sampling has demonstrated that, although PCB concentrations in groundwater at two monitoring wells exceed drinking water standards (maximum groundwater concentration of 0.98 µg/L compared to an EPA drinking water standard of 0.5 µg/L), PCB detections in pore water and surface water are infrequent and well below drinking water standards. The information supports a conclusion that migration of PCBs from soil or DNAPL to groundwater and subsequent discharge to surface water is not detectable, and, furthermore, that partitioning of PCBs from sediment to pore water and subsequent dissolved phase migration to surface water is insignificant. The HHRA and BERA indicate that potential exposures to pore water and surface water are associated with insignificant risks. Use of groundwater will be prohibited by an institutional control, indicating that there are no unacceptable risks associated with groundwater.

Potential migration of residual on-shore PCBs to the river will be mitigated through construction of bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest On-Shore Area of the site and the Northwest Extension Area. In addition, a recovery system for PCB DNAPL will be operated. Finally, remediated areas along the shoreline will be covered with a protective stone armoring to prevent potential erosion of clean cover soil.

8.2.4 Institutional Controls

- Groundwater: Institutional controls will prohibit use of groundwater as a potable water source.

- Institutional controls: Institutional controls will include an environmental easement that will:
  - require the remedial party or site owner to complete and submit to NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
  - allow the use and development for restricted-residential use only (which allows for residential, commercial, and/or industrial use)
  - restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;
  - prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and
  - require compliance with a Department approved Site Management Plan.

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16. USEPA. (1996). Phase 2 Report: Further Site Characterization and Analysis. Database Report Volume 2A. Hudson River PCBs Reassessment RI/FS. Region II, New York. March 1996.

17. Wong, C, Capel, P.D. and Nowell, Lisa, 2001. National-scale, field-based evaluation of the biota-sediment accumulation factor model. Environ. Sci. Technol. 35, 1709-1715.

TABLES

TABLE I
SUMMARY OF HISTORICAL SITE INVESTIGATIONS
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE & CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Investigator	Time Period of Investigation	Date of Report	Location	Reference
Dolph Rotfeld Associates	-	1976	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Converse Engineering	-	1986	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Malcolm Pimie, Inc.			OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Phase I	Nov 1986	Dec 1987	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Phase II	Summer 1987	Dec 1987	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Olko Engineering	Jan 1988	1988	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
EPA	N/A	Jan 1989	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Groundwater Technology, Inc.	Mar 1989		OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Eldon Environmental	May to Aug 1989	Oct 1989	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Parish & Weiner, Inc.	N/A	Oct 1989	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Westchester Dept of Health	Sep 1994	Dec 1994	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Golder Associates	Dec 1995 to Mar 1996	Oct 27 2000	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Fluor Daniel	Sep 1997 to Aug 1998	Oct 27 2000	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Fluor Daniel	May 1998	Nov 1998	OU-2	Offshore Sampling Supplemental Testing, Harbor At Hastings, Hastings-On-Hudson, New York NYSDEC Site # 360022
Fluor Daniel/IT Corp	Jun 1999 to May 2000	Oct 27 2000	OU-1	Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
IT Corp	Sep to Oct 2001	Nov 30, 2001	OU-1	Peer Review Summary Report, Excavation Evaluation for Operatble Unit #1, Harbor at Hastings Site, Hastings on Hudson, New York
Earth Tech of New York, Inc.	Aug 2000 to Apr 2001	Mar 10, 2003	OU-1	Final Feasibility Study Report, Harbor at Hastings Site (OU#2) Site 3-60-022, Work Assignment No. D003821-15
Parsons	Sep 2004 to Nov 2004	Jan 6, 2005	OU-2	Field Work Summary Report for Fall 2004, Atlantic Richfield Supplemental Offshore Investigation, Former Anaconda Plant Site, Operable Unit No. 2
Parsons	July 2005	Nov 30, 2005	OU-2	Field Work Summary Report for Summer 2005, Physical Site Characterization and Sediment Sampling Effort, Former Anaconda Plant Site, Operable Unit No. 2
Parsons	Nov 2005	Feb 2006	OU-2	Fall 2005 Field Sampling Summary Report--Focused AVS-SEM Sediment Sampling, Operable Unit 2 (OU-2) of Harbor-at-Hastings Site (Site 3-60-022) Hastings-on-Hudson, New York
Haley & Aldrich	Jan 2007 to Dec 2008	Jan 2009	OU-1 & OU-2	Supplemental Northwest Corner Investigations Finding Report, NYSDEC Site (#3-60-022), Hastings-On-Hudson, New York
Haley & Aldrich	Aug to Sep 2010	Nov 2010	OU-1	DNAPL IRM Recovery Well Installation Memorandum
Haley & Aldrich	Sep 2010	Dec 2010	OU-2	Rip Rap Field Investigation Data Report, Former Anaconda Wire and Cable Plant Site, Hastings-on-Hudson, New York
Haley & Aldrich	Jun to July 2011	Sep 2010	OU-1	DNAPL IRM Recovery Well Field Expansion Summary Memorandum
Haley & Aldrich	2013-2015	Aug 2015	OU-1 & OU-2	Pre-Design Investigation Data Summary Report, Former Anaconda Wire & Cable Co., Hastings-on-Hudson, New York

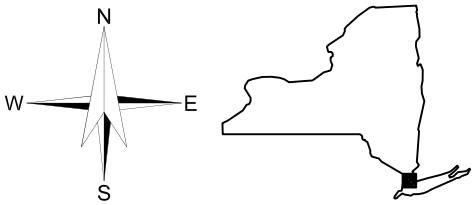
TABLE II

SUMMARY OF REPORTS
FORMER ANACONDA WIRE AND CABLE COMPANY
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

1. "Comprehensive Engineering and Environmental Analysis", Anaconda Site, Dolph Rotfeld Associates (1976).
2. “Site Investigation Report”, Malcolm Pirnie, Hastings Associates, (1987).
3. "Soils, Foundations, and Shore Edge Treatment, Engineering Report for The Harbor at Hastings Associates," Olko Engineering (1988)
4. "Subsurface Site Assessment", Harbor at Hastings Development, Groundwater Technology, Inc. (1989)
5. "Remedial Investigation Report", Harbor at Hastings Site, Golder Associates (1996)
6. "Interim Remedial Measure Workplan – Separate Phase Liquid Recovery", Harbor at Hastings Site, Fluor Daniel GTI, Inc. (1998)
7. "Supplemental Sampling Report", Harbor at Hastings Site, Fluor Daniel GTI, Inc. (1998)
8. "Aquatic Habitat and Biological Characterization for the Hastings on Hudson Site", Aquatec Biological Sciences (1998).
9. "Remedial Investigation Report", Harbor at Hastings Site OU#2, Earth Tech of NY (2000)
10. "Remedial Investigation Report", Harbor at Hastings Site, IT Corporation (2000)
11. "Peer Review Summary Report", Excavation Evaluation for Operable Unit No. 1", Harbor at Hastings Site, IT Corporation (2001).
12. “Feasibility Study Report”, Shaw Environmental and Infrastructure, Inc., (2002)
13. “Final Feasibility Study” (OU-2), Earth Tech, (2003)
14. "Field Work Summary Report for Fall 2004 Atlantic Richfield Supplemental Offshore Investigation." Parsons (2005), and letter from Parsons to NYSDEC entitled "Addendum to Fieldwork Summary Report dated January 2005", dated 8 February 2005.
15. "Field Work Summary Report for Summer 2005 Physical Site Characterization and Sediment Sampling Effort." Parsons (2005).
16. “Supplemental Feasibility Study Report for Operable Unit No. 2”, Parsons (2006)
17. " 50% Design Report for Operable Unit No. 1", Haley & Aldrich of NY (2006)
18. “Modified Conceptual Site Model”, Haley & Aldrich of NY (2008)
19. "Supplemental Northwest Corner Investigation Findings Report", Haley & Aldrich of NY (2008).
20. "DNAPL IRM Recovery Well Installation", Haley & Aldrich of NY (2010).
21. "DNAPL IRM Final Evaluation Report", Haley & Aldrich of NY (2010).
22. "Data Report on Riprap Field Investigations", Haley & Aldrich of NY (2010).
23. “Revised Feasibility Study Report ", Haley & Aldrich of NY (2011).
24. “Pre-Design Investigation Data Summary Report”, Haley & Aldrich of NY (2015)

FIGURES

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY ALDRICH

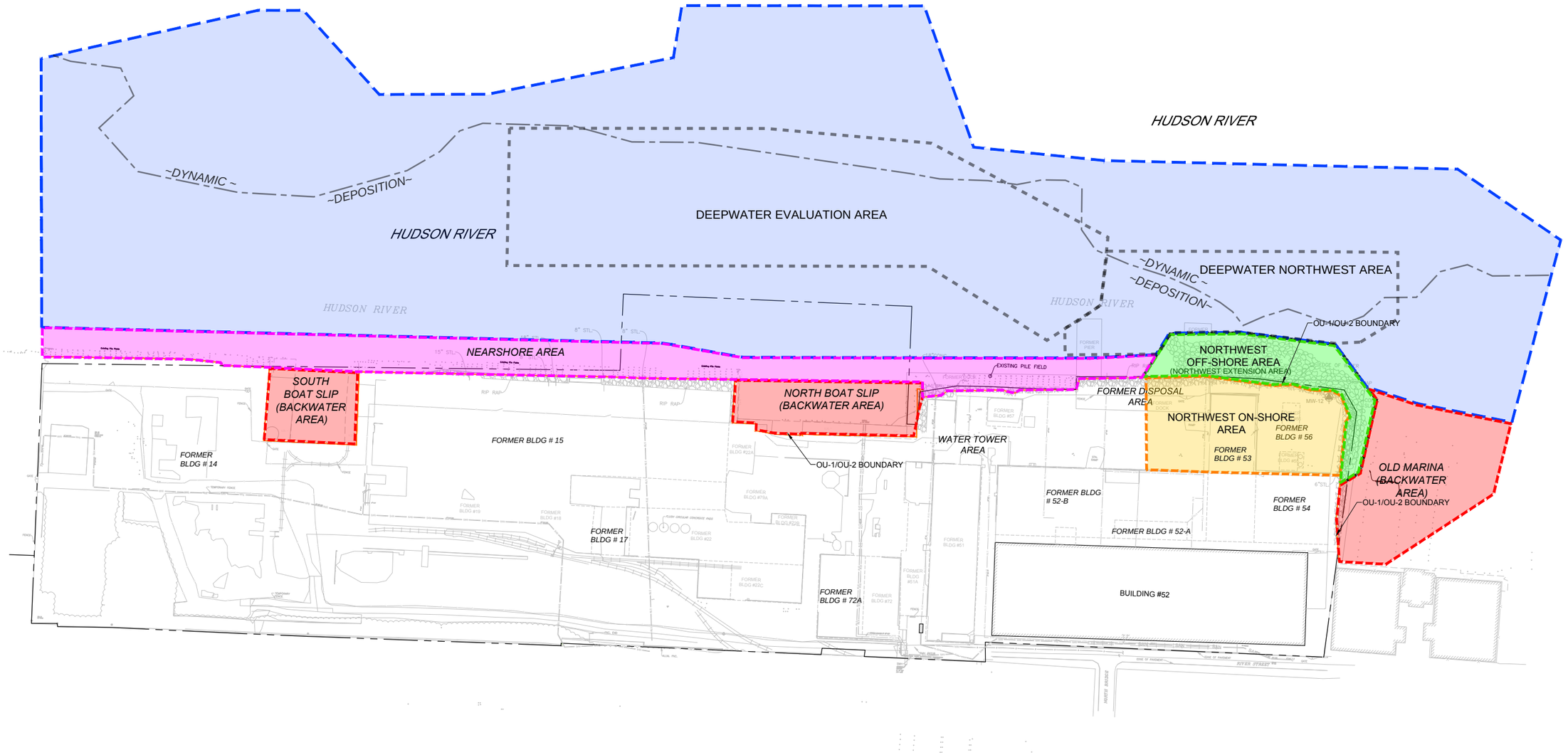
OU-1 REMEDIATION
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

SCALE: 1:24000
NOVEMBER 2015

FIGURE 1

G:\PROJECTS\28612 HASTINGS\H&S MASTER\HASPS\258_BUILDING 52 ASBESTOS\FIGURES\28612-LOCUS.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- EXISITNG STORM SEWER
- EXISITNG SANITARY SEWER
- RIP-RAP
- RIVER ENVIRONMENT BOUNDARY BETWEEN DEPOSITION AND DYNAMIC (DEPOSITION/EROSION)
- MONITORING WELL
- DEEPWATER AREA
- NEARSHORE AREA
- NORTHWEST OFF-SHORE AREA
- NORTHWEST ON-SHORE AREA
- BACKWATER AREA

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
3. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
4. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
5. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
6. THE OU-2/OU-1 BOUNDARY IS LOCATED AT THE MHW.

N

0 100 200 300 400

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE FEATURES

SCALE: AS SHOWN
NOVEMBER 2015

FIGURE 2

These locations will be removed as a result of the slopeback construction

Resampled with SG-006

S-1 5 FT
S-2 7 FT
S-3 6 FT
S-4 2 FT
S-5 12 FT
S-6 4 FT
S-8 4 FT
S-9 2 FT
S-10 4 FT
S-12 8 FT
S-13 12 FT
S-14 10 FT

LEGEND

PDI SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

REMOVAL AREA
PROPERTY LIMITS
DELINEATION COMPLETE
ADDITIONAL REMOVAL & DELINEATION REQUIRED
N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH
SAMPLES REMOVED BY EXCAVATION
RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

SHEET 1
SHEET 2

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 1 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM

Removal Areas S-15,S-16,S-17,S-18,S-20: Additional excavation and delineation is required where results are >10 mg/kg at edge of the shown removal area.

Residual below max. removal depth of 12 ft.

S-15 12 FT
S-16 6 FT
S-17 8 FT
S-18 8 FT
S-19 12 FT
S-20 8 FT
S-14 4 FT

SHEET 1
SHEET 2
SHEET 2
SHEET 3

LEGEND

PDI SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES (MAX PCBs)
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

- REMOVAL AREA
- PROPERTY LIMITS
- DELINEATION COMPLETE
- ADDITIONAL REMOVAL & DELINEATION REQUIRED
- N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH
- SAMPLES REMOVED BY EXCAVATION
- RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 2 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM

Residual below max. removal depth of 9 ft. (typ.)

Residual below max. removal depth of 12 ft.

Resampled with SP-201

Below existing building slab (typ.)

BUILDING 52

JOB TRAILERS

SHEET 2

SHEET 3

SHEET 3

SHEET 4

LEGEND

PDI SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- REMOVAL AREA
- PROPERTY LIMITS
- DELINEATION COMPLETE
- ADDITIONAL REMOVAL & DELINEATION REQUIRED
- N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH

HISTORIC SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- SAMPLES REMOVED BY EXCAVATION
- RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 3 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM

Residual below max. removal depth of 9 ft. (typ.)

Below existing building slab (typ.)

Removal Areas N-8,N-10,N-12,N-16,N-17,N-18,N-28: Additional excavation and delineation is required where results are >10 mg/kg at edge of the shown removal area.

JOB TRAILERS

BUILDING 52

SHEET 3

SHEET 4

LEGEND

PDI SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES (MAX PCBs)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

- REMOVAL AREA
- PROPERTY LIMITS
- DELINEATION COMPLETE
- ADDITIONAL REMOVAL & DELINEATION REQUIRED
- N-15 6 FT — REMOVAL AREA DESIGNATION AND REMOVAL DEPTH
- SAMPLES REMOVED BY EXCAVATION
- RESIDUALS >10 mg/kg (below removal depth)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

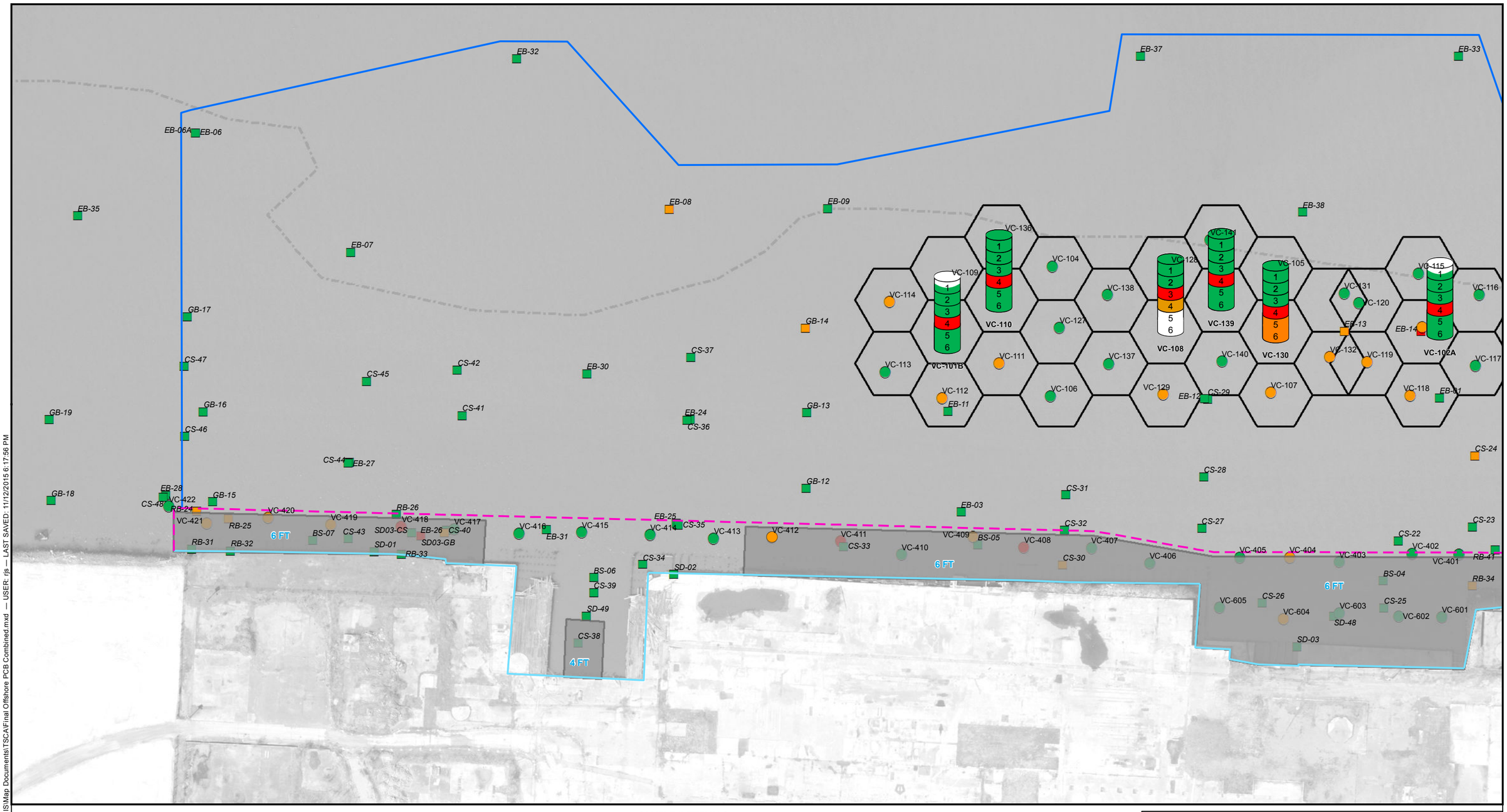
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ONSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 3
SHEET 4 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Onshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 11:53:33 AM



GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Offshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 6:17:56 PM

LEGEND

PDI SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- SAMPLES REMOVED BY DREDGE

HISTORIC SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- RESIDUALS > 10 mg/kg (below removal depth)

- NW EXTENSION
- DECISION UNIT
- REMOVAL/BACKFILL AREA
- AREA WITH COVER

- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- RIVER ENVIRONMENT BOUNDARY

SAMPLE INTERVALS (PCBs in mg/kg)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- Not Sampled or Not Analyzed

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

0 120 240
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OFFSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 4
SHEET 1 OF 2

Additional Delineation Required

SEE FIGURE 5 FOR DETAIL

6 FT

LEGEND

PDI SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- SAMPLES REMOVED BY DREDGE

HISTORIC SAMPLES (MAX PCBs)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- RESIDUALS > 10 mg/kg (below removal depth)

- NW EXTENSION
- DECISION UNIT
- REMOVAL/BACKFILL AREA
- AREA WITH COVER

- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- RIVER ENVIRONMENT BOUNDARY

SAMPLE INTERVALS (PCBs in mg/kg)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- Not Sampled or Not Analyzed

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

0 120 240
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OFFSHORE PROPOSED REMEDY AND RESIDUALS

NOVEMBER 2015

FIGURE 4
SHEET 2 OF 2

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCA\Final Offshore PCB Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 6:17:56 PM

Residual below cover (typ.)

Resampled with VC-319

Residual below max. removal depth of 6 ft.

Residual below removal depth of 3 ft.

Residual below removal depth of 3 ft.

Residual below max. removal depth of 6 ft.

Contained within the Northwest Extension (typ.)

LEGEND

PDI SAMPLES (MAX PCBs)
- >50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- SAMPLES REMOVED BY DREDGE

HISTORIC SAMPLES (MAX PCBs)
- >50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- RESIDUALS > 10 mg/kg (below removal depth)

- NW EXTENSION
- DECISION UNIT
- REMOVAL/BAKFILL AREA
- AREA WITH COVER
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- RIVER ENVIRONMENT BOUNDARY

SAMPLE INTERVALS (PCBs in mg/kg)
- > 50 mg/kg
- 10 - 50 mg/kg
- 0 - 10 mg/kg
- Not Sampled or Not Analyzed

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 40 80
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OFFSHORE PROPOSED REMEDY AND RESIDUALS NW OFFSHORE

NOVEMBER 2015

FIGURE 5

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\TSCANWC Combined.mxd — USER: rjs — LAST SAVED: 11/12/2015 7:21:22 PM

APPENDIX A

TABLES & FIGURES
(SELECT REPORTS)

Conceptual Site Model (CSM)

Figure 7A	Total PCB Concentrations in Soil (Northwest Corner)
Figure 7B	Total PCB Concentrations in Soil (North Remainder Area)
Figure 7C	Total PCB Concentrations in Soil (South Area)
Figure 13A	Total PCB Concentrations in Groundwater (Sitewide)

OU-1 Record of Decision (ROD)

Figure 3	PCB Material Locations and DNAPL Extents in the Northwest Corner

OU-2 Record of Decision (ROD)

Figure 5	Extent of PCB in Sediments

Pre-Design Investigation Data Summary Report (PDI)

Table 3.3A	Summary of Soil Analytical Results - Total PCBs
Table 3.5A	Summary of Sediment Analytical Results for Deepwater Investigation - Total PCBs
Table 3.5B	Summary of Sediment Analytical Results for Deepwater Investigation - Total PCBs, Variability Sampling Locations
Table 3.6A	Summary of Sediment Analytical Results for Northwest Area Deepwater Locations - Total PCB
Table 3.6B	Summary of Sediment Analytical Results for Nearshore and Backwater Locations - Total PCBs
Figure 3.2F	Outfall Investigations
Figure 3.4A	Location Plan - Extension Alignment Borings and Probes
Figure 3.5G	Deepwater Investigation – PDI PCB Results – Variability Sampling
Figure 3.6A	Northwest Area Investigation – PDI PCB Results – Surface to 0.5 Foot
Figure 3.6I	Nearshore & Backwater - PDI PCB Results - Surface to 0.5 Foot
Figure 4.3A	River Environment – Deposition/Dynamic Areas with PDI Sample Locations
Figure 4.4A	Northwest Area Sediment Removal Evaluation Overview
Figure 4.4H	Nearshore & Backwater – Sediment Removal Evaluation – Surface to 6 Foot
Figure 4.4I	Nearshore & Backwater – Sediment Removal Evaluation – 6 to 8 Foot
Figure 4.4J	Old Marina Sediment Removal Evaluation – PDI PCB Results-Surface to 8 Foot

APPENDIX A

TABLES & FIGURES
(SELECT REPORTS)

Baseline Sampling Data Report (Baseline)

APPENDIX B

OU-1 RODs

APPENDIX C

OU-2 ROD

APPENDIX D

RFS APPENDICES (SELECT REPORTS)

HALEY ALDRICH

APPENDIX E

REMEDIAL DESIGN WORK PLAN EXCERPTS
(SCOPE OF PROGRAM)

APPENDIX F

BASELINE SAMPLING AND ANALYSIS PLAN
(SCOPE OF PROGRAM)

HALEY ALDRICH

APPENDIX G

PDI DATA SUMMARY REPORT

HALEY ALDRICH

APPENDIX H

BASELINE DATA REPORT YEAR 1 & 2

HALEY ALDRICH

APPENDIX I

LABORATORY REPORTS

TABLE SUMMARY OF LAB REPORTS

- Soil Analytical Data – PCBs
- Soil Analytical Data – Metals
- Sediment Analytical Data – PCBs
- Sediment Analytical Data – Metals
- Baseline Analytical Results – Porewater, Sediment, Groundwater, and Air
- Baseline Analytical Results – Surface Water
- Baseline Analytical Results – Biota 2013
- Baseline Analytical Results – Biota 2014

LAB REPORTS (AVAILABLE ON DVD ONLY)

APPENDIX A

TABLES & FIGURES
(SELECT REPORTS)

Conceptual Site Model (CSM)

Figure 7A	Total PCB Concentrations in Soil (Northwest Corner)
Figure 7B	Total PCB Concentrations in Soil (North Remainder Area)
Figure 7C	Total PCB Concentrations in Soil (South Area)
Figure 13A	Total PCB Concentrations in Groundwater (Sitewide)

OU-1 Record of Decision (ROD)

Figure 3	PCB Material Locations and DNAPL Extents in the Northwest Corner

OU-2 Record of Decision (ROD)

Figure 5	Extent of PCB in Sediments

Pre-Design Investigation Data Summary Report (PDI)

Table 3.3A	Summary of Soil Analytical Results - Total PCBs
Table 3.5A	Summary of Sediment Analytical Results for Deepwater Investigation - Total PCBs
Table 3.5B	Summary of Sediment Analytical Results for Deepwater Investigation - Total PCBs, Variability Sampling Locations
Table 3.6A	Summary of Sediment Analytical Results for Northwest Area Deepwater Locations - Total PCB
Table 3.6B	Summary of Sediment Analytical Results for Nearshore and Backwater Locations - Total PCBs
Figure 3.2F	Outfall Investigations
Figure 3.4A	Location Plan - Extension Alignment Borings and Probes
Figure 3.5G	Deepwater Investigation – PDI PCB Results – Variability Sampling
Figure 3.6A	Northwest Area Investigation – PDI PCB Results – Surface to 0.5 Foot
Figure 3.6I	Nearshore & Backwater - PDI PCB Results - Surface to 0.5 Foot
Figure 4.3A	River Environment – Deposition/Dynamic Areas with PDI Sample Locations
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Figure 4.4J	Old Marina Sediment Removal Evaluation – PDI PCB Results-Surface to 8 Foot

APPENDIX A

TABLES & FIGURES
(SELECT REPORTS)

Baseline Sampling Data Report (Baseline)

Conceptual Site Model (CSM)

Figure 7A	Total PCB Concentrations in Soil (Northwest Corner)
Figure 7B	Total PCB Concentrations in Soil (North Remainder Area)
Figure 7C	Total PCB Concentrations in Soil (South Area)
Figure 13A	Total PCB Concentrations in Groundwater (Sitewide)

DB-13	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	36 - 38 ft	38 - 40 ft	40 - 42 ft
	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998
Total PCBs	3440	987	145	79	18	30	0.443	200	21	590	3.9	0.88

HA-118-A	5 - 10 ft	10 - 15 ft	15 - 17 ft	17 - 20 ft	20 - 25 ft	25 - 26.5 ft
	3/30/2006	3/30/2006	3/30/2006	3/30/2006	3/30/2006	3/30/2006
Total PCBs	1100	5.3	0.74	1.5	0.53	98

DB-23	6 - 8 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	31 - 32 ft	40 - 42 ft
	3/19/1998	3/19/1998	3/19/1998	3/19/1998	3/19/1998	3/19/1998	3/19/1998	3/19/1998
Total PCBs	2360	2410	127	6	1.2	0.52	91000	160

DB-14	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 34.5 ft	36 - 38 ft	38 - 40 ft
	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998	3/10/1998
Total PCBs	480	33	1.74	1.82	0.047	0.16	0.07	0.21	700	200000	38	7.8

MW-04	4 - 6 ft	8 - 8 ft	12 - 12 ft	16 - 16 ft	20 - 20 ft
	10/6/1997	10/6/1997	10/6/1997	10/6/1997	10/6/1997
Total PCBs	10700	91	320	940	290

FL-06	0 - 0.5 ft
	6/8/1998
Total PCBs	940

DB-02	30 - 30 ft
	10/7/1997
Total PCBs	100000

MW-10	0 - 2 ft	4 - 6 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 35 ft	35 - 36 ft	43 - 44 ft	44 - 46 ft
	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/5/1998	3/6/1998	3/6/1998
Total PCBs	1250	153	9.98	4.47	0.926	0.504	9.9	150	14	0.34	0.18	0.15

FL-07	0 - 0.5 ft
	6/8/1998
Total PCBs	510

FL-02	0 - 0.5 ft
	6/8/1998
Total PCBs	16

FL-05	0 - 0.5 ft
	6/8/1998
Total PCBs	140

FL-03	0 - 0.5 ft
	6/8/1998
Total PCBs	100

FL-04	0 - 0.5 ft
	6/8/1998
Total PCBs	17

SB-159	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 39 ft
	1/27/2000	1/27/2000	1/27/2000	1/27/2000	1/27/2000
Total PCBs	23.9	3.1	4.47	37000	160000

HA-203	5 - 10 ft
	12/8/2007
Total PCBs	ND/ND

DB-28	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	12 - 14 ft	18 - 20 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 36 ft
	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998
Total PCBs	78	1700	680	970	42	22	0.79	0.5	0.4	2.3	0.038	

FL-12	0 - 0.5 ft
	6/8/1998
Total PCBs	920

DB-24	0 - 2 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 35 ft	36 - 38 ft	38 -
	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/1998	3/25/
Total PCBs	136	3100	15000	8000	5300	5000	9600	88000	250000	11	

FL-01	0 - 0.5 ft
	6/8/1998
Total PCBs	460

DB-15	0 - 2 ft	4 - 6 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 36 ft	36 - 38 ft
	3/11/1998	3/11/1998	3/11/1998	3/11/1998	3/11/1998	3/11/1998	3/11/1998	3/11/1998	3/11/1998	3/11/1998
Total PCBs	540	290	5	7.2	3.6	87	18000	2.5	38	43

FL-08	0 - 0.5 ft
	6/8/1998
Total PCBs	1800

DB-20	0 - 2 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	34 - 35 ft	35 - 36 ft	36 - 38 ft
	3/17/1998	3/17/1998	3/17/1998	3/17/1998	3/17/1998	3/17/1998	3/17/1998	3/17/1998	3/17/1998	3/16/1998
Total PCBs	360	14800	381000	23700	133000	42000	234	7600	316	7.4

DB-19	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 36 ft
	3/16/1998	3/16/1998	3/16/1998	3/16/1998	3/16/1998	3/16/1998	3/16/1998	3/16/1998	3/16/1998	3/16/1998
Total PCBs	160000	29000	13000	22500	19700	13600	50800	8160	208000	160

HA-215	5 - 7 ft	7 - 9 ft	15 - 17 ft	17 - 19 ft	19 - 21 ft	21 - 25 ft
	12/8/2007	12/8/2007	12/8/2007	12/8/2007	12/8/2007	12/8/2007
Total PCBs	ND	ND	ND	ND	ND	ND

FL-13	0 - 0.5 ft
	6/8/1998
Total PCBs	190

FL-09	0 - 0.5 ft
	6/8/1998
Total PCBs	4.1

DB-12	0 - 2 ft	4 - 6 ft	8 - 12 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft
	3/3/1998	3/3/1998	3/3/1998	3/3/1998	3/3/1998	3/3/1998	3/3/1998	3/3/1998	3/3/1998
Total PCBs	10700	450	93	14.8	15	55	28.6	26.2	140

EE-23	2 - 4 ft	5 - 7 ft	7 - 9 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	520	1400	4100

HA-221A	25 - 27 ft
	12/11/2007
Total PCBs	ND

DB-11	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	18 - 20 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 36 ft	36 - 38 ft
	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998	3/4/1998
Total PCBs	911	30.2	33.9	3.86	1.31	1.49	5.78	84000	8.3	8.8		

DB-31	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	32 - 34 ft	34 - 36 ft	36 - 38 ft
	6/17/1998	6/17/1998	6/17/1998	6/17/1998	6/18/1998	6/18/1998	6/18/1998	6/18/1998	6/18/1998	6/18/1998
Total PCBs	1.91	0.12	0.13	0.38	0.16	0.24	0.16	0.23	0.084	ND

DB-18	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	34 - 36 ft
	3/13/1998	3/13/1998	3/13/1998	3/13/1998	3/13/1998	3/13/1998	3/13/1998	3/13/1998	3/13/1998
Total PCBs	140	17000	4900	38000	6900	2000	96000	43000	440

FL-14	0 - 0.5 ft
	6/8/1998
Total PCBs	250

DB-26	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	32 - 34 ft	36 - 38 ft	38 - 40 ft
	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998
Total PCBs	370	1100	9400	17000	28000	9200	19000	6000	36	14

DB-22	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	18 - 20 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 33 ft	33 - 34 ft	34 - 36 ft
	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998	3/18/1998
Total PCBs	88500	62200	100	3.98	1.2	13.1	26100	41400	766	139	1680	

FL-10	0 - 0.5 ft
	6/8/1998
Total PCBs	2400

DB-16	4 - 6 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	30 - 32 ft	36 - 38 ft
	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998
Total PCBs	4800	58	91	1.2	4.61	7.22	8.91	0.18

FL-11	0 - 0.5 ft
	6/8/1998
Total PCBs	1900

PDSB-27	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	10/12/2005	10/12/2005	10/12/2005	10/12/2005	10/12/2005
Total PCBs	239	17.7	11.6	257	126

DB-25	0 - 2 ft	2 - 4 ft	6 - 8 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	32 - 34 ft	34 - 35 ft	35 - 36 ft	36 - 38 ft
	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998	6/8/1998
Total PCBs	21000	270000	20000	53000	12000	22000	18000	16000	54000	1100	3.6	480

HA-117	24 - 24 ft	25 - 30 ft
	3/27/2008	3/27/2008
Total PCBs	21	950

HA-117-A	30 - 31 ft
	3/27/2008
Total PCBs	780

FL-19	0 - 0.5 ft
	6/8/1998
Total PCBs	6400

DB-27	0 - 2 ft	4 - 6 ft	8 - 10 ft	12 - 14 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	36 - 38 ft	38 - 40 ft
	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/9/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998	6/10/1998
Total PCBs	16000	1900	3500	3700	6400	43000	760	6200	4.8	4.7

HA-115	0 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 15 ft	15 - 17 ft	17 - 20 ft	20 - 25 ft	25 - 27 ft	27 - 29 ft
	3/25/2008	3/25/2008	3/25/2008	3/25/2008	3/25/2008	3/25/2008	3/25/2008	3/25/2008	3/26/2008	3/26/2008
Total PCBs	13000	22	320	4600	6700	770	2300	640	620	2/12

FL-18	0 - 0.5 ft
	6/8/1998
Total PCBs	180

DB-17	0 - 2 ft	4 - 6 ft	8 - 10 ft	16 - 18 ft	20 - 22 ft	24 - 26 ft	28 - 30 ft	31 - 32 ft
	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998	3/12/1998
Total PCBs	32000	420	730	1.11	3.83	1.46	220	0.11

PDSB-30	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	10/14/2005	10/14/2005	10/14/2005	10/14/2005	10/14/2005
Total PCBs	1.4	610	123	2.33	4.12

SB-097	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999
Total PCBs	0.28	0.048	0.35	0.049	ND	ND	ND	0.036	ND

SB-096	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999	7/20/1999
Total PCBs	2.4	ND	0.55	0.091	0.048	ND	0.073	ND	ND

FL-15	0 - 0.5 ft
	6/8/1998
Total PCBs	150

POSB-28	0 - 2 ft	2 - 4 ft	6 - 8 ft	8 - 10 ft
	10/11/2005	10/11/2005	10/11/2005	10/11/2005
Total PCBs	0.68	20.5	620	91

FL-16	0 - 0.5 ft
	6/8/1998
Total PCBs	37

FL-20	0 - 0.5 ft
	6/8/1998
Total PCBs	5.7

FL-17	0 - 0.5 ft
	6/8/1998
Total PCBs	43

HA-116	0 - 5 ft	5 - 10 ft	10 - 12 ft	12 - 15 ft	15 - 20 ft	20 - 22 ft	22 - 25 ft	25 - 27 ft	27 - 29 ft
	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008
Total PCBs	7100	1100	560	1500	1200	22	1.7	3.7	3.1

FL-21	0 - 0.5 ft
	6/8/1998
Total PCBs	14

PDSB-29	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	10/13/2005	10/13/2005	10/13/2005	10/13/2005	10/13/2005
Total PCBs	0.375	2.83	10600	910	1620

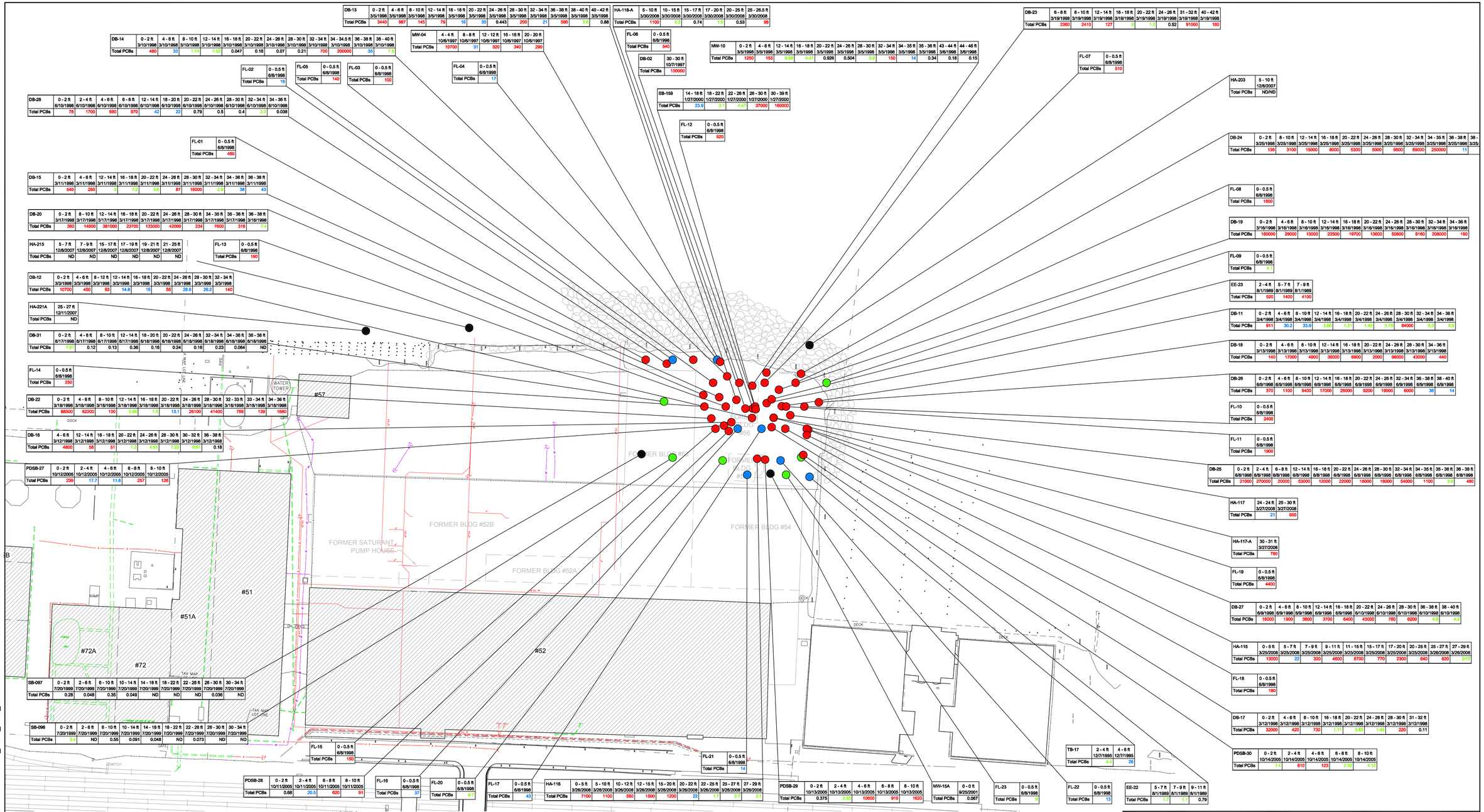
MW-15A	0 - 0 ft
	9/25/2001
Total PCBs	0.067

FL-23	0 - 0.5 ft
	6/8/1998
Total PCBs	6

TB-17	2 - 4 ft	4 - 6 ft
	12/7/1995	12/7/1995
Total PCBs	4.4	25

FL-22	0 - 0.5 ft
	6/8/1998
Total PCBs	13

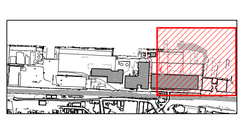
EE-22	5 - 7 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	1.7	1.1	0.79



LEGEND:

- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT <1 MG/KG
- RESULT >1 AND <=10 MG/KG
- RESULT >10 AND <=50 MG/KG
- RESULT >50 MG/KG
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- UNKNOWN

NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. MAXIMUM RESULT SHOWN IN EACH DEPTH INTERVAL.
7. RESULTS IN DATABOXES SCREENED AGAINST SITE-SPECIFIC CRITERIA: < 1MG/KG, >1 AND <=10 MG/KG, >10 MG/KG AND <=50 MG/KG, AND >50 MG/KG.
8. ALL RESULTS SHOWN IN MG/KG.
9. SAMPLES COLLECTED POST 2005 INCLUDE AROCLOR 1262 AND 1268. SEE SECTION 6.1.1 IN MODIFIED CONCEPTUAL SITE MODEL REPORT FOR MORE INFORMATION.



SITE KEY: NTS

W S N E

0 60 120 180 240

SCALE IN FEET

HALEY & ALDRICH

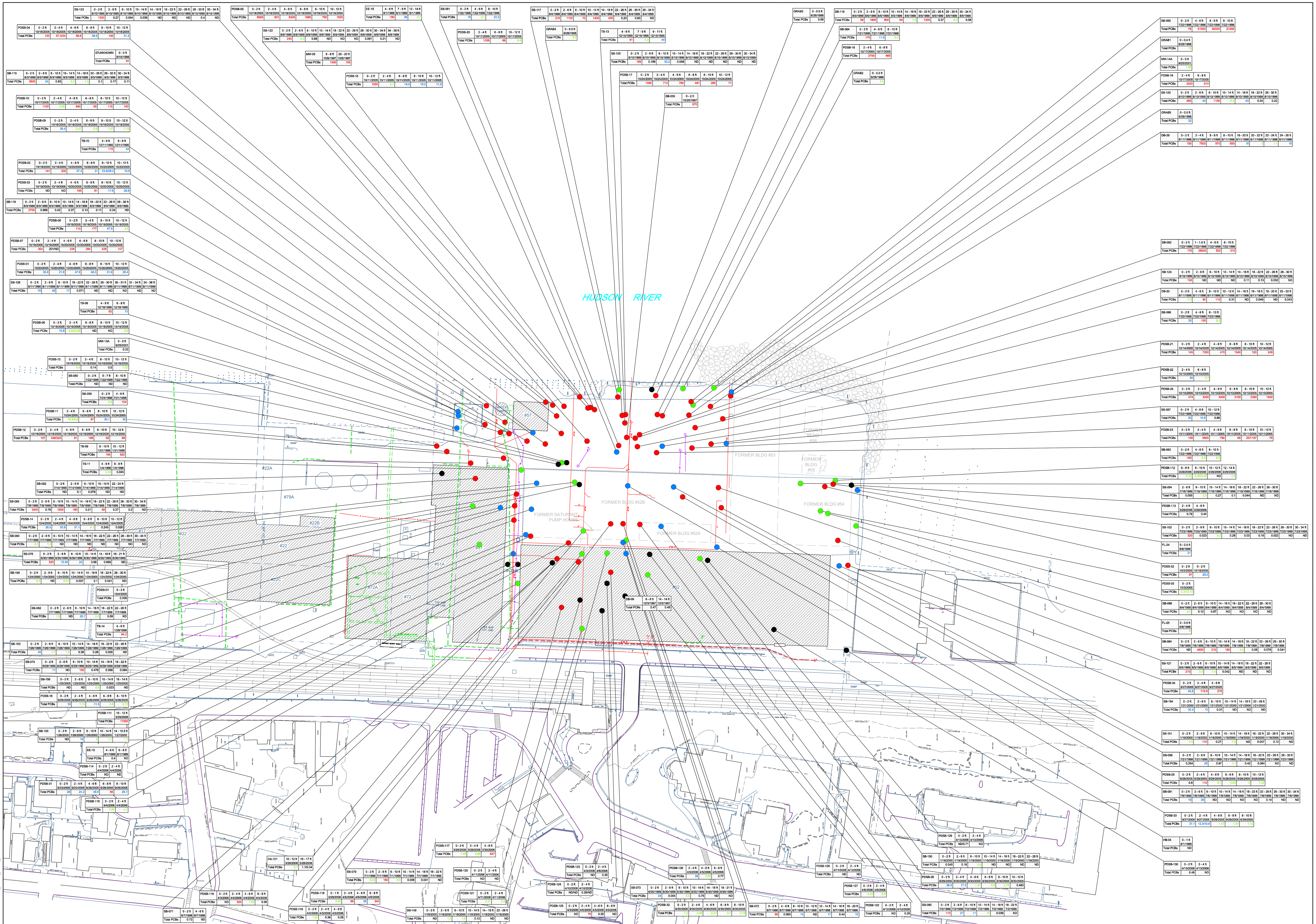
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS IN SOIL (NORTHWEST CORNER)

SCALE: AS SHOWN
AUGUST 2008

FIGURE 7A

G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_SOIL_PCB_R2.DWG



LEGEND:

- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT <1 MG/KG
- RESULT >1 AND <=10 MG/KG
- RESULT >10 AND <=50 MG/KG
- RESULT >50 MG/KG
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- UNKNOWN

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
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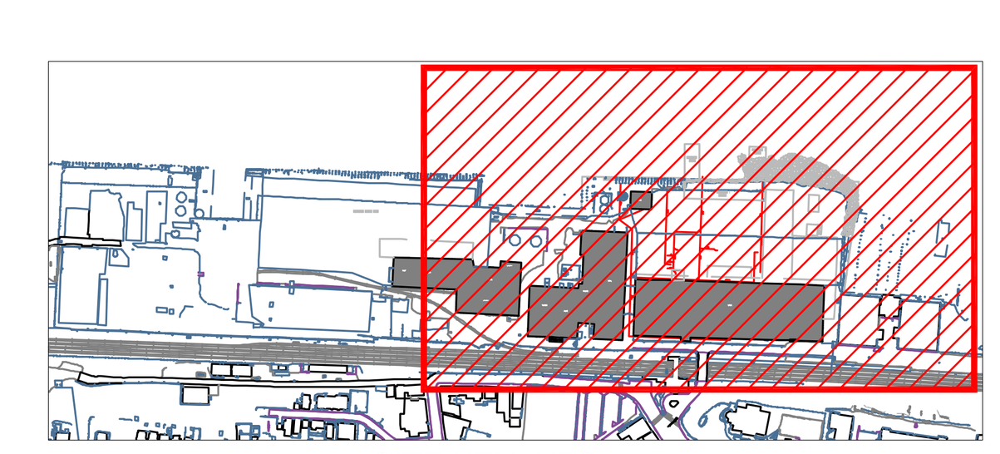
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. MAXIMUM RESULT SHOWN IN EACH DEPTH INTERVAL.
7. RESULTS IN DATABOXES SCREENED AGAINST SITE-SPECIFIC CRITERIA: < 1MG/KG, >1 AND <=10 MG/KG, >10 MG/KG AND <=50 MG/KG, AND >50 MG/KG.
8. ALL RESULTS SHOWN IN MG/KG.
9. SAMPLES COLLECTED POST 2005 INCLUDE AROCLOR 1262 AND 1268. SEE SECTION 6.1.1 IN MODIFIED CONCEPTUAL SITE MODEL REPORT FOR MORE INFORMATION.



SITE KEY: NTS

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS IN SOIL (NORTH REMAINDER AREA)

SCALE: AS SHOWN
AUGUST 2008

FIGURE 7B

G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_SOIL_PCB_R2.DWG

EE-01	3 - 5 ft	5 - 7 ft	7 - 13 ft	13 - 15 ft
	8/1/1989	8/1/1989	8/1/1989	8/1/1989
Total PCBs	930	6.1	5.6	4.2

EE-04	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
	8/1/1989	8/1/1989	8/1/1989	8/1/1989
Total PCBs	21	ND	ND	ND

EE-02	1 - 3 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND	ND

EE-03	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989	8/1/1989
Total PCBs	820	290	0.7	ND

PDSB-102	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
	3/27/2006	3/27/2006	3/27/2006	3/27/2006
Total PCBs	8	4.2	4.96	1.53

PDSB-37	2 - 4 ft
	10/26/2005
Total PCBs	1.99

SB-090	0 - 2 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/13/1999	7/13/1999	7/13/1999	7/13/1999	7/13/1999	7/13/1999
Total PCBs		ND	0.11	0.08	ND	ND

SB-058	0 - 2 ft	4 - 6 ft
	7/21/1998	7/21/1998
Total PCBs	30	0.8100001

PDSB-101	10 - 12 ft	12 - 14 ft
	3/24/2006	3/24/2006
Total PCBs	ND	ND

TB-16	3 - 5 ft	5 - 7 ft
	12/5/1995	12/5/1995
Total PCBs	0.12	0.86

HB-06	0 - 1 ft
	8/1/1989
Total PCBs	370

PDSB-38	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/24/2005	10/24/2005	10/24/2005	10/24/2005	10/24/2005	10/24/2005
Total PCBs	18.4	1.64	0.87	0.743	2.36	1.04

SB-091	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	26 - 30 ft
	7/14/1999	7/14/1999	7/14/1999	7/14/1999	7/14/1999	7/14/1999	7/14/1999
Total PCBs	2.83	0.106	ND	ND	ND	ND	ND

EE-07	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND	ND

EE-08	4 - 6 ft	8 - 10 ft	10 - 12 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

SB-110	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/29/1999	7/29/1999	7/29/1999	7/29/1999	7/29/1999	7/29/1999	7/29/1999
Total PCBs	0.068	0.82	ND	ND	ND	ND	ND

PDSS-10	0 - 2 ft
	10/21/2005
Total PCBs	1.5

PDSB-103	10 - 12 ft	12 - 14 ft
	3/27/2006	3/27/2006
Total PCBs	ND	ND

SB-105	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/27/1999	7/27/1999	7/27/1999	7/27/1999	7/27/1999	7/27/1999	7/27/1999
Total PCBs	2.4	6.1	1.44	0.31	0.28	ND	ND

TB-05	4 - 6 ft	12 - 14 ft
	12/29/1995	12/29/1995
Total PCBs	0.13	1.6

TB-01	4 - 6 ft	10 - 12 ft
	12/28/1995	12/28/1995
Total PCBs	ND	ND

MW-02A(TB-02)	4 - 6 ft	8 - 10 ft
	12/28/1995	12/28/1995
Total PCBs	ND	ND

PDSB-35	0 - 2 ft
	10/21/2005
Total PCBs	0.68/0.67

TB-06	4 - 6 ft
	1/4/1996
Total PCBs	0.32

TB-03	4 - 6 ft	10 - 12 ft
	12/27/1995	12/27/1995
Total PCBs	ND	ND

SB-068	0 - 2 ft	4 - 6 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft	16 - 16 ft
	8/7/1998	8/7/1998	8/7/1998	8/7/1998	8/7/1998	8/7/1998
Total PCBs	0.45	ND	ND	0.22	0.043	ND

EE-16	5 - 7 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

PDSB-107	6 - 8 ft	8 - 10 ft
	3/26/2006	3/26/2006
Total PCBs	ND	ND

EE-19	3 - 5 ft	5 - 7 ft	7 - 9 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

SB-095A	0 - 2 ft	2 - 3.5 ft	3 - 5.4 ft
	7/19/1999	7/19/1999	7/19/1999
Total PCBs	10.3	1.18	0.005

SB-095B	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	8/11/1999	8/11/1999	8/11/1999	8/11/1999
Total PCBs	0.11	0.03	ND	ND

PDSS-14	0 - 2 ft
	10/31/2005
Total PCBs	0.028

PDSS-13	0 - 2 ft
	10/31/2005
Total PCBs	0.51

SB-078	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	17 - 17.5 ft
	7/1/1999	7/1/1999	7/1/1999	7/1/1999	7/1/1999
Total PCBs	4.9	0.034	0.026	0.053	ND

SB-077	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft
	6/30/1999	6/30/1999	6/30/1999	6/30/1999
Total PCBs	19	0.228	ND	ND

PDSB-110	6 - 8 ft	8 - 10 ft
	4/10/2006	4/10/2006
Total PCBs	ND/ND	ND

SB-158	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft
	1/26/2000	1/26/2000	1/26/2000	1/26/2000
Total PCBs	5.9	ND	ND	ND

PDSS-07	0 - 2 ft
	11/1/2005
Total PCBs	0.212/0.227

PDSS-05	0 - 2 ft
	10/27/2005
Total PCBs	3.56

PDSB-108	2 - 4 ft	4 - 6 ft
	4/7/2006	4/7/2006
Total PCBs	0.24/ND	0.28/0.24

PDSS-06	0 - 2 ft
	10/27/2005
Total PCBs	7.08

SB-074	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 19 ft
	6/29/1999	6/29/1999	6/29/1999	6/29/1999	6/29/1999	6/29/1999
Total PCBs	2.1	0.043	ND	ND	0.031	ND

PDSB-109	2 - 4 ft	4 - 6 ft
	4/7/2006	4/10/2006
Total PCBs	536	52

PDSS-04	0 - 2 ft
	10/27/2005
Total PCBs	1.3

SB-070	0 - 2 ft	4 - 6 ft	8 - 10 ft	10 - 12 ft
	8/7/1998	8/7/1998	8/7/1998	8/7/1998
Total PCBs	0.021	4.6	0.042	ND

TB-12	4 - 6 ft	8 - 10 ft
	2/2/1996	2/2/1996
Total PCBs	1.91	0.36

SB-089	0 - 2 ft	2 - 6 ft	10 - 14 ft	14 - 18 ft	20 - 24 ft	24 - 28 ft
	7/13/1999	7/13/1999	7/13/1999	7/13/1999	7/13/1999	7/13/1999
Total PCBs	3.4	0.32	ND	0.034	ND	ND

PDSB-36	0 - 2 ft	2 - 4 ft	4 - 6 ft
	10/5/2005	10/5/2005	10/5/2005
Total PCBs	0.038	ND	3.43

PDSB-100	10 - 12 ft	12 - 14 ft
	3/24/2006	3/24/2006
Total PCBs	12.2	1.23

SB-088	0 - 2 ft	2 - 6 ft	8 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
	7/13/1999	7/13/1999	7/13/1999	7/13/1999	7/13/1999	7/13/1999
Total PCBs	23	33	14	ND	0.02	0.083

PDSS-08	0 - 2 ft
	10/20/2005
Total PCBs	0.387

SB-087	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	26 - 28 ft
	7/12/1999	7/12/1999	7/12/1999	7/12/1999	7/12/1999	7/12/1999
Total PCBs	8	0.033	0.027	ND	ND	ND

SB-056	0 - 2 ft	4 - 6 ft
	7/23/1998	7/23/1998
Total PCBs	8.9	1.38

PDSS-09	0 - 2 ft
	10/20/2005
Total PCBs	0.023

SB-057	0 - 2 ft	4 - 6 ft
	7/21/1998	7/21/1998
Total PCBs	1.14	0.165

EE-24	3 - 5 ft	5 - 7 ft	7 - 9 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	1.2	ND	ND

EE-05	3 - 5 ft	5 - 7 ft	7 - 9 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

TB-15	6 - 8 ft
	12/22/1995
Total PCBs	250

PDSB-104	6 - 8 ft	8 - 10 ft
	3/27/2006	3/27/2006
Total PCBs	ND	ND

EE-06	3 - 5 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

SB-146	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	1/17/2000	1/17/2000	1/17/2000	1/17/2000	1/17/2000
Total PCBs	0.11	0.082	ND	ND	ND

SB-147	0 - 2 ft	2 - 6 ft	6 - 10 ft
	1/17/2000	1/17/2000	1/17/2000
Total PCBs	2	ND	ND

SB-148	0 - 2 ft	2 - 6 ft	6 - 10 ft
	1/17/2000	1/17/2000	1/17/2000
Total PCBs	ND	7.3	ND

MW-01A	5 - 7 ft	7 - 9 ft
	12/5/1995	12/5/1995
Total PCBs	0.95	13

SB-118	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999
Total PCBs	5.7	40	0.018	0.1	ND

PDSS-11	0 - 2 ft
	10/26/2005
Total PCBs	1.45

SB-152	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	22 - 26 ft
	1/20/2000	1/20/2000	1/20/2000	1/20/2000	1/20/2000
Total PCBs	11.2	8.3	ND	ND	ND

HB-01	0 - 1 ft
	8/1/1989
Total PCBs	430

PDSB-105	10 - 12 ft	12 - 14 ft
	3/28/2006	3/28/2006
Total PCBs	ND	ND/ND

SB-012	4 - 4 ft
	10/22/1997
Total PCBs	4.4

SB-111	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 22 ft
	7/30/1999	7/30/1999	7/30/1999	7/30/1999	7/30/1999	7/30/1999	7/30/1999
Total PCBs	3.4	13	3	1.4	0.39	0.67	ND

SB-112	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	18 - 22 ft
	8/2/1999	8/2/1999	8/2/1999	8/2/1999	8/2/1999
Total PCBs	3.5	110	0.029	0.34	ND

SB-113	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
	8/2/1999	8/2/1999	8/2/1999	8/2/1999	8/2/1999	8/2/1999
Total PCBs	0.11	0.45	0.213	0.081	ND	ND

HB-05	0 - 2 ft
	8/1/1989
Total PCBs	0.41

SB-109	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	8/10/1999	8/10/1999	8/10/1999	8/10/1999
Total PCBs	0.038	0.028	ND	ND

SB-108	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	8/10/1999	8/10/1999	8/10/1999	8/10/1999
Total PCBs	1.4	0.41	ND	ND

SB-107	0 - 2 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
	8/9/1999	8/9/1999	8/9/1999	8/9/1999
Total PCBs	ND	ND	ND	ND

HB-03	1 - 2 ft
	8/1/1989
Total PCBs	ND

TB-21	6 - 8 ft
	2/8/1996
Total PCBs	0.34

EE-14	4 - 6 ft	6 - 8 ft	10 - 12 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

HB-02	0 - 1 ft
	8/1/1989
Total PCBs	1

SB-106	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/28/1999	7/28/1999	7/28/1999	7/28/1999	7/28/1999	7/28/1999
Total PCBs	1.6	0.15	0.023	ND	ND	ND

PDSS-12	0 - 2 ft
	10/26/2005
Total PCBs	0.058

SB-101	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	18 - 22 ft
	7/22/1999	7/22/1999	7/22/1999	7/22/1999	7/22/1999
Total PCBs	1.4	0.45	0.038	ND	ND

SB-104	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	7/27/1999	7/27/1999	7/27/1999	7/27/1999	7/27/1999
Total PCBs	0.028	ND	ND	ND	ND

TB-07	4 - 8 ft
	1/3/1996
Total PCBs	ND

PDSS-17	0 - 2 ft
	10/26/2005
Total PCBs	0.49

PDSS-16	0 - 2 ft
	11/1/2005
Total PCBs	0.172

PDSB-106	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	3/28/2006	3/28/2006	3/28/2006	3/28/2006
Total PCBs	28.8	5.2	0.25	ND

SB-100	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft
	7/22/1999	7/22/1999	7/22/1999	7/22/1999
Total PCBs	0.24	ND	0.058	0.058

PDSS-15	0 - 2 ft
	11/1/2005
Total PCBs	3.27

TB-19	4 - 6 ft	8 - 10 ft
	2/5/1996	2/5/1996
Total PCBs	0.41	0.38

TB-18	2 - 4 ft	5 - 7 ft	7 - 9 ft
	12/8/1995	12/8/1995	12/8/1995
Total PCBs	350	570	290

EE-20	5 - 7 ft	7 - 9 ft	9 - 11 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	ND	ND	ND

SB-093	0 - 2 ft	4 - 8 ft	8 - 12 ft	12 - 16 ft	16 - 18 ft
	7/14/1999	7/14/1999	7/14/1999	7/14/1999	7/14/1999
Total PCBs	280	16	1.6	0.11	ND

SB-069	0 - 2 ft	4 - 6 ft	6 - 8 ft
	8/7/1998	8/7/1998	8/7/1998
Total PCBs	24	ND	ND

SB-157	0 - 2 ft	2 - 4 ft
	1/25/2000	1/25/2000
Total PCBs	7.4	2.4

SB-114	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
	8/27/1999	8/27/1999	8/27/1999	8/27/1999	8/27/1999
Total PCBs	ND	ND	0.045	0.026	ND

SB-099	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999
Total PCBs	7.3	0.75	ND	ND	ND	ND	ND

HUDSON RIVER

FORMER BLDG #15

#19 #18 #17 #22 #22 #22A #79A #22B #22C #51A #72A #72

LEGEND:

- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT <1 MG/KG
- RESULT >1 AND <=10 MG/KG
- RESULT >10 AND <=50 MG/KG
- RESULT >50 MG/KG
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- UNKNOWN

NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. MAXIMUM RESULT SHOWN IN EACH DEPTH INTERVAL.
7. RESULTS IN DATABOXES SCREENED AGAINST SITE-SPECIFIC CRITERIA: < 1MG/KG, >1 AND <=10 MG/KG, >10 MG/KG AND <=50 MG/KG, AND >50 MG/KG.
8. ALL RESULTS SHOWN IN MG/KG.
9. SAMPLES COLLECTED POST 2005 INCLUDE AROCLOR 1262 AND 1268. SEE SECTION 6.1.1 IN MODIFIED CONCEPTUAL SITE MODEL REPORT FOR MORE INFORMATION.

SITE KEY: NTS

W S N E

0 60 120 180 240

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS IN SOIL (SOUTH AREA)

SCALE: AS SHOWN
AUGUST 2008

FIGURE 7C

G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_SOIL_PCB_R2.DWG

MW-14A	10/1/2001
	-
Total PCBs, filtered	0.00032

MW-14B	10/1/2001
	-
Total PCBs, filtered	0.18

PDMW-03	10/28/2005	4/16/2008
	-	-
Total PCBs	ND	ND

MW-03A	2/29/1996	11/10/1997	10/24/2005
	-	-	-
Total PCBs	0.112	0.04	ND
Total PCBs, filtered	-	ND	-

MW-04	11/10/1997	8/25/1999	2/2/2000
	-	-	-
Total PCBs	0.169	0.0247	0.097
Total PCBs, filtered	ND	ND	ND

MW-03B	2/29/1996
	-
Total PCBs	ND

MW-10	3/23/1998	7/21/1998	4/14/2008
	-	-	-
Total PCBs	2	0.0011	0.0012J0.0012
Total PCBs, filtered	-	ND	-

MW-05	11/10/1997	8/26/1999	2/2/2000
	-	-	-
Total PCBs	0.16	0.0694	0.052
Total PCBs, filtered	ND	ND	ND

EE-W3	8/1/1989
	-
Total PCBs	0.012

MW-12	3/26/1998	7/15/1998	8/25/1999	2/2/2000
	-	-	-	-
Total PCBs	390	0.56	9	2.7
Total PCBs, filtered	-	0.001	0.00029	0.00091

PDMW-01	10/26/2005	2/20/2008
	-	-
Total PCBs	0.0012	-
Total PCBs, filtered	-	ND

HADW12	2/19/2008	4/14/2008
	-	-
Total PCBs	-	ND
Total PCBs, filtered	ND	-

PDMW-05	2/19/2008
	-
Total PCBs, filtered	ND

MW-01A	2/28/1996	11/11/1997	9/1/1999	1/28/2000
	-	-	-	-
Total PCBs	ND	ND	0.00014	0.00033
Total PCBs, filtered	-	ND	ND	ND

MW-01B	2/28/1998
	-
Total PCBs	ND

PDMW-06	10/27/2005
	-
Total PCBs	ND

MW-07	11/11/1997	9/1/1999	1/28/2000	10/27/2005
	-	-	-	-
Total PCBs	ND	ND	ND	ND
Total PCBs, filtered	-	ND	ND	-

MW-06	11/11/1997	9/1/1999	1/28/2000
	-	-	-
Total PCBs	ND	0.00026	0.00018
Total PCBs, filtered	ND	ND	ND

MW-15A	10/1/2001
	-
Total PCBs, filtered	ND

MW-15B	10/1/2001
	-
Total PCBs, filtered	0.072

MW-09	11/10/1997
	-
Total PCBs	0.0032

TRANSFORMER	3/23/1998
	-
Total PCBs	0.0014

MW-02A	10/26/2005
	-
Total PCBs	ND

MW-02A(TB-02)	2/29/1996
	-
Total PCBs	ND

EE-W1	8/1/1989
	-
Total PCBs	ND

MW-13A	10/1/2001
	-
Total PCBs, filtered	ND

MW-13B	10/1/2001
	-
Total PCBs, filtered	ND

MW-08	11/10/1997	8/26/1999	2/2/2000
	-	-	-
Total PCBs	0.0068	0.065	0.0031
Total PCBs, filtered	-	ND	ND

PDMW-10	3/23/2006	2/20/2008	4/16/2008
	-	-	-
Total PCBs	0.0027	-	ND
Total PCBs, filtered	-	ND	-

PDMW-19S	4/14/2006
	-
Total PCBs	0.00061

PDMW-19D	4/14/2006
	-
Total PCBs	ND

PDMW-16S	4/11/2006
	-
Total PCBs	ND

PDMW-16D	4/10/2006
	-
Total PCBs	ND

PDMW-17S	4/6/2006
	-
Total PCBs	0.00004

PDMW-17D	4/11/2006
	-
Total PCBs	ND

PDMW-18S	4/12/2006
	-
Total PCBs	ND

PDMW-18D	4/12/2006
	-
Total PCBs	ND

HUDSON RIVER

HUDSON RIVER

FORMER BLDG #55

FORMER BLDG #56

FORMER BLDG #53

FORMER BLDG #52B

FORMER BLDG #54

FORMER BLDG #52A

FORMER SATURATED PUMP HOUSE

WATER TOWER

LEGEND:

- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- LOCATIONS SAMPLED FOR PCBs
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- UNKNOWN

NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS OFF SHORE WERE LOCATED USING A GLOBAL POSITIONING SYSTEM.
6. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
7. RESULTS IN DATABOXES WERE NOT SCREENED AGAINST CRITERIA.
8. ALL RESULTS SHOWN IN MG/L.

W S N E

0 100 200 300 400

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS IN GROUNDWATER (SITEWIDE)

SCALE: AS SHOWN
AUGUST 2008

FIGURE 13A

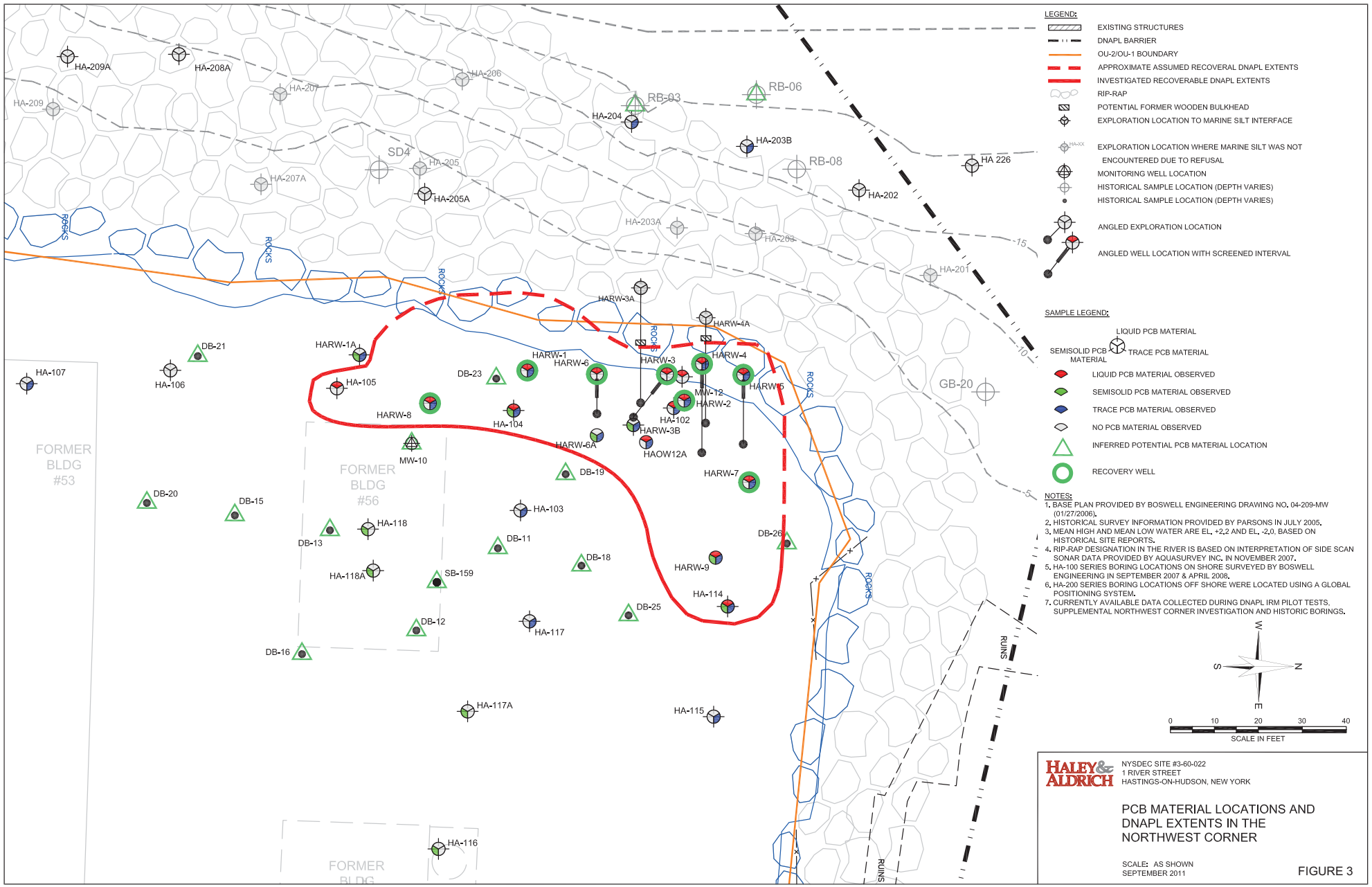
G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_GW_PCB_R2.DWG

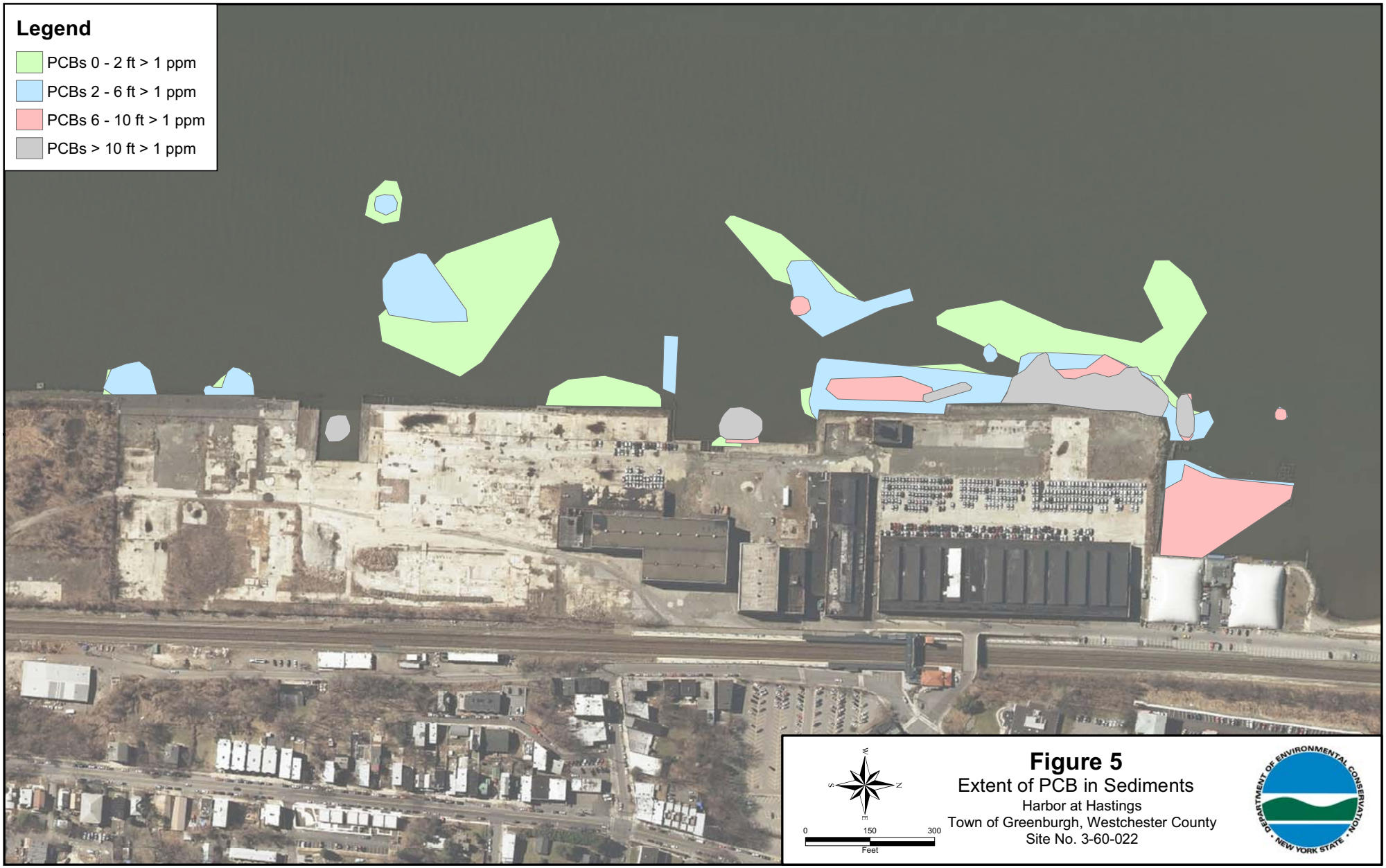
OU-1 Record of Decision (ROD)

Figure 3 PCB Material Locations and DNAPL Extents in the Northwest Corner

OU-2 Record of Decision (ROD)

Figure 5 Extent of PCB in Sediments


LEGEND:
EXISTING STRUCTURES
DNAPL BARRIER
OU-2/OU-1 BOUNDARY
APPROXIMATE ASSUMED RECOVERAL DNAPL EXTENTS
INVESTIGATED RECOVERABLE DNAPL EXTENTS
RIP-RAP
POTENTIAL FORMER WOODEN BULKHEAD
EXPLORATION LOCATION TO MARINE SILT INTERFACE
EXPLORATION LOCATION WHERE MARINE SILT WAS NOT ENCOUNTERED DUE TO REFUSAL
MONITORING WELL LOCATION
HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
ANGLED EXPLORATION LOCATION
ANGLED WELL LOCATION WITH SCREENED INTERVAL
SAMPLE LEGEND:
LIQUID PCB MATERIAL
SEMISOLID PCB MATERIAL
TRACE PCB MATERIAL
LIQUID PCB MATERIAL OBSERVED
SEMISOLID PCB MATERIAL OBSERVED
TRACE PCB MATERIAL OBSERVED
NO PCB MATERIAL OBSERVED
INFERRED POTENTIAL PCB MATERIAL LOCATION
RECOVERY WELL
NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. HA-100 SERIES BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. HA-200 SERIES BORING LOCATIONS OFF SHORE WERE LOCATED USING A GLOBAL POSITIONING SYSTEM.
7. CURRENTLY AVAILABLE DATA COLLECTED DURING DNAPL IRM PILOT TESTS, SUPPLEMENTAL NORTHWEST CORNER INVESTIGATION AND HISTORIC BORINGS.
W
S
N
E
0
10
20
30
40
SCALE IN FEET
HALEY & ALDRICH
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK
PCB MATERIAL LOCATIONS AND DNAPL EXTENTS IN THE NORTHWEST CORNER
SCALE: AS SHOWN
SEPTEMBER 2011
FIGURE 3
G:\PROJECTS\28612\250 - RFS\COMMUNICATIONS\2011-09-29 DEC FIGURE\28612-PCB MATERIAL EXTENTS_DF.DWG
HA-209A
HA-208A
HA-209
HA-207
HA-206
RB-03
RB-06
HA-204
HA-203B
SD4
HA-205
RB-08
HA 226
HA-207A
HA-205A
HA-202
HA-203A
HA-203
HA-201
ROCKS
HARW-3A
HARW-4A
HARW-1A
HARW-1
HARW-6
HARW-3
HARW-4
DB-21
DB-23
HA-107
HA-106
HA-105
HARW-5
MW-12
HARW-2
HARW-8
HA-104
HA-102
HARW-3B
HARW-6A
HAOW12A
MW-10
GB-20
FORMER BLDG #53
FORMER BLDG #56
DB-19
HARW-7
DB-20
DB-15
HA-103
HA-118
DB-13
DB-11
DB-26
DB-18
HA-118A
SB-159
HARW-9
HA-114
DB-25
DB-12
HA-117
DB-16
RUINS
HA-117A
HA-115
HA-116
FORMER BLDG


Legend
PCBs 0 - 2 ft > 1 ppm
PCBs 2 - 6 ft > 1 ppm
PCBs 6 - 10 ft > 1 ppm
PCBs > 10 ft > 1 ppm
W
S
N
E
0
150
300
Feet
Figure 5
Extent of PCB in Sediments
Harbor at Hastings
Town of Greenburgh, Westchester County
Site No. 3-60-022
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE

Pre-Design Investigation Data Summary Report (PDI)

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TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NA	NA-101	320	-	12	0.8	15	0.22	ND
	NA-102	140	120	6.2	5.4	3	0.11	-
	NA-201	13	ND	1.1	-	-	ND	-
	NA-202	-	ND	5.7	-	-	-	-
	NA-203	-	ND	-	-	-	-	-
	NA-204	-	-	ND	-	0.093	ND	-
	NA-301	8.2	-	-	-	-	-	-
	NA-302	1.3	-	-	-	-	-	-
NB	NB-001	-	-	-	7.9	2.8	1.3	ND
NC	NC-001	-	-	-	12	ND	-	-
	NC-002	-	-	-	300	40	26	ND
	NC-003	-	-	-	84	2	-	-
	NC-004	-	ND	ND	-	-	-	-
	NC-101	29	-	-	-	-	-	-
	NC-102	50	-	-	-	-	2.5	-
	NC-103	43	-	-	-	-	-	-
	NC-104	140	-	-	-	-	-	-
	NC-105	-	-	100	-	-	-	-
	NC-108	-	-	-	78	0.46	-	-
	NC-114*	-	-	-	-	16	0.079	-
	NC-115	-	-	-	-	0.34	-	-
	NC-116	-	-	-	-	2	-	-
	NC-117	-	-	-	0.47	ND	-	-
	NC-118	-	-	-	1.3	ND	ND	-
	NC-119*	-	-	-	3.2	-	-	-
	NC-120	-	-	-	9.8	0.13	-	-
	NC-201	-	-	-	-	0.54	0.12	-
	NC-202	-	-	-	2.5	-	-	-
	NC-203	2.8	-	-	6.3	-	-	-
	NC-204	32	0.67	-	-	-	-	-
	NC-205	5.4	-	4.2	7.8	0.29	-	-
ND	ND-101	-	-	ND	-	-	-	-
	ND-102	-	-	0.076	0.17	-	-	-
	ND-103	-	-	200	42	0.42	-	-
	ND-104	-	-	3.1	0.45	-	-	-
	ND-201	-	-	630	43	0.15	-	-
	ND-202	-	-	3.6	1.3	-	3.6	-
NE	NE-101	1200	8.5	-	-	-	-	-
	NE-102	20	ND	-	-	-	-	-
	NE-103	87	0.12	-	-	-	-	-
	NE-104	23	15	-	0.097	-	-	-
	NE-201	22	6.6	-	-	-	-	-
	NE-202	0.16	1.9	-	-	-	-	-
	NE-203	11	-	0.66	170	0.046 J	-	-
	NE-204	32	1.5	0.19	0.047 J	-	-	-
	NE-301	3.1	-	-	-	-	-	-
NF	NF-101	-	-	ND	-	-	ND	-
	NF-102	-	-	0.065	-	-	0.21	-
	NF-202	1.6	-	-	-	-	-	-
NG	NG-001	-	-	-	-	-	11	0.87
	NG-101	-	-	-	-	-	6.2	-
	NG-102	-	-	-	-	-	2.3	-
	NG-103	-	-	-	-	-	8.2	-
	NG-104	-	-	-	-	-	10	-
	NG-201	-	-	170	160	260	12	4.3
	NG-202	-	-	-	1700	33	2.2	-
	NG-203	-	-	-	-	-	0.083	-
	NG-204	-	-	-	-	-	36	0.75

Notes & Abbreviations

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1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NH	NH-001	-	5.3	ND	-	-	-	-
	NH-002	-	11	3.1	6.3	ND	-	-
	NH-003	-	30	0.7	-	-	-	-
	NH-101	260	0.092	-	-	-	-	-
	NH-105	9200	-	-	-	99	1.3	-
	NH-106	31	0.28	ND	-	0.79	-	-
	NH-107	-	0.22	-	-	-	-	-
	NH-108	-	0.9	-	-	-	-	-
	NH-109	-	26	14	ND	-	-	-
	NH-110	-	17	10	0.15	-	-	-
	NH-111	-	0.17	-	-	-	-	-
	NH-112	-	0.12	0.12	-	-	-	-
	NH-113	540	-	810	0.22	ND	-	-
	NH-114	21	-	0.2	-	9.6	-	-
	NH-115	91	-	2100	2.5	6.7	-	-
	NH-116	280	-	4.3	2.9	-	-	-
	NH-117	25	11	540	37	0.8	-	-
	NH-118	1100	0.74	65	5.9	-	-	-
	NH-119	-	23	600	550	180	46	1
	NH-120	-	4.4	-	-	-	-	-
	NH-121	-	4.2	-	-	-	-	-
	NH-201	-	-	2.2	-	-	-	-
	NH-202	-	-	3.3	-	-	-	-
	NH-203	-	ND	ND	-	-	-	-
	NH-204	-	2.5	0.67	-	-	-	-
	NH-205	37	9.3	-	-	-	-	-
	NH-206	180	0.16	-	-	-	-	-
	NH-207	130	3.4	ND	-	-	-	-
	NH-208	2700	300	0.81	-	-	-	-
	NH-209	42	0.21	0.6	0.62	-	0.079	-
	NH-210	-	180	13	20	3.9	0.74	-
	NH-211	-	28	16	88	10	4.2	-
	NH-212	2800	2100	1	-	-	-	-
	NH-213	800	-	20	0.92	-	-	-
	NH-214	-	-	-	-	0.33	-	-
	NH-215	290	5.2	1.3	-	-	-	-
	NH-301	4900	-	-	-	-	-	-
	NH-302	250	-	-	-	-	-	-
	NH-304	290	-	-	-	-	-	-
	NH-305	48	0.73	-	7.4	-	-	-
	NH-306	47	6	-	-	-	-	-
	NH-307	60	5	-	-	-	-	-
	NH-308	23	0.74	-	-	-	-	-
	NH-309	2	150	0.12	-	-	-	-
	NH-310	340	34	3.5	-	0.3	-	-
	NH-311	-	-	-	4.5	2.7	-	-
	NH-312	-	99	7.1	6	3.2	-	-
	NH-313	13	ND	-	-	-	-	-
	NH-314	0.051 J	6.9	-	-	-	-	-
	NH-315	23	4.8	-	-	-	-	-
	NH-316	-	1.1	-	-	-	-	-
	NH-318	550	140	14	11	-	-	-
	NH-319	84	6.4	-	1.2	-	-	-
	NH-320	20	1.7	-	-	-	-	-
	NH-321	23	0.4	-	-	-	-	-
	NH-322	29	0.38	-	-	-	-	-
	NH-323	3.8	-	-	-	-	-	-
	NH-324	0.43	-	-	-	-	-	-
	NH-325	ND	-	-	-	ND	-	-
	NH-326	0.11	-	-	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NI	NI-001	-	-	-	-	-	9.1	1.7
	NI-002	-	65	0.81	-	-	-	-
	NI-101	-	12	290	2.7	5.8	-	-
	NI-102	-	-	3.1	0.28	-	-	-
	NI-103	-	-	0.14	2	-	-	-
	NI-104	-	-	960	39	0.78	-	-
	NI-105	-	38	1.1	-	-	-	-
	NI-106	-	29	0.79	-	-	-	-
	NI-107	-	0.18	1.5	-	-	-	-
	NI-108	-	-	130	0.53	-	-	-
	NI-201	-	48	0.85	0.37	-	-	-
	NI-202	-	39	0.28	1.4	0.63	-	-
	NI-203	-	23	0.58	-	-	-	-
	NI-204	-	0.68	5.9	-	-	-	-
	NI-205	-	-	0.92	-	-	-	-
	NI-206	-	-	1.7	-	-	-	-
	NI-207	-	-	0.68	-	-	-	-
	NI-210	-	60	0.52	ND	0.11	-	-
	NI-301	-	24	0.25	-	-	2	-
	NI-302	-	21	47	ND	0.79	-	-
	NI-303	-	620	3000	410	190	14	-
	NI-304	-	11	0.62	-	-	ND	-
	NI-305	-	-	43	1.6	-	-	-
	NI-306	-	-	260	29	0.13	24	4.4
	NI-307	-	-	89	0.99	2.3	3.4	-
	NI-308	-	0.41	0.46	-	-	-	-
	NI-309	-	8.5	-	-	-	-	-
	NI-310	-	-	7.3	-	15	3.5	-
NJ	NJ-001	-	44	ND	-	-	-	-
	NJ-101	-	4.4	0.43	-	-	-	-
	NJ-102	-	0.13	0.99	-	-	-	-
	NJ-103	-	0.26	0.06	-	-	-	-
	NJ-104	-	37	ND	-	-	-	-
	NJ-105	ND	0.6	-	-	-	-	-
	NJ-106	0.079	0.63	-	-	-	-	-
	NJ-201	-	25	1.4	-	-	-	-
	NJ-301	-	7.7	-	-	-	-	-
	NJ-302	-	110	0.033 J	-	0.23	-	-
	NJ-303	-	1600	0.092	-	-	-	-
	NJ-304	16	0.19	-	-	-	-	-
	NJ-305	24	2400	420	750	-	-	-
	NJ-306	-	0.071	-	3.8	0.41	-	-
	NJ-307	12	0.07	-	-	-	-	-
	NJ-308	6.3	-	-	-	-	-	-
NK	NK-101	-	66	0.99	-	-	-	-
	NK-102	-	3.3	-	-	-	-	-
	NK-103	-	20	0.61	-	-	-	-
	NK-104	-	83	7.9	-	-	-	-
	NK-201	-	13	1.6	-	-	-	-
	NK-202	-	ND	2	-	-	-	-
	NK-203	-	3.4	5.4	-	-	-	-
	NK-204	-	26	2.1	-	-	-	-
	NK-301	-	2	-	-	-	-	-
	NK-302	-	130	1.5	-	-	-	-
	NK-303	-	0.12	2.5	-	-	-	-

Notes & Abbreviations

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FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NL	NL-001	-	9.4	-	-	-	-	-
	NL-101	1400	2.8	-	-	-	-	-
	NL-102	230	3.4	-	-	-	-	-
	NL-103	53	0.13	-	-	-	-	-
	NL-201	24	ND	-	-	-	-	-
	NL-202	110	0.9	-	-	-	-	-
	NL-203	2.3	-	-	-	-	-	-
	NL-204	0.21	-	-	-	-	-	-
	NL-301	1.7	-	-	-	-	-	-
	NL-302	34	ND	-	-	-	-	-
	NL-303	780	6.8	-	-	-	-	-
	NL-304	29	ND	-	-	-	-	-
	NL-305	0.59	-	-	-	-	-	-
	NL-306	0.35	-	-	-	-	-	-
	NL-307	0.21	-	-	-	-	-	-
	NL-308	0.38	-	-	-	-	-	-
NM	NM-101	0.1	-	-	-	-	-	-
	NM-102	220	190	130	15	3.4	-	-
	NM-103	5	-	-	-	-	-	-
	NM-104	1.1	-	-	-	-	-	-
	NM-201	85	0.44	-	1.8	-	-	-
	NM-202	86	120	66	15	0.99	-	-
	NM-203	48	-	21	2.1	-	-	-
	NM-204	-	-	1.1	-	-	-	-
	NM-301	-	-	-	47	9.9	-	-
	NM-302	-	-	0.29	-	-	-	-
	NM-303	-	ND	-	7	-	-	-
NN	NN-001	-	-	-	550	26	28	21
	NN-002	-	5.9	0.87	-	-	-	-
	NN-101	45	7.7	-	-	-	-	-
	NN-102	-	-	-	2.3	ND	-	-
	NN-103	-	-	2	-	3.4	-	-
	NN-104	-	-	-	-	55	50	0.22
	NN-105	260	6.8	-	2	-	-	-
	NN-201	140	6.1	0.32	-	-	-	-
	NN-202	-	-	-	150	39	2.2	-
	NN-301	110	11	1.7	-	-	-	-
	NN-302	140	28	38	4.6	-	-	-
	NN-303	3	-	6.5	-	-	-	-
	NN-304	0.17	-	0.44	-	-	-	-
	NN-305	86	4.3	6.8	-	-	-	-
	NN-306	-	-	29	2.2	-	-	-
	NN-307	75	5.4	36	6.5	-	-	-
	NN-308	61	2.9	-	-	-	-	-
	NN-309	7	2.6	1.5	-	-	-	-
	NN-310	4.6	1.4	1.6	-	-	-	-
NS	NS-001	-	-	0.024 J	81	4.2	-	-
	NS-101	-	-	0.045 J	24	2.1	-	-
	NS-102	-	-	ND	52	0.3	-	-
	NS-103	-	-	0.043 J	68	5.6	12	-
	NS-104	-	-	0.68	200	2.3	-	-

Notes & Abbreviations

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TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
PDMW	PDMW-22S	-	-	-	-	-	3.9	-
	PDMW-22S-01	-	-	430	-	-	550	0.046 J
	PDMW-22S-03	-	-	28	220	12	6.2	-
	PDMW-22S-04	-	-	0.97	-	0.48	ND	-
	PDMW-22S-10	-	-	87	-	-	47	0.2
	PDMW-24S	-	-	-	1.2	-	-	-
SA	SA-001	-	11	ND	-	-	-	-
	SA-002	1.7	0.23	0.15	-	-	-	-
	SA-003	-	-	240	18	4.9	-	-
	SA-004	-	36	0.61	-	-	-	-
	SA-103	-	7.8	-	-	-	-	-
	SA-104	-	ND	-	-	-	-	-
	SA-105	-	-	0.15	ND	-	-	-
	SA-107	-	ND	-	-	-	-	-
	SA-108	-	2.3	-	-	-	-	-
	SA-201	2.9	-	0.72	3	-	-	-
	SA-202	-	0.14	-	-	-	-	-
SB	SB-001	11	8.1	0.043 J	-	-	-	-
	SB-101	15	13	1.5	-	-	-	-
	SB-201	-	ND	-	-	-	-	-
SC	SC-001	-	0.38	23	-	-	-	-
	SC-101	-	-	19	6.1	-	-	-
	SC-102	-	-	24	-	-	-	-
	SC-103	-	-	12	5.4	0.8	-	-
	SC-201	-	-	ND	-	-	-	-
	SC-202	-	-	0.34	0.043 J	-	-	-
	SC-203	-	-	33	22	ND	-	-
	SC-204	-	-	19	13	1.1	-	-
	SC-205	-	-	17	21	6.8	-	-
	SC-301	-	-	-	7.3	15	0.72	-
	SC-302	-	-	-	19	22	11	-
	SC-303	-	-	-	0.61	-	-	-
	SC-304	-	-	-	0.19	-	-	-
	SC-305	-	-	-	1.9	-	-	-
	SC-306	-	-	-	14	ND	-	-
	SC-307	-	-	-	-	17	6.2	-
	SC-308	-	-	-	-	0.34	-	-
	SC-309	-	-	-	-	ND	-	-
	SC-310	-	-	-	2.4	-	-	-
	SC-311	-	-	-	3.2	-	-	-
	SC-312	-	-	-	-	16	35	1.2
	SC-313	-	-	-	-	3.7	3.3	-
	SC-314	-	-	-	0.2	-	-	-
	SC-315	-	-	16	4.2	-	2.1	-
	SC-316	-	-	-	-	17	12	0.44
	SC-317	-	-	-	-	1.8	0.56	-
	SC-318	-	-	-	-	0.37	0.11	-
	SC-319	-	-	-	-	3.2	5.6	-
SE	SE-101	-	-	-	0.24	-	ND	-
	SE-102	-	-	-	0.17	-	510	0.057
	SE-103	-	-	-	-	-	1.5	-
	SE-201	-	-	-	-	-	ND	-
	SE-202	-	-	-	-	-	0.29	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
SG	SG-001**	-	-	-	7.4	ND	ND (9-11)	-
	SG-002	-	-	-	ND	ND	-	-
	SG-004**	-	2400	-	-	-	-	-
	SG-006	-	-	1.8	ND	-	-	-
	SG-101**	-	5.1	-	-	-	-	-
	SG-102**	-	-	-	0.095	-	-	-
	SG-103	-	-	-	-	0.11	-	-
	SG-104**	-	65	24	0.62	-	-	-
	SG-201	-	-	38	1.9	-	-	-
	SG-202	-	-	22	6	-	-	-
	SG-203**	-	1	-	-	-	-	-
	SG-301	-	-	1.4	-	-	-	-
	SG-302	-	-	0.46	-	-	-	-
	SG-303	-	-	0.2	-	-	-	-
	SG-304	-	-	0.56	-	-	-	-
SH	SH-001	-	1.7	-	-	-	-	-
	SH-101	0.054	-	-	-	-	-	-
	SH-102	1.1	-	-	-	-	-	-
	SH-103	0.13	-	-	-	-	-	-
	SH-104	8.6	-	-	-	-	-	-
SL	SL-101	-	14	4.8	-	-	-	-
	SL-102	-	0.19	-	-	-	-	-
	SL-103	-	0.55	-	-	-	-	-
	SL-201	-	ND	-	-	-	-	-
	SL-202	-	0.036 J	-	-	-	-	-
	SL-203	-	0.44	-	-	-	-	-
SM	SM-101	1.3	-	-	-	-	-	-
	SM-102	200	92	14	-	-	-	-
	SM-201	0.16	-	1.4	0.098	-	-	-
	SM-202	0.044 J	-	2.8	-	-	-	-
	SM-203	2	9.9	7.2	23	-	-	-
	SM-204	-	-	-	15	7.7	-	-
SN	SN-001	-	-	-	2.5	-	-	-
	SN-101	-	3.9	1.6	-	-	-	-
	SN-102	-	ND	0.2	-	-	-	-
SO	SO-101	0.23	-	-	-	-	-	-
	SO-102	0.75	-	-	-	-	-	-
	SO-103	ND	-	-	-	-	-	-
SP	SP-001	9.8	0.58	1.1	4	-	-	-
	SP-101	2.1	3.2	-	-	-	-	-
	SP-102	11	4.8	-	-	-	-	-
	SP-103	3	0.22	-	-	-	-	-
	SP-104	7.5	-	-	-	-	-	-
	SP-105	5.4	ND	-	-	-	-	-
	SP-106	1.4	-	-	-	-	-	-
	SP-201	5.5	-	-	-	-	-	-
SQ	SQ-001	-	3.3	-	-	-	-	-
	SQ-101	3.7	7.5	-	-	-	-	-
	SQ-102	320	21	0.91	-	-	-	-
	SQ-103	4.3	33	25	0.74	-	-	-
	SQ-104	38	2.1	3.1	-	-	-	-
	SQ-105	25	31	0.29	-	-	-	-
	SQ-106	1.6	10	-	-	-	-	-
	SQ-201	-	-	0.5	-	-	-	-
	SQ-202	33	-	25	0.038 J	-	-	-
	SQ-203	6.2	4.3	-	-	-	-	-
	SQ-204	3.5	ND	-	-	-	-	-
	SQ-301	-	-	0.38	-	-	-	-
	SQ-303	-	3.3	-	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
PD2	PD2-GL-001**	-	-	-	0.064	-	-	-
	PD2-GL-002**	-	-	22	-	-	-	-
PDI2	PDI2-17-01	35	0.16	1.9	-	0.054 J	-	-
	PDI2-17-02	-	2.2	1900	310	140	180	19
	PDI2-FH-01	-	-	0.17	-	-	-	-
	PDI2-POLE-01	-	-	-	6.1	-	-	-
SS	SS-101	-	-	280	-	180	25	2.6
	SS-102	-	-	150	190	200	67	ND
	SS-103	-	-	560	-	340	49	240
	SS-104	-	-	540	450	140	540	130
	SS-105	-	-	53	0.055 J	5.7	2	-
	SS-106	-	-	1.8	46	2.2	-	-
	SS-107	-	-	13	0.17	1	0.2	-
	SS-201	-	-	13	3.1	-	0.76	-
	SS-202	-	-	5.2	-	-	-	-
	SS-203	-	-	100	37	2.4	-	-
	SS-204	-	-	24	16	1.3	0.81	-
	SS-205	-	-	22	190	6.1	5.6	-
	SS-206	-	-	240	-	-	90	2.6
	SS-207	-	-	100	-	-	58	4.7
	SS-208	-	-	19	27	1.7	ND	-
	SS-209	-	-	1000	0.14	170	84	0.32
	SS-210	-	-	12	210	3.1	1.4	-
	SS-211	-	-	7	290	2.9	1.8	-
	SS-212	-	-	450	-	-	130	8.3
	SS-213	-	-	11	31	23	2.1	-
	SS-214	-	-	140	-	-	55	0.53
	SS-215	-	-	120	5	-	4.1	-
	SS-216	-	-	15	2.4	-	-	-
	SS-217	-	-	2	1.6	-	-	-
	SS-218	-	-	0.36	0.81	-	0.26	-
	SS-219	-	-	0.65	1.2	-	0.23	-
	SS-220	-	-	48	2.1	30	2.7	-
	SS-221	-	-	11	9.7	ND	3.7	-
	SS-222	-	-	100	3.2	9.1	2.3	-
	SS-223	-	-	53	1.6	1.7	-	-
	SS-224	-	-	3.1	-	-	-	-
	SS-225	-	-	0.44	-	-	-	-
	SS-226	-	-	ND	14	6.3	-	-
	SS-227	-	-	8.8	-	3.2	-	-
	SS-228	-	-	-	20	8	5.5	-
	SS-229	-	-	1.6	9.7	2.2	-	-
	SS-230	-	-	28	130	1.6	8.8	-
	SS-231	-	-	28	0.36	0.25	-	-
WA	WA-001	-	-	-	32	18	-	-
	WA-002	-	34	1.3	-	-	-	-
	WA-101	-	-	-	-	0.12	-	-
	WA-102	-	-	-	-	ND	-	-
	WA-103	-	-	-	-	0.57	-	-
	WA-104	-	-	-	-	ND	-	-
	WA-105	-	-	-	-	1.8	-	-
	WA-106	-	-	-	-	290	-	-
	WA-106A	-	-	-	-	320	-	-
	WA-107	-	-	-	-	110	-	-
	WA-108	-	-	-	-	19	-	-
	WA-110	-	-	-	-	0.87	-	-
	WA-112	-	-	-	-	0.24	-	-
	WA-113	110	-	-	-	0.27	-	-
	WA-114	690	-	-	-	ND	-	-
	WA-115	140	ND	-	-	0.087	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
WA	WA-116	480	29	0.13	-	0.21	-	-
	WA-117	260	3.4	3	-	ND	-	-
	WA-118	3200	1.6	0.21	-	ND	-	-
	WA-119	10000	1.5	-	-	0.15	-	-
	WA-120	7900	48	18	3.4	ND	-	-
	WA-121	1100	-	-	-	100	-	-
	WA-122	2200	-	-	-	61	-	-
	WA-123	-	950	44	0.72	2.7	-	-
	WA-124	-	30	0.21	-	0.28	-	-
	WA-125	-	0.33	-	-	ND	-	-
	WA-126	-	0.081	-	-	1.1	-	-
	WA-127	-	140	0.4	-	0.18	-	-
	WA-128	-	ND	-	ND	ND	-	-
	WA-129	9400	-	300	0.044 J	2	-	-
	WA-130	-	0.099	-	-	ND	-	-
	WA-131	-	0.27	-	-	ND	-	-
	WA-132	-	2	0.26	-	ND	-	-
	WA-133	-	2.8	-	-	200	-	-
	WA-134	-	0.2	-	-	ND	-	-
	WA-135	-	1.6	-	-	ND	-	-
	WA-136	-	-	-	-	ND	-	-
	WA-137	-	-	-	-	7	-	-
	WA-138	-	-	-	-	1.1	-	-
	WA-139	-	-	-	-	1.2	-	-
	WA-140	-	-	-	-	ND	-	-
	WA-141	-	870	0.26	-	1.3	-	-
	WA-142	-	-	0.17	-	0.097	-	-
	WA-143	-	-	0.28	-	0.17	-	-
	WA-144	-	-	0.1	-	3	-	-
	WA-145	-	-	-	-	1.3	-	-
	WA-146	-	0.19	-	-	2.3	-	-
	WA-147	-	0.34	-	-	0.11 J	-	-
	WA-148	-	1000	-	-	38	-	-
	WA-149	-	-	-	210	13	-	-
	WA-152	-	-	200	-	1500	-	-
	WA-153	-	-	-	46	0.082	-	-
	WA-154	-	-	85	22	9.9	-	-
	WA-157	-	ND	-	-	0.093	-	-
	WA-158	-	-	-	-	0.12	-	-
	WA-159	-	-	-	-	5.4	-	-
	WA-160	-	-	0.12	-	0.13	-	-
	WA-161	-	-	3.2	-	0.98	-	-
	WA-162	-	-	5.7	-	8.7	-	-
	WA-163	-	-	0.4	9.2	3.1	-	-
	WA-201	-	-	-	-	ND	-	-
	WA-202	380	57	7.7	-	5.2	-	-
	WA-203	120	0.049 J	-	-	-	-	-
	WA-204	31	ND	-	-	-	-	-
	WA-205	-	2.2	-	-	-	-	-
	WA-206	-	-	-	ND	0.81	-	-
	WA-207	-	-	ND	-	ND	-	-
	WA-208	-	ND	-	-	-	-	-
	WA-209	-	2.5	-	-	ND	-	-
	WA-210	-	ND	-	-	ND	-	-
	WA-211	-	ND	-	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
WB	WB-101	690	390	2.9	-	-	-	-
	WB-102	2200	2.4	ND	-	-	-	-
	WB-103	480	380	0.29	-	-	-	-
	WB-104	43	ND	-	-	-	-	-
	WB-201	18	0.34	-	ND	-	-	-
	WB-202	57	1.2	-	-	-	-	-
	WB-203	-	0.28	-	-	-	-	-
	WB-204	-	-	ND	-	-	-	-
	WB-205	-	120	180	1.1	-	-	-
	WB-206	8	-	-	ND	-	-	-
	WB-301	62	8100	410	53	890	700	1.9
	WB-302	4.5	-	-	-	-	-	-
	WB-303	-	0.49	-	0.061	2900	ND	-
WC	WC-001	-	29	-	-	-	-	-
	WC-002	-	-	0.7	-	-	-	-
	WC-101	-	ND	-	-	-	-	-
	WC-102	-	ND	ND	-	-	-	-
	WC-103	-	0.12	ND	-	-	-	-
	WC-104	-	0.63	-	-	-	-	-
	WC-105	-	0.24	-	-	-	-	-
	WC-201	160	ND	13	ND	-	-	-
	WC-202	410	-	-	-	-	-	-
WD	WD-001	0.81	690	7200	2200	210	-	-
WE	WE-001	-	-	-	11	12	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.5A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR DEEPWATER INVESTIGATION - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (feet)						
Results in mg/kg		0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6	6-8
Deepwater Investigation	VC-101	0.46	0.19	0.36	0.59	1.7	-	-
	VC-102	0.22	0.3	0.35	2.5	24	-	-
	VC-103	0.75	0.8	1.7	1.3	71	9.9	-
	VC-104	0.15	0.46	0.23	0.9	1.2	-	-
	VC-105	0.19	0.17	0.15	1.1	2.2	-	-
	VC-106	0.49	0.43	0.45	2.6	6.3	-	-
	VC-107	0.15	4.1	1	0.98	18	-	-
	VC-108	0.15	0.19	0.4	490	11	-	-
	VC-109	1.8	0.26	0.31	0.59	3.5	-	-
	VC-110	0.21	0.27	0.36	0.57	110	9	-
	VC-111	0.2	0.39	5.7	0.99	42	-	-
	VC-112	1.2	0.6	1.3	47	0.6	-	-
	VC-113	0.17	0.63	0.61	6.4	0.68	-	-
	VC-114	0.12	0.32	0.42	0.8	38	-	-
	VC-115	0.34	0.32	0.48	3.2	ND	-	-
	VC-116	0.26	0.25	0.056 J	0.058 J	ND	-	-
	VC-117	0.15	0.21	1.5	1.7	1.9	-	-
	VC-118	0.28	6.4	20	16	9.2	-	-
	VC-119	0.79	0.25	0.6	10	5.5	-	-
	VC-120	0.19	2	0.2	4.3	0.77	-	-
	VC-121	0.78	0.31	0.63	0.34	ND	-	-
	VC-122	0.14	0.19	1.2	ND	ND	-	-
	VC-123	0.32	0.16	0.45	2.3	380	ND	-
	VC-124	0.33	0.58	0.85	8.7	9.2	-	-
	VC-125	0.3	0.21	0.48	1	9.2	-	-
	VC-126	0.73	0.18	0.71	3	ND	-	-
	VC-127	1.4	0.31	0.57	0.74	7.6	-	-
	VC-128	0.21	16	0.38	0.45	ND	-	-
	VC-129	0.16	0.34	0.69	1.9	17	-	-
	VC-130	0.8	0.25	0.36	0.97	1100	32	-
	VC-131	0.4	0.23	0.23	1.2	0.15	-	-
	VC-132	0.55	0.23	0.74	5	15	-	-
	VC-133	0.27	0.34	1.2	1.5	0.11	-	-
	VC-134	0.2	0.3	0.56	3	5	-	-
	VC-135	0.67	1.3	4.9	36	ND	-	-
	VC-136	1.5	0.17	3.4	0.67	ND	-	-
	VC-137	0.26	0.22	0.41	2.8	1.4	-	-
	VC-138	0.17	0.19	0.26	1.4	ND	-	-
	VC-139	0.17	0.2	0.33	1.5	860	0.11	-
	VC-140	0.41	0.39	0.82	2.3	8.2	-	-
	VC-141	0.18	0.25	0.23	0.38	ND	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

TABLE 3.5B SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR DEEPWATER INVESTIGATION - TOTAL PCBs
VARIABILITY SAMPLING LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (feet)						
Results in mg/kg		0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6	6-8
Deepwater Investigation Variability Sampling	VC-101	0.46	0.19	0.36	0.59	1.7	-	-
	VC-101A	-	0.31	0.53	0.78	3.7	0.72	-
	VC-101B	*	0.31	0.57	0.72	70	ND	-
	VC-101C	-	0.27	0.42	0.64	4.5	0.052 J	-
	VC-102	0.22	0.3	0.35	2.5	24	-	-
	VC-102A	*	0.23	0.34	1.1	91	ND	-
	VC-102B	-	0.37	0.87	5.1	9.1	ND	-
	VC-102C	-	0.35	0.7	0.11	ND	ND	-
	VC-103	0.75	0.8	1.7	1.3	71	9.9	-
	VC-103A	-	0.41	1.2	17	10	21	-
	VC-103B	*	0.65	0.55	2.5	70	95	-
	VC-103C	-	0.39	0.58	2.7	0.083	ND	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

* Sample indicated as < 50 mg/kg based on entire VC-100 series: average < 1 mg/kg; max < 2 mg/kg

TABLE 3.6A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NORTHWEST AREA DEEPWATER LOCATIONS - TOTAL PCBs
NORTHWEST AREA DEEPWATER LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-301	8.3	0.25	0.58	0.73	-	-	-	-
	VC-302	0.21	0.29	0.77	58	130	23	-	-
	VC-303	0.27	4.7	1.7	1000	44	340	31	-
	VC-304	3.4	4.5	12	330	6400	250	3.3	1.1
	VC-305	0.79	2.1	24	560	6200	5900	49	-
	VC-306	0.23	0.46	11	1500	560	110	200	0.92
	VC-307	1.3	900	61	1	-	-	-	-
	VC-308	1.1	84	130	0.35	-	-	-	-
	VC-309	6.3	16	38	470	800	430	2100	59
	VC-310	0.3	0.35	38	1.9	ND	ND	ND	-
	VC-311	0.53	2.1	15	20	2.2	ND	9800	-
	VC-312	1.1	0.17	0.23	120	39	-	-	-
	VC-313	0.14 J	0.57	1.1	5.2	ND	-	ND	-
	VC-314	20	0.5	1.7	0.3	-	1.3	13	-
	VC-315	4.3	1.1	1.1	3.2	61	85	0.11	ND
	VC-316	0.83	1.4	9.4	770	12	3.1	0.91	46
	VC-317	1.1	0.46	3.7	1	20	530	0.068 J	ND
	VC-318	2.1	0.26	0.44	720	13	0.2	110	1000
	VC-319	0.26	0.6	0.47	ND	-	-	-	-
	VC-320	0.53	22	5.1	ND	-	-	-	-
	VC-321	0.29	0.27	130	13	-	-	-	-
	VC-322	0.33	0.35	57	ND	-	-	-	-
	VC-323	0.3	25	0.52	ND	-	-	-	-
	VC-324	0.35	0.26	0.73	0.35	-	-	-	-
	VC-325	2.4	2.2	32	ND	-	-	-	-
	VC-326	7.1	0.6	0.52	0.83	16	5.6	ND	0.46
	VC-327	1.2	0.54	3.7	310	0.38	1.8	ND	1.3
	VC-328	0.28	0.33	1.2	0.72	1.8	13	6900	0.61
	VC-329	0.15	0.2	0.4	0.47	53	5.6	0.27	ND
	VC-330	25	900	250	72	150	31	-	-
	VC-331	31	1.9	ND	ND	ND	-	-	-
	VC-332	0.47	21	25	58	270	29	-	-
	VC-334	2.3	0.32	0.41	0.74	11	ND	ND	-
	VC-335	0.29	0.35	0.62	32	0.056 J	ND	ND	-
	VC-336	0.3	1.9	870	0.23	ND	ND	ND	-
	VC-337	280	1400	0.32	ND	110	3.5	ND	-
	VC-338	0.39	ND	ND	9.9	0.63	0.17	ND	700
	VC-339	-	-	-	75	0.42	ND	ND	-
	VC-340	-	-	-	-	-	ND	ND	-
	VC-341	33	0.41	0.28	0.79	0.73	41	55	-
	VC-342	9.6	6.2	1	0.37	0.34	0.33	ND	66
	VC-343	24	0.32	0.37	0.94	3.6	ND	ND	-
	VC-344	0.16	0.33	1	4.1	6.1	100	-	-
	VC-345	0.79	9.1	220	20	18	11	-	-
	VC-346	14	0.97	0.92	0.93	6.7	27	8500	6300
	VC-347	0.87	0.35	1.2	23	0.72	1200	0.14	-
	VC-348	0.34	0.42	0.87	0.42	0.58	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

TABLE 3.6A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NORTHWEST AREA DEEPWATER LOCATIONS - TOTAL PCBs
NORTHWEST AREA DEEPWATER LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-349*	-	6.6	11	21	370	0.24	-	-
	VC-350	4.1	4.4	7.6	20	24	-	-	-
	VC-351	0.28	0.37	7.9	-	-	-	-	-
	VC-352	0.25	0.25	1.2	-	-	-	-	-
	VC-353	0.32	0.31	1.1	-	-	-	-	-
	VC-354	0.29	0.71	0.82	-	-	-	-	-
	VC-355	4.1	4.3	27	590	140	1.1	-	-
	VC-356	0.43	1.1	0.98	9.1	0.17	-	-	-
	VC-357	0.36	0.22	1.6	-	-	-	-	-
	VC-358	0.31	0.24	0.3	-	-	37	-	-
	VC-359	0.27	1.6	2.9	83	16	-	-	-
	VC-360	1.3	0.93	15	0.51	ND	-	-	-
	VC-361	0.51	0.22	1200	3.3	-	-	-	-
	VC-362	1.7	0.08 J	4.3	0.42	0.55	0.95	0.47	-
	VC-363	3.2	0.98	0.75	0.56	11	200	0.21	-
	VC-364	0.44	0.072 J	0.54	0.73	0.57	1.4	3.5	-
	VC-365	-	-	-	ND	-	-	-	-
	VC-367	-	-	24	27	0.084 J	-	-	-
	VC-368	1.1	0.7	0.64	0.32	3.3	-	-	-
	VC-370	0.39	0.21	0.53	0.78	58	93	-	-
	VC-372	-	-	-	-	35	-	-	-
	VC-373	0.34	ND	ND	ND	ND	-	-	-
	VC-375	0.39	0.51	4.2	8.4	4.8	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

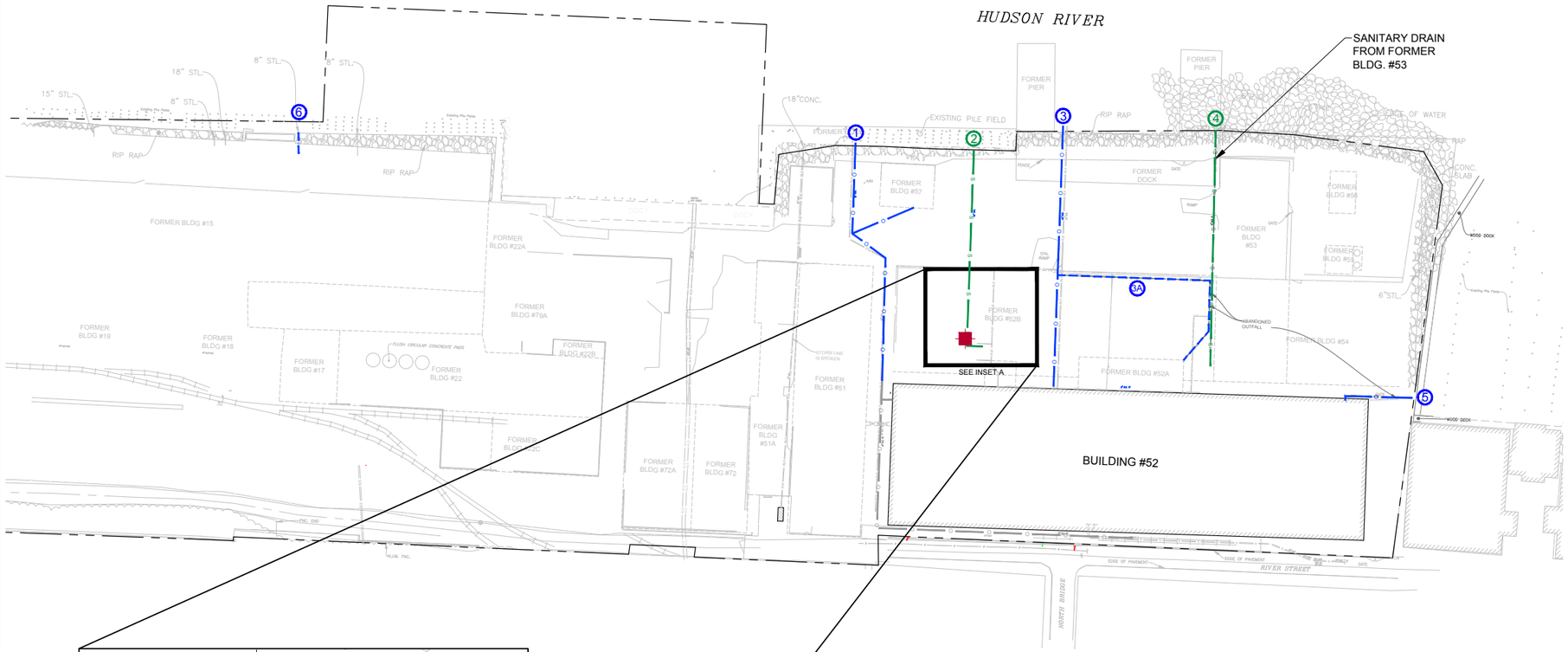
TABLE 3.6B - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NEARSHORE AND BACKWATER - TOTAL PCBs
NEARSHORE, OLD MARINA, AND NORTH BOAT SLIP LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

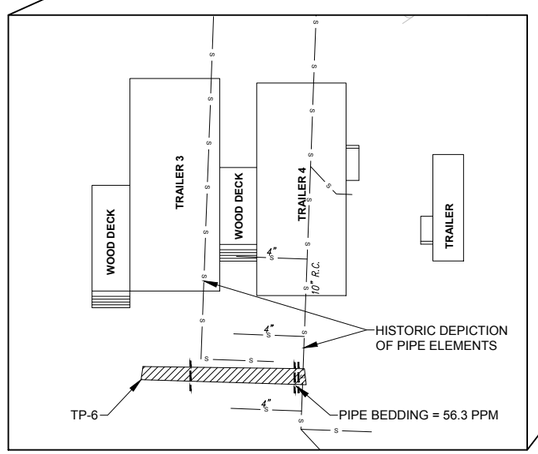
Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Nearshore	VC-401	1.4	3.3	4.9	5.2	8.5	8.2	7.3	4.3
	VC-402	0.68	1.2	2.7	5	3.5	5.1	5.2	2.8
	VC-403	0.11 J	0.36	1.9	2.4	4.8	7.3	1.5	1.5
	VC-404	2.2	0.68	11	1.3	2.8	4.8	6.7	3.1
	VC-405	0.47	0.95	5.9	2.7	5.1	5.4	6.2	0.84
	VC-406	0.32	0.13	0.33	ND	ND	ND	ND	ND
	VC-407	0.11	ND	ND	ND	ND	ND	ND	ND
	VC-408	0.32	110	7.5	ND	ND	ND	ND	ND
	VC-409	0.36	5.7	28	1.7	2.9	0.25	ND	0.081 J
	VC-410	0.4	1.6	3.1	3.7	6.6	1.2	0.13	ND
	VC-411	0.32	0.61	1.4	3.5	1.7	58	ND	ND
	VC-412	0.21	0.76	1	5.6	4	5.6	11	13
	VC-413	0.24	0.39	1.8	0.65	0.63	2.3	4.1	4.7
	VC-414	0.39	0.52	0.5	0.45	0.53	4.3	1.4	4.3
	VC-415	0.27	0.36	0.51	0.55	1	1.4	1.3	2.6
	VC-416	0.47	1.6	0.8	0.82	1.5	2.9	1.9	3.6
	VC-417	0.3	0.61	1.5	2.3	1.4	3	2.8	4.2
	VC-418	0.19	9.1	110	2.3	2.4	3.3	4.4	2.2
	VC-419	19	1.8	1.1	0.85	3.9	6	4	ND
	VC-420	0.68	1.4	0.87	2.9	4.2	22	0.18	0.081 J
	VC-421	0.89	2	4.9	13	4.7	23	0.1	ND
	VC-422	0.73	2.9	3	2.3	6.8	2.4	3	ND
Old Marina	VC-501	4.5	2.6	1.5	2.1	2.8	4	170	31
	VC-502	0.25	1.9	1.3	2.3	3.4	5.3	4	0.3
	VC-503	0.091 J	1.6	2.4	3.7	4.6	5.1	5.8	4.5
	VC-504	1.1	1.7	1.3	2.5	3.7	5	4.6	2.9
	VC-505	0.41	1.6	1.7	4.1	5.7	6.1	4.3	1.7
	VC-506	0.13	0.21	0.72	2.4	3.3	4.8	5.4	7.8
	VC-507	0.33	0.26	0.46	1	3.9	6.3	3.2	ND
	VC-508	0.19	0.27	1.4	0.79	1.6	7.8	5.2	0.83
	VC-509	0.77	1.6	2.6	3.4	5.5	5.9	7	8.3
	VC-510	0.46	0.21	0.32	0.73	1.6	3	4.9	5.2
	VC-511	0.24	0.35	0.25	0.52	0.55	0.8	4.1	11
	VC-512	0.27	0.3	0.34	0.48	0.51	9.9	0.49	4.3
	VC-513	0.31	0.65	3.2	4.1	5.1	2.6	5.5	ND
	VC-514	0.31	0.33	0.24	0.76	2	1.8	1.1	17
	VC-515	0.25	0.29	0.32	1.2	3.2	9.8	0.092	ND
	VC-516	0.39	0.24	0.82	2.2	3.2	14	ND	ND
North Boat Slip	VC-601	0.6	2.3	3.2	1.1	3.9	3.1	4	7.3
	VC-602	0.41	0.15	0.46	1	2.2	1.8	2.6	4.6
	VC-603	0.36	0.42	0.55	0.8	0.99	2.9	2.3	6.1
	VC-604	1.6	0.59	0.51	0.79	1.2	1.7	25	2.7
	VC-605	0.24	0.21	0.27	1.1	1.3	3.4	8.8	3.5

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 1 mg/kg overlying a sample > 1 mg/kg.
2. Results shaded green are < 1 mg/kg overlying a sample > 1 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 1 mg/kg.





INSET A
1" = 20'

LEGEND:

- TEST PIT (NUMBER AND LOCATION OF TEST PITS ARE SUBJECT TO CHANGE BASED ON SITE CONDITION.)
- POTENTIAL SOURCES OF CONTAMINATION FROM PROCESSES IN BUILDING 52/BUILDING 15
- HISTORIC NON-PROCESS SEWER OUTFALL
- ALTERNATE ALIGNMENT
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP RAP

BUILDING 52 OUTFALLS:

1. DELINEATION OF EXCAVATION EXTENTS AS RESULT OF APPENDIX 3 CONCLUDED ENTIRE OUTFALL ALIGNMENT WILL BE REMOVED. RDWP DID NOT REQUIRE INVESTIGATION OF THIS OUTFALL.
2. TEST PIT COMPLETED. HISTORICAL DOCUMENT REVIEW INDICATES THIS IS NOT A BUILDING 52 OUTFALL.
3. 3A DELINEATION OF EXCAVATION EXTENTS AS RESULT OF APPENDIX 3 CONCLUDED A SIGNIFICANT PORTION OF THE OUTFALL ALIGNMENT WILL BE REMOVED. THE SUFFICIENCY OF DATA TO CHARACTERIZE THE PIPE WILL BE EVALUATED DURING THE REMEDIAL DESIGN.
4. INVESTIGATION NOT REQUIRED. HISTORICAL DOCUMENT REVIEW INDICATES A POTENTIAL ALTERNATE ALIGNMENT (AS COMPARED TO THE RDWP). THE SUFFICIENCY OF DATA TO CHARACTERIZE THE PIPE WILL BE EVALUATED DURING THE REMEDIAL DESIGN.
5. DELINEATION OF EXCAVATION EXTENTS AS RESULT OF APPENDIX 3 CONCLUDED ENTIRE OUTFALL ALIGNMENT WILL BE REMOVED. RDWP DID NOT REQUIRE INVESTIGATION OF THIS OUTFALL.

BUILDING15 OUTFALL:

6. RDWP DID NOT REQUIRE INVESTIGATION OF THIS OUTFALL. WILL BE ADDRESSED IN THE REMEDIAL DESIGN.

N

0 80 160 240 320
SCALE IN FEET

NOTES:

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
3. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
4. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
5. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.

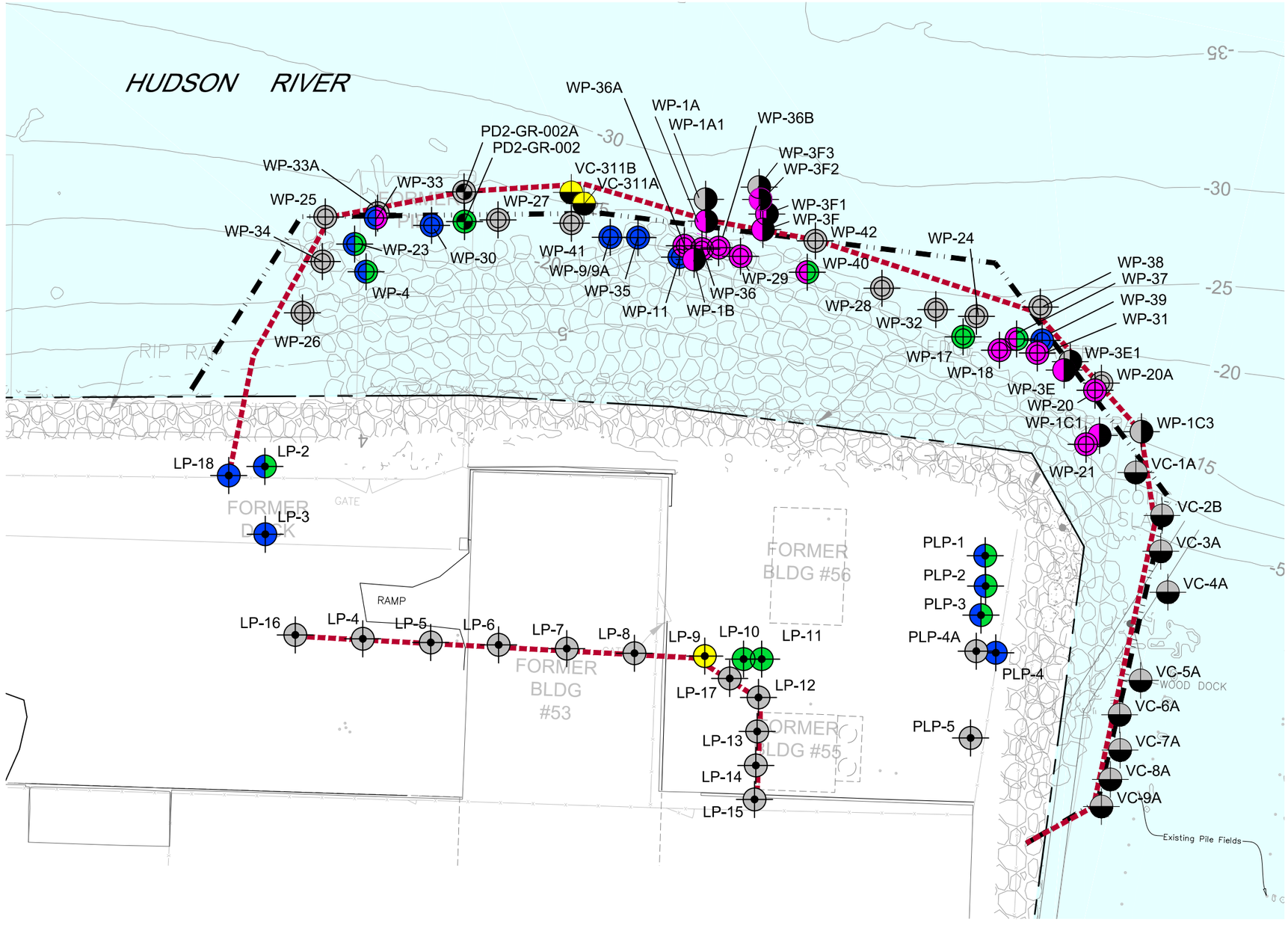
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OUTFALL INVESTIGATIONS

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2F



LEGEND:

- PD2-GR-002 — DESIGNATION AND APPROXIMATE LOCATION OF GEOTECHNICAL TEST BORING DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2014.
- WP-1C3 — DESIGNATION AND APPROXIMATE LOCATION OF PCBM AND OBSTRUCTION PROBE DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2014.
- VC-1A — DESIGNATION AND APPROXIMATE LOCATION OF VIBRACORE EXPLORATIONS DRILLED IN THE RIVER OR OLD MARINA DURING PRE-DESIGN INVESTIGATION IN 2014.
- PLP-1 — DESIGNATION AND APPROXIMATE LOCATION OF PCBM AND OBSTRUCTION PROBE DRILLED ON LAND DURING PRE-DESIGN INVESTIGATION IN 2013.
- WP-32 — DESIGNATION AND APPROXIMATE LOCATION OF PCBM AND OBSTRUCTION PROBE DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2013.
- APPROXIMATE ALIGNMENT OF BULKHEAD WALL FROM RFS
- POTENTIAL ALIGNMENT OF BULKHEAD WALL AND DEADMAN ANCHOR BASED ON PCBM AND OBSTRUCTION DATA GATHERED FROM PDI EXPLORATIONS THROUGH 2014. ALIGNMENT IS APPROXIMATE AND SUBJECT TO CHANGE

KEY

- INDICATES PROBE COMPLETED, NO PCBM OBSERVED
- INDICATES, SEMI-SOLID PCBM OBSERVED AT DEPTH (NON-EXCAVATABLE)
- INDICATES TRACE PCBM OBSERVED
- INDICATES PROBE COMPLETED, SEMI-SOLID PCBM OBSERVED SHALLOW (EXCAVATABLE)
- INDICATES OBSTRUCTIONS ENCOUNTERED

W S Z E

0 50 100

SCALE IN FEET

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

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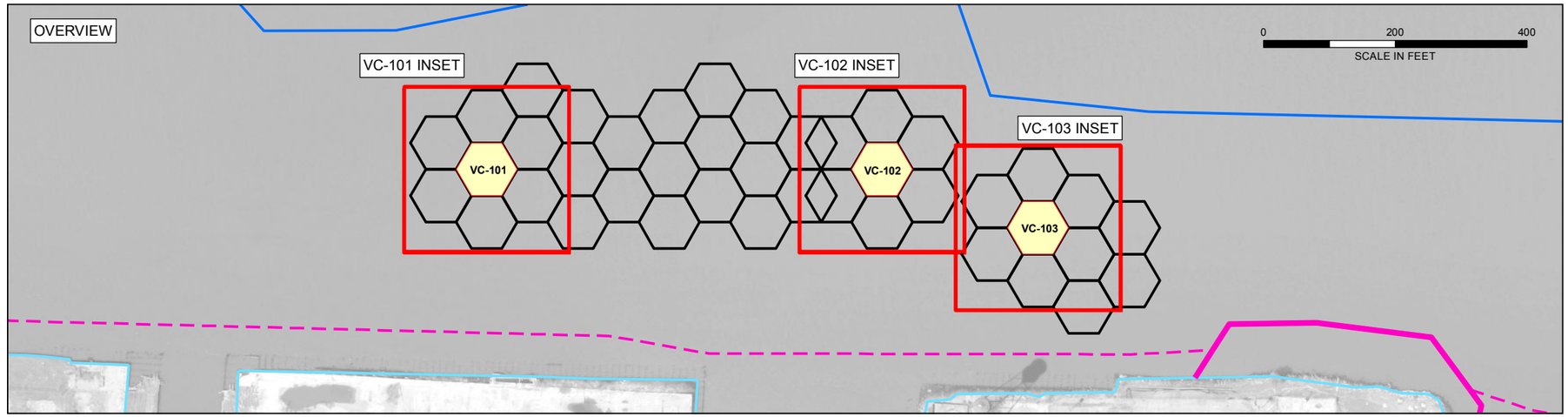
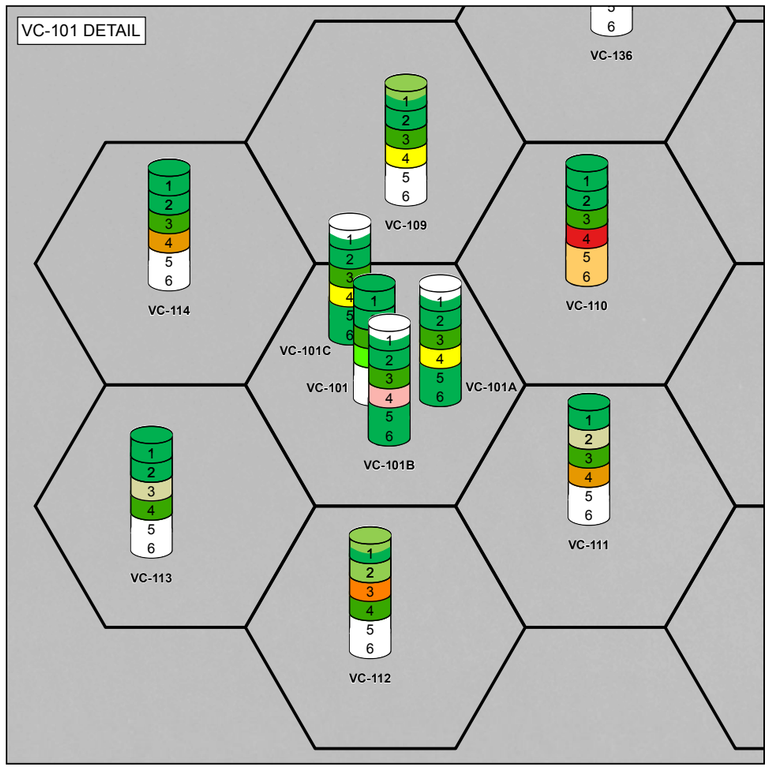
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

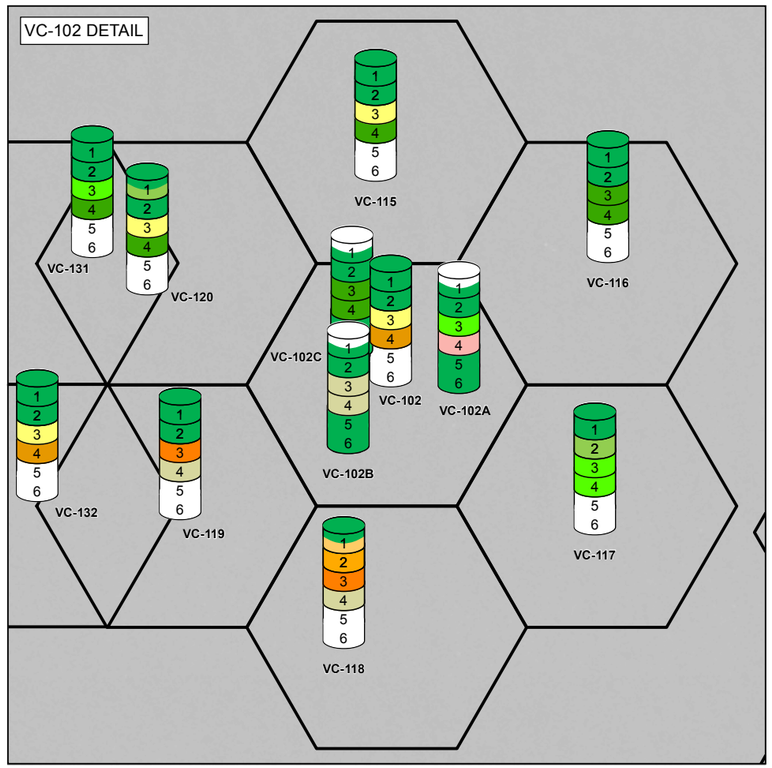
LOCATION PLAN - EXTENSION ALIGNMENT BORINGS AND PROBES

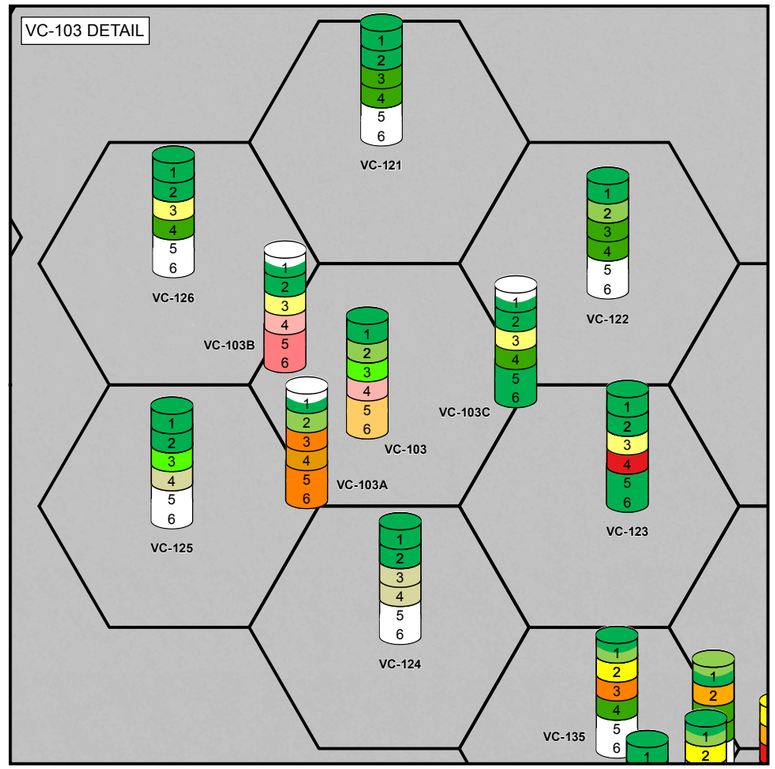
SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.4A









LEGEND

- 0 - 1 mg/kg
- 1 - 2 mg/kg
- 2 - 5 mg/kg
- 5 - 10 mg/kg
- 10 - 50 mg/kg
- 50 - 100 mg/kg
- > 100 mg/kg
- Not Sampled or Not Analized

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. # - INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL).

2. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

DEEPWATER INVESTIGATION - PDI PCB RESULTS - VARIABILITY SAMPLING

AUGUST 2015

FIGURE 3.5G

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0803_TJV_Fig3.5G_VariabilitySampling_BL_D1.mxd — USER: mclancy — LAST SAVED: 8/3/2015 11:32:36 AM

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EB-29 GB-04 VC-122 CS-16 CS-14 CS-13 EB-16 VC-133 VC-103C VC-353 VC-352 VC-351 RB-17 RB-18 CS-05 VC-354 VC-323 VC-321 CS-10 VC-123 CS-15 VC-325 RB-14 VC-322 VC-372 CS-12 VC-319 VC-320 CS-04 VC-344 VC-343 VC-358 VC-324 RB-19 VC-365 VC-340 VC-339 SD02-CS VC-361 RB-16 SD01-CS VC-134 VC-347 VC-342 VC-373 VC-374 CS-18 VC-379 VC-377 VC-357 VC-345 VC-329 VC-328 VC-369 VC-366 SD01-GB VC-356 VC-348 VC-364 VC-341 VC-317 VC-318 VC-338 VC-313 VC-337 CS-11 VC-336 CS-09 RB-42 VC-326 SD05-CS VC-346 SD02-GB RB-21 VC-315 VC-370 VC-335 VC-135 VC-368 VC-309 VC-307 VC-306 VC-376 VC-360 VC-327 VC-363 VC-303 VC-334 VC-316 VC-311 RB-22 VC-371 RB-23 VC-304 SD04-CS CS-03 VC-355 VC-349 VC-305 VC-359 VC-314 VC-312 VC-308 VC-378 VC-375 VC-332 VC-362 VC-367 BS-02 VC-302 RB-27 EB-22 VC-301 VC-350 RB-15 VC-333 VC-330 RB-43 VC-331 RB-40 RB-13 SD04-GB SD05-GB CS-08 SD-04 CS-02 RB-36 VC-1 EB-19 VC-2A VC-2B VC-3 VC-511 RB-30 VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION- PDI RESULTS PCB - SURFACE TO 0.5 FOOT

AUGUST 2015

FIGURE 3.6A

EB-06
EB-08
EB-09
EB-38
EB-07
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-114
VC-110
VC-138
VC-139
VC-120
GB-17
GB-14
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
CS-37
CS-47
CS-42
VC-113
VC-111
VC-137
VC-140
VC-132
VC-119
CS-45
EB-30
VC-112
VC-106
VC-129
CS-29
EB-12
VC-107
GB-16
CS-41
GB-13
CS-36
EB-24
CS-46
CS-44
EB-27
GB-12
CS-28
CS-31
SHEET 1
SHEET 2
CS-48
EB-28
VC-422
GB-15
RB-24
EB-03
VC-420
RB-26
VC-421
RB-25
VC-419
VC-418
SD03-CS
VC-417
CS-35
EB-25
VC-409
CS-32
CS-27
VC-416
EB-31
VC-415
VC-414
VC-413
VC-412
VC-411
BS-05
VC-408
VC-407
BS-07
CS-43
SD03-GB
CS-40
EB-26
CS-33
VC-410
RB-31
RB-32
SD-01
RB-33
CS-34
CS-30
VC-406
VC-405
VC-404
VC-403
SD-02
BS-06
CS-39
VC-605
CS-26
VC-603
VC-604
CS-38
SD-03

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 1 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6I_PCBNS00-05Sediment_BL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:06:23 PM

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SHEET 1

SHEET 2

SHEET 2

SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

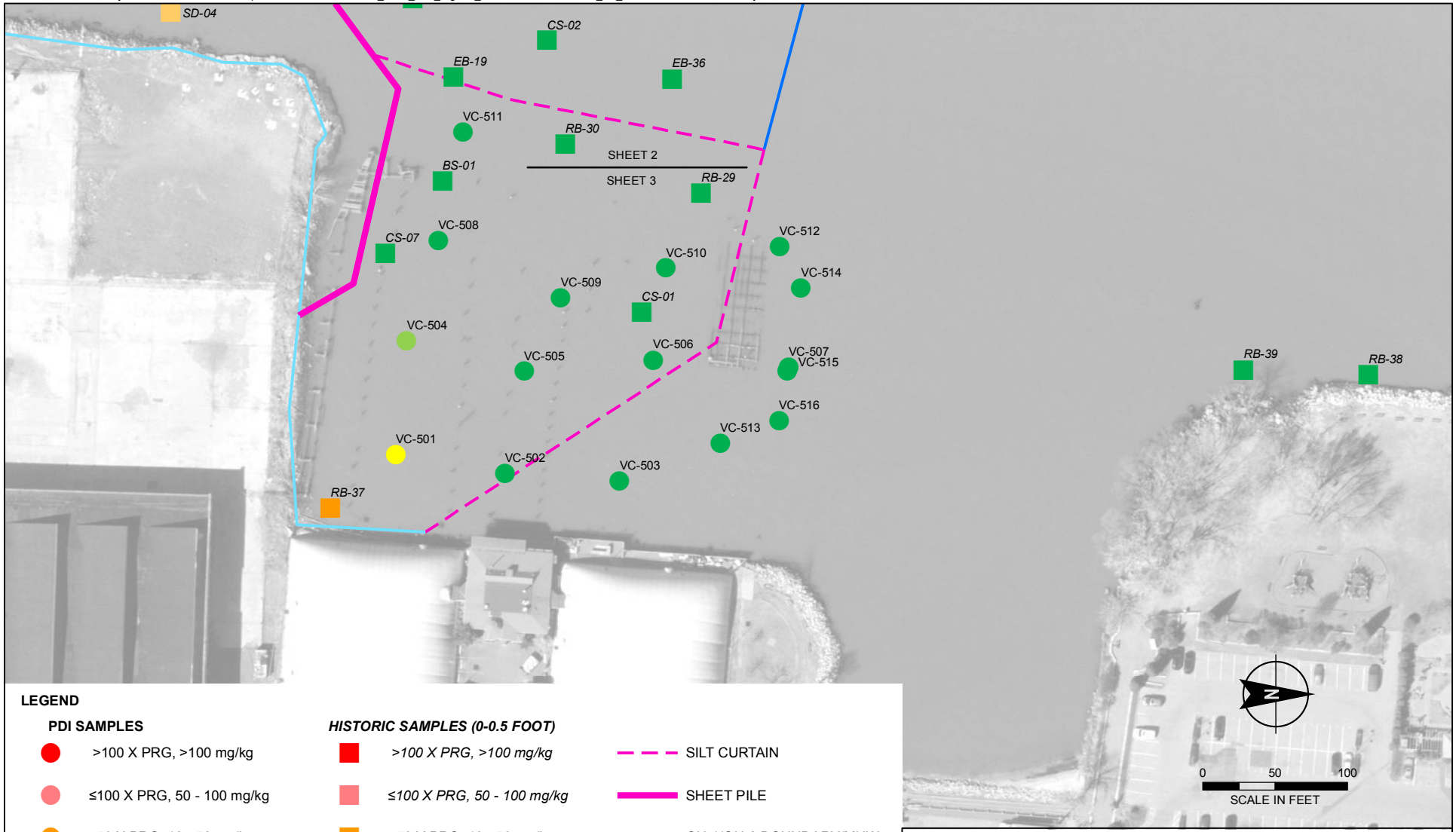
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 2 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6I_PCBOM00-05Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:09:37 PM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

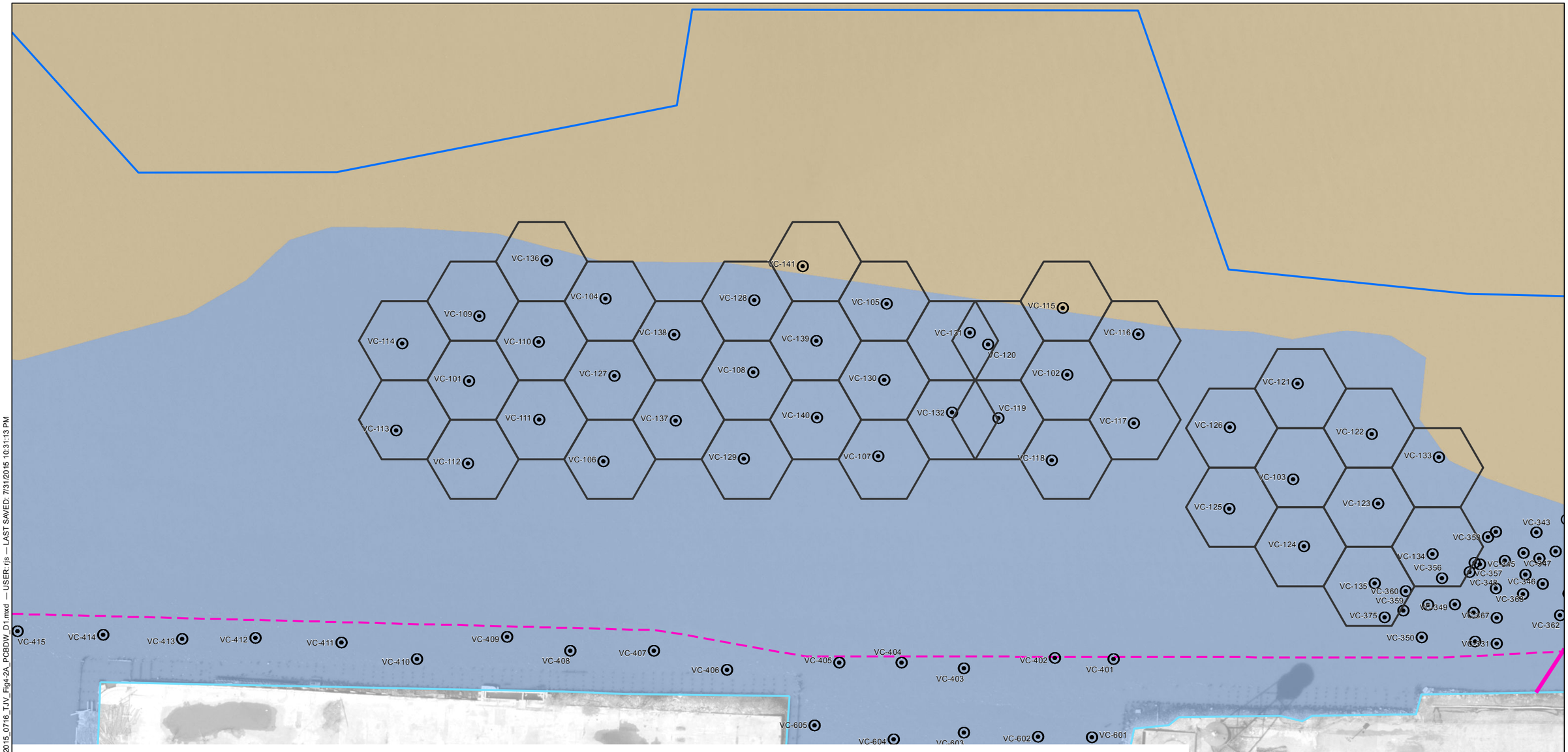
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 3 OF 3

AUGUST 2015



LEGEND

- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- PDI SAMPLE LOCATION
- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

RIVER ENVIRONMENT DEPOSITION/DYNAMIC AREAS WITH PDI SAMPLE LOCATIONS

JULY 2015

FIGURE 4.3A

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0716_TJV_Fig4-2A_PCBDW_D1.mxd — USER: rjs — LAST SAVED: 7/31/2015 10:31:13 PM

VC-344 0-4 FT Cover
VC-347 0-4 FT Cover
VC-329 0-3 FT Cover
VC-328 0-5 FT Cover
VC-345 0-2 FT Removal
VC-346 0-5 FT Cover
VC-327 0-3 FT Removal
VC-363 0-4 FT Cover
VC-322 0-2 FT Removal
VC-321 0-2 FT Removal
VC-339 0-3 FT Removal
VC-361 0-2 FT Removal
VC-341 0-5 FT Cover
VC-317 0-4 FT Cover
VC-318 0-3 FT Removal
VC-315 0-3 FT Cover
VC-316 0-3 FT Removal
VC-370 0-3 FT Cover
VC-311 0-5 FT Cover
VC-337 0-2 FT Removal
VC-312 0-3 FT Removal
VC-309 0-6 FT Removal
VC-307 0-2 FT Removal
VC-308 0-2 FT Removal
VC-336 0-2 FT Removal
VC-306 0-6 FT Removal
VC-304 0-3 FT Removal
VC-305 0-5 FT Removal
VC-303 0-3 FT Removal
VC-301 0-6 FT Removal
VC-302 0-4 FT Removal
VC-359 0-3 FT Removal
VC-355 0-4 FT Removal
VC-349 0-3 FT Cover
VC-332 0-4 FT Removal
VC-330 0-4 FT Removal
VC-122
VC-123
VC-133
VC-103C
VC-134
VC-135
VC-379
VC-377
VC-356
VC-357
VC-348
VC-358
VC-343
VC-372
VC-325
VC-353
VC-352
VC-351
VC-354
VC-323
VC-320
VC-319
VC-324
VC-365
VC-340
VC-364
VC-369
VC-326
VC-368
VC-313
VC-373
VC-374
VC-366
VC-371
VC-335
VC-334
VC-376
VC-360
VC-378
VC-375
VC-367
VC-362
VC-314
VC-350
VC-383
VC-331
VC-333
VC-380
VC-381
VC-382
EB-29
EB-16
EB-21
EB-22
CS-16
CS-14
CS-13
CS-15
CS-18
CS-05
CS-10
CS-04
CS-11
CS-09
CS-03
CS-08
CS-02
RB-17
RB-18
RB-19
RB-16
RB-42
RB-22
RB-27
RB-07
RB-15
RB-02
RB-20
RB-03
RB-06
RB-08
RB-04
RB-30
RB-40
RB-13
RB-05
RB-01
RB-36
SD02-CS
SD02-GB
SD-42
SD05-CS
SD-44
SD-43
SD-45
SD05-GB
SD-50
SD04-GB
SD-04
SD-41
SD01-CS
SD01-GB
SD04-CS
BS-02
HA-219
HA-218
HA-217
HA-211
HA-209
HA-206
HA-205
HA-203B
HA-203
HA-201
HA-221
HA-216
HA-215
VC-1
VC-2A
VC-2B
VC-3
VC-4
EB-19
RB-09
SD-34
VC-511
GB-04

LEGEND

PDI SAMPLES (MAX 0-6 FT)

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (MAX 0-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- SHALLOW REMOVAL (2 FT)
- DEEPER REMOVAL (UP TO 6 FT)
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION OVERVIEW

AUGUST 2015

FIGURE 4.4A

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\Evaluation\2015_0715_TJV_Fig4-4A_PCB0-6NWAreaOverview_BL_D1.mxd — USER: tvogler — LAST SAVED: 8/10/2015 11:38:04 AM

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EB-06
EB-06A
EB-07
EB-08
EB-09
EB-38
GB-17
GB-14
CS-47
CS-37
CS-42
CS-45
EB-30
GB-16
CS-41
GB-13
CS-36
EB-24
CS-46
CS-44
EB-27
GB-12
CS-48
EB-28
VC-422
GB-15
RB-24
VC-421
RB-25
VC-420
RB-26
VC-419
VC-418
SD03-CS
SD03-GB
EB-26
VC-417
CS-40
6 FT
BS-07
CS-43
SD-01
RB-33
RB-31
RB-32
VC-416
EB-31
VC-415
CS-35
EB-25
VC-414
VC-413
VC-412
VC-411
CS-33
VC-410
VC-409
BS-05
EB-03
CS-31
CS-32
CS-30
VC-408
VC-407
VC-406
6 FT
CS-28
CS-27
VC-405
VC-404
VC-403
CS-34
SD-02
BS-06
CS-39
SD-49
VC-705
VC-704
VC-701
VC-702
CS-38
VC-703
4 FT
VC-605
CS-26
VC-604
VC-603
SD-48
SD-03
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-120
VC-138
VC-139
VC-114
VC-110
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
VC-132
VC-119
VC-113
VC-111
VC-137
VC-140
VC-112
EB-11
VC-106
VC-129
CS-29
EB-12
VC-107
EB-02
SHEET 1
SHEET 2

LEGEND

PDI	HISTORIC	PCBS
		BACKGROUND (PRG), 0-1 mg/kg
		≤2 X PRG, 1-2 mg/kg
		≤5 X PRG, 2-5 mg/kg
		≤10 X PRG, 5-10 mg/kg
		≤50 X PRG, 10-50 mg/kg
		≤100 X PRG, 50-100 mg/kg
		>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

- PCB
- COPPER
- LEAD
- REMOVAL AREA
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
<1.25 X PRG	129-161	132-165
<1.5 X PRG	161-194	165-198
<2 X PRG	194-258	198-264
<5 X PRG	258-645	264-660
<10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - SEDIMENT REMOVAL EVALUATION - SURFACE TO 6 FOOT

FIGURE 4.4H
SHEET 1 OF 3

AUGUST 2015

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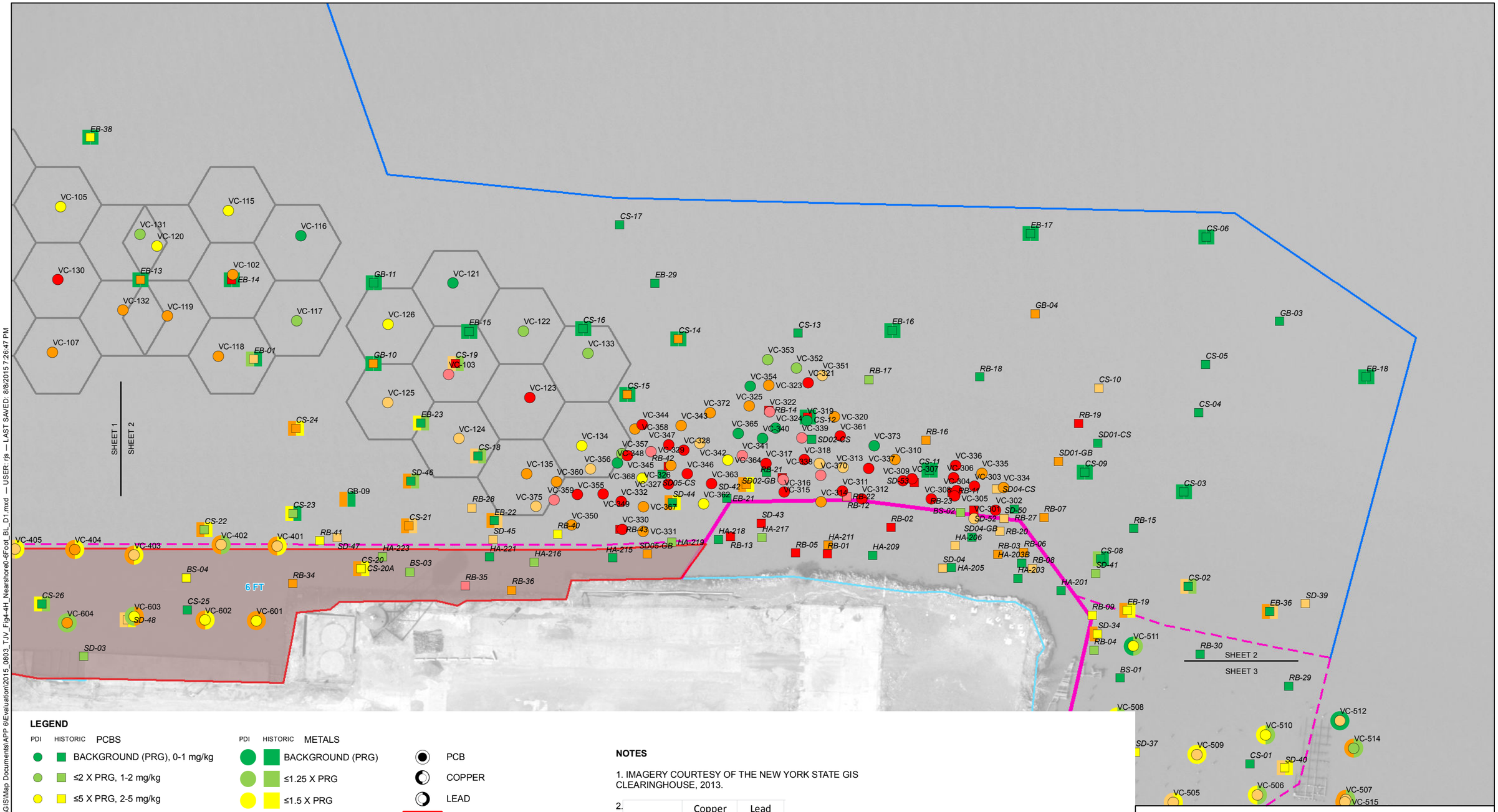


LEGEND

PDI	HISTORIC	PCBS
●	■	BACKGROUND (PRG), 0-1 mg/kg
●	■	≤2 X PRG, 1-2 mg/kg
●	■	≤5 X PRG, 2-5 mg/kg
●	■	≤10 X PRG, 5-10 mg/kg
●	■	≤50 X PRG, 10-50 mg/kg
●	■	≤100 X PRG, 50-100 mg/kg
●	■	>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
●	■	BACKGROUND (PRG)
●	■	≤1.25 X PRG
●	■	≤1.5 X PRG
●	■	≤2 X PRG
●	■	≤5 X PRG
●	■	≤10 X PRG
●	■	>10 X PRG

- PCB
- COPPER
- LEAD
- REMOVAL AREA
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
<1.25 X PRG	129-161	132-165
<1.5 X PRG	161-194	165-198
<2 X PRG	194-258	198-264
<5 X PRG	258-645	264-660
<10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

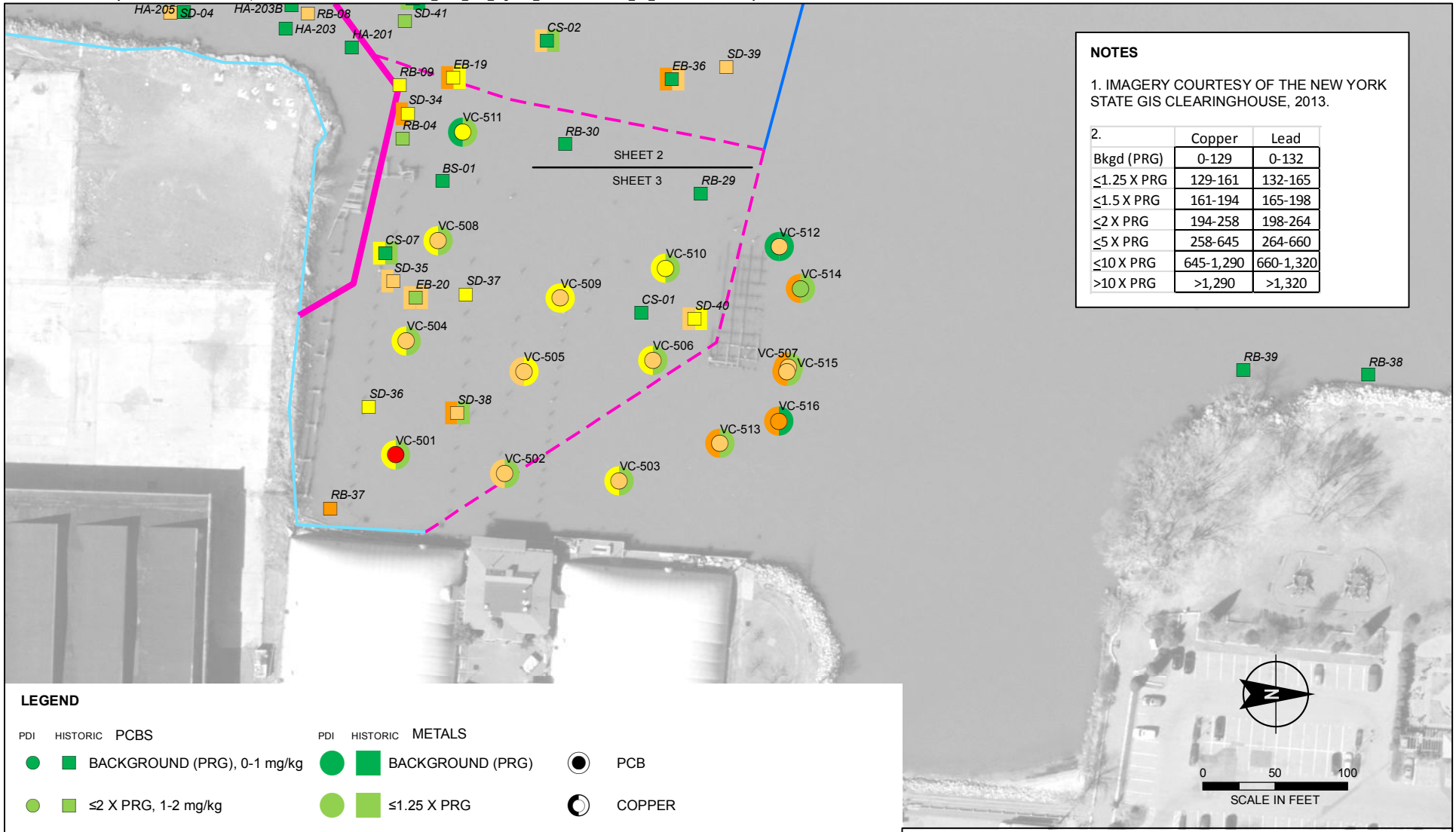
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - SEDIMENT REMOVAL EVALUATION - SURFACE TO 6 FOOT

FIGURE 4.4H
SHEET 2 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\Evaluation\2015_0803_TJV_Fig4-4H_Nearshore0-6Foot_AL_D1.mxd — USER: rjs — LAST SAVED: 8/7/2015 11:33:42 AM



NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

LEGEND

PDI	HISTORIC	PCBS
		BACKGROUND (PRG), 0-1 mg/kg
		≤2 X PRG, 1-2 mg/kg
		≤5 X PRG, 2-5 mg/kg
		≤10 X PRG, 5-10 mg/kg
		≤50 X PRG, 10-50 mg/kg
		≤100 X PRG, 50-100 mg/kg
		>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

PCB
COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

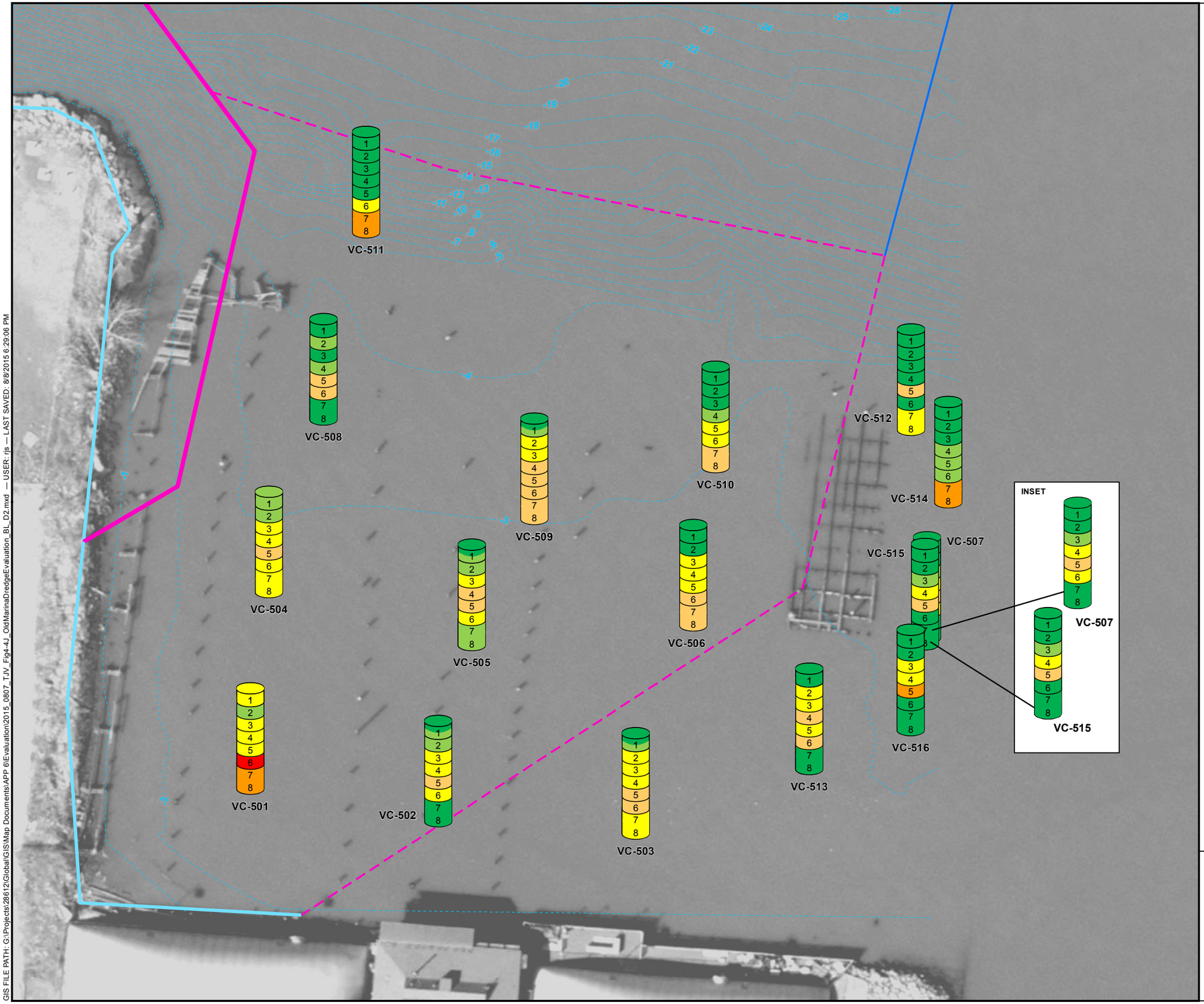
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - SEDIMENT REMOVAL EVALUATION - SURFACE TO 6 FOOT

FIGURE 4.4H
SHEET 3 OF 3

AUGUST 2015



LEGEND

- 0 - 1 mg/kg
- 1 - 2 mg/kg
- 2 - 5 mg/kg
- 5 - 10 mg/kg
- 10 - 50 mg/kg
- 50 - 100 mg/kg
- > 100 mg/kg
- Not Sampled or Not Analized

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

LEGEND

- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- Bathymetry

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 40 80
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OLD MARINA SEDIMENT REMOVAL EVALUATION - PDI PCB RESULTS - SURFACE TO 8 FOOT

AUGUST 2015

FIGURE 4.4J

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\Evaluation\2015_0807_TJV_Fig4-4J_OldMarinaDredgeEvaluation_BL_D2.mxd — USER: rjs — LAST SAVED: 8/8/2015 6:29:06 PM

Baseline Sampling Data Report (Baseline)

TABLE 4
Analytical Summary of PCBs in Surface Water
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Sample Type	Date	Sample Depth	Total PCBs (ug/L)	Aroclor-1242 ug/L	Aroclor 1248 (ug/L)	Aroclor-1260 (ug/L)	DOC (mg/L)	TOC (mg/L)	TSS (mg/L)
SW-001	N	10/25/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**20.6**	**20.4**	**6.9**
SW-002	N	10/25/2013	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**3.9**	**6.5**
SW-003	N	10/25/2013	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.6**	**3.7**	**7.6**
SW-003 (dup)	FD	10/25/2013	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.1**	**4.1**	**6.6**
SW-004	N	10/25/2013	2 - 7.8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**6.6**	**6.8**	**8.5**
SW-005	N	10/25/2013	2.1 - 10.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**7.0**	**7.4**	**7.4**
SW-006	N	10/25/2013	2 - 8.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**4.0**	**6.5**
SW-001	N	12/12/2013	2 - 9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.7**	**3.9**	**38.6**
SW-002	N	12/12/2013	2 - 5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**6.3**	**7.2**	**32.4**
SW-003	N	12/12/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.8**	**5.3**	**44.2**
SW-003 (dup)	FD	12/12/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.8**	**5.4**	**66.6**
SW-004	N	12/12/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.6**	**4.4**	**57.8**
SW-005	N	12/12/2013	2 - 9.2 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.4**	**4.8**	**45.6**
SW-006	N	12/12/2013	2 - 7.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**23.6**	**24.6**	**40.5**
SW-001	N	4/9/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**4.1**	**13.7**
SW-002	N	4/9/2014	2 - 4.9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**17.6**
SW-003	N	4/9/2014	2 - 5.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.6**	**12.6**
SW-003 (dup)	FD	4/9/2014	2 - 5.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**14.8**
SW-004	N	4/9/2014	2 - 6.8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**8.3**	**8.7**	**15.9**
SW-005	N	4/9/2014	2 - 7.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**5.7**	**6.1**	**14.9**
SW-006	N	4/9/2014	2 - 5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**6.7**	**7.3**	**12.3**
SW-001	N	5/7/2014	2.1 - 8.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.5**	**3.5**	**21.3**
SW-002	N	5/7/2014	2 - 6.7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.6**	**4.8**	**24.1**
SW-003	N	5/7/2014	2.1 - 6.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**8.0**	**8.1**	**25.9**
SW-003 (dup)	FD	5/7/2014	2.1 - 6.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**8.0**	**8.2**	**23.7**
SW-004	N	5/7/2014	2.2 - 8.4 (ft)	**0.0211 J**	ND(0.0186)	**0.0211 J**	ND(0.0186)	**10.3**	**10.5**	**30.0**
SW-005	N	5/7/2014	2.2 - 7.5 (ft)	**0.019 J**	ND(0.0186)	**0.019 J**	ND(0.0186)	**3.5**	**3.6**	**33.4**
SW-006	N	5/7/2014	2.1 - 5.8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.7**	**3.9**	**25.4**
SW-007	N	5/7/2014	2 - 22 (ft)	**0.0199 J**	ND(0.0186)	**0.0199 J**	ND(0.0186)	**3.2**	**3.6**	**39.6**
SW-001	N	6/9/2014	2.2 - 8.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.3**	**10.1**	**12.2**
SW-002	N	6/9/2014	2.1 - 8.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**4.6**	**11.7**
SW-003	N	6/9/2014	2 - 9.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.4**	**4.4**	**23.2**
SW-003 (dup)	FD	6/9/2014	2 - 9.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.4**	**4.4**	**20.6**
SW-004	N	6/9/2014	2 - 7.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**13.3**	**13.7**	**20.2**
SW-005	N	6/9/2014	2 - 10.5 (ft)	ND(0.0186)	ND(0.01)	ND(0.0186)	ND(0.0186)	**3.9**	**5.4**	**21.3**
SW-006	N	6/9/2014	2 - 7 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**4.7**	**21.2**
SW-001	N	7/8/2014	2.3 - 8.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**3.9**	**12.0**
SW-002	N	7/8/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**3.9**	**13.9**
SW-003	N	7/8/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.1**	**29.4**
SW-003 (dup)	FD	7/8/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.2**	**25.5**
SW-004	N	7/8/2014	2 - 9.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**4.3**	**18.3**
SW-005	N	7/8/2014	2 - 8.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.4**	**22.7**
SW-006	N	7/8/2014	2 - 7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.4**	**19.5**
SW-001	N	8/5/2014	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.4**	**12.6**
SW-002	N	8/5/2014	2 - 7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**13.5**
SW-003	N	8/5/2014	2 - 6.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**4.8**	**12.0**
SW-003 (dup)	FD	8/5/2014	2 - 6.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**4.8**	**10.5**
SW-004	N	8/5/2014	2 - 6 (ft)	**0.0193 J**	ND(0.0186)	ND(0.0186)	**0.0193 J**	**3.2**	**4.7**	**24.0**
SW-005	N	8/5/2014	2 - 9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.5**	**4.4**	**21.5**
SW-006	N	8/5/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**12.2**	**13.9**	**16.5**
SW-007	N	8/5/2014	2 - 25 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.0**	**3.4**	**16.0**

1. Results in bold are above the MDL. Aroclor 1216, 1221, 1232, 1242, 1254, 1262 and 1268 were not detected.

2. ND - Not detected above reporting limit; J - Estimated value; TOC, Total Organic Carbon; DOC, Dissolved Organic Carbon; TSS, Total Suspended Solids

TABLE 4
Analytical Summary of PCBs in Surface Water
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Sample Type	Date	Sample Depth	Total PCBs (ug/L)	Aroclor-1242 ug/L	Aroclor 1248 (ug/L)	Aroclor-1260 (ug/L)	DOC (mg/L)	TOC (mg/L)	TSS (mg/L)
SW-001	N	9/4/2014	2 - 7.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.8**	**9.8**
SW-002	N	9/4/2014	2 - 4.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**3.8**	**9.2**
SW-003	N	9/4/2014	2 - 13.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.7**	**4.0**	**9.4**
SW-003 (dup)	FD	9/4/2014	2 - 13.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**4.3**	**13.4**
SW-004	N	9/4/2014	2 - 7.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**4.0**	**16.8**
SW-005	N	9/4/2014	2 - 8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**3.9**	**6.7**
SW-006	N	9/4/2014	2 - 7.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**4.0**	**4.3**	**10.1**
SW-001	N	10/3/2014	2 - 7.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.7**	**14.4**
SW-002	N	10/3/2014	2.2 - 8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**3.6**	**15.3**
SW-003	N	10/3/2014	2 - 8.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**6.4**	**6.8**	**42.1**
SW-003 (dup)	FD	10/3/2014	2 - 8.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**6.4**	**6.8**	**38.9**
SW-004	N	10/3/2014	2.2 - 7.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.9**	**21.0**
SW-005	N	10/3/2014	2.1 - 8.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.7**	**4.4**	**19.1**
SW-006	N	10/3/2014	2.1 - 8.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**4.1**	**4.1**	**16.9**
SW-007	N	10/3/2014	-	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**4.1**	**32.4**
SW-001	N	5/12/2015	2 - 9.6 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.2**	**3.4**	**18.0**
SW-002	N	5/12/2015	2.1 - 8.4 (ft)	**0.0132**	**0.0132**	ND(0.01)	ND(0.01)	**3.0**	**3.9**	**46.0**
SW-003	N	5/12/2015	2 - 9.6 (ft)	**0.0229**	**0.0229**	ND(0.01)	ND(0.01)	**2.8**	**3.9**	**48.0**
SW-003 (dup)	FD	5/12/2015	2 - 9.6 (ft)	**0.0153**	**0.0153**	ND(0.01)	ND(0.01)	**2.9**	**3.8**	**52.4**
SW-004	N	5/12/2015	2 - 8 (ft)	**0.0193**	**0.0193**	ND(0.01)	ND(0.01)	**2.9**	**3.6**	**55.0**
SW-005	N	5/12/2015	2 - 9.6 (ft)	**0.0208**	**0.0208**	ND(0.01)	ND(0.01)	**2.9**	**4.2**	**85.9**
SW-006	N	5/12/2015	1.9 - 10.9 (ft)	**0.0152**	**0.0152**	ND(0.01)	ND(0.01)	**2.9**	**4.2**	**54.4**
SW-007	N	5/12/2015	2.2 - 27.9 (ft)	**0.0245**	**0.0245**	ND(0.01)	ND(0.01)	**2.8**	**4.6**	**113.0**

1. Results in bold are above the MDL. Aroclor 1216, 1221, 1232, 1242, 1254, 1262 and 1268 were not detected.

2. ND - Not detected above reporting limit; J - Estimated value; TOC, Total Organic Carbon; DOC, Dissolved Organic Carbon; TSS, Total Suspended Solids

TABLE 6
Analytical Summary of PCBs in Sediment[1]
Former Anaconda Wire and Cable Site
1 River Street
Hastings-on-Hudson, NY

Location[2]	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs	TOC
B1-SS-001	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.219 AE**	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.219**	**2.2**
B1-SS-002	ND(0.121)	ND(0.121)	ND(0.121)	ND(0.121)	**0.271 AE**	ND(0.121)	ND(0.121)	ND(0.121)	ND(0.121)	**0.271**	**2.8**
B1-SS-003	ND(0.113)	ND(0.113)	ND(0.113)	ND(0.113)	**0.243 AE**	ND(0.113)	ND(0.113)	ND(0.113)	ND(0.113)	**0.243**	**2.4**
B1-SS-004	ND(0.129)	ND(0.129)	ND(0.129)	**0.408 AD**	ND(0.129)	ND(0.129)	ND(0.129)	ND(0.129)	ND(0.129)	**0.408**	**2.7**
B1-SS-005	ND(0.115)	ND(0.115)	ND(0.115)	**0.33 AD**	ND(0.115)	ND(0.115)	ND(0.115)	**0.151 AH**	ND(0.115)	**0.481**	**2.8**
B1-SS-006	ND(0.142)	ND(0.142)	ND(0.142)	**0.451 AD**	ND(0.142)	ND(0.142)	ND(0.142)	ND(0.142)	ND(0.142)	**0.451**	**3.5**
B1-SS-007(FD)	ND(0.243)	ND(0.243)	ND(0.243)	ND(0.243)	**0.625 AE**	**1.05 AF**	ND(0.243)	**1.29 AH**	ND(0.243)	**2.965**	**2.9**
B1-SS-007	ND(0.127)	ND(0.127)	ND(0.127)	ND(0.127)	**2.01 AE**	**0.972 AF**	ND(0.127)	**1.04 AH**	ND(0.127)	**4.022**	**2.6**
B1-SS-101	ND(0.108)	ND(0.108)	ND(0.108)	**0.452 AD**	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.452**	**2.1**
B1-SS-008	ND(0.124)	ND(0.124)	ND(0.124)	ND(0.124)	**0.287 AE**	ND(0.124)	ND(0.124)	ND(0.124)	ND(0.124)	**0.287**	**2.7**
B1-SS-009	ND(0.0816)	ND(0.0816)	ND(0.0816)	ND(0.0816)	ND(0.0816)	**0.356 AF**	ND(0.0816)	**0.759 AH**	ND(0.0816)	**1.115**	**1.6**
B1-SS-102	ND(0.106)	ND(0.106)	ND(0.106)	**0.328 AD**	ND(0.106)	ND(0.106)	ND(0.106)	ND(0.106)	ND(0.106)	**0.328**	**2.2**
B1-SS-010	ND(0.118)	ND(0.118)	ND(0.118)	ND(0.118)	**0.253 AE**	**0.133 AF**	ND(0.118)	**0.171 AH**	ND(0.118)	**0.557**	**2.2**
B1-SS-011	ND(0.105)	ND(0.105)	ND(0.105)	ND(0.105)	**0.227 AE**	**0.133 AF**	ND(0.105)	**0.779 AH**	ND(0.105)	**1.139**	**2.3**
B1-SS-012	ND(0.123)	ND(0.123)	ND(0.123)	ND(0.123)	**0.265 AE**	**0.161 AF**	ND(0.123)	ND(0.123)	ND(0.123)	**0.426**	**2.9**
B1-SS-013	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.26 AE**	**0.112 AF**	ND(0.108)	ND(0.108)	ND(0.108)	**0.372**	**2.3**
B1-SS-014	ND(0.187)	ND(0.187)	ND(0.187)	ND(0.187)	**0.245 AE**	ND(0.187)	ND(0.187)	ND(0.187)	ND(0.187)	**0.245**	**1.7**

Notes:
1. All sample results expressed as mg/kg; Total Organic Carbon (TOC) expressed as percent. Results in **bold** above the detection limit. FD = Field Duplicate
2. Samples B1-SS-001 through -003 are upstream of the Site; -004 through -102 are adjacent to the Site; -012 through -014 are downstream of the Site.
3. ND - Not detected above reporting limit
   AD - Aroclor 1242 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
   AE - Aroclor 1248 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
   AF - Aroclor 1254 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
   AH - Aroclor 1262 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.

TABLE 8
ANALYTICAL SUMMARY OF PCBs IN POREWATER[1]
FORMER ANACONDA WIRE & CABLE SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Location[2]	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs	TOC
PW-001 (SS-001)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.2**
PW-002 (SS-003)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.6**
PW-003 (SS-005)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	**8.67**
PW-004 (SS-006)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	**16.0**
PW-005 (SS-007)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**8.15**
PW-006 (SS-009)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0063)	**0.0139**	**0.0157**	ND(0.0063)	ND(0.0063)	ND(0.0063)	**0.0296**	**8.64**
PW-007 (SS-011)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	**6.86**

Notes:

1. All sample results expressed as ug/L; TOC expressed as mg/L. Results in **bold** above the detection limit.
2. SamplesPW-001 and -002 are upstream of the Site; samples PW-003 through -007 are adjacent to the Site.
3. ND - Not detected above reporting limit

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	(FILLET) Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	(OFFAL) Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	WHOLE BODY - **CALCULATED Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**						**North**						**North**				
AMEL-BT01B-004	1B	9/20/13	American Eel	215	50.3	-	ND	0.585	84.2	0.142	100%	24.27	ND	0.857	97.6	0.5338	72%	62.29	ND	0.73	0.35	77%	48.20
AMEL-BT01C-001	1C	9/19/13	American Eel	219	48	-	ND	2.81	104.8	0.4318	63%	15.37	ND	2.98	97.8	0.4193	61%	14.07	ND	2.89	0.43	62%	14.72
AMEL-BT01B-005	1B	9/23/13	American Eel	225	50	-	ND	5.29	113.6	1.345	46%	25.43	ND	6.37	93.2	1.575	43%	24.73	ND	5.78	1.45	45%	25.08
AMEL-BT01B-006	1B	9/23/13	American Eel	256	53	-	ND	1.51	128	0.114	100%	7.55	ND	4.19	110.7	0.743	67%	17.73	ND	2.75	0.41	72%	14.74
AMEL-BT01A-002	1A	9/20/13	American Eel	360	56.5	-	ND	3.37	169.7	0.806	63%	23.92	ND	6.73	149.1	1.406	61%	20.89	ND	4.94	1.09	62%	21.99
AMEL-BT01A-003	1A	9/20/13	American Eel	724	71.5	-	ND	15.7	343.3	2.758	41%	17.57	ND	16.5	301.7	2.294	41%	13.90	ND	16.07	2.54	41%	15.81
North - Deep							**North - Deep**						**North - Deep**						**North - Deep**				
AMEL-BT01D-004	1D	9/20/13	American Eel	232	49.5	-	ND	0.91	81.5	0.2315	79%	25.44	ND	5.16	108.1	2.018	65%	39.11	ND	3.33	1.25	66%	37.50
AMEL-BT01D-005	1D	9/20/13	American Eel	246	58	-	ND	1.37	71.6	0.899	58%	65.62	ND	3.21	132.5	2.16	53%	67.29	ND	2.56	1.72	54%	66.98
AMEL-BT01E-002	1E	9/20/13	American Eel	308	54.5	-	ND	2.33	132.8	1.095	51%	47.00	ND	5.9	140.6	2.583	50%	43.78	ND	4.17	1.86	50%	44.65
AMEL-BT01E-003	1E	9/20/13	American Eel	395	58.5	-	ND	2.28	153.8	0.614	61%	26.93	ND	4.12	178.4	1.126	61%	27.33	ND	3.27	0.89	61%	27.20
AMEL-BT01E-001	1E	9/20/13	American Eel	603.5	67.5	-	ND	17.3	266.4	2.119	48%	12.25	ND	12.1	274.1	1.09	47%	9.01	ND	14.66	1.60	48%	10.89
Adjacent							**Adjacent**						**Adjacent**						**Adjacent**				
AMEL-BT02B-004	2B	9/18/13	American Eel	52	29.5	-	ND	1.42	13.6	0.2891	82%	20.36	ND	2.23	27.5	0.5254	81%	23.56	ND	1.96	0.45	81%	22.79
AMEL-BT02C-009	2C	9/25/13	American Eel	82	36.5	-	ND	3.23	29.7	0.676	55%	20.93	ND	4.27	45.3	1.09	57%	25.53	ND	3.86	0.93	56%	24.00
AMEL-BT02D-007	2D	9/23/13	American Eel	96	40.5	-	ND	3.17	42.3	0.898	73%	28.33	ND	4.15	48.9	1.18	73%	28.43	ND	3.70	1.05	73%	28.39
AMEL-BT02E-002	2E	9/18/13	American Eel	120	41	-	ND	4.32	48	4.93	60%	114.12	ND	6.67	65.5	6.79	59%	101.80	ND	5.68	6.00	59%	105.76
AMEL-BT02C-010	2C	9/25/13	American Eel	155	47	-	ND	6.05	53.6	2.613	70%	43.19	ND	4.97	86.9	2.044	68%	41.13	ND	5.38	2.26	69%	42.01
AMEL-BT02B-008	2B	9/24/13	American Eel	217	49	-	ND	1.18	96.9*	1.86	100%	157.63	ND	3.63	110.9	4.71	100%	129.75	ND	2.49	3.38	100%	135.92
AMEL-BT02D-011	2D	9/25/13	American Eel	260	49.6	-	ND	15.2	115.3	2.883	59%	18.97	ND	12.2	125.9	2.053	58%	16.83	ND	13.63	2.45	59%	17.97
AMEL-BT02E-001	2E	9/18/13	American Eel	418	61	-	ND	4.94	168.4	3.229	86%	65.36	ND	6.69	200.2	4.264	87%	63.74	ND	5.89	3.79	87%	64.36
AMEL-BT02A-006	2A	9/18/13	American Eel	534	66.5	-	ND	14.5	229.7	2.869	45%	19.79	ND	11.7	243.1	2.216	46%	18.94	ND	13.06	2.53	45%	19.40
AMEL-BT02C-003	2C	9/18/13	American Eel	563	60	-	ND	13.3	267.8	2.319	80%	17.44	ND	8.71	252.2	1.47	76%	16.88	ND	11.07	1.91	78%	17.22
AMEL-BT02B-005	2B	9/18/13	American Eel	656	66	-	ND	3.43	281.7	0.795	74%	23.18	ND	8.02	316.9	1.905	75%	23.75	ND	5.86	1.38	75%	23.59
Adjacent - Deep							**Adjacent - Deep**						**Adjacent - Deep**						**Adjacent - Deep**				
AMEL-BT02H-016	2H	9/26/13	American Eel	91	37.5	-	ND	10.4	43.5	3.075	47%	29.57	ND	4.7	41.6	1.229	46%	26.15	ND	7.61	2.17	46%	28.54
AMEL-BT02G-013	2G	9/25/13	American Eel	94	41	-	ND	3.48	29.3	4.294	81%	123.39	1.12	5.5	55.6	6.827	80%	124.13	0.73	4.80	5.95	80%	123.94
AMEL-BT02F-008	2F	9/25/13	American Eel	98	39.5	-	ND	1.38	46.1	0.5489	55%	39.78	ND	3.56	43.8	1.418	53%	39.83	ND	2.44	0.97	54%	39.82
AMEL-BT02G-012	2G	9/25/13	American Eel	99	40.2	-	ND	2.25	28.1	0.818	62%	36.36	ND	5.12	63.2	2.17	63%	42.38	ND	4.24	1.75	63%	41.40
AMEL-BT02G-005	2G	9/19/13	American Eel	104.5	39	-	ND	6.81	42	1.282	63%	18.83	ND	4.2	43.1	0.688	62%	16.38	ND	5.49	0.98	63%	17.88
AMEL-BT02G-011	2G	9/25/13	American Eel	113	40.3	-	ND	2.28	41.6	0.335	54%	14.69	ND	5.44	62.2	0.833	52%	15.31	ND	4.17	0.63	53%	15.18
AMEL-BT02F-007	2F	9/25/13	American Eel	114	40.8	-	ND	3.31	46	0.856	53%	25.86	ND	5.23	56.7	1.314	51%	25.12	ND	4.37	1.11	52%	25.37
AMEL-BT02F-006	2F	9/25/13	American Eel	115	44.5	-	ND	4.42	55.3	1.962	45%	44.39	ND	4.66	54.3	2.046	44%	43.91	ND	4.54	2.00	45%	44.14
AMEL-BT02G-010	2G	9/25/13	American Eel	125	42.3	-	ND	8.07	37.7	5.582	54%	69.17	ND	13.9	72.2	7.22	54%	51.94	ND	11.90	6.66	54%	55.95
AMEL-BT02H-015	2H	9/25/13	American Eel	129	43.5	-	ND	4.52	62.6	0.795	47%	17.59	ND	4.76	57.5	0.776	46%	16.30	ND	4.63	0.79	47%	16.96
AMEL-BT02H-014	2H	9/25/13	American Eel	131	39.5	-	ND	15.3	40.9	3.814	51%	24.93	0.815	11.2	71.7	2.359	51%	21.06	0.52	12.69	2.89	51%	22.76
AMEL-BT02F-009	2F	9/25/13	American Eel	150	44.6	-	ND	6.64	68.5	1.558	49%	23.46	ND	7.08	71.6	1.462	47%	20.65	ND	6.86	1.51	48%	21.98
AMEL-BT02G-004	2G	9/19/13	American Eel	178	45.5	-	ND	7.5	54	2.121	65%	28.28	ND	7.09	93	1.753	65%	24.72	ND	7.24	1.89	65%	26.08
AMEL-BT02F-003	2F	9/19/13	American Eel	217	51	-	ND	2.21	66.9	0.425	63%	19.23	ND	4.31	108.7	0.705	59%	16.36	ND	3.51	0.60	60%	17.05
AMEL-BT02H-002	2H	9/18/13	American Eel	226	53	-	ND	5.2	70.8	2.26	60%	43.46	ND	4.72	121.2	1.859	58%	39.39	ND	4.90	2.01	59%	40.98
AMEL-BT02H-001	2H	9/18/13	American Eel	329	54	-	ND	19.9	161.3	2.228	36%	11.20	ND	14.6	134.6	1.542	36%	10.56	ND	17.49	1.92	36%	10.96
South							**South**						**South**						**South**				
AMEL-BT03C-007	3C	9/23/13	American Eel	44	35.5	Mouth/head wound	ND	0.186	12.5	0.115	100%	61.83	ND	0.391	28.4	0.4043	82%	103.40	ND	0.33	0.32	84%	96.20
AMEL-BT03B-006	3B	9/23/13	American Eel	51	30.5	-	ND	2.49	18.4	0.829	60%	33.29	ND	3.33	29.4	1.094	59%	32.85	ND	3.01	0.99	60%	32.99
AMEL-BT03B-001	3B	9/18/13	American Eel	96	33	-	ND	0.322	33.2	0.106	100%	32.92	0.522	1.45	46.3	0.76	84%	52.41	0.30	0.98	0.49	85%	49.74
AMEL-BT03B-002	3B	9/18/13	American Eel	207	48	-	ND	5.86	96.7	1.265	48%	21.59	0.574	4.38	83.4	0.927	48%	21.16	0.27	5.17	1.11	48%	21.42
AMEL-BT03B-004	3B	9/19/13	American Eel	249.5	50.5	-	ND	0.436	88.8	0.131	100%	30.05	ND	2.6	122	1.0411	77%	40.04	ND	1.69	0.66	79%	38.95
AMEL-BT03A-003	3A	9/19/13	American Eel	362	57.5	-	ND	11.2	159.2	2.28	51%	20.36	ND	8.33	180.9	1.566	51%	18.80	ND	9.67	1.90	51%	19.64
AMEL-BT03B-005	3B	9/19/13	American Eel	628	66.5	-	ND	16.9	297.9	2.11	53%	12.49	ND	9.38	274.5	0.997	52%	10.63	ND	13.29	1.58	53%	11.86

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	(FILLET) Lead (ppm)	(FILLET) Lipids (%)	(FILLET) Mass (g)	(FILLET) Total PCBs (ppm)	(FILLET) Aroclor 1260+	(FILLET) PCBs LN (ppm)	(OFFAL) Lead (ppm)	(OFFAL) Lipids (%)	(OFFAL) Mass (g)	(OFFAL) Total PCBs (ppm)	(OFFAL) Aroclor 1260+	(OFFAL) PCBs LN (ppm)	WHOLE BODY - **CALCULATED Lead (ppm)	WHOLE BODY - **CALCULATED Lipids (%)	WHOLE BODY - **CALCULATED Total PCBs (ppm)	WHOLE BODY - **CALCULATED Aroclor 1260+	WHOLE BODY - **CALCULATED PCBs LN (ppm)
South - Deep							**South - Deep**						**South - Deep**						**South - Deep**				
AMEL-BT03D-004	3D	9/20/13	American Eel	112	50.5	-	ND	0.212	22.4	ND	--	ND	ND	0.807	76.2	0.27	100%	33.46	ND	0.67	0.21	100%	31.06
AMEL-BT03D-001	3D	9/19/13	American Eel	164	46.3	-	ND	3.06	62.4	1.127	50%	36.83	ND	4.78	69	1.517	46%	31.74	ND	3.96	1.33	48%	33.60
AMEL-BT03D-002	3D	9/19/13	American Eel	173	45	-	ND	2.24	60.9	0.653	52%	29.15	ND	9.39	77.2	2.68	51%	28.54	ND	6.24	1.79	51%	28.64
AMEL-BT03D-005	3D	9/20/13	American Eel	200	48.8	-	ND	1.44	82.3	0.5329	71%	37.01	ND	3.83	88.9	1.821	71%	47.55	ND	2.68	1.20	71%	44.82
AMEL-BT03D-003	3D	9/19/13	American Eel	483	62.5	-	ND	11.7	221.2	2.317	51%	19.80	ND	11	198.3	2.145	48%	19.50	ND	11.37	2.24	50%	19.66

The fillet will include everything but the head, skin and viscera.
The offal will consist of the remainder of the carcass and will be analyzed separately.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs
* Estimated mass

**Calculated from fillet and offal

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Blue Crab Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Process	Notes	(LEG MUSCLE) Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	(HEPATOPANCREAS) Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North								**North**					**North**					**North**				
BCRAB-BT01C-004	1C	9/19/13	Blue Crab	24/42	7/9	Composite Whole fish	Composite of two specimens											ND	1.23	ND	--	ND
BCRAB-BT01C-003	1C	9/19/13	Blue Crab	55	9	Whole fish	-											ND	2.05	0.0513	100%	2.50
BCRAB-BT01C-005	1C	9/19/13	Blue Crab	75	11	Leg muscle & Hepatopancreas	-	ND	0.792	ND (0.087)	--	ND	ND	14.2	0.537	100%	3.78					
BCRAB-BT01A-003	1A	9/19/13	Blue Crab	130	14	Leg muscle & Hepatopancreas	-	ND	0.99	ND (0.101)	--	ND	ND	11.3	0.273	100%	2.42					
BCRAB-BT01B-001	1B	9/18/13	Blue Crab	164	13.4	Leg muscle & Hepatopancreas	-	ND	0.596	ND	--	ND	ND	11.6	0.912	100%	7.86					
BCRAB-BT01A-002	1A	9/19/13	Blue Crab	205	15	Leg muscle & Hepatopancreas	-	ND	0.786	ND	--	ND	ND	9.09	0.459	100%	5.05					
North - Deep								**North - Deep**					**North - Deep**					**North - Deep**				
BCRAB-BT01E-005	1E	9/23/13	Blue Crab	63	10.5	Leg muscle & Hepatopancreas	Left claw atrophy	Inadequate sample mass for separte analysis										ND	1.24	0.0319	100%	2.57
BCRAB-BT01D-003	1D	9/21/13	Blue Crab	81	14	Leg muscle & Hepatopancreas	Missing right claw	Inadequate sample mass for separte analysis										ND	0.703	0.0271	100%	3.85
BCRAB-BT01D-002	1D	9/21/13	Blue Crab	178	17	Leg muscle & Hepatopancreas	-	ND	0.934	ND	--	ND	ND	15.4	0.6204	67%	4.03					
BCRAB-BT01E-004	1E	9/23/13	Blue Crab	194	14.5	Leg muscle & Hepatopancreas	-	ND	0.702	ND	--	ND	ND	4.82	0.723	100%	15.00					
BCRAB-BT01D-001	1D	9/19/13	Blue Crab	223	18	Leg muscle & Hepatopancreas	Only one claw - cull	ND	0.915	ND	--	ND	ND	2.15	ND (0.401)	--	ND					
Adjacent								**Adjacent**					**Adjacent**					**Adjacent**				
BCRAB-BT02A,B-COMP	2A,B	9/18/13	Blue Crab	25/12	7.3/5.5	Composite Whole fish	Two small crabs (2A and 2B)											ND	2.51	0.0872	100%	3.47
BCRAB-BT02D-006	2D	9/24/13	Blue Crab	53	10.5	Leg muscle & Hepatopancreas	-	ND	0.819	ND (0.334)	--	ND	1.08	11	ND (0.237)	--	ND					
BCRAB-BT02A-005	2A	9/19/13	Blue Crab	62	10	Leg muscle & Hepatopancreas	-	Inadequate sample mass for separte analysis										ND	2.14	0.0845	100%	3.95
BCRAB-BT02D-003	2D	9/18/13	Blue Crab	119	14	Leg muscle & Hepatopancreas	Missing one claw	Inadequate sample mass for separte analysis										ND	0.786	0.0679	100%	8.64
BCRAB-BT02E-010	2E	9/26/13	Blue Crab	130	12.3	Leg muscle & Hepatopancreas	-	ND	0.592	ND	--	ND	ND	11.7	1.27	100%	10.85					
BCRAB-BT02B-008	2B	9/25/13	Blue Crab	162	13.3	Leg muscle & Hepatopancreas	-	ND	0.801	0.0927	100%	11.57	ND	9.85	3.724	63%	37.81					
BCRAB-BT02D-004	2B	9/18/13	Blue Crab	178	14.2	Leg muscle & Hepatopancreas	-	ND	0.479	ND	--	ND	ND	5.04	0.663	100%	13.15					
BCRAB-BT02E-006	2E	9/19/13	Blue Crab	180	15	Leg muscle & Hepatopancreas	-	ND	0.47	0.0413	100%	8.79	ND	1.72	0.522	100%	30.35					
BCRAB-BT02A-002	2A	9/18/13	Blue Crab	211	15	Leg muscle & Hepatopancreas	-	ND	0.463	ND	--	ND	ND	10.8	1.407	58%	13.03					
BCRAB-BT02B-001	2B	9/18/13	Blue Crab	215	16	Leg muscle & Hepatopancreas	-	ND	0.604	0.0276	100%	4.57	ND	5.91	1.85	100%	31.30					
BCRAB-BT02E-009	2E	9/25/13	Blue Crab	302	18.5	Leg muscle & Hepatopancreas	-	ND	0.763	ND	--	ND	ND	5.32	1.19	100%	22.37					
South								**South**					**South**					**South**				
BCRAB-BT03B-004	3B	9/21/13	Blue Crab	25	7	Whole fish	-											ND	2.21	0.0931	66%	4.21
BCRAB-BT03C-003	3C	9/21/13	Blue Crab	48	10	Leg muscle & Hepatopancreas	Missing left claw	Inadequate sample mass for separte analysis										ND	1.39	ND	--	ND
BCRAB-BT03C-002	3C	9/21/13	Blue Crab	51	10	Leg muscle & Hepatopancreas	Both claws missing	Inadequate sample mass for separte analysis										ND	1.3	0.0492	100%	3.78
BCRAB-BT03B-005	3B	9/23/13	Blue Crab	56	9.5	Leg muscle & Hepatopancreas	-	Inadequate sample mass for separte analysis										ND	2.37	0.066	100%	2.78
BCRAB-BT03C-001	3C	9/19/13	Blue Crab	136	13	Leg muscle & Hepatopancreas	Missing one claw	ND	0.865	ND	--	ND	ND	10.3	0.7757	69%	7.53					
South - Deep								**South - Deep**					**South - Deep**					**South - Deep**				
BCRAB-BT03D-001	3D	9/23/13	Blue Crab	286	18.5	Leg muscle & Hepatopancreas	-	ND	0.198	ND	--	ND	ND	3.98	1.06	100%	26.63					

Leg muscle and Hepatopancreas will be analyzed separately on all individuals that are greater than or equal to 3.5" (~9 cm) in width if adequate sample mass is available.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm, except as noted above due to inadequate sample mass
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
White Perch Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**				
WP-BT01C-003	1C	9/23/13	White Perch	51	15.5	-	ND	3.86	1.121	30%	29.04
WP-BT01C-002	1C	9/23/13	White Perch	59	16.5	-	ND	5.14	0.726	26%	14.12
WP-BT01B-005	1B	9/23/13	White Perch	88	18.3	-	ND	5.26	2.191	56%	41.65
WP-BT01B-004	1B	9/23/13	White Perch	97	18.5	-	ND	5.08	1.584	32%	31.18
WP-BT01B-001	1B	9/19/13	White Perch	105	14	-	ND	3.38	1.047	40%	30.98
Adjacent							**Adjacent**				
WP-BT02E-006	2E	9/25/13	White Perch	50	15.5	-	ND	4.75	1.836	25%	38.65
WP-BT02A-003	2A	9/19/13	White Perch	54	15	-	ND	1.41	0.825	46%	58.51
WP-BT02A-005	2A	9/19/13	White Perch	70	16	-	ND	5.4	1.609	32%	29.80
WP-BT02A-001	2A	9/19/13	White Perch	75	17	-	ND	4.02	1.033	50%	25.70
WP-BT02A-004	2A	9/19/13	White Perch	79	17	-	ND	3.41	1.12	35%	32.84
WP-BT02A-002	2A	9/19/13	White Perch	178	23	-	ND	5.61	2.251	51%	40.12
South							**South**				
WP-BT-03B-005	3B	9/21/13	White Perch	53	15.5	-	ND	5.38	1.545	28%	28.72
WP-BT03B-002	3B	9/21/13	White Perch	61	15.6	-	ND	4.39	0.88	24%	20.05
WP-BT03B-003	3B	9/21/13	White Perch	61	16.8	-	ND	3.84	1.327	35%	34.56
WP-BT03B-004	3B	9/21/13	White Perch	67	17	-	ND	5.46	1.118	26%	20.48
WP-BT03C-001	3C	9/21/13	White Perch	119	20	-	ND	3.8	1.801	29%	47.39

Hold an aliquot from the whole fish to allow for potential PCB Congener analysis.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Oyster Toadfish Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

							(FILLET)						(OFFAL)						WHOLE BODY - CALCULATED**				
Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**						**North**						**North**				
OYTD-BT01B-005	1B	9/20/13	Oyster Toadfish	200	21.5	-	ND	0.273	39.6	ND	--	ND	ND	0.767	118.5	0.127	100%	16.56	ND	0.64	0.10	100%	14.80
OYTD-BT01B-002	1B	9/19/13	Oyster Toadfish	228	22	-	ND	0.0502	46.3	ND	--	ND	ND	0.424	157.6	0.155	100%	36.56	ND	0.34	0.12	100%	35.33
OYTD-BT01A-001	1A	9/19/13	Oyster Toadfish	239	22	-	ND	0.479	47.9	ND	--	ND	ND	1.09	165.8	0.217	100%	19.91	ND	0.95	0.17	100%	17.67
OYTD-BT01A-003	1A	9/20/13	Oyster Toadfish	253	25	-	ND	0.227	32.6	ND	--	ND	ND	0.58	178.3	0.133	100%	22.93	ND	0.53	0.11	100%	21.40
OYTD-BT01A-004	1A	9/20/13	Oyster Toadfish	389	27	-	ND	0.222	66.8	ND	--	ND	ND	0.625	259.2	0.0622	100%	9.95	ND	0.54	0.05	100%	9.12
North - Deep							**North - Deep**						**North - Deep**						**North - Deep**				
OYTD-BT01E-004	1E	9/20/13	Oyster Toadfish	250	22	-	ND	0.354	51.5	ND	--	ND	ND	1.5	136.4	0.4009	74%	26.73	ND	1.19	0.29	74%	24.54
OYTD-BT01E-005	1E	9/21/13	Oyster Toadfish	262	23.5	-	ND	0.277	51.3	ND	--	ND	ND	0.605	177.5	0.0482	100%	7.97	ND	0.53	0.04	100%	7.04
OYTD-BT01D-002	1D	9/19/13	Oyster Toadfish	333	25	-	ND	0.285	74.6	ND	--	ND	ND	0.96	224.7	0.192	100%	20.00	ND	0.79	0.14	100%	18.21
OYTD-BT01D-001	1D	9/19/13	Oyster Toadfish	361	27	-	ND	0.0828	66.9	ND	--	ND	ND	0.601	234.8	0.269	100%	44.76	ND	0.49	0.21	100%	43.07
OYTD-BT01E-003	1E	9/19/13	Oyster Toadfish	473	31	-	ND	0.495	94.5	0.215	100%	43.43	ND	0.405	344.9	0.234	100%	57.78	ND	0.42	0.23	100%	54.18
Adjacent							**Adjacent**						**Adjacent**						**Adjacent**				
OYTD-BT02B-001	2B	9/18/13	Oyster Toadfish	125	18.3	-	ND	0.33	22.7	ND	--	ND	ND	0.818	81.2	0.111	100%	13.57	ND	0.71	0.09	100%	12.19
OYTD-BT02D-004	2D	9/25/13	Oyster Toadfish	140	20	-	ND	0.115	24.4	ND	--	ND	ND	0.688	106	0.0936	100%	13.60	ND	0.58	0.08	100%	13.10
OYTD-BT02E-005	2E	9/26/13	Oyster Toadfish	240	23.5	-	ND	0.18	40	ND	--	ND	ND	0.69	183.6	0.0753	100%	10.91	ND	0.60	0.06	100%	10.33
OYTD-BT02B-002	2B	9/19/13	Oyster Toadfish	363	28	-	ND	0.475	61.5	0.11	100%	23.16	ND	0.292	431.6	0.0656	100%	22.47	ND	0.31	0.07	100%	22.60
OYTD-BT02B-003	2B	9/25/13	Oyster Toadfish	397	27.3	-	ND	0.0642	70.1	ND	--	ND	ND	1.21	297.4	0.301	100%	24.88	ND	0.99	0.24	100%	24.57
Adjacent - Deep							**Adjacent - Deep**						**Adjacent - Deep**						**Adjacent - Deep**				
OYTD-BT02G-004	2G	9/24/13	Oyster Toadfish	170	21.6	-	ND	0.406	32.2	ND	--	ND	ND	0.742	115.8	0.048	100%	6.47	ND	0.67	0.04	100%	5.61
OYTD-BT02F-006	2F	9/25/13	Oyster Toadfish	175	20.5	-	ND	0.113	32.5	ND	--	ND	ND	0.623	127.4	0.0848	100%	13.61	ND	0.52	0.07	100%	13.01
OYTC-BT02H-003	2H	9/23/13	Oyster Toadfish	181	22	-	ND	0.102	42.6	ND	--	ND	ND	0.16	125.3	ND	--	ND	ND	0.15	ND	--	ND
OYTD-BT02G-008	2G	9/25/13	Oyster Toadfish	224	23	-	ND	0.516	43.2	0.0541	100%	10.48	ND	0.821	168.2	0.243	100%	29.60	ND	0.76	0.20	100%	26.94
OYTD-BT02H-009	2H	9/25/13	Oyster Toadfish	253	24	-	ND	0.129	43.6	ND	--	ND	ND	0.42	191.6	0.0426	100%	10.14	ND	0.37	0.03	100%	9.48
OYTD-BT02H-005	2H	9/24/13	Oyster Toadfish	267	24.5	-	ND	0.46	44.5	ND	--	ND	ND	0.503	200	0.0271	100%	5.39	ND	0.50	0.02	100%	4.48
OYTD-BT02G-001	2G	9/21/13	Oyster Toadfish	275	24	-	ND	0.131	51	ND	--	ND	ND	0.352	199.8	0.0508	100%	14.43	ND	0.31	0.04	100%	13.18
OYTD-BT02G-007	2G	9/25/13	Oyster Toadfish	320	28	-	ND	0.0415	42.3	0.025	100%	60.24	ND	0.388	250.7	0.248	100%	63.92	ND	0.34	0.22	100%	63.85
OYTD-BT02G-002	2G	9/21/13	Oyster Toadfish	425	27.5	-	ND	0.0628	82.8	ND	--	ND	ND	0.724	296.8	0.341	100%	47.10	ND	0.58	0.27	100%	45.99
South							**South**						**South**						**South**				
OYTD-BT03A-001	3A	9/19/13	Oyster Toadfish	74	15	-	ND	0.0886	30.2*	ND	--	ND	ND	1.83	40.5	0.3739	68%	20.43	ND	1.09	0.21	68%	19.72
OYTD-BT03C-005	3C	9/20/13	Oyster Toadfish	198	23	-	ND	0.0427	34.3	ND	--	ND	ND	0.466	122.4	0.0446	100%	9.57	ND	0.37	0.03	100%	9.33
OYTD-BT03C-003	3C	9/19/13	Oyster Toadfish	205	22	-	ND	0.447	43	ND	--	ND	ND	1.14	133.2	0.0998	100%	8.75	ND	0.97	0.08	100%	7.77
OYTD-BT03C-004	3C	9/19/13	Oyster Toadfish	222	22	-	ND	0.351	47	ND	--	ND	ND	0.816	155.2	0.3053	89%	37.41	ND	0.71	0.23	89%	33.10
OYTD-BT03C-006	3C	9/21/13	Oyster Toadfish	253	23	-	ND	0.0507	49	ND	--	ND	ND	1.11	170.4	0.1459	80%	13.14	ND	0.87	0.11	80%	12.97
OYTD-BT03B-002	3B	9/19/13	Oyster Toadfish	265	23	-	ND	0.372	49.6	ND	--	ND	ND	0.825	178.8	0.057	100%	6.91	ND	0.73	0.04	100%	6.14
South - Deep							**South - Deep**						**South - Deep**						**South - Deep**				
OYTD-BT03D-003	3D	9/20/13	Oyster Toadfish	140	19.5	-	ND	0.121	27.4	ND	--	ND	ND	1.36	92.5	0.146	100%	10.74	ND	1.08	0.11	100%	10.46
OYTD-BT03D-005	3D	9/23/13	Oyster Toadfish	181	22.3	-	ND	0.324	35.2	0.0343	100%	10.59	ND	0.74	129.8	0.189	100%	25.54	ND	0.65	0.16	100%	23.95
OYTD-BT03D-002	3D	9/20/13	Oyster Toadfish	309	25	-	ND	0.407	49.5	ND	--	ND	ND	0.724	223.5	0.072	100%	9.94	ND	0.67	0.06	100%	8.84
OYTD-BT03D-001	3D	9/18/13	Oyster Toadfish	383	26	-	ND	0.538	64.7	0.0845	100%	15.71	1.11	0.872	285.6	0.331	100%	37.96	0.90	0.81	0.29	100%	35.23
OYTD-BT03D-004	3D	9/23/13	Oyster Toadfish	470	28.5	-	ND	0.522	69.8	0.0576	100%	11.03	ND	0.969	351.3	0.379	100%	39.11	ND	0.89	0.33	100%	36.40

The fillet will initially include everything but the head and viscera. As this species is a "scaleless" fish, homogenization could exclude the skin if initial attempts to include it fail (e.g. the skin is too tough).

The offal will consist of the remainder of the carcass and will be analyzed separately.
Hold an aliquot from the fillets to allow for potential PCB Congener analysis.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs
* Estimated mass

**Calculated from fillet and offal

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Hogchoker Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North - Deep							**North - Deep**				
HOGCH-BT01D-001	1D	9/23/13	Hogchoker	20	10.5	-	ND	1.47	0.3393	41%	23.08
Adjacent - Deep							**Adjacent - Deep**				
HOGCH-BT02F-003	2F	9/20/13	Hogchoker	9	9	Composite of two samples sent to the lab separately	ND	0.93	0.6235	62%	67.04
HOGCH-BT02F-004	2F	9/20/13	Hogchoker	17	10						
HOGCH-BT02H-009	2H	9/26/13	Hogchoker	14	9.6	-	ND	1.99	0.659	58%	33.12
HOGCH-BT02G-005	2G	9/25/13	Hogchoker	16	9.5	-	ND	2.91	0.3557	43%	12.22
HOGCH-BT02G-007	2G	9/25/13	Hogchoker	17	10.5	-	ND	1.86	0.1542	39%	8.29
HOGCH-BT02H-001	2H	9/19/13	Hogchoker	18	10	-	ND	1.41	0.58	61%	41.13
HOGCH-BT02G-002	2G	9/20/13	Hogchoker	19	10.5	Whiteish area above ventral fin	ND	1.4	0.324	100%	23.14
HOGCH-BT02G-006	2G	9/25/13	Hogchoker	25	11.3	Slight discoloration on dorsal side	ND	2.06	0.2286	38%	11.10
HOGCH-BT02G-008	2G	9/25/13	Hogchoker	28	12	-	ND	1.39	0.1314	43%	9.45
South - Deep							**South - Deep**				
HOGCH-BT03D-001	3D	9/20/13	Hogchoker	8	8	Composite of two samples sent to the lab separately	ND	1.35	0.3937	52%	29.16
HOGCH-BT03D-003	3D	9/25/13	Hogchoker	8	8						
HOGCH-BT03D-004	3D	9/26/13	Hogchoker	16	10	-	ND	2.53	0.3082	24%	12.18
HOGCH-BT03D-002	3D	9/20/13	Hogchoker	17	10	-	ND	1.7	0.2399	44%	14.11

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Spot Croaker Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**				
SPOT-BT01B-003	1B	9/26/13	Spot	57	15	-	ND	9.63	0.612	21%	6.36
SPOT-BT01C-001	1C	9/24/13	Spot	79	16.5	-	ND	4.64	0.3908	20%	8.42
SPOT-BT01C-002	1C	9/25/13	Spot	80	17	-	ND	7.75	0.713	26%	9.20
Adjacent							**Adjacent**				
SPOT-BT02C-001	2C	9/18/13	Spot	53	15	-	ND	3.83	0.479	32%	12.51
SPOT- BT02A-003	2A	9/24/13	Spot	72	16.5	-	ND	2.54	0.351	29%	13.82
SPOT-BT02C-002	2C	9/19/13	Spot	82	18	-	ND	1.22	0.3752	29%	30.75
SPOT-BT02A-004	2A	9/24/13	Spot	84	17.5	-	0.516	8.81	1.309	32%	14.86
SPOT-BT02D-005	2D	9/24/13	Spot	87	19	-	ND	8.43	0.98	28%	11.63
South							**South**				
SPOT-BT03B-001	3B	9/21/13	Spot	61	15.3	-	ND	4.39	0.456	32%	10.39
SPOT-BT03B-003	3B	9/21/13	Spot	61	15.5	-	ND	4.44	0.768	24%	17.30
SPOT-BT03B-005	3B	9/21/13	Spot	63	16	-	ND	4.27	0.563	25%	13.19
SPOT-BT03B-004	3B	9/21/13	Spot	65	15	-	ND	2.28	0.2277	24%	9.99
SPOT-BT03B-002	3B	9/21/13	Spot	69	16	-	ND	8.38	0.717	22%	8.56

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Grass Shrimp Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Process	Notes
North - Deep							
GSHMP-BT01D-001a	1D	9/19/13	Grass Shrimp	11	4-6	Hold/Discard	
GSHMP-BT01D-002	1D	9/20/13	Grass Shrimp	15	2-7	Hold/Discard	
GSHMP-BT01D-001b	1D	9/21/13	Grass Shrimp	23	2-6	Hold/Discard	-
GSHMP-BT01D-001c	1D	9/23/13	Grass Shrimp	29	4-6	Hold/Discard	23 count
GSHMP-BT01E-001	1E	9/23/13	Grass Shrimp	33	3.5-6	Hold/Discard	24 count
Adjacent - Mixed	* Deep						
GSHMP-BT02G-001	*2G	9/20/13	Grass Shrimp	7	4-7	Hold/Discard	
GSHMP-BT02B-001	2B	9/18/13	Grass Shrimp	4.87	4-5	Hold/Discard	
GSHMP-BT02D-001a	2D	9/18/13	Grass Shrimp	14.45	4-6	Hold/Discard	
GSHMP-BT02D-001b	2D	9/24/13	Grass Shrimp	13	3.3-5.5	Hold/Discard	18 count
GSHMP-BT02H-001	*2H	9/23/13	Grass Shrimp	26	3.3-6.3	Hold/Discard	-
GSHMP-BT02D-001c	2D	9/23/13	Grass Shrimp	29	3-6	Hold/Discard	39 count
South - Deep							
GSHMP-BT03D-001a	3D	9/19/13	Grass Shrimp	6	6	Hold/Discard	
GSHMP-BT03D-001b	3D	9/21/13	Grass Shrimp	8	2.5-6.5	Hold/Discard	

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Miscellaneous Catch Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Process	Notes
CHC-BT02F-001	2F	9/25/13	Channel Catfish	428	33	Hold/Discard	-
CHC-BT02A-002	2A	9/19/13	Channel Catfish	619	33	Hold/Discard	-
CHC-BT01E-001	1E	9/26/13	Channel Catfish	673	37.5	Hold/Discard	-
CHC-BT02A-001	2A	9/19/13	Channel Catfish	700	37	Hold/Discard	-
STB-BT02C-COMP	2C	9/18/13	Striped Bass	3.8	7	Hold/Discard	Too small for analysis
STB-BT03C-002	3C	9/24/13	Striped Bass	15	12.3	Hold/Discard	-
STB-BT03C-001	3C	9/23/13	Striped Bass	69	19.3	Hold/Discard	-
LMB-BT02E-001	2E	9/18/13	Large Mouth Bass	105	19.5	Discard	-

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	FILLET Lipids (%)	FILLET Fillet Mass (g)	FILLET Total PCB (ppm)	FILLET Aroclor 1260+	FILLET PCBs LN (ppm)	OFFAL Lipids (%)	OFFAL Offal Mass (g)	OFFAL Total PCB (ppm)	OFFAL Aroclor 1260+	OFFAL PCBs LN (ppm)	WHOLE BODY **CALCULATED Lipids (%)	WHOLE BODY **CALCULATED Total PCB (ppm)	WHOLE BODY **CALCULATED Aroclor 1260+	WHOLE BODY **CALCULATED PCBs LN (ppm)
North									**North**					**North**					**North**			
AMEL-BT01B-002	1B	9/26/14	1023	American eel	156	45.7	Fillet & Offal	-	1.51	84.20	0.41	76%	27.42	2.88	64.50	0.75	67%	25.93	2.10	0.55	71%	26.19
AMEL-BT01A-001	1A	9/19/14	1212	American eel	167	48	Fillet & Offal	-	1.45	83.00	0.64	93%	44.23	2.39	73.10	1.07	92%	44.62	1.89	0.81	92%	42.59
AMEL-BT01B-001	1B	9/17/14	1612	American eel	206	49	Fillet & Offal	-	1.78	110.40	0.27	100%	15.06	3.02	89.00	0.60	82%	20.00	2.33	0.41	88%	17.13
AMEL-BT01C-002	1C	9/18/14	1333	American eel	236	53.5	Fillet & Offal	-	4.26	116.50	1.04	69%	24.51	5.54	112.00	1.18	67%	21.37	4.89	1.10	68%	22.78
AMEL-BT01C-005	1C	9/24/14	1652	American eel	271	55	Fillet & Offal	-	1.77	131.80	0.22	85%	12.18	3.96	127.90	0.71	63%	17.80	2.85	0.45	68%	14.68
AMEL-BT01C-003	1C	9/24/14	1650	American eel	287	56	Fillet & Offal	-	3.53	121.20	0.92	71%	26.09	5.80	151.40	1.54	57%	26.60	4.79	1.22	62%	25.44
AMEL-BT01B-003	1B	9/26/14	1024	American eel	317	51.2	Fillet & Offal	-	16.80	161.00	1.49	53%	8.84	13.20	131.40	1.25	39%	9.49	15.18	1.31	47%	8.66
AMEL-BT01C-001	1C	9/17/14	1616	American eel	327	56	Fillet & Offal	-	0.93	171.50	0.21	100%	22.62	3.80	144.00	0.64	87%	16.95	2.24	0.40	91%	19.61
AMEL-BT01A-002	1A	9/25/14	1114	American eel	415	59.5	Fillet & Offal	-	7.76	233.40	0.87	56%	11.19	9.48	157.50	0.98	57%	10.37	8.45	0.88	57%	10.47
North - Deep									**North - Deep**					**North - Deep**					**North - Deep**			
AMEL-BT01D-003	1D	9/18/14	1337	American eel	96	42.7	Fillet & Offal	-	0.81	47.50	0.25	79%	31.34	1.96	48.20	1.05	78%	53.47	1.39	0.66	78%	42.75
AMEL-BT01D-004	1D	9/18/14	1338	American eel	109	41	Fillet & Offal	-	3.50	50.00	0.76	65%	21.74	4.00	53.90	0.76	65%	18.98	3.76	0.74	65%	19.72
AMEL-BT01D-002	1D	9/18/14	1336	American eel	138	44.8	Fillet & Offal	-	0.90	70.20	0.31	77%	34.97	1.67	63.60	1.04	77%	62.51	1.26	0.66	77%	47.74
AMEL-BT01D-005	1D	9/18/14	1339	American eel	163	47.3	Fillet & Offal	-	0.93	84.50	0.30	82%	31.89	2.77	74.00	1.20	78%	43.14	1.79	0.71	79%	36.59
AMEL-BT01E-002	1E	9/23/14	1612	American eel	198	49.2	Fillet & Offal	-	3.54	91.70	0.70	65%	19.66	7.38	94.30	1.91	52%	25.85	5.49	1.26	55%	21.86
AMEL-BT01E-001	1E	9/19/14	1218	American eel	213	51.5	Fillet & Offal	Head wound	14.60	94.70	1.46	49%	9.99	12.90	103.60	1.23	49%	9.52	13.71	1.27	49%	9.27
Adjacent									**Adjacent**					**Adjacent**					**Adjacent**			
AMEL-BT02A-003	2A	9/26/14	1025	American eel	120	44	Fillet & Offal	-	3.36	66.10	1.49	83%	44.38	5.29	49.30	2.07	73%	39.09	4.18	1.71	78%	41.47
AMEL-BT02A-001	2A	9/25/14	1115	American eel	157	42.6	Fillet & Offal	-	8.61	98.00	1.67	54%	19.35	6.71	53.40	1.21	55%	18.00	7.94	1.48	55%	18.59
AMEL-BT02A-002	2A	9/25/14	1116	American eel	308	54.6	Fillet & Offal	-	14.30	154.10	4.04	79%	28.26	13.40	132.50	3.46	80%	25.82	13.88	3.59	80%	25.83
AMEL-BT02B-001	2B	9/23/14	1154	American eel	108	39.1	Fillet & Offal	-	7.77	61.10	1.78	69%	22.90	8.01	42.30	2.18	60%	27.24	7.87	1.93	65%	24.44
AMEL-BT02B-003	2B	9/23/14	1156	American eel	151	47	Fillet & Offal	-	0.59	73.40	0.36	90%	60.75	1.49	73.20	4.76	85%	319.19	1.04	2.53	85%	188.00
AMEL-BT02B-004	2B	9/23/14	1157	American eel	283	52	Fillet & Offal	-	16.10	146.40	2.54	61%	15.78	11.50	124.90	2.15	47%	18.69	13.98	2.30	55%	16.70
AMEL-BT02C-003	2C	9/16/14	1235	American eel	176	46.7	Fillet & Offal	-	12.00	96.20	2.87	77%	23.92	9.75	77.70	1.86	77%	19.04	10.99	2.42	77%	21.75
AMEL-BT02C-004	2C	9/17/14	1311	American eel	176	49	Fillet & Offal	-	1.11	82.70	0.68	100%	61.62	4.83	88.10	1.89	100%	39.13	3.03	1.30	100%	49.82
AMEL-BT02C-001	2C	9/16/14	1233	American eel	360	58.5	Fillet & Offal	-	9.53	207.30	1.97	81%	20.63	10.30	143.90	1.96	83%	19.01	9.85	1.92	82%	19.57
AMEL-BT02D-002	2D	9/23/14	1202	American eel	136	43.2	Fillet & Offal	-	3.37	54.80	1.56	77%	46.35	6.53	71.90	2.82	67%	43.23	5.16	2.19	70%	42.92
AMEL-BT02D-004	2D	9/24/14	1011	American eel	166	42.1	Fillet & Offal	-	6.24	65.80	2.26	79%	36.19	8.22	89.50	1.93	70%	23.43	7.38	1.97	74%	27.42
AMEL-BT02D-001	2D	9/16/14	1236	American eel	364	57	Fillet & Offal	-	11.70	142.90	2.86	77%	24.45	14.50	216.30	2.08	76%	14.34	13.39	2.38	77%	18.32
AMEL-BT02E-003	2E	9/18/14	1619	American eel	293	46	Fillet & Offal	-	3.49	150.80	1.59	87%	45.53	5.35	129.30	1.78	86%	33.29	4.35	1.63	87%	38.66
AMEL-BT02E-002	2E	9/18/14	1618	American eel	310	55.5	Fillet & Offal	-	2.93	153.40	2.98	91%	101.71	5.24	137.70	5.73	91%	109.43	4.02	4.20	91%	103.23
AMEL-BT02E-005	2E	9/23/14	1208	American eel	358	60.1	Fillet & Offal	-	4.47	159.30	0.79	75%	17.61	5.62	173.80	1.21	59%	21.49	5.07	0.95	65%	18.60
Adjacent - Deep									**Adjacent - Deep**					**Adjacent - Deep**					**Adjacent - Deep**			
AMEL-BT02F-002	2F	9/17/14	1057	American eel	87	38.5	Fillet & Offal	-	1.74	39.30	1.11	81%	63.56	3.13	41.70	1.46	78%	46.74	2.46	1.23	79%	52.44
AMEL-BT02F-001	2F	9/16/14	1231	American eel	169	45.3	Fillet & Offal	-	12.00	84.30	3.22	61%	26.83	10.30	73.00	2.77	61%	26.89	11.21	2.85	61%	25.41
AMEL-BT02F-004	2F	9/17/14	1059	American eel	216	48.5	Fillet & Offal	-	7.06	130.60	1.56	72%	22.04	8.89	84.90	2.06	73%	23.21	7.78	1.75	73%	22.49
AMEL-BT02G-005	2G	9/17/14	1051	American eel	161	43.5	Fillet & Offal	-	6.87	98.90	0.74	60%	10.80	6.99	58.80	0.71	59%	10.14	6.91	0.72	60%	10.38
AMEL-BT02G-004	2G	9/17/14	1050	American eel	209	48	Fillet & Offal	-	12.00	129.20	2.34	50%	19.50	13.40	70.90	1.71	50%	12.78	12.50	2.07	50%	16.74
AMEL-BT02G-003	2G	9/16/14	1230	American eel	487	58.8	Fillet & Offal	-	12.50	270.60	1.97	56%	15.74	12.70	192.60	1.72	57%	13.56	12.58	1.80	57%	14.34
AMEL-BT02H-006	2H	9/17/14	1048	American eel	372	58.7	Fillet & Offal	-	5.57	196.60	2.83	100%	50.81	7.21	169.40	3.43	100%	47.57	6.33	3.08	100%	48.84
AMEL-BT02H-005	2H	9/16/14	1227	American eel	393	59.5	Fillet & Offal	-	11.30	178.70	1.34	64%	11.87	11.60	199.50	1.39	64%	11.94	11.46	1.35	64%	11.74
AMEL-BT02H-003	2H	9/16/14	1225	American eel	539	68	Fillet & Offal	-	10.40	277.60	1.92	73%	18.46	8.41	246.20	1.43	73%	17.00	9.46	1.66	73%	17.46
South									**South**					**South**					**South**			
AMEL-BT03B-005	3B	9/23/14	1418	American eel	137	45.2	Fillet & Offal	-	1.25	64.60	0.24	100%	19.04	4.07	69.10	1.10	78%	26.95	2.71	0.68	81%	23.04
AMEL-BT03C-003	3C	9/18/14	1022	American eel	139	44	Fillet & Offal	-	2.21	55.40	0.93	66%	42.26	3.70	76.20	1.27	65%	34.43	3.07	1.10	65%	36.72
AMEL-BT03B-004	3B	9/19/14	1003	American eel	176	46.6	Fillet & Offal	-	0.38	75.90	0.12	100%	30.89	1.96	90.50	0.78	89%	39.78	1.24	0.46	91%	34.30
AMEL-BT03B-003	3B	9/18/14	1016	American eel	179	46	Fillet & Offal	-	1.24	86.20	0.59	73%	47.42	3.45	88.00	1.56	73%	45.33	2.36	1.07	73%	45.79
AMEL-BT03C-005	3C	9/18/14	1029	American eel	187	48.7	Fillet & Offal	-	1.40	89.10	0.87	72%	62.29	2.80	95.80	1.36	73%	48.64	2.13	1.12	73%	54.98
AMEL-BT03C-001	3C	9/18/14	1020	American eel	234	51.8	Fillet & Offal	-	2.63	120.80	0.48	66%	18.33	5.73	110.50	1.08	66%	18.88	4.11	0.77	66%	18.53
AMEL-BT03A-003	3A	9/17/14	0943	American eel	239	50	Fillet & Offal	-	1.06	120.10	0.53	72%	49.91	3.54	112.60	1.24	68%	35.08	2.26	0.86	69%	42.28
AMEL-BT03A-005	3A	9/24/14	1249	American eel	264	51.6	Fillet & Offal	-	0.93	116.30	0.34	86%	37.07	2.72	128.10	1.24	74%	45.55	1.87	0.77	76%	39.16
AMEL-BT03A-002	3A	9/16/14	1036	American eel	799	69.5	Fillet & Offal	-	13.70	472.60	1.23	59%	8.98	13.80	301.60	1.16	59%	8.42	13.74	1.19	59%	8.64

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	FILLET Lipids (%)	FILLET Fillet Mass (g)	FILLET Total PCB (ppm)	FILLET Aroclor 1260+	FILLET PCBs LN (ppm)	OFFAL Lipids (%)	OFFAL Offal Mass (g)	OFFAL Total PCB (ppm)	OFFAL Aroclor 1260+	OFFAL PCBs LN (ppm)	WHOLE BODY **CALCULATED Lipids (%)	WHOLE BODY **CALCULATED Total PCB (ppm)	WHOLE BODY **CALCULATED Aroclor 1260+	WHOLE BODY **CALCULATED PCBs LN (ppm)
South - Deep									South - Deep					South - Deep					South - Deep			
AMEL-BT03D-002	3D	9/16/14	1027	American eel	116	39.2	Fillet & Offal	-	6.39	63.20	0.50	58%	7.84	6.88	48.50	0.54	60%	7.85	6.60	0.51	59%	7.70
AMEL-BT03D-004	3D	9/16/14	1029	American eel	139	50.5	Fillet & Offal	-	2.98	72.40	0.87	63%	29.23	5.04	64.70	1.14	59%	22.66	3.95	1.01	61%	26.34
AMEL-BT03D-003	3D	9/16/14	1028	American eel	147	44	Fillet & Offal	-	4.17	78.00	0.63	73%	14.99	5.84	53.30	0.85	74%	14.50	4.85	0.70	74%	14.46
AMEL-BT03D-001	3D	9/16/14	1026	American eel	153	45	Fillet & Offal	-	6.27	78.90	0.79	68%	12.60	6.60	69.30	0.79	69%	11.95	6.42	0.78	68%	12.11
AMEL-BT03D-005	3D	9/16/14	1030	American eel	173	47	Fillet & Offal	-	5.54	79.00	0.92	80%	16.61	7.72	89.20	1.13	79%	14.57	6.70	1.02	79%	15.35

The fillet will include everything but the head, skin and viscera
The offal will consist of the remainder of the carcass and will be analyzed separately

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

**Calculated from fillet and offal

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Blue Crab Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

									LEG MUSCLE					HEPATOPANCREAS					WHOLE BODY				
Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	Lipids (%)	Leg Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Hepato. Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North									**North**					**North**					**North**				
BCRAB-BT01B-003	1B	9/18/14	1332	Blue crab	48	9.5	Whole	-											2.69	44.50	0.07	100%	2.76
BCRAB-BT01C-002	1C	9/17/14	1614	Blue crab	79	12.7	Whole	-											0.81	74.50	0.03	100%	3.92
BCRAB-BT01C-001	1C	9/16/14	1612	Blue crab	101	11.7	Whole	-											1.76	91.30	0.06	100%	3.20
BCRAB-BT01C-003	1C	9/17/14	1615	Blue crab	101	13.7	Leg and Hepat.	-	0.34	8.40	ND (0.123)	-	ND	2.09	14.00	0.10	100%	4.55					
BCRAB-BT01B-005	1B	9/19/14	1214	Blue crab	113	14	Leg and Hepat.	-	0.55	15.90	ND (0.0993)	-	ND	7.28	14.40	0.28	100%	3.90					
BCRAB-BT01C-004	1C	9/18/14	1334	Blue crab	139	13.5	Leg and Hepat.	-	0.34	15.90	ND (0.0605)	-	ND	6.73	20.50	0.51	100%	7.53					
BCRAB-BT01A-003	1A	9/18/14	1330	Blue crab	143	13.3	Whole	Missing 1 left leg											1.57	118.80	0.07	100%	4.28
BCRAB-BT01A-002	1A	9/17/14	1610	Blue crab	145	14.8	Whole	-											0.47	105.70	ND (0.05)	-	ND
BCRAB-BT01B-002	1B	9/18/14	1331	Blue crab	188	13.8	Leg and Hepat.	Missing 1 right leg	0.34	28.50	0.04	100%	11.75	4.86	19.80	0.23	100%	4.79					
BCRAB-BT01A-004	1A	9/19/14	1210	Blue crab	224	15.4	Leg and Hepat.	Missing 1 right leg	0.44	32.10	0.04	100%	8.94	1.88	23.10	0.27	100%	14.31					
North - Deep									**North - Deep**					**North - Deep**					**North - Deep**				
BCRAB-BT01D-002	1D	9/18/14	1341	Blue crab	106	12.8	Whole	Missing 2 right legs											0.67	86.80	ND (0.05)	-	ND
BCRAB-BT01D-005	1D	9/26/14	1028	Blue crab	127	13.4	Whole	Missing 1 leg											1.40	106.00	0.07	100%	5.24
BCRAB-BT01D-001	1D	9/16/14	1610	Blue crab	133	14.7	Leg and Hepat.	-	0.31	9.40	ND (0.0976)	-	ND	5.30	20.90	0.42	100%	7.87					
BCRAB-BT01E-004	1E	9/19/14	1219	Blue crab	136	15.3	Leg and Hepat.	Missing 2 right legs	ND (0.3)	11.70	ND (0.0969)	-	ND	1.14	20.20	0.07	100%	6.11					
BCRAB-BT01E-002	1E	9/17/14	1316	Blue crab	142	13.8	Leg and Hepat.	-	0.59	16.20	ND (0.0654)	-	ND	2.40	18.60	0.21	100%	8.92					
Adjacent									**Adjacent**					**Adjacent**					**Adjacent**				
BCRAB-BT02A-003	2A	9/23/14	1622	Blue crab	99	11.5	Whole	Regrowing right back leg											1.92	91.80	0.06	100%	3.22
BCRAB-BT02A-001	2A	9/23/14	1153	Blue crab	125	14.6	Leg and Hepat.	-	ND (0.3)	12.00	ND (0.0997)	-	ND	0.39	7.00	ND (0.169)		ND					
BCRAB-BT02A-002	2A	9/23/14	1621	Blue crab	129	13.6	Leg and Hepat.	Missing 2 right legs, 1 left leg	0.40	18.40	ND (0.0995)	-	ND	4.33	12.80	0.51	100%	11.73					
BCRAB-BT02B-001	2B	9/23/14	1158	Blue crab	63	10.2	Whole	Juvenile											2.00	52.50	0.44	100%	22.20
BCRAB-BT02C-002	2C	9/18/14	1344	Blue crab	38	9.5	Whole	Juvenile female, missing right pincer											0.87	22.50	0.08	100%	8.85
BCRAB-BT02C-005	2C	9/27/14	0822	Blue crab	190	15.2	Leg and Hepat.	-	0.38	10.00	ND (0.05)	-	ND	2.81	14.90	0.40	100%	14.09					
BCRAB-BT02D-005	2D	9/25/14	1111	Blue crab	99	12.3	Whole	Missing right pincer											2.03	82.50	0.07	100%	3.32
BCRAB-BT02D-001	2D	9/17/14	1041	Blue crab	162	14	Leg and Hepat.	Missing 2 right legs	0.54	15.60	ND (0.069)	-	ND	3.78	22.60	0.42	100%	11.22					
BCRAB-BT02E-003	2E	9/18/14	1621	Blue crab	114	13	Whole	-											1.74	92.00	0.14	100%	7.87
BCRAB-BT02E-005	2E	9/23/14	1205	Blue crab	199	14.8	Leg and Hepat.	-	0.43	9.40	ND (0.05)	-	ND	5.96	15.90	0.52	100%	8.74					
Adjacent - Deep									**Adjacent - Deep**					**Adjacent - Deep**					**Adjacent - Deep**				
BCRAB-BT02F-001	2F	9/18/14	1610	Blue crab	106	13.7	Whole	-											1.10	70.30	0.04	100%	3.48
BCRAB-BT02F-002	2F	9/18/14	1611	Blue crab	158	15	Leg and Hepat.	-	0.46	16.20	ND (0.1)	-	ND	4.35	11.00	0.12	100%	2.83					
BCRAB-BT02G-003	2G	9/27/14	0944	Blue crab	184	15.2	Leg and Hepat.	Missing right pincer, 2 right legs	ND (0.3)	8.50	ND (0.0946)	-	ND	2.80	16.30	0.33	100%	11.82					
BCRAB-BT02H-001	2H	9/18/14	1614	Blue crab	68	10.5	Whole	Missing 3 right legs											2.22	48.20	0.05	100%	2.40
BCRAB-BT02H-002	2H	9/18/14	1615	Blue crab	138	14	Leg and Hepat.	Missing right pincer, 1 left leg	0.64	11.30	ND (0.0982)	-	ND	4.19	13.20	0.50	100%	11.96					
South									**South**					**South**					**South**				
BCRAB-BT03C-006	3C	9/19/14	1222	Blue crab	54	10.6	Whole	Missing right pincer											1.42	44.70	0.04	100%	2.73
BCRAB-BT03B-001	3B	9/18/14	1017	Blue crab	56	9.5	Whole	Juvenile female											2.16	46.10	0.09	100%	4.12
BCRAB-BT03C-001	3C	9/16/14	1033	Blue crab	60	10.2	Whole	-											2.21	56.40	0.08	100%	3.62
BCRAB-BT03C-003	3C	9/18/14	1018	Blue crab	95	14.5	Leg and Hepat.	Soft shell, missing left pincer	ND (0.3)	6.70	ND (0.151)	-	ND	5.38	11.50	0.21	100%	3.96					
BCRAB-BT03A-004	3A	9/23/14	1415	Blue crab	96	11.8	Whole	-											2.03	65.00	0.11	100%	5.52
BCRAB-BT03A-005	3A	9/24/14	1244	Blue crab	122	12.5	Leg and Hepat.	-	0.30	16.30	ND (0.0995)	-	ND	9.04	17.70	0.56	100%	6.16					
BCRAB-BT03B-005	3B	9/23/14	1417	Blue crab	125	12.8	Whole	-											1.77	108.00	0.07	100%	3.99
BCRAB-BT03A-002	3A	9/18/14	1014	Blue crab	134	13.5	Leg and Hepat.	Missing right pincer	0.43	12.60	ND (0.101)	-	ND	6.47	15.90	0.71	100%	10.96					
BCRAB-BT03B-002	3B	9/19/14	1001	Blue crab	140	13.6	Leg and Hepat.	Missing 1 right leg	ND (0.3)	14.80	ND (0.0987)	-	ND	6.22	13.20	0.53	100%	8.47					
BCRAB-BT03B-004	3B	9/23/14	1416	Blue crab	168	15	Leg and Hepat.	Soft shell	0.97	9.90	ND (0.05)	-	ND	5.36	27.70	0.29	100%	5.37					
South - Deep									**South - Deep**					**South - Deep**					**South - Deep**				
BCRAB-BT03D-003	3D	9/19/14	1006	Blue crab	51	9.2	Whole	-											2.03	39.10	0.07	100%	3.50
BCRAB-BT03D-005	3D	9/26/14	1022	Blue crab	118	12.4	Whole	-											1.18	94.50	0.08	100%	7.08
BCRAB-BT03D-001	3D	9/16/14	1031	Blue crab	162	14	Leg and Hepat.	-	0.49	17.40	ND (0.0614)	-	ND	7.33	14.10	0.72	100%	9.88					
BCRAB-BT03D-002	3D	9/18/14	1028	Blue crab	181	14.5	Leg and Hepat.	Missing right pincer, 1 right leg	0.65	18.90	ND (0.05)	-	ND	6.83	26.20	0.20	100%	2.94					
BCRAB-BT03D-004	3D	9/26/14	1021	Blue crab	202	15.5	Leg and Hepat.	-	0.47	17.70	0.0392	100%	8.41	4.63	17.50	0.75	100%	16.11					

Leg muscle and hepatopancreas will be analyzed separately on all individuals that are greater than or equal to 3.5" (~9 cm) in width if adequate sample mass is available.

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
White Perch Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

									FILLET*					OFFAL					WHOLE BODY**				
Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	Lipids (%)	Fillet Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Offal Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North									**North**					**North**					**North**				
WP-BT01A-007	1A	9/23/14	1619	White perch	85	18.1	Whole	-	-	-	0.97	-	19.43	-	-	-	-	-	8.70	74.30	1.72	21%	19.75
WP-BT01A-008	1A	9/23/14	1620	White perch	88	18.3	Whole	-	-	-	0.82	-	17.72	-	-	-	-	-	8.25	82.30	1.51	22%	18.29
WP-BT01A-005	1A	9/18/14	1329	White perch	95	17.5	Whole	-	-	-	1.58	-	33.49	-	-	-	-	-	8.08	86.10	2.56	31%	31.71
WP-BT01B-001	1B	9/25/14	1530	White perch	98	18.6	Whole	-	-	-	0.96	-	20.06	-	-	-	-	-	8.44	85.70	1.71	22%	20.28
WP-BT01A-002	1A	9/18/14	1326	White perch	113	18.6	Whole	-	-	-	1.01	-	19.86	-	-	-	-	-	8.85	101.90	1.78	26%	20.11
WP-BT01A-006	1A	9/23/14	1618	White perch	118	20	Whole	-	-	-	1.06	-	25.34	-	-	-	-	-	7.44	111.10	1.84	28%	24.77
WP-BT01C-001	1C	9/25/14	1416	White perch	125	20	Whole	-	-	-	1.23	-	27.53	-	-	-	-	-	7.79	111.30	2.08	24%	26.64
WP-BT01A-004	1A	9/18/14	1328	White perch	132	20	Whole	-	-	-	0.80	-	15.23	-	-	-	-	-	9.22	118.30	1.49	27%	16.17
WP-BT01A-001	1A	9/18/14	1325	White perch	158	22	Whole	-	-	-	0.30	-	13.61	-	-	-	-	-	5.38	137.70	0.80	31%	14.80
WP-BT01A-003	1A	9/18/14	1327	White perch	162	21.5	Whole	-	-	-	0.82	-	13.23	-	-	-	-	-	10.50	149.00	1.52	25%	14.47
Adjacent									**Adjacent**					**Adjacent**					**Adjacent**				
WP-BT02A-003	2A	9/23/14	1152	White perch	99	19.2	Whole	-	-	-	1.37	-	32.23	-	-	-	-	-	7.40	85.50	2.27	36%	30.64
WP-BT02A-001	2A	9/23/14	1150	White perch	113	19.8	Whole	-	-	-	3.11	-	60.35	-	-	-	-	-	8.54	101.20	4.66	49%	54.57
WP-BT02A-002	2A	9/23/14	1151	White perch	127	20.4	Whole	-	-	-	2.24	-	48.85	-	-	-	-	-	7.75	115.00	3.47	49%	44.77
WP-BT02A-004	2A	9/23/14	1426	White perch	144	21	Whole	-	-	-	2.41	-	55.99	-	-	-	-	-	7.28	132.00	3.70	53%	50.85
WP-BT02B-001	2B	9/27/14	0947	White perch	99	18.3	Whole	-	-	-	5.48	-	110.30	-	-	-	-	-	8.17	87.50	7.93	58%	97.06
WP-BT02C-005	2C	9/23/14	1627	White perch	78	17.5	Fillet/Offal	-	2.85	35.60	1.38	42%	48.28	9.74	35.20	4.07	42%	41.79	6.28	78.30	2.46	42%	40.74
WP-BT02C-001	2C	9/18/14	1617	White perch	113	20	Whole	-	-	-	3.23	-	79.72	-	-	-	-	-	6.79	106.80	4.82	53%	71.05
WP-BT02C-004	2C	9/23/14	1626	White perch	116	19.3	Whole	-	-	-	0.88	-	22.22	-	-	-	-	-	7.21	101.60	1.60	24%	22.12
WP-BT02C-003	2C	9/23/14	1625	White perch	121	19.4	Whole	-	-	-	1.16	-	24.80	-	-	-	-	-	8.13	106.80	1.98	30%	24.32
WP-BT02C-002	2C	9/23/14	1624	White perch	148	21.4	Whole	-	-	-	1.19	-	28.78	-	-	-	-	-	7.32	138.00	2.03	33%	27.70
WP-BT02D-004	2D	9/24/14	1643	White perch	79	17.5	Fillet/Offal	-	3.16	36.60	0.93	31%	29.40	8.78	38.80	2.73	33%	31.09	6.05	79.40	1.76	32%	28.75
WP-BT02D-005	2D	9/24/14	1644	White perch	81	18	Whole	-	-	-	1.10	-	27.26	-	-	-	-	-	7.18	73.50	1.90	23%	26.41
WP-BT02D-002	2D	9/24/14	1641	White perch	98	19	Whole	-	-	-	1.03	-	41.29	-	-	-	-	-	4.71	87.30	1.81	29%	38.34
WP-BT02D-003	2D	9/24/14	1642	White perch	106	12.7	Whole	Tail not present	-	-	1.07	-	17.43	-	-	-	-	-	10.30	95.50	1.86	32%	18.05
WP-BT02D-001	2D	9/24/14	1640	White perch	260	26	Fillet/Offal	-	3.76	119.70	0.81	32%	21.62	11.30	133.30	2.32	31%	20.52	7.73	259.90	1.56	32%	20.48
WP-BT02E-003	2E	9/25/14	1418	White perch	86	18	Fillet/Offal	-	1.21	36.90	0.47	35%	38.43	5.09	44.50	2.07	37%	40.61	3.33	84.70	1.29	36%	38.08
WP-BT02E-002	2E	9/24/14	1648	White perch	105	19.4	Whole	-	-	-	2.59	-	38.05	-	-	-	-	-	11.10	96.10	3.95	38%	35.59
WP-BT02E-004	2E	9/25/14	1419	White perch	113	19.7	Whole	-	-	-	1.54	-	25.30	-	-	-	-	-	10.10	103.20	2.50	32%	24.74
WP-BT02E-001	2E	9/23/14	1207	White perch	131	21.2	Whole	-	-	-	1.91	-	39.86	-	-	-	-	-	8.12	117.50	3.02	41%	37.13
WP-BT02E-005	2E	9/25/14	1420	White perch	159	22.2	Fillet/Offal	-	4.43	69.00	1.28	34%	28.80	9.82	82.50	2.94	35%	29.94	7.37	158.80	2.08	35%	28.07
South									**South**					**South**					**South**				
WP-BT03A-001	3A	9/24/14	1247	White perch	74	17.3	Fillet/Offal	-	4.23	33.00	1.36	27%	32.25	8.04	37.10	2.59	28%	32.26	6.25	73.60	1.92	28%	30.72
WP-BT03C-005	3C	9/19/14	1504	White perch	82	18.3	Fillet/Offal	-	1.96	41.10	0.65	25%	33.01	5.71	38.80	1.86	25%	32.50	3.78	83.30	1.18	25%	31.43
WP-BT03C-002	3C	9/19/14	1501	White perch	84	18.5	Whole	-	-	-	0.75	-	33.99	-	-	-	-	-	4.41	77.90	1.42	26%	32.13
WP-BT03A-002	3A	9/24/14	1248	White perch	92	18	Fillet/Offal	-	4.59	39.10	1.43	34%	31.20	9.61	45.80	3.17	38%	33.01	7.30	92.10	2.19	37%	29.66
WP-BT03B-002	3B	9/17/14	1619	White perch	104	19.5	Whole	-	-	-	0.55	-	32.21	-	-	-	-	-	3.73	93.70	1.14	22%	30.62
WP-BT03B-003	3B	9/18/14	1622	White perch	105	19.5	Whole	-	-	-	1.61	-	33.13	-	-	-	-	-	8.28	95.70	2.60	26%	31.40
WP-BT03B-005	3B	9/18/14	1624	White perch	109	19	Whole	-	-	-	1.14	-	23.36	-	-	-	-	-	8.45	97.20	1.95	23%	23.09
WP-BT03B-004	3B	9/18/14	1623	White perch	115	19.6	Whole	-	-	-	1.16	-	22.27	-	-	-	-	-	8.94	102.30	1.98	24%	22.16
WP-BT03B-001	3B	9/17/14	1618	White perch	117	20	Whole	-	-	-	1.26	-	40.11	-	-	-	-	-	5.68	101.90	2.12	34%	37.34
WP-BT03C-003	3C	9/19/14	1502	White perch	128	20.5	Whole	-	-	-	1.15	-	30.04	-	-	-	-	-	6.83	115.00	1.97	29%	28.77
WP-BT03A-003	3A	9/24/14	1645	White perch	135	20.4	Whole	-	-	-	0.52	-	12.35	-	-	-	-	-	8.01	122.80	1.10	29%	13.72
WP-BT03A-004	3A	9/24/14	1646	White perch	136	20.3	Whole	-	-	-	1.81	-	33.26	-	-	-	-	-	9.14	121.70	2.88	31%	31.51
WP-BT03C-001	3C	9/19/14	1004	White perch	140	20.5	Whole	-	-	-	1.75	-	31.85	-	-	-	-	-	9.20	127.50	2.79	24%	30.32
WP-BT03A-005	3A	9/25/14	1120	White perch	152	22	Fillet/Offal	-	2.72	60.20	0.67	28%	24.60	7.23	85.60	1.81	31%	25.06	5.37	150.70	1.30	30%	24.06
WP-BT03C-004	3C	9/19/14	1503	White perch	160	21.4	Fillet/Offal	-	4.96	76.20	1.84	26%	37.18	11.30	78.40	4.37	27%	38.67	8.18	160.80	3.00	27%	36.47

Hold an aliquot from the whole fish to allow for potential PCB Congener analysis.
*Fillet concentrations were calculated for samples processed as whole fish.
**Whole fish concentrations were calculated for samples processed as fillet/offal.

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Oyster Toadfish Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	WHOLE BODY Lipids (%)	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North													
OYTD-BT01A-001	1A	9/25/14	1415	Oyster toadfish	157	20	Whole	-	1.23	135.00	0.22	100%	17.64
OYTD-BT01B-001	1B	9/24/14	1647	Oyster toadfish	275	23	Whole	-	1.24	253.40	0.25	74%	20.27
North - Deep													
OYTD-BT01D-002	1D	9/27/14	0824	Oyster toadfish	220	22.6	Whole	-	1.33	194.00	0.18	100%	13.46
OYTD-BT01E-003	1E	9/23/14	1611	Oyster toadfish	276	24.2	Whole	-	1.20	248.50	0.27	100%	22.33
OYTD-BT01D-001	1D	9/23/14	1616	Oyster toadfish	328	24.4	Whole	-	1.38	305.60	0.18	83%	12.91
OYTD-BT01E-001	1E	9/17/14	1313	Oyster toadfish	436	27.3	Whole	-	1.13	410.70	0.41	100%	36.55
OYTD-BT01E-002	1E	9/17/14	1314	Oyster toadfish	470	29	Whole	-	0.94	447.50	0.15	100%	16.13
Adajcent													
OYTD-BT02A-001	2A	9/17/14	1309	Oyster toadfish	244	23.1	Whole	-	1.45	225.80	0.31	100%	21.31
OYTD-BT02D-001	2D	9/23/14	1204	Oyster toadfish	124	18.6	Whole	-	1.78	106.80	1.07	72%	60.11
OYTD-BT02D-002	2D	9/25/14	1118	Oyster toadfish	159	19.2	Whole	-	1.54	134.50	0.38	69%	24.35
OYTD-BT02D-003	2D	9/25/14	1119	Oyster toadfish	258	23.2	Whole	-	1.88	238.00	0.38	80%	20.45
Adajcent - Deep													
OYTD-BT02F-006	2F	9/23/14	1215	Oyster toadfish	184	21.3	Whole	-	0.94	152.50	0.16	100%	16.79
OYTD-BT02F-001	2F	9/16/14	1232	Oyster toadfish	226	22	Whole	-	1.22	213.00	0.31	81%	25.19
OYTD-BT02G-001	2G	9/17/14	1054	Oyster toadfish	312	25.4	Whole	-	0.88	283.20	0.08	100%	9.14
OYTD-BT02G-005	2G	9/27/14	0946	Oyster toadfish	351	25	Whole	-	0.69	316.10	0.08	100%	11.71
OYTD-BT02H-001	2H	9/17/14	1047	Oyster toadfish	208	21.5	Whole	-	1.01	190.40	0.09	100%	8.49
South													
OYTD-BT03A-001	3A	9/25/14	1121	Oyster toadfish	43	12.6	Whole	-	1.56	39.40	0.29	79%	18.78
OYTD-BT03C-002	3C	9/18/14	1025	Oyster toadfish	160	20.7	Whole	-	1.51	142.70	0.21	74%	13.82
OYTD-BT03C-001	3C	9/18/14	1024	Oyster toadfish	326	26.1	Whole	-	1.23	302.80	0.27	100%	21.79
South - Deep													
OYTD-BT03D-001	3D	9/16/14	1032	Oyster toadfish	189	20.5	Whole	-	1.65	168.50	0.17	100%	10.06
OYTD-BT03D-006	3D	9/23/14	1422	Oyster toadfish	206	22.2	Whole	-	1.33	186.60	0.13	100%	9.85
OYTD-BT03D-007	3D	9/26/14	1020	Oyster toadfish	208	22.2	Whole	-	1.15	203.90	0.18	82%	15.30
OYTD-BT03D-004	3D	9/23/14	1420	Oyster toadfish	211	21	Whole	-	1.71	189.10	0.26	60%	15.05
OYTD-BT03D-003	3D	9/19/14	1007	Oyster toadfish	222	21.6	Whole	-	1.54	194.30	0.13	100%	8.70

The fillet will initially include everything but the head and viscera. As this species is a "scaleless" fish, homogenization could exclude the skin if initial attempts to include it fail (e.g. the skin is too tough).
The offal will consist of the remainder of the carcass and will be analyzed separately.
Hold an aliquot from the fillets to allow for potential PCB Congener analysis.

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Hogchoker Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	WHOLE BODY Lipids	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North - Deep									**North - Deep**				
HOGCH-BT01E-003	1E	9/23/14	1614	Hogchoker	15	10	Whole	-	0.93	13.30	0.18	35%	19.22
HOGCH-BT01E-004	1E	9/24/14	1240	Hogchoker	17	10.6	Whole	-	0.40	12.60	0.42	60%	105.24
HOGCH-BT01E-007	1E	9/26/14	1440	Hogchoker	19	11	Whole	-	1.28	17.10	0.15	24%	11.41
HOGCH-BT01E-005	1E	9/24/14	1241	Hogchoker	20	10.8	Whole	-	3.67	16.70	0.54	31%	14.77
HOGCH-BT01E-006	1E	9/25/14	1417	Hogchoker	25	11	Whole	-	1.54	20.60	0.65	65%	42.27
HOGCH-BT01D-001	1D	9/27/14	0915	Hogchoker	29	12.3	Whole	-	2.85	25.40	0.43	34%	15.19
Adjacent - Deep									**Adjacent - Deep**				
HOGCH-BT02F-003	2F	9/18/14	1607	Hogchoker	16	10.6	Whole	-	0.61	13.50	0.15	39%	24.72
HOGCH-BT02F-005	2F	9/18/14	1609	Hogchoker	18	11	Whole	-	ND (0.3)	15.10	ND (0.05)	-	ND
HOGCH-BT02F-002	2F	9/17/14	1105	Hogchoker	21	11.5	Whole	-	1.34	16.50	0.20	32%	14.85
HOGCH-BT02G-006	2G	9/26/14	1030	Hogchoker	17	10.6	Whole	-	0.44	14.50	ND (0.05)	-	ND
HOGCH-BT02G-003	2G	9/19/14	1009	Hogchoker	18	10.4	Whole	-	0.96	13.30	0.18	44%	18.40
HOGCH-BT02G-005	2G	9/23/14	1214	Hogchoker	21	11.3	Whole	-	0.62	16.60	0.37	60%	60.42
HOGCH-BT02H-002	2H	9/17/14	1045	Hogchoker	10	9	Whole	Composite	0.64	20.60	0.17	45%	26.07
HOGCH-BT02H-004	2H	9/18/14	1612	Hogchoker	12	10.5							
HOGCH-BT02H-005	2H	9/18/14	1613	Hogchoker	21	11.1	Whole	-	0.41	17.10	0.03	100%	7.26
HOGCH-BT02H-003	2H	9/17/14	1046	Hogchoker	25	11	Whole	-	0.61	18.10	0.06	57%	10.46
South - Deep									**South - Deep**				
HOGCH-BT03D-001	3D	9/17/14	0945	Hogchoker	9	9.2	Whole	Composite	0.44	18.30	0.23	52%	52.36
HOGCH-BT03D-006	3D	9/25/14	1110	Hogchoker	11	9							
HOGCH-BT03D-005	3D	9/23/14	1425	Hogchoker	14	9.5	Whole		1.64	12.90	0.60	23%	36.59
HOGCH-BT03D-004	3D	9/23/14	1424	Hogchoker	17	10.4	Whole	-	0.58	15.00	0.10	66%	17.75
HOGCH-BT03D-003	3D	9/23/14	1423	Hogchoker	21	10.1	Whole	-	4.59	16.30	0.96	25%	21.00
HOGCH-BT03D-002	3D	9/18/14	1027	Hogchoker	26	12.7	Whole	-	0.50	23.20	ND (0.05)	-	ND

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Miscellaneous Catch
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes
Striped Bass								
STB-BT02A-001	2A	9/23/14	1623	Striped bass	12	10.6	Hold/Discard	-
STB-BT02C-001	2C	9/18/14	1343	Striped bass	9	10.2	Hold/Discard	-
STB-BT02E-001	2E	9/24/14	1649	Striped bass	194	26.5	Hold/Discard	-
STB-BT03B-003	3B	9/23/14	1419	Striped bass	15	11.8	Hold/Discard	-
STB-BT03B-002	3B	9/18/14	1625	Striped bass	36	15	Hold/Discard	-
STB-BT03B-001	3B	9/17/14	1617	Striped bass	86	20.5	Hold/Discard	-
STB-BT03C-001	3C	9/19/14	1221	Striped bass	260	29	Hold/Discard	-
Grass Shrimp								
GRSHMP-BT01D-001	1D	9/23/14	1617	Grass Shrimp	19	-	Hold/Discard	13 count; length range 3.5 to 5.7 cm; eggs present on females
GRSHMP-BT02E-001	2E	9/25/14	1113	Grass Shrimp	9	-	Hold/Discard	10 count; length range 3.7 to 5.8 cm; eggs present on females
White catfish								
WC-BT01B-001	1B	9/17/14	1613	White catfish	540	34	Hold/Discard	-
WC-BT01C-001	1C	9/26/14	1031	White catfish	1059	42.4	Hold/Discard	-

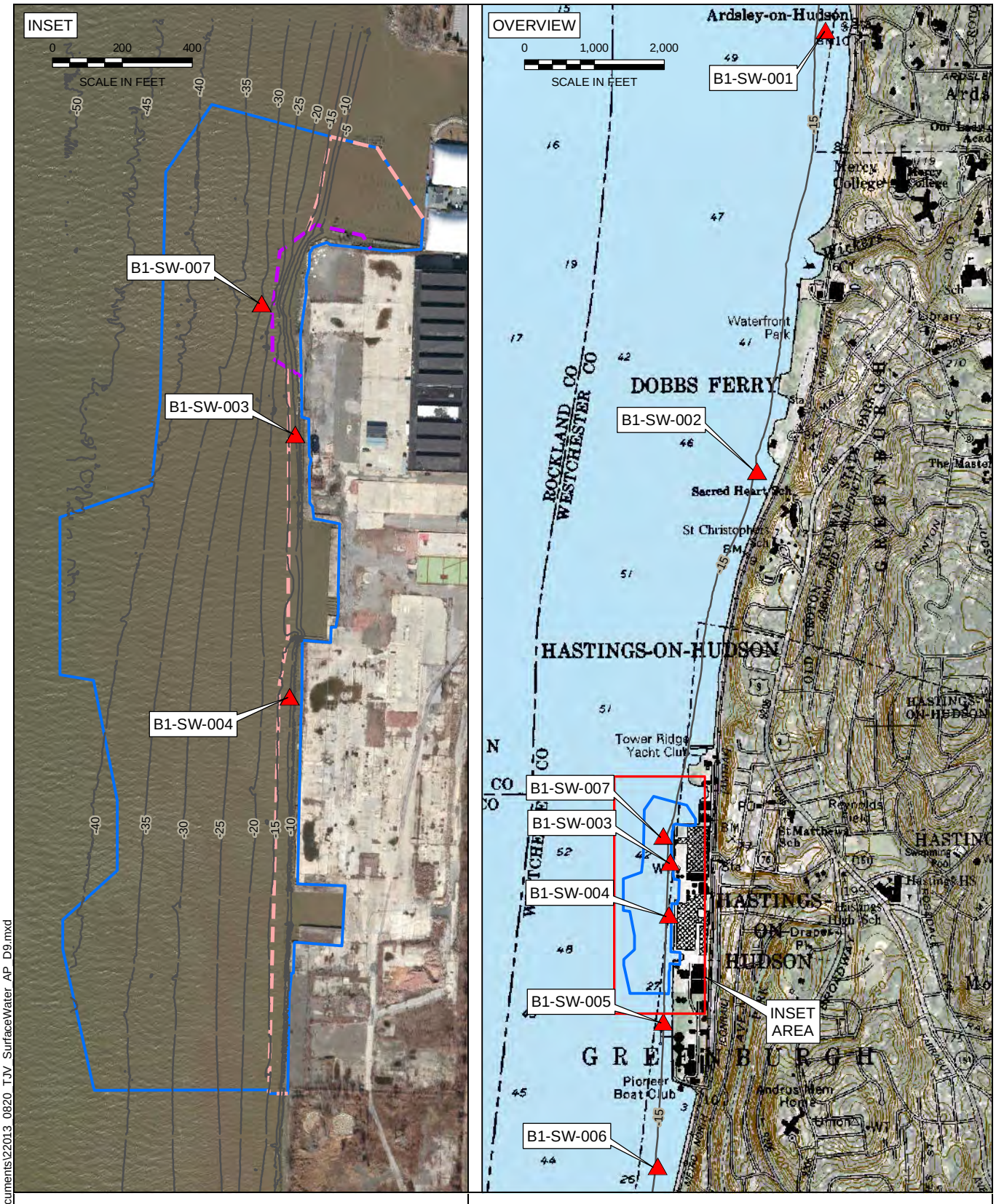
TABLE 14
Analytical Summary of PCBs and Metals in Groundwater
Former Anaconda Wire and Cable Plant Site
Hastings-on-Hudson, New York
October 2015

Location	**Standards, Criteria, and Guidance Values (Unfiltered) (ug/L)**	PDMW-16S	PDMW-19S	PDMW-20S	PDMW-27S	MW-01A	MW-05	MW-09	MW-09
Sample Date		08/01/2014	08/04/2014	08/04/2014	12/02/2014	08/05/2014	08/05/2014	08/04/2014	08/04/2014
Sample Type		N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	FD, Unfiltered
Sample Name		0710-080114-1105	0710-080414-1030	0710-080414-1520	0710-120214-1630	0710-080514-0915	0710-080514-1235	0710-080414-1230	0710-080414-0002
Total Metals (ug/L)									
Beryllium	3	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
Copper	200	ND (5)	**22.7**	ND (5)	**43.3**	ND (5)	**6.14**	**177**	**177**
Lead	25	ND (5)	**18.3**	ND (5)	**80.7**	ND (5)	ND (5)	ND (5)	ND (5)
Zinc	2000	ND (5)	**112**	ND (5)	**69.7**	ND (5)	**16.2**	**752**	**752**
PCBs (ug/L)									
Aroclor 1016	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1221	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1232	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1242	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1248	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1254	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1260	-	ND (0.05)	**0.979**	ND (0.05)	ND (0.05)	ND (0.05)	**0.826**	**0.241**	**0.269**
Aroclor 1262	-	ND (0.05)	ND (0.1)	ND (0.05)	**0.652**	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1268	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Total PCBs	0.09	ND (0.05)	**0.979**	ND (0.05)	**0.652**	ND (0.05)	**0.826**	**0.241**	**0.269**

Notes:
ND (Not detected above laboratory detection limits)
1. Results in **bold** were detected.
2. Results shaded in grey are above SCG values.

TABLE 15
Analytical Summary of PCBs in Air
Baseline Air Monitoring Program - 2015
Former Anaconda Wire & Cable Plant Site
Hastings-on-Hudson, New York

Sample Date	Sample Time	Sample Type	Aroclor 1248 (ug/m3)	Aroclor 1254 (ug/m3)	Aroclor 1260 (ug/m3)	Aroclor 1262 (ug/m3)	Aroclor 1268 (ug/m3)	Total PCBs (ug/m3)
6/19/2015	16:50	N	ND (0.0134)	ND (0.0134)	ND (0.0134)	ND (0.0134)	ND (0.0134)	ND (0.0134)
6/25/2015	16:00	N	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)
7/1/2015	13:26	N	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)
7/7/2015	13:30	N	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)
7/13/2015	15:40	N	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)
7/19/2015	13:50	N	ND (0.0133)	ND (0.0133)	ND (0.0133)	ND (0.0133)	ND (0.0133)	ND (0.0133)
7/25/2015	12:26	N	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)
7/31/2015	15:10	N	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)
8/6/2015	13:40	N	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)
8/12/2015	14:00	N	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)
8/12/2015	14:05	Field Duplicate (8/12/15, 14:00)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)
8/12/2015	14:10	Field Blank	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
8/18/2015	8:30	N	ND (0.0185)	ND (0.0185)	ND (0.0185)	ND (0.0185)	ND (0.0185)	ND (0.0185)



SURFACE WATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

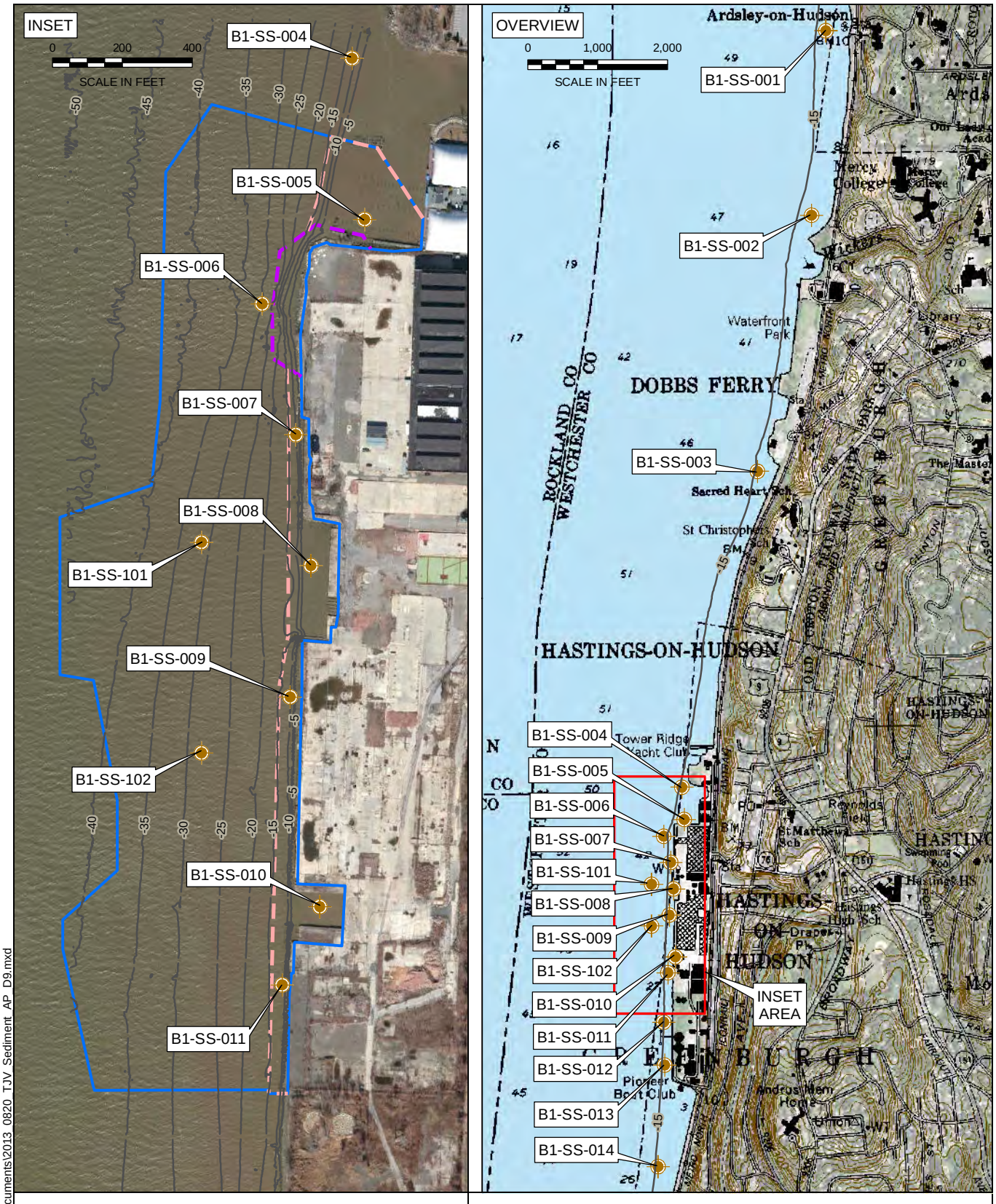
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE WATER

SCALE: AS SHOWN
AUGUST 2013

FIGURE 2

G:\Projects\28612\Global\GIS\Map Documents\12013_0820_TJV_SurfaceWater_AP_D9.mxd



SURFACE SEDIMENT AND MACRO-INVERTEBRATE SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

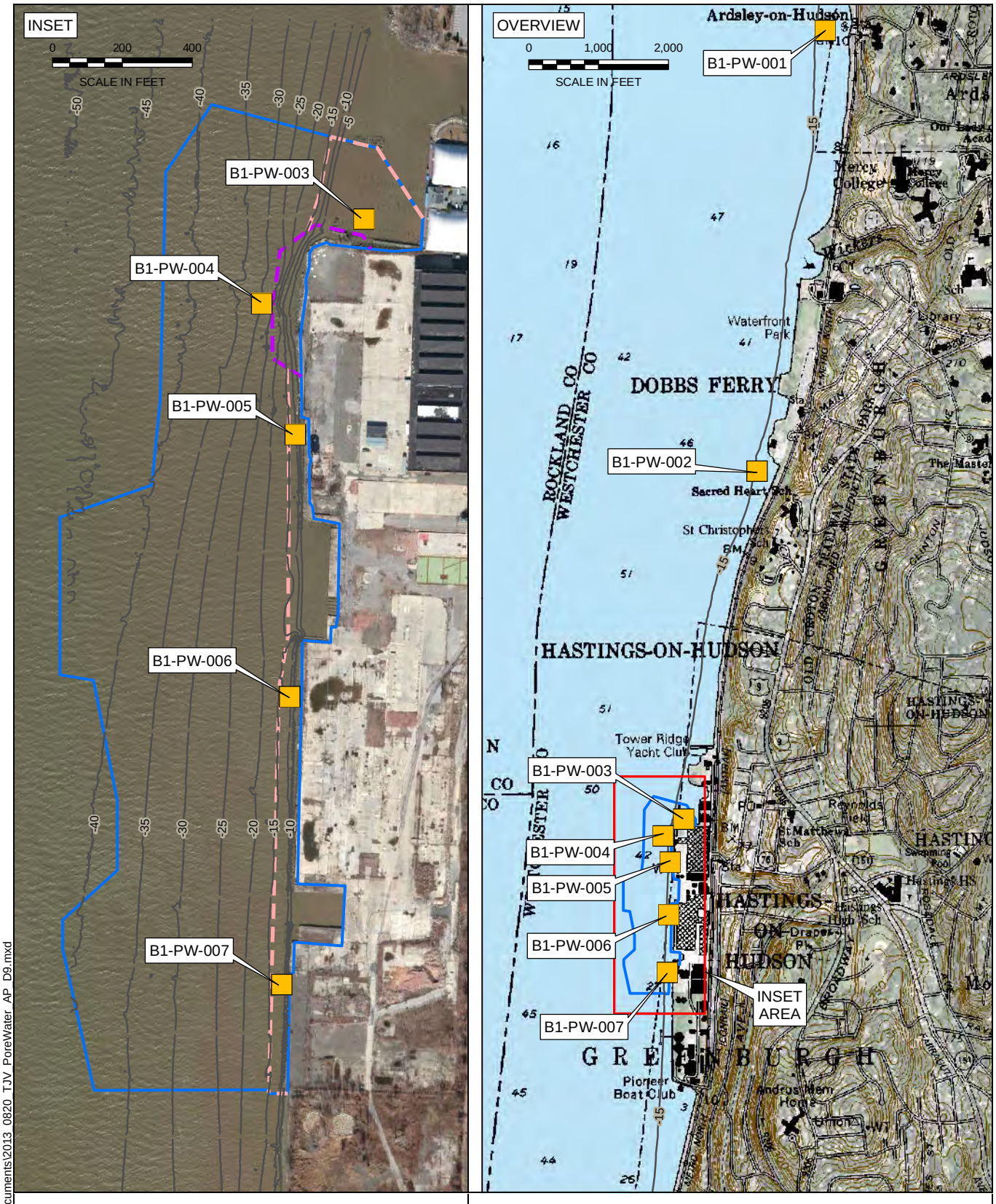
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE SEDIMENT AND MACRO-INVERTEBRATES

SCALE: AS SHOWN
AUGUST 2013

FIGURE 3

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Sediment_AP_D9.mxd



POREWATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

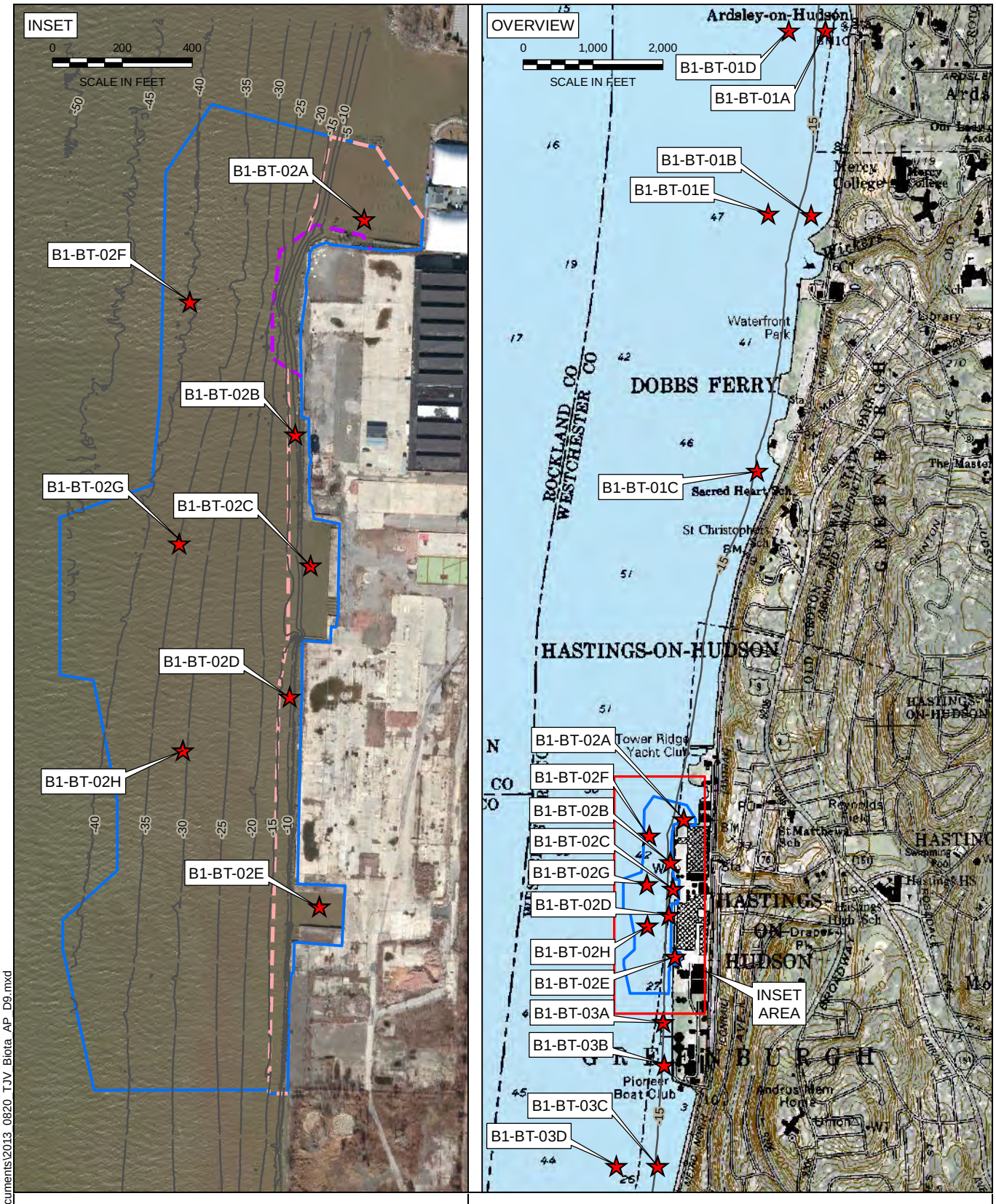
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - POREWATER

SCALE: AS SHOWN
AUGUST 2013

FIGURE 4

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_PoreWater_AP_D9.mxd



FISH AND SHELLFISH SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

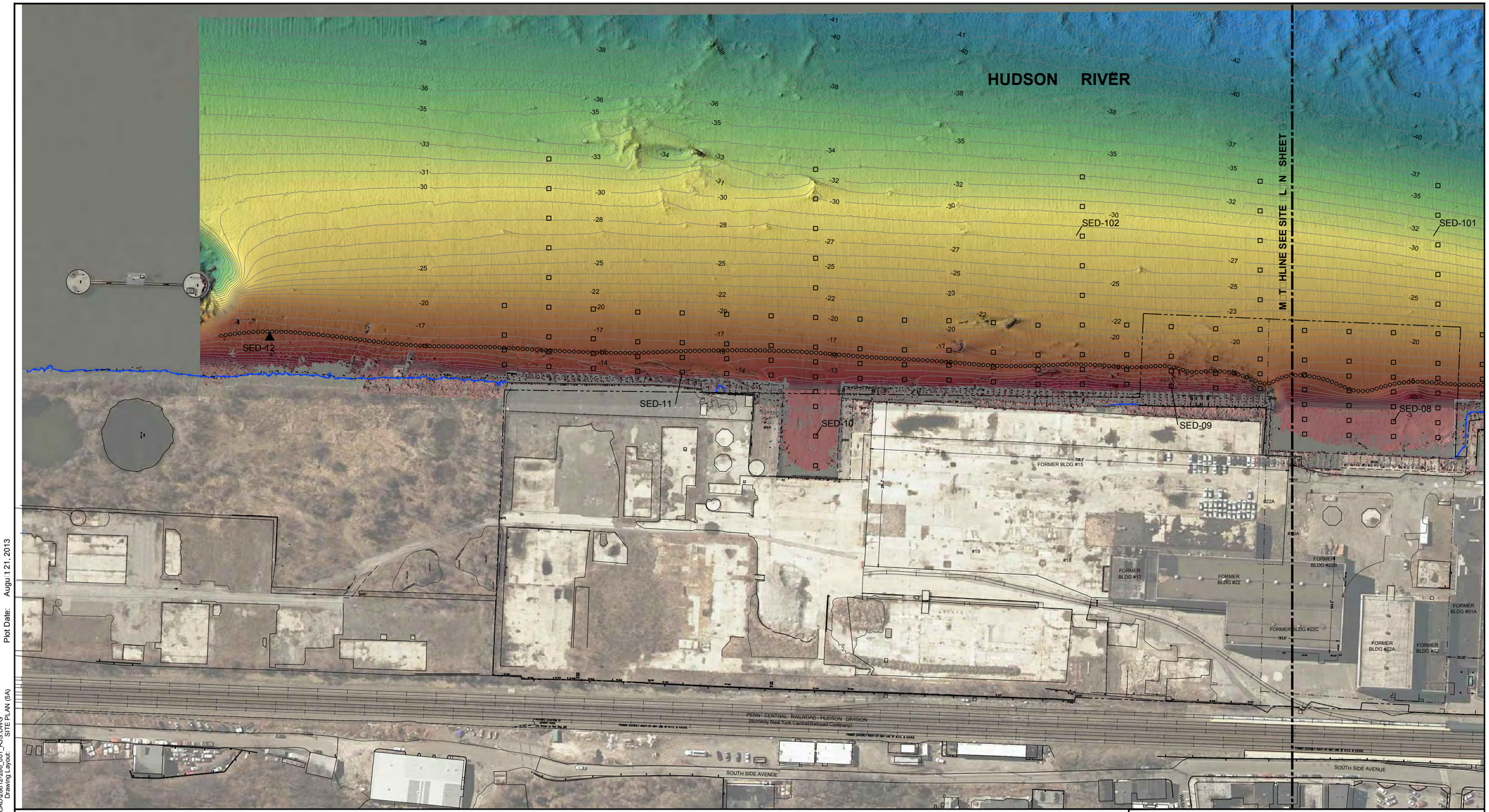
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINESAMPLING AND ANALYSIS PLAN - FISH AND SHELLFISH

SCALE: AS SHOWN
AUGUST 2013

FIGURE 5

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Biota_AP_D9.mxd



Plot Date: August 21, 2013

G:\28612_HASTINGS\286\CAD\286122-286_001_RJS.DWG
Drawing Layout: SITE PLAN (6A)

Drawing Name: LUCIDO, SAM
Operator Name:

LEGEND

- PROPERTY LINE
- RAIL ROAD
- APPROXIMATE SPI LOCATION
- EL. - 15 FT. DEPTH CONTOUR
- NORTHWEST EXTENSION
- SED-12 ▲ SEDIMENT SAMPLE LOCATION AND NUMBER (SPI LOCATIONS INCLUDED AT THESE LOCATIONS)

NOTES

1. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
2. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
3. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
4. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

W S N E

0 80 160

SCALE IN FEET

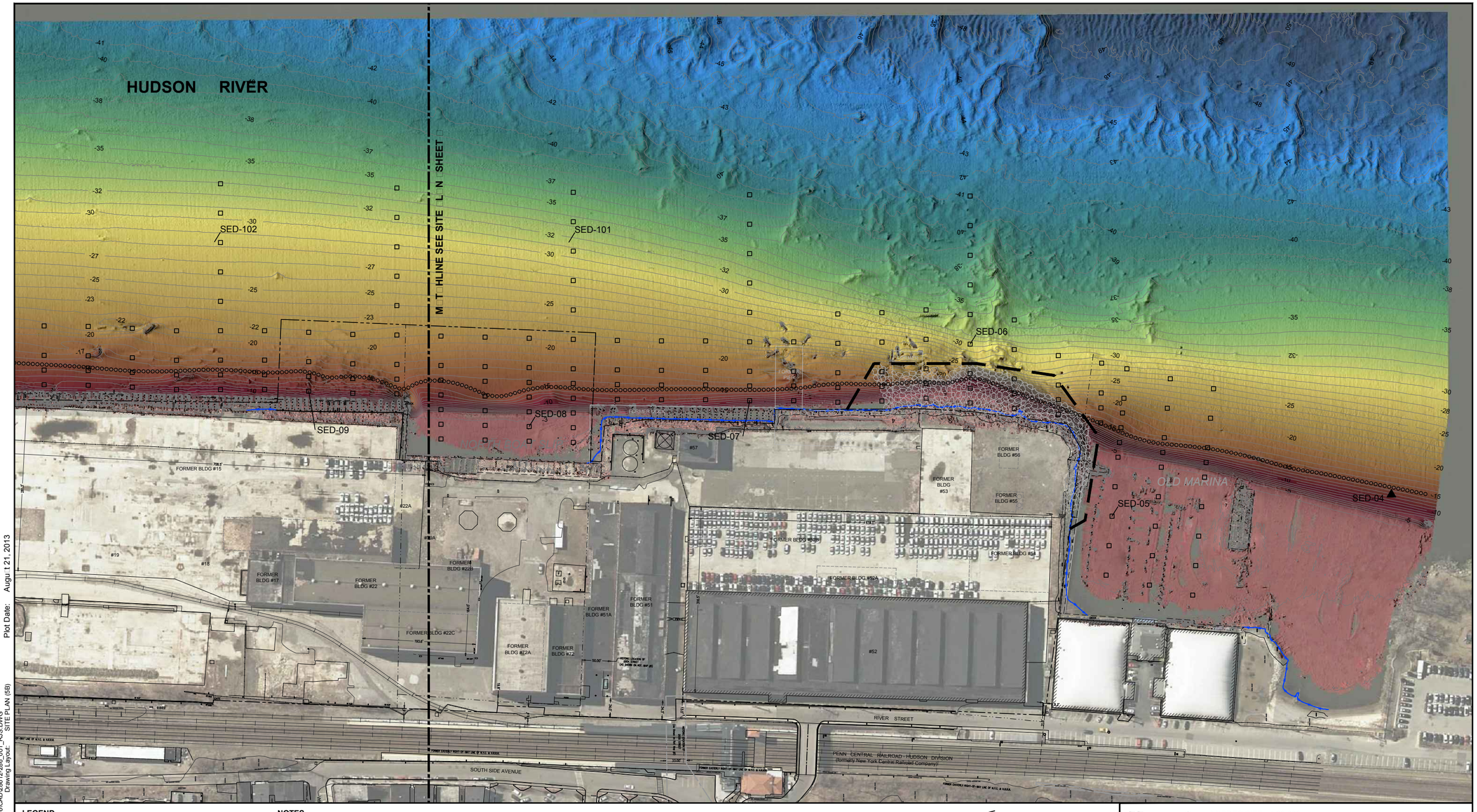
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SPI LOCATIONS SHEET 1 of 2

SCALE: AS SHOWN
APRIL 2013

FIGURE 6A



Plot Date: August 21, 2013
G:\28612_HASTINGS\286\CAD\28612-286_001_PJS.DWG
Drawing Layout: SITE PLAN (5B)
Drawing Name:
Operator Name: LUCIDO, SAM

LEGEND

- PROPERTY LINE
- RAIL ROAD
- APPROXIMATE SPI LOCATION
- EL. - 15 FT. DEPTH CONTOUR
- NORTHWEST EXTENSION
- SED-04 ▲ SEDIMENT SAMPLE LOCATION AND NUMBER (SPI LOCATIONS INCLUDED AT THESE LOCATIONS)

NOTES

1. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
2. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
3. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
4. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

W S N E

0 80 160
SCALE IN FEET

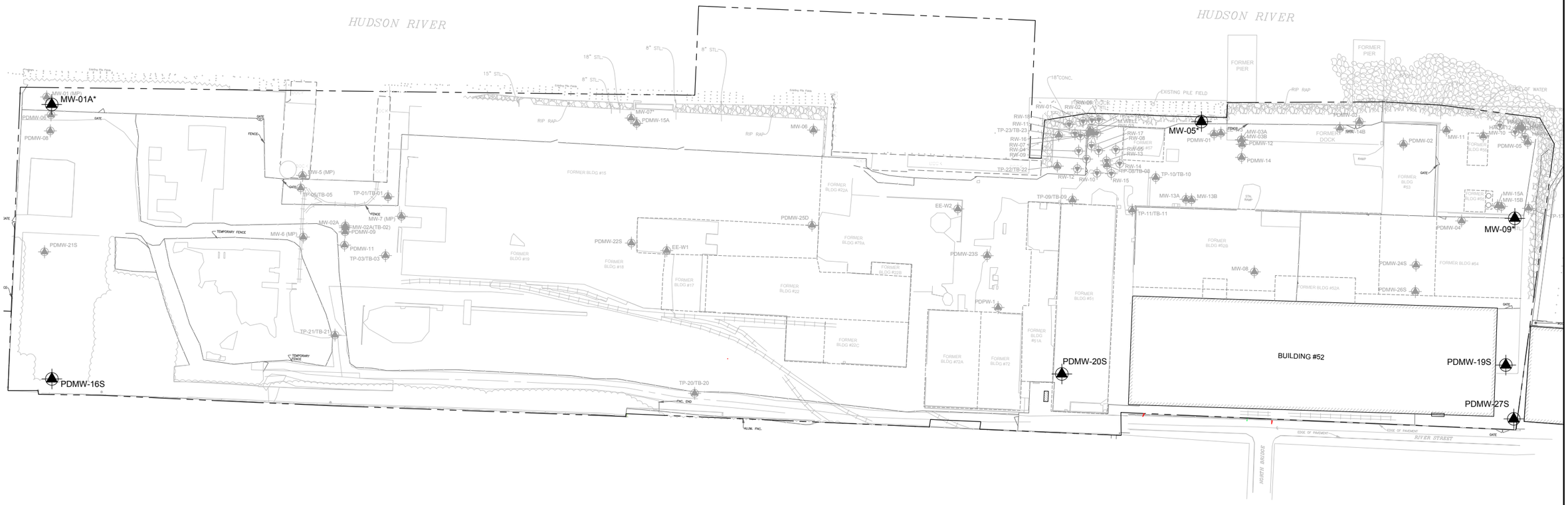
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SPI LOCATIONS SHEET 2 of 2

SCALE: AS SHOWN
APRIL 2013

FIGURE 6B



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP-RAP
- PDI SAMPLING WELL LOCATION
- EXISTING MONITORING WELL
- RECOVERY WELL

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YOR

GROUNDWATER SAMPLING LOCATION PLAN

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 7

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:15 PM Layout: FIG 3.2B
\\DTR\COMMON\28612_HASTINGS\293\CAD\28612-293-0010 2006 OU1 SAMPLING.DWG

HUDSON RIVER

SOUTH BOAT SLIP

NORTH BOAT SLIP

FORMER BLDG #15

FORMER BLDG #79A

FORMER BLDG #19

FORMER BLDG #18

FORMER BLDG #17

FORMER BLDG #22A

FORMER BLDG #22B

FORMER BLDG #22C

FORMER BLDG #72A

FORMER BLDG #72

FORMER BLDG #51

FORMER BLDG #51A

BASELINE AIR MONITORING LOCATION

FORMER BLDG #57

RIVER (PRIMARY)

FENCE (SECONDARY)

FORMER BLDG #53

FORMER BLDG #56

NORTHWEST CORNER AREA

FORMER BLDG #55

FORMER BLDG #52B

OLD MARINA

FORMER BLDG #54

FORMER SATURANT PUMP HOUSE

FORMER BLDG #52A

BLDG #52

RIVER STREET

PENN CENTRAL RAILROAD - HUDSON DIVISION
(formerly New York Central Railroad Company)

SOUTH SIDE AVENUE

WASHINGTON AVE

SOUTH SIDE AVENUE

SOUTH SIDE AVENUE

LEGEND:

- APPROXIMATE LOCATION OF METEOROLOGICAL STATION
- PROPOSED AIR MONITORING LOCATION
- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- EXISTING FENCE
- NEW FENCE (MATCH EXISTING CHAIN LINK)
- TEMPORARY FENCE MOUNTED ON JERSEY BARRIER. (8 FOOT MIN.)
- RIP-RAP
- UG DRAINS / SEWER TO RIVER

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.

N

0 100 200 300 400

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE AIR MONITORING LOCATION PLAN

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 8

POSTOLOWSKI, KEVIN Printed: 1/29/2015 5:59 PM Layout: AIR
G:\28612\GLOBAL\CAD\28612-SITEPLAN_R1 AIR.DWG

APPENDIX B

OU-1 ROD

OU-1 ROD – MARCH 2004

HALEY ALDRICH

Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision
Harbor at Hastings Site
Operable Unit No. 1
Village of Hastings-on-Hudson
Westchester County New York
Site Number 3-60-022

March 2004

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* ERIN M. CROTTY, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Harbor at Hastings Inactive Hazardous Waste Disposal Site
Operable Unit No. 1
Village of Hastings-on-Hudson,
Westchester County, New York
Site No. 3-60-022

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for Operable Unit #1 of the Harbor at Hastings site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for Operable Unit #1 of} the Harbor at Hastings inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the Harbor at Hastings site and the criteria identified for evaluation of alternatives, the NYSDEC has selected partial excavation, long-term containment, and deed restrictions. The components of the remedy are as follows:

- Excavation and off-site disposal of PCB-contaminated soil to a maximum depth of 9 feet in the Northwest Corner and along the Northern Shoreline of the site,

- Containment of remaining deep contamination in the Northwest Corner and Northern Shoreline areas using a slurry wall, sealed sheet pile bulkhead, and an impermeable cap,

- Outside of the Northwest Corner and Northern Shoreline containment areas, excavation, to a maximum depth of 12 feet, of all PCB-contaminated soil. For the few areas where PCB contamination exceeds 12 feet, soil would either be excavated by alternative methods, or contained within a watertight sheet pile structure and capped.

- Excavation of lead "hot spots" in shallow soils, corresponding to lead levels between 2160 ppm and 43,200 ppm.

- Installation of a watertight steel sheet pile bulkhead along the site shoreline,

- Installation of a 2-foot thick barrier system, consisting of a demarcation layer and soil cover over areas not covered by an impermeable cap,

- Institutional controls to prevent exposure to contaminated soils and groundwater beneath the site, and to preserve the integrity of the cover system and containment cells,

- Annual certification that the institutional controls are in place and effective, and

- Long term monitoring.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

MAR 18 2004

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

TABLE OF CONTENTS

RECORD OF DECISION

Harbor at Hastings Site
Operable Unit No. 1
Village of Hastings-on-Hudson
Westchester County, New York
Site No. 3-60-022
March 2004

SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for Operable Unit #1 (OU 1) of the Harbor at Hastings site. This remedy addresses the threat to human health and the environment created by the presence of polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), lead, copper, beryllium, and other inorganic contaminants at the site.

The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this remedy. As more fully described in Sections 3 and 5 of this document, past wire manufacturing operations have resulted in the disposal of hazardous wastes, including polychlorinated biphenyls (PCBs) and metals. These wastes have contaminated the soil and groundwater beneath the site, and the sediments and ecosystem of the adjacent Hudson River. These disposal activities have resulted in:

- a significant threat to human health associated with potential exposure to contaminated soils and groundwater;

- a significant environmental threat associated with the impacts of contaminants to groundwater and the surface water, sediment and ecosystem of the Hudson River.

To eliminate or mitigate these threats, the NYSDEC has selected the following remedy:

- Excavation and off-site disposal of PCB-contaminated soil to a maximum depth of 9 feet in the Northwest Corner and along the Northern Shoreline of the site,

- Containment of remaining deep contamination in the Northwest Corner and Northern Shoreline areas using a slurry wall, sealed sheet pile bulkhead, and an impermeable cap,

- Outside of the Northwest Corner and Northern Shoreline containment areas, excavation, to a maximum depth of 12 feet, of all PCB-contaminated soil. For the few areas where PCB contamination exceeds 12 feet, soil would either be excavated by alternative methods, or contained within a watertight sheet pile structure and capped.

- Excavation of lead "hot spots" in shallow soils, corresponding to lead levels between 2160 ppm and 43,200 ppm.
- Installation of a watertight steel sheet pile bulkhead along the site shoreline,
- Installation of a 2-foot thick barrier system, consisting of a demarcation layer and soil cover over areas not covered by an impermeable cap,
- Institutional controls to prevent exposure to contaminated soils and groundwater beneath the site, and to preserve the integrity of the cover system and containment cells,
- Annual certification that the institutional controls are in place and effective, and
- Long term monitoring.

This remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Harbor at Hastings site is located on approximately 26 acres on the eastern shore of the Hudson River in the Village of Hastings-on-Hudson, Westchester County. As shown on Figure 1, the site is bounded to the east by the Metro North Commuter Railroad, and to the north and west by the

Hudson River. To the south, the site is bordered by the former Mobil Oil Terminal and the active Uhlich Color Company, which together comprise the Tappan Terminal Inactive Hazardous Waste Disposal Site #3-60-015.

The landmass of the site was created by filling into the Hudson River between the mid-1800's and the early 1900's. Specific sources of fill material are unknown, but common practice was to use demolition debris, ash and furnace slag as riverfront fill. The shoreline of the site is comprised of variable timber bulkheads, sheet piling, stone revetment, dock platforms, and timber piles that once supported docks.

Presently, the property is owned by ARCO Environmental Remediation Limited (AERL), an indirect subsidiary of the Atlantic Richfield Corporation (ARCO), who leases certain buildings on the site to two tenants. Other buildings are abandoned and in disrepair. Several of these buildings were demolished between 1999 and 2002. An estimated 90% of the property is covered by asphalt paving, concrete slabs or buildings.

Operable Unit Number 1 (OU#1), which is the subject of this PRAP, consists of the 28-acre on-site property and the soils and groundwater beneath it. An operable unit represents a portion of the site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.

The remaining operable unit for this site (OU#2) consists of off-site contamination in the sediments and ecosystem of the Hudson River. A separate PRAP has been developed for OU#2.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

c.1850 to 1919 - The land beneath the site was created by filling. Industries at the site included the National Conduit and Cable Company, the Hastings Pavement Company and the American Brass Company.

1919 to 1977 - The site was owned and operated by the Anaconda Wire and Cable Company for the manufacture of copper wire, lead covered cable, high voltage cable and insulated wire. Beginning in the late-1930's, PCB (Aroclor) mixtures were used to impregnate paper- and asbestos-wrapped cable before the outer sheathing was applied. These PCB mixtures were prepared in the northwest corner of the site, and the wrappings were impregnated and dried in the western water tower area (see Figure 2). Unmixed Aroclors were also stored in Building 54 prior to use. In 1977, Anaconda was acquired by the Atlantic Richfield Corporation (ARCO).

1978 to 1998 - Several owners and tenants occupied the property, the most notable owner being Harbor at Hastings Associates. From 1988 through 1992, Building 15 was leased to Age Carting for operation as a construction and demolition (C&D) transfer station. During this period, an estimated 150,000 cubic yards of C&D waste was disposed in Building 15 and elsewhere on the property. Under a Court Order, this material was removed from the property by 1998.

1998 to present - In September 1998, ARCO re-acquired the property. During this period, several buildings in the southern part of the site were demolished, site security was improved, and all sub-leases were terminated. Presently, the site has two tenants, Riverside Auto Body and Guski Trucking Company. The property is fenced and gated, and on-site security personnel control access to the site.
A more complete description of the site history and industrial facilities is provided in the October 1995 "Summary and Evaluation of Existing Data" Report.

3.2: Remedial History

Between 1976 and 1989, several geotechnical and environmental investigations were conducted at the site which involved soil sampling and analysis. In particular, the December 1987 "Site Investigation Report" summarized the results of surface and subsurface soil samples, groundwater monitoring, and building sump samples. Based on this report, the U.S. Environmental Protection Agency (EPA) issued a Preliminary Assessment for the site in January 1989. Additional investigations were conducted during 1989, resulting in the October 1989 "Environmental Investigation Report." These investigations revealed the presence of PCBs, petroleum hydrocarbons and metal contaminants in surface and subsurface soils. These contaminants were also found in groundwater beneath the site at levels exceeding water quality standards. The maximum concentration of PCBs found during these investigations prior to 1990 was 4,100 parts per million (ppm) in subsurface soils in the northwest corner of the site.

In July 1989, the NYSDEC listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. The PRP for the site, documented to date, is the Atlantic Richfield Company (ARCO), a subsidiary of BP America, Inc..

The NYSDEC and ARCO entered into a Consent Order on November 16, 1995. The Order obligates ARCO to implement an RI/FS only. Upon issuance of the ROD the NYSDEC will approach ARCO to implement the selected remedy under an Order on Consent.

SECTION 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site.

The RI was conducted between November 1995 and May 2000. The field activities and findings of the investigation are described in the October 2000 "Remedial Investigation Report".

The following activities were conducted during the RI:

- Site surveying and off-shore bathymetry (water depth) measurements;
- Site inspections to determine potential source areas;
- A subsurface investigation consisting of 237 soil borings to determine the contaminant levels and physical properties of the subsurface fill and underlying soils;
- Installation of 17 permanent monitoring wells, 25 temporary piezometers and 18 floatin product recovery wells to evaluate water quality and to estimate flow conditions beneath the site; and
- Collection of 895 surface and subsurface soil samples and 46 groundwater samples for analysis.

To determine whether the soil and groundwater beneath the site contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater SCGs are based on NYSDEC "Ambient Water Quality Standards and Guidance Values".
- Soil SCGs are based on the NYSDEC "Technical and Administrative Guidance Memorandum (TAGM) 4046; Determination of Soil Cleanup Objectives and Cleanup Levels".
- The SCG for dioxin in soil is based on the Agency for Toxic Substances and Disease Registry (ATSDR) Interim Policy Guideline for Dioxin and Dioxin-Like Compounds in Soil.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized below. More complete information can be found in the RI report.

5.1.1: Site Geology and Hydrogeology

The site was constructed from man-made fill that was placed into the Hudson River. The upper Fill Unit ranges in thickness from 10 to 20 feet along the eastern boundary of the site, to 20 to 40 feet along the river shoreline. The fill is comprised of sand, silt, gravel, brick, concrete, ash, cinder, slag and other debris. The Fill Unit is moderately permeable, with conductivities estimated to be 10^{-3} to 10^{-5} cm/s.

The Fill Unit is underlain by the Marine Grey Silt Unit, which represents the original Hudson River sediments. This material occurs as a soft, plastic, low permeability clayey silt, with an estimated conductivity of 10^{-5} to 10^{-7} cm/s. The Marine Silt ranges in thickness from 10 feet on the eastern side of the site, to 40 feet along the Hudson River. Because of its low permeability ($1x10^{-7}$ cm/s), the Marine Silt Unit serves as a confining unit between contaminants in the layers above and groundwater discharging from the Basal Sands Unit below. Structurally, the Marine Silt Unit is highly compressible and has low shear strength, so it is not a suitable bearing surface for structures.

The Basal Sands are a unit of medium to dense coarse sands and gravels that vary in thickness from 10 feet on the eastern side of the site to 70 feet along the river. Because this unit provides structural support for pile-supported structures at the site, it is also referred to as the "bearing sands" unit.

Bedrock beneath the site occurs from approximately 50 feet below grade in the eastern portion of the site, to 100 feet or more below grade along the river.

Groundwater beneath the site is present in two productive units, the man-made Fill Unit, and the Basal Sand Unit. These units are separated by the Marine Silt layer that was the original Hudson River bottom.

Shallow groundwater in the Fill Unit originates from precipitation and infiltration through the land surface east of the site, flows westward through the fill, and discharges into the Hudson River. Except along the southern shoreline, groundwater in the Fill Unit flows unrestricted into the river. The new shoreline bulkhead described in Section 5.2 below provides a watertight barrier to groundwater flow along the southern part of the site. Along this portion of the shoreline, groundwater is diverted around the bulkhead before discharging to the river. The groundwater table in the Fill Unit ranges from 2 to 8 feet below grade, and varies in the western part of the site with the tidal fluctuations of the Hudson River.

Groundwater in the Basal Sands Unit originates to the east of the site, as part of the regional flow of groundwater from the upland areas of the Hudson River Valley towards the river. Because this groundwater originates at higher elevations along the river and is confined by the Marine Silt, it occurs under artesian conditions beneath parts of the site. That is, the water level in certain deep wells is higher than the ground surface. Groundwater in the Basal Sand Aquifer flows westward beneath the site and discharges to the Hudson River.

5.1.2: Nature of Contamination

As described in the RI report, many soil and groundwater samples were collected to characterize the nature and extent of contamination. As summarized in Table 1, the main categories of contaminants that exceed their SCGs are PCBs, semivolatile organic compounds (SVOCs) and inorganics (metals).

PCBs are a group of 209 different synthetic organic chemicals that were used in industry due to their resistance to heat and electrical insulating properties. PCBs have low solubility in water, low volatility in air, and tend to adsorb to oils, fats and carbon-rich materials, if available. In the environment, PCBs are relatively persistent, and are degraded only under certain highly favorable

conditions. PCBs bioaccumulate in animals, and concentrations in portions of the food chain can be 100,000 times higher than the levels found elsewhere in the environment.

PCBs were typically formulated into "Aroclor" mixtures, in which the degree of chlorination varied depending on the use of the product. The primary PCB mixture found at the Harbor at Hastings site was Aroclor 1260, with lesser amounts of Aroclor 1254. In pure form, Aroclor 1260 is 60% chlorine by weight, and is one of the heaviest, most viscous, and most persistent PCB mixtures. Aroclor 1260 is described in the technical literature as a "sticky resin." When it was used to impregnate the paper wrapping for high voltage cables, it was reportedly dissolved in a petroleum-based solvent.

Elastic Material Containing High Levels of PCBs

Hair-like Filament of Elastic Material

The highest levels of Aroclor 1260 found at the site were associated with an elastic material that resembles rubber cement. This elastic material ranged from small hair-like filaments to a 2-inch separate layer within the soil column. A liquid form of this elastic material, highly viscous in consistency, was also found in one monitoring well along the site shoreline. This elastic material is believed to be the Aroclor wire insulating mixture that was formulated in the northwest corner of the site. The liquid elastic material was found to contain traces of the solvent in which it was originally dissolved. This material had apparently leaked or was dumped into the ground and has migrated beneath the site and into the Hudson River. As the solvent carrier dissolved from the mixture into the groundwater, the PCB component became more viscous and, ultimately, resinous. Figure 3 shows a conceptual model of PCB migration from its source locations in the northwest corner and shoreline/water tower areas of the site.

SVOCs are another group of organic chemicals which generally have a moderate to low solubility in water, and which do not readily evaporate into air. The SVOCs found in site soils and fill are all polycyclic aromatic hydrocarbons (PAHs), such as pyrene, chrysene, and substituted anthracenes,

pyrenes and fluoranthenes. PAHs are commonly associated with coal, ash, heavy petroleum oils and products of incomplete combustion.

The inorganic contaminants of concern are the metals arsenic, beryllium, chromium, copper, lead, mercury and zinc. These metals may be associated with the ash and furnace slag that comprises much of the fill beneath the site. Arsenic, beryllium, copper and lead are also known to have been used by Anaconda in the manufacture of wire and cable.

Volatile organic compounds (VOCs) were not found consistently or at high levels in site media. One groundwater sample contained 1,1-dichloroethane and 1,1,1-trichloroethene at levels exceeding ambient water quality standards.

5.1.3: Extent of Contamination

This section describes the findings of the investigation for the environmental media that were investigated.

Chemical concentrations are reported in parts per billion (ppb) for groundwater and parts per million (ppm) for soil. For comparison purposes, where applicable, SCGs are provided for each medium.

Table 1 summarizes the degree of contamination for the contaminants of concern in soil and groundwater, and compares the data with the SCGs for the site.

Soil

PCBs

PCBs were detected in soils in five distinct areas of the site. These areas are the northwest corner, the shoreline/water tower area, the central area, the southwestern corner, and the southeastern corner of the site. These areas demonstrated different contamination characteristics, and so are discussed separately below. The total mass of PCBs present at the site is estimated to be 88,250 pounds.

Figures 4A, 4B, and 4C show the concentrations of PCBs in these areas at five depths: 1 foot, 6 feet, 10 feet, 20 feet, and 30 feet. These figures demonstrate the shallow nature of PCB contamination in the southwestern, southeastern and central areas, and the limit of contamination in the northwest corner at depths greater than 20 feet. The cleanup objectives used in these figures and in the discussion below are 1 ppm total PCBs in surface soil (0-1 foot), and 10 ppm total PCBs in subsurface soil (> 1 foot).

Northwest Corner

The highest PCB detections and greatest depth of migration were found in the northwest corner, where PCBs were historically mixed and used. The elastic matrix of highly concentrated Aroclor 1260 was found in several investigatory borings performed in the northwest corner of the site. The maximum detection in this area was 381,000 ppm (38%) PCB in a sample taken between 12 and 14 feet. In one location adjacent to the Hudson River, the liquid form of the elastic matrix was found,

pooled in a depression in the surface of the Marine Silt Unit at a depth of approximately 35 feet. As shown in Figures 4A, 4B and 4C, PCB contamination extends to at least 30 feet beneath the northwest corner. In some locations, the depth of contamination approaches 40 feet.

Northwest Corner Investigation

Northern Shoreline & Water Tower Area

PCB contamination along the northern shoreline and in the water tower area is believed to be related to the storage of wire reels and other materials in open areas of this part of the site. This open area included portions of two present buildings, Buildings 52A and 52B, which were constructed after 1954. Contamination in this area is not as deep or as concentrated as in the northwest corner. As shown in Figures 4A, 4B, and 4C, contamination along the shoreline does not exceed 20 feet below ground surface. The maximum PCB concentration found in this area was 90,000 ppm at a depth of 9 feet below ground surface. The elastic matrix was found in three soil borings taken from this area, including the sample containing the highest PCB level.

Central Area

PCBs were found at shallow depths near Building 72A, which was Anaconda's former laboratory building. The maximum detection in this area was 280 ppm of PCB (Aroclor 1260) at a depth of 0-2 feet below the building slab. The deepest exceedance of state cleanup objectives was a sample collected between 4 and 8 feet, with a concentration of 16 ppm.

Southeastern Area

Six soil samples were collected from the southeastern corner of the site. Unlike the rest of the site, Aroclor 1254, which is associated with electrical transformers, was also found in this area. The maximum detections of PCBs were 430 ppm of Aroclor 1260 at the surface (0-1 feet), and 140 ppm of Aroclor 1254 at 4 feet.

Southwestern Area

A small area of PCB contamination was identified by three samples taken in 1989, which found Aroclor 1260 with a maximum concentration of 930 ppm in a sample 3 to 5 feet deep. Recent samples taken from the area, including immediately adjacent to the 1989 locations, found a maximum detection of 33 ppm. Because the 1989 samples were not analyzed in accordance with current quality control procedures, the specific numerical results are not reliable. Nevertheless, all the sample locations where PCB detections exceed their cleanup goals are included in the Southwestern Area.

Lead

Several occurrences of high lead levels, exceeding the NYSDEC soil cleanup objective of 400 ppm, were found in surface soils in the southern part of the site, where lead scrap was collected and recovered. Elevated lead levels were found in 6 samples collected from 0-2 feet in the southern area. These "hot spots", which are shown on Figure 5, ranged in concentration from 2160 ppm to 43,200 ppm. Elsewhere in this area, lead levels in surface soil were much lower, ranging from 6.8 ppm to 670 ppm. The locations with high detections were scattered throughout the southern area among locations with much lower levels, indicating a sporadic pattern of distribution.

Elsewhere, elevated lead levels, between 400 ppm and 1000 ppm, were found at intermediate depths (4' to 18') at several locations in the southern, central, and northwestern parts of the site. There is no apparent correlation of these detections to the historic use of the buildings and open spaces above them. The only discernable pattern is that they occur in the western half of the site. Based on the widespread, sporadic distribution of elevated lead at intermediate depths, with lower levels above and below, this may be related to the type of fill used to create the land mass. The use of more lead-bearing wastes, such as ash and slag, at certain times during the filling process could have caused this pattern of distribution. Alternatively, the variable retention properties of this fill may have caused process-related wastes leaching from the surface to preferentially adsorb at these intermediate depths.

Copper

Copper was found throughout the site at levels exceeding the NYSDEC soil cleanup objective of 25 ppm. Sporadic detections of very high copper levels (>10,000 ppm) were found at intermediate depths (6' to 18') in the southern, central, and water tower areas of the site. Three of the shallow samples identified as lead "hot spots" were also highly contaminated with copper, indicating that scrap wire operations at the south end of the site also released copper to surface soils.

Other Metals

Zinc was found throughout the site at levels exceeding the NYSDEC soil cleanup objective of 20 ppm. The highest levels of zinc (>1000 ppm) were found at intermediate depth, suggesting a fill-related source, such as furnace slag. Berylium was also found to frequently exceed its soil cleanup objective of 0.16 ppm.at locations throughout the site. Other metals found at lower frequencies were arsenic, barium, cadmium, chromium, cobalt, cyanide mercury, nickel, and silver.

Chlorinated Dibenzofurans and Dioxins

A special investigation for dioxins in surface soil was conducted in areas where scrap was incinerated and refuse was burned in the open. As shown in Figure 5, these areas include:

- a former incinerator south of the south boat slip,

- an area north of Building 57 used for open burning, and
- an area further north of Building 57 where an incinerator was located.

Dioxin results are compared to the action levels established by the federal Agency for Toxic Substances and Disease Registry (ATSDR) by determining the toxicity equivalent (TEQ) for each sample. The relative toxicity of individual dioxin-like compounds are normalized to the equivalent toxicity of 2,3,7,8-TCDD by multiplying their concentration by a Toxicity Equivalency Factor (TEF). The total TEQ is the sum of these normalized toxicity equivalents for all dioxin compounds detected. The ATSDR action level for dioxin TEQ is 1 ppb.

Samples from the southern incinerator area had dioxin TEQs of 0.19 to 0.33 ppb, below the ATSDR action level. In the northern burning areas, dioxin TEQ ranged from 5.1 to 8.3 ppb. These areas coincide with samples where PCBs exceeded 1 ppm in surface soil.

Semivolatile Organic Compounds

Semivolatile Organic Compounds (SVOCs) were detected in surface and subsurface soil samples throughout the site. The predominant group of SVOCs that were detected are polycyclic aromatic hydrocarbons (PAHs) such as pyrene, chrysene, and substituted anthracenes, pyrenes and fluoranthenes. These PAHs are commonly associated with ash, asphalt, heavy petroleum oils and products of incomplete combustion. Elevated levels of PAHs were found at intermediate depths (4' - 18') at scattered locations in the southern part of the site. Their sporadic distribution at intermediate depths suggests that they are related to the fill that was historically used to construct the site.

Groundwater

Groundwater samples taken from the Fill Unit were analyzed in both filtered and unfiltered forms to determine the influence of suspended fine particles on contaminant levels. The majority of unfiltered samples contained PCBs at levels that exceed the ambient groundwater standard of 0.09 ppb. One unfiltered groundwater sample contained PCBs at 390 ppm, which is more than 100 times greater than the reported solubility of Aroclor 1260 (2.1 ppb). This sample was taken from the well containing “liquid elastic matrix”, and it is likely that particles of this matrix were collected with the water sample. Filtered samples contained much lower levels of PCBs, with a maximum detection of 1.0 ppb.

High levels of metals, primarily lead and copper, and several PAHs were also found in unfiltered groundwater samples. As shown below, filtered samples contained a lower frequency of exceedance and lower maximum levels of these metals, indicating a component of particulate-phase transport of these contaminants.

Unfiltered Samples		
	Copper	Lead
% of Samples Exceeding Standard	46%	77%

Maximum Exceedance of Standard[a]	57	106
Filtered Samples		
	Copper	Lead
% of Samples Exceeding Standard	4%	19%
Maximum Exceedance of Standard[a]	1.4	33

[a] Ratio of the maximum detected value to the standard

One groundwater sample taken in 1989 contained the volatile organic contaminant 1,1,1-trichloroethene at a concentration of 89 ppb, but this was not found in later samples.

Groundwater samples taken from the Basal Sand Unit did not contain detectable levels of PCBs or PAHs. Metals of concern were either not detectable, or well below ambient water quality standards. The highest levels of copper and lead were 7.3 ppb and 6.5 ppb, compared to their standards of 200 ppb and 25 ppb, respectively. The presence of the marine silt unit and the strong upward groundwater flow gradient have effectively prevented site contaminants from entering the Basal Sand Unit.

Floating Petroleum Product

A thin layer of petroleum product, or light non-aqueous phase liquid (LNAPL), was found floating on groundwater in the immediate vicinity of the water tower. This is the location of former 100,000 gallon above-ground storage tanks that served the boiler system in Building 57 north of the water tower. The thickness of this layer ranged from a sheen to 1 ½". This LNAPL was tested and found to contain PCBs in excess of 50 ppm. Removal of this LNAPL from the subsurface is being performed as an interim remedial measure, as discussed below.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the RI/FS.

Building 14 Sump and Trench Cleanout - Building 14, located in the southern portion of the site, had been used as a boiler house and for electrolytic processing. Certain samples of standing water and sediment from three sumps and a trench were found to be contaminated with PCBs. An IRM was performed in December 1997 to pump out water and sediments, steam clean the surfaces of these structures, and backfill them with clean sand.

Floating Oil Recovery - In the water tower area, a layer of petroleum contamination was found, floating on the groundwater surface. The thickness of this layer ranged from a thin sheen to 1½ inches, and the oil was found to be contaminated with PCBs. In June 1998, oil recovery devices were installed in four monitoring wells, and oil is being removed from them on a weekly basis. Through February 2004, approximately 430 gallons of oil have been recovered, and this system will

continue to operate until the floating product is removed. All recovered oil is temporarily stored on-site and disposed at a permitted off-site facility.

Northwest Corner Interim Cover

In June 1998, the top 2 inches of surface soils from the Northwest Corner of the site were found to contain up to 4,400 ppm of PCBs. Because Buildings 53 and 54 are located adjacent to this area, and were occupied by a manufacturing operation, concerns were raised for potential exposure of workers to contaminated dusts. In July 1998, an interim cover of four inches of gravel was placed over exposed soils, and a fence was erected around areas of contamination.

Shoreline Bulkhead

Most of the existing bulkhead along the Hudson River is comprised of a combination of wooden bulkheads, stone revetment (rip-rap), and a short section of steel sheeting. Portions of the wooden bulkhead are badly deteriorated, and there is evidence of fill releases to the river and settlement of pavement and building slabs. Also, sediment samples taken offshore of the northwest corner were found to contain the "rubber cement" material and to be contaminated with high levels of PCBs, indicating subsurface releases along the shoreline.

To prevent the further release of contaminated fill and PCBs to the river, ARCO installed a sheet pile bulkhead as an IRM along the southern portion of the shoreline, where the deterioration was most severe. This work was completed in December 2000. The steel sheeting was driven into the marine silt layer to prevent further releases of contaminants at the site shoreline. Because the sheeting is water tight, groundwater that previously discharged continuously along the shoreline is now re-directed around the ends of the wall.

5.3: Summary of Human Exposure Pathways

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in the Risk Assessment, which can be found at the document repositories listed in Section 1.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

There are currently no completed human exposure pathways on OU1 of the site due to the following:

- buildings, pavement and gravel cover contaminated soil across the site;
- a fence, gate, and on-site security personnel control access to the site; and
- a public water supply provides potable water to the site.

However, in the absence of remediation, the following potential exposure pathways exist:

- humans could come into direct contact with, or incidentally ingest, contaminated soils if existing cover materials are removed and existing security measures that restrict access to the site do not continue;
- humans may inhale contaminated air-borne particulates if existing cover materials are removed and dust is generated; and
- humans may be exposed to contaminated groundwater if a private well is installed for non-potable use (e.g., as a production well) or for a supplemental source of potable water.

In addition, on-site contamination is migrating off-site and impacting the water, sediments and biota of the Hudson River. Although recreational users of the river may be exposed to site-related contaminants through the incidental ingestion of contaminated surface water, the primary human exposure pathway is through the consumption of contaminated fish. This exposure pathway is addressed in the PRAP for OU2.

5.4: Summary of Environmental Impacts

This section summarizes the existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The Fish and Wildlife Impact Analysis, which is included in the RI Report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors. The following environmental exposure pathways and ecological risks have been identified:

The Hudson River environment is exposed to site contaminants due to the hydraulic connection between site groundwater and the river water. River sediments are also subject to contamination from the release of subsurface fill and elastic matrix along the shoreline, and the runoff of contaminated surface soils. Sediment samples taken from the Hudson River indicate the presence of both metals and site-related PCBs at high concentrations. As a result, the ecological exposure pathway is considered to be complete.

The primary ecological exposure pathway is through the migration of PCBs from the site to river water and sediments and their uptake and bioconcentration by aquatic organisms in addition to bioaccumulation in wildlife consuming those organisms. The potential also exists for direct contact with and/or ingestion of soils and water by wildlife living near the site.

These environmental exposure pathways have been further investigated as part of the off-site investigation of Operable Unit #2 of this site.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- Reduce, control, or eliminate to the extent practicable the contamination present within the soils and fill on site, and thereby eliminate the significant threat posed by the presence of hazardous wastes at the site.

- Eliminate the potential for direct human or animal contact with the contaminated soils or groundwater on site.

- Eliminate the threat to surface waters and sediments by eliminating surface run-off and subsurface releases of fill from the site.

- Eliminate, to the extent practicable, the migration of PCBs, metals and other containants into the Hudson River by surface and subsurface erosion of contaminated soils, transport of contaminated groundwater, and migration of PCBs in both elastic material and petroleum phases.

- Prevent, to the extent possible, migration of contaminants at the site to groundwater and surface water.

Further, the remediation goals for the site include attaining to the extent practicable:

- Provide for attainment of SCGs for groundwater quality at the limits of the site.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for Operable Unit #1 of the Harbor at Hastings Site were identified, screened and

evaluated in the November 2002 "Feasibility Study", which is available at the document repositories identified in Section 1.

A summary of the remedial alternatives that were considered for this site are discussed below. The present worth represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address contaminated soils and groundwater at the site. Table 2 provides a summary of the key elements and certain performance measures of these alternatives. Most of these alternatives include institutional controls to prevent future exposure to any residual contamination that would remain at the site. These institutional controls include a declaration of restrictions on the property deed, a detailed example of which is provided in Appendix A of this document. This restriction will require:

- Notification of NYSDEC and NYSDOH for any intrusive activities that could result in exposure to subsurface soils, or any change in the use of the site that could cause subsurface soils to become exposed;

- A prohibition on the construction of pile-supported structures over the Northwest Corner and Northern Shoreline containment areas;

- Development of a soils management plan to address residual contaminated soils that may be excavated from the site during future redevelopment. The plan will require soil characterization, proper health and safety procedures for subsurface excavation and, where applicable, disposal/reuse in accordance with NYSDEC regulations;

- Annual certification that the institutional controls and engineering controls put in place pursuant to the Record of Decision are still in place, have not been altered, and are still effective;

- A prohibition on the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the NYSDEC and the Westchester County Department of Health.

Alternative 1:
No Action

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. Ongoing IRMs would be discontinued, and existing security measures would be abandoned. This alternative

would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth:	$ 0
Capital Cost:	$ 0
Annual O&M:	$ 0

Alternative 1A: No Further Remedial Action
• Administrative Controls
• Reconstruction of Shoreline Bulkhead

No Further Remedial Action is a variation of the No Action Alternative that provides for continued administrative controls limiting site access, continued operation of IRMs, and reconstruction of the bulkhead along the remaining shoreline. This was presented as the No Action Alternative in the FS, but is distinguished from the No Action Alternative in this PRAP due to its extensive scope. It is presented as a sub-alternative to maintain consistency with the FS in the numbering of the remaining alternatives.

The property is presently fenced and gated, and on-site security personnel control access to the site. These administrative controls would continue. The two ongoing IRMs described in Section 5.2, floating oil (LNAPL) recovery and Northwest Corner surface cover, would continue to be operated and maintained.

To prevent the erosion of fill material into the river, the bulkhead described in Section 5.2 would be installed along the remaining shoreline. Conceptually, this bulkhead would consist of a Waterloo Barrier® or equivalent sealed sheet-pile system. The Waterloo Barrier® is a steel sheet pile system in which the joints between sheets are sealed with grout to create an impermeable wall. While this impermeable wall would prevent contaminants from flowing into the river, it could also create a backup and mounding of groundwater beneath the site. For this reason, the bulkhead would be designed to include groundwater collection, hydraulic relief or diversion structures as necessary. The bulkhead would also include a cathodic protection system to reduce the rate of corrosion. Alternative shoreline containment methods would be considered as appropriate, based on future site re-use and hydrogeologic factors.

Present Worth:	$ 16,800,000
Capital Cost:	$ 10,500,000
Annual O&M:	$ 220,000
Time to Implement	1 year

Alternative 2:
• Excavation of all PCB-Contaminated Fill Excavation of Lead Hot Spots
• Bulkhead Reconstruction

This alternative would remove all soil that exceeds the NYSDEC's soil cleanup objective for PCBs: 1 ppm in surface soil (0 to 1 foot below grade), and 10 ppm in subsurface soil (> 1 foot below grade).

Because the total depth of excavation would approach 40 feet below grade, both dry and flooded excavation methods would be required, as described below. The estimated volume of PCB contaminated fill (as measured in place) that would be excavated and disposed off-site is 110,000 cubic yards.

This remedial alternative would also include the excavation and off-site disposal of fill containing high levels of lead from the 6 "hot spots" identified in Section 5.1.3 of this document. Lead-contaminated fill would be excavated from four, two-foot deep, 50 foot x 50 foot areas and two, two-foot deep, 25 foot x 50 foot areas along the shoreline and property line. The estimated total volume of lead-contaminated fill (as measured in place) that would be excavated and disposed of off-site is 925 cubic yards. Post-excavation sampling would be conducted to verify that no high levels of lead remain in surface soils in this area.

Because this excavation would remove those areas where IRMs are ongoing (free product recovery, northwest corner interim cover), these would be discontinued. To prevent the erosion of remaining fill material along the shoreline, the shoreline bulkhead would be reconstructed as described in Alternative 1A.

Present Worth:	$ 150,000,000
Capital Cost:	$ 149,000,000
Annual O&M:	$ 12,000
Time to Implement	4 years

"Dry" Excavation Methods

Alternatives that remove fill material from the site include varying depths of excavation, but all involve the technique of "dry excavation" for the upper several feet of material. Alternatives 7 through 12 rely solely on dry excavation methods because deeper fill is not removed.

Generally, shallow excavations within the upper 4 feet of fill could be conducted without the need for bracing or pumping of groundwater (de-watering). Beyond 4 feet, and below the water table, excavations would require shoring and bracing to be completed safely. Shoring typically consists of steel sheets driven into the ground around the perimeter of the excavation to prevent the walls from collapsing as material is removed. These are either braced internally, or are tied back to supports outside the excavation. For sheeting along the Hudson River shoreline, tiebacks into the river sediments may be necessary.

Installation of a shoring system at the site is made more difficult by the presence of buried debris, abandoned structures and foundation piles. These would likely interfere with the driving of sheeting around the excavation, and with the removal of material from within it. Pre-trenching and removal of obstructions would be necessary before any sheeting could be driven.

Excavation "in the dry" is the technique of pumping water out of an excavation to allow the material to be removed in solid form, and to visually monitor the progress of the excavation. Because the water level outside the hole is higher than inside it, the differential water pressure adds significantly to the forces acting on the shoring system.

Excavation Alternatives

Most of the alternatives under consideration involve varying degrees of excavation and removal of contaminated fill from the site. Specific excavation techniques are described in the following pages. Aside from the method of excavation, the following elements are common to the alternatives involving excavation:

Buildings and other structures located in areas targeted for excavation would be demolished and their foundations would be removed. Asbestos and lead abatement would be conducted as necessary prior to demolition.

Excavation cells would be created by driving sheet piles around the perimeter of the targeted area. Additional pre-design investigation may be necessary in certain areas to delineate the targeted area. As excavation proceeds, the cells would be de-watered by pumping groundwater with submersible pumps. Pumped groundwater would be filtered to remove fine soil particles, along with suspended and dissolved contaminants, with subsequent off-site disposal of the filtered solids. The treated water would be discharged to the river in compliance with the State Pollution Discharge Elimination System (SPDES).

The excavated material would be de-watered and mixed with a solidifying agent on-site as necessary to comply with transportation requirements as a solid material. The fill would be stockpiled on-site and tested to determine whether it should be disposed as hazardous or non-hazardous waste. The material would then be transported by rail or barge for disposal in a permitted off-site landfill which meets all state and federal disposal standards. Rail transportation may require rehabilitation of the existing site railroad spur.

The feasible limit of dry excavation at this site is primarily determined by the potential for "bottom heave". Bottom heave occurs when the soil at the bottom of the excavation can no longer withstand the pressure exerted by the surrounding soils and groundwater, and it heaves upward into the excavation. This could cause the collapse of the shoring system and surrounding structures. The maximum safe depth for dry excavation at this site is estimated to be between 12 and 15 feet. According to ARCO's Feasibility Study, excavation below 9 feet must be performed by injecting grout into the bottom of the excavation. This high density grout adds additional weight to the bottom of the hole to offset the forces that cause bottom heave. This technique is effective to approximately 12 feet below grade. Below this depth, excavation must proceed by flooded methods, as described below.

Alternative 3:

• Excavation of all Contaminated Fill above the Water Table
• Excavation of PCB-Contaminated Fill below the Water Table
• Bulkhead Reconstruction
•

In addition to the PCB-contaminated fill specified in Alternative 2, this alternative would also excavate all fill located above the water table that contains any contaminant that exceeds its soil cleanup objective. This would include the lead "hot spots" discussed in Alternative 2. Because the total depth of excavation would be approximately 40 feet below grade, both dry and flooded excavation methods would be required. The estimated volume of fill (as measured in place) that would be excavated and disposed off-site is 287,000 cubic yards.

Because this excavation would remove those areas where IRMs are ongoing (free product recovery, northwest corner interim cover), these would be discontinued. To prevent the erosion of remaining fill material along the shoreline, the shoreline bulkhead would be reconstructed as described in Alternative 1A.

Present Worth:	$ 225,000,000
Capital Cost:	$ 224,000,000
Annual O&M:	$ 25,000
Time to Implement	3 years

Alternative 4:

• Excavation of all PCB-Contaminated Fill
• Excavation of Lead Hot Spots
• Construction of a Multi-Layered Cap
• Bulkhead Reconstruction

This alternative would consist of excavation and off-site disposal of all surface and subsurface fill where PCB concentrations equal or exceed 1 ppm and 10 ppm, respectively. This alternative would also include the removal of lead "hot spots", as described in Alternative 2.

Deep (Flooded) Excavation Methods

Alternatives that include excavation of the full thickness of fill, to 40 feet or more, require a more difficult method of excavation. Past the depth where dry excavation becomes unstable, further excavation would proceed by flooding the hole with water and dredging the fill in slurry form. This slurry, with a low solids content, would be pumped to a treatment area for de-watering and filtration. Sufficient water would be pumped into the excavation cell to maintain the water level at or above ground level to prevent bottom heave from occurring.

This method presents several significant challenges and concerns:

- Flooding the excavation increases the driving force for contaminants to move downward into the clean Basal Sand Unit. This is a particular concern where structural piles must be removed from the excavation area. As the piles are pulled out through the Marine Silt layer, the resulting void may act as a conduit for contaminant migration into the Basal Sand.
- Inspection and control of the excavation is very difficult due to the presence of turbid water in the hole. Verifying completion of the excavation is similarly difficult.
- The extracted slurry contains a high percentage of water that must be removed and treated. The de-watered fill requires additional filtration or addition of a bulking agent for shipment off-site.
- Clean backfill material is likely to be re-contaminated by the dirty water remaining in the hole.
- Tidal fluctuations in groundwater level must be accounted for in maintaining the water level in the excavation area.
- The risk of collapse, worker injury and contaminant release to the Hudson River is increased.

Because this excavation would remove those areas where IRMs are ongoing (free product recovery, northwest corner interim cover), these would be discontinued. To prevent the erosion of remaining fill material along the shoreline, the shoreline bulkhead would be reconstructed as described in Alternative 1A.

Because the total depth of excavation would approach 40 feet below grade, both dry and flooded excavation methods would be required. The estimated volume of PCB contaminated fill (as measured in place) that would be excavated and disposed off-site is 110,000 cubic yards.

To address fill-related contamination that would remain after excavation is complete, a multi-layer, impermeable cap would be installed. This type of cap is described below, and is designed to minimize infiltration of rainwater and snow melt into the capped area. To protect the impermeable barrier from penetrations, future development of the site would be restricted, and new buildings would not be permitted. Future use would likely be open space or parkland, using only structures that could be supported on footings, rather than piles.

Present Worth:	$ 167,000,000
Capital Cost:	$ 158,000,000
Annual O&M:	$ 311,000
Time to Implement	9 months

Alternative 5:

• Containment of the Water Tower and Northwest Corner Areas
• Excavation of Fill Containing the "Elastic Matrix"
• Excavation of Contaminated Fill above the Water Table outside the Containment Area
• Bulkhead Reconstruction

This alternative would consist of excavation and off-site disposal of all fill containing the highly contaminated "elastic matrix" described in Section 5.1.2 above. For purposes of estimating volumes and costs of this remedial alternative, the extent of fill containing the "elastic matrix" was defined as all fill containing PCB concentrations greater than or equal to 1,000 ppm. This assumption is based on RI data that shows the presence of the "elastic matrix" generally corresponds to soil concentrations greater than 1,000 ppm. Because the total depth of this excavation would approach 40 feet below grade, both dry and flooded excavation methods would be required. The estimated total volume of fill containing the "elastic matrix" (as measured in place) that would be excavated and disposed off-site is 28,000 cubic yards.

In addition to the excavation and off-site disposal of fill containing the "elastic matrix", a containment system would be constructed around the Water Tower and Northwest Corner areas, as described in the sidebar "Containment of the Northwest Corner and Water Tower Areas". This would contain the remaining PCB contamination after the highly contaminated elastic matrix is removed. This containment system would comprise 1.9 acres, which would be restricted from development.

In areas outside of the containment system, all fill located above the water table that contains any contaminant that exceeds its soil cleanup objective (including PCBs and lead) would also be excavated. In addition, all fill below the water table and outside the containment area with PCBs exceeding 10 ppm would be removed. This portion of the excavation could be performed using dry excavation methods. The estimated total volume of fill (as measured in place) that would be excavated outside of the containment area would be 208,000 cubic yards, bringing the total excavation volume for Alternative 5 to 236,000 cubic yards.

Finally, the bulkhead along the waterfront would be reconstructed to prevent erosion of fill material and particulate transport into the Hudson River. Operation of the LNAPL recovery system would

also continue. This alternative would remove approximately 98% of the current mass of PCB contamination from the site.

Present Worth:	$ 165,000,000
Capital Cost:	$ 162,000,000
Annual O&M:	$ 111,000
Time to Implement	12 Months

Multi-layer Impermeable Cap

Alternatives 4 and 6 include a cap with an impermeable barrier to prevent precipitation from entering the fill. For alternatives that include containment of the northwest corner and water tower areas, this type of cap is also included for the contained area.

This cap would be designed to meet the requirements for landfill capping (6NYCRR Part 360) and PCB disposal facilities (TSCA Part 761). However, because fill at the site doesn't generate methane, the gas venting requirements of a Part 360 cap would be waived. The components of the cap, from bottom to top would be:

- a bedding layer of sand or geotextile to protect the barrier from underlying debris
- an impermeable layer of geomembrane or compacted clay
- a barrier protection layer of 18" of soil
- a 6" vegetated topsoil or asphalt layer

The underlying fill and/or bedding layer would be properly sloped to promote drainage along the overlying barrier layer and away from the site. Additional drainage layers or structures may be necessary to convey water collected above the barrier to the discharge point.

Unlike the contact barrier/soil cover described elsewhere, this cap is intended to minimize the amount of precipitation entering the fill. As a result, this cap would have more stringent requirements for intrusive work beneath the cap and restrictions on structures built over it.

Containment of the Northwest Corner and Water Tower Areas

Alternatives 5 through 9, 11 and 12 include containment of the northwest corner and water tower areas, either alone or in conjunction with excavation. This containment area would consist of a vertical barrier surrounding the areas containing 10 ppm or greater of PCBs, and a multi-layer cap. The vertical barrier would prevent groundwater from flowing into and out of the containment area, minimizing the potential for contaminants to further migrate into the Hudson River.

The vertical barrier system would be constructed using a Waterloo Barrier® or equivalent sealed sheet-pile system along the shoreline. The Waterloo Barrier® is a steel sheet pile system in which the joints between sheets are sealed with grout to create an impermeable wall. This would also serve as the bulkhead along the shoreline.

The upland sides of the containment area would be enclosed by a slurry wall keyed into the underlying Marine Grey Silt Unit. A slurry wall is a vertical trench filled with a low permeability material such as bentonite clay or a clay-cement mixture. The trench would be excavated into the surface of the Marine Silt unit, so that the low permeability wall is sealed into a low permeability base.

The contained area would be capped by a low permeability cap to minimize infiltration into the containment cell, as described in "Multi-Layer Impermeable Cap". Water levels inside the cell would be monitored and water would be extracted and treated as necessary to prevent a buildup that could mobilize contamination.

The acreage of the PCB containment area would vary, depending on the excavation component of each alternative. The contained area would be restricted from development to maintain the integrity of the impermeable cap and prevent exposure to the high levels of PCBs beneath it.

Alternative 6:

• Containment of the Water Tower and Northwest Corner Areas
• Excavation of Fill Containing the "Elastic Matrix" in the Containment Area
• Excavation of Lead Hot Spots
• Construction of a Multi-Layered Cap
• Bulkhead Reconstruction

This alternative is similar to Alternative 5, except that only lead hot spots would be excavated outside the containment area, and the remainder would be covered with a multi-layer, impermeable cap.

The elastic matrix, corresponding to approximately 1000 ppm PCBs, would be excavated using both dry and flooded excavation methods, to a depth of about 40 feet. Lead hot spots in the southern part of the site would also be excavated and removed.

A containment system would be constructed around the Northwest Corner and Water Tower areas. The entire site would then be capped with an impermeable multi-layer cap, and would be restricted from development.

This alternative would remove approximately 97% of the existing mass of PCB contamination from the site.

Present Worth:	$ 132,000,000
Capital Cost:	$ 123,000,000
Annual O&M:	$ 309,000
Time to Implement	12 Months

Soil Barrier System

Alternatives 7 through 12 include a 24-inch soil barrier system to prevent direct exposure to contaminated soil beneath the site. The system would consist of a demarcation layer of synthetic material such as Geogrid, or asphalt, concrete that is placed on top of the existing fill, except where existing foundations or pavement already provide an effective demarcation layer. Where these surfaces are in disrepair, they would be repaired or replaced. The demarcation layer would then be covered with an 18-inch layer of soil and a 6-inch layer of topsoil that would be seeded and fertilized. Alternative surfaces, such as new pavement or building slabs, would be considered as a substitute for the upper 6-inch layer, in conjunction with the final site development plan.

Although the demarcation layer is not intended to be a precipitation barrier, large areas of subsurface asphalt or concrete would collect significant rainfall and snow melt. The soil barrier system would include measures to promote runoff and/or infiltration, including grading, drainage swales infiltration zones, and/or other controls. In alternatives where containment of the northwest corner and water tower area is provided, the cover system would consist of a multi-layer cap with an impermeable layer to minimize infiltration into the containment area, as described earlier.

To ensure that future activity at the site would not compromise the integrity of the soil barrier, and to prevent future exposure to contaminated fill, an easement or restrictive covenant would be placed on the deed. This easement or covenant would specify the requirements for conducting intrusive activities beneath the soil barrier. These requirements would include NYSDEC, NYSDOH and Village notification, health and safety planning, soil management and disposal, and barrier repair procedures that must be followed in the event that intrusive activities are conducted beneath the barrier. Proposed requirements for this legal instrument are presented in

Alternative 7:
Containment of the Water Tower and Northwest Corner Areas
- **Excavation of Shallow PCB-Impacted Fill**
- **Excavation of Lead Hot Spots**
- **Soil Barrier System**
- **Bulkhead Reconstruction**

This alternative is similar to Alternatives 5 and 6, except that excavation would be limited to PCB-contaminated fill located within six feet of the ground surface, both inside and outside of the containment area. This alternative would also include the excavation and off-site disposal of the lead "hot spots" described in Alternative 2.

The containment system would be constructed around areas of the site where PCBs in fill exceed 10 ppm after shallow excavaton is complete. This would include areas containing the "elastic matrix" of highly contaminated material that would not be removed under this alternative. The acreage of this containment area would be 3.8 acres, which would be restricted from development.

A soil barrier system would also be constructed over the entire site, and the bulkhead along the entire waterfront would be reconstructed. The floating product collection IRM would be continued until all LNAPL is recovered.

The estimated volume of fill that would be excavated and disposed off-site (as measured in-place) is approximately 42,000 cubic yards. Excavation of PCB-containing fill would be limited to the depth of the groundwater table. Dewatering is expected to be minimal. Post excavation sampling and analysis would be used to determine the ultimate disposition of the material. This alternative would remove approximately 29% of the existing mass of PCB contamination from the site.

Present Worth:	$ 45,800,000
Capital Cost:	$ 39,400,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 8:

• Containment of the Water Tower and Northwest Corner Areas
• Excavation of PCB-Contaminated Fill above the Water Table and outside the Containment Area
• Excavation of Lead Hot Spots
• Soil Barrier System
• Bulkhead Reconstruction

This alternative is very similar to Alternative 7, except that shallow PCBs inside the containment area would not be excavated. Excavation would be limited to PCB-contaminated fill located within six feet of the ground surface outside of the containment area. This alternative would also include the excavation and off-site disposal of the lead "hot spots" described in Alternative 2.

A containment system would be constructed around areas of the site where PCBs in fill exceed 10 ppm in the Northwest Corner and Water Tower area. This would include areas containing the "elastic matrix" of highly contaminated material that would not be removed under this alternative. The acreage of this containment area would be 3.8 acres, which would be restricted from development.

A soil barrier system would also be constructed over the entire site, and the bulkhead along the entire waterfront would be reconstructed. The floating product collection IRM would be continued until all LNAPL is recovered.

The estimated volume of fill that would be excavated and disposed off-site (as measured in-place) is approximately 10,000 cubic yards. Excavation of PCB-containing fill would be limited to the depth of the groundwater table. Dewatering is expected to be minimal. Post excavation sampling and analysis would be used
to determine the ultimate disposition of the material. This alternative would remove less than 1% of the existing mass of PCB contamination from the site.

Present Worth:	$ 33,000,000
Capital Cost:	$ 25,900,000
Annual O&M:	$ 246,000
Time to Implement	12 Months

Alternative 9:

- **In-Situ Stabilization/Solidification of the "Liquid Elastic Matrix"**
- **Containment of the Water Tower and Northwest Corner Areas**
- **Excavation of PCB-Contaminated Fill above the Water Table and Outside the Containment Area**
- **Excavation of Lead Hot Spots**
- **Soil Barrier System**
- **Bulkhead Reconstruction**

This alternative includes all the elements of Alternative 8, with the addition of in-place stabilization of the most potentially mobile form of PCBs, the elastic matrix. Stabilization/Solidification technology was first evaluated in the June 1998 Draft Feasibility Study Report as an in-place method of treating the elastic matrix. The area where the liquid elastic matrix is present would be stabilized/solidified by injecting and mixing a binding agent such as Portland cement. Pilot testing of this technology showed a low degree of chemical immobilization of PCBs. However, solidification is expected to effectively reduce the permeability of the fill containing the elastic matrix, thereby reducing the groundwater flow and potential for contaminant migration. PCB-contaminated fill located within six feet of the ground surface outside of the containment area would be excavated and disposed off-site. This alternative would also include the excavation and off-site disposal of the lead "hot spots" described in Alternative 2.

A containment system would be constructed around areas of the site where PCBs in fill exceed 10 ppm in the Northwest Corner and Water Tower area. This would include areas containing the "elastic matrix" of highly contaminated material. The acreage of this containment area would be 3.8 acres, which would be restricted from development.

A soil barrier system would also be constructed over the entire site, and the bulkhead along the entire waterfront would be reconstructed. The floating product collection IRM would be continued until all LNAPL is recovered.

Monitoring and Maintenance

Alternatives that include excavation of contaminated soil or long-term management by capping or containment would require monitoring, both during the construction phase and in the long term.

Construction-Phase Monitoring

Monitoring during soil excavation would be necessary to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) would be developed during the remedial design phase. These plans would specify the monitoring procedures, action levels, and contingency measures that are required to protect public health. Generally, air monitoring for PCBs would include both laboratory analysis for volatile emissions and real-time measurement of dust levels. A sample CAMP is attached as Appendix B of this PRAP.

Post-Construction Monitoring and Maintenance

Long-term monitoring and maintenance would be required for alternatives that involve containment or capping of contaminated soil.

Water quality and water elevation monitoring would be performed inside the containment area to ensure that the impermeable cap, slurry wall, and sealed sheet piles are properly functioning, and that excessive groundwater does not accumulate. Groundwater monitoring would also be performed outside the containment area to demonstrate that the shoreline bulkhead is watertight and that the associated groundwater and stormwater diversion structures are functioning properly.

The estimated volume of fill that would be excavated and disposed off-site (as measured in place) is approximately 10,000 cubic yards. Post-excavation sampling and analysis would be used to determine the ultimate disposition of the material. This alternative would remove less than 1% of the existing mass of PCB contamination from the site.

Present Worth:	$ 37,200,000
Capital Cost:	$ 30,800,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 10:
• Excavation of Lead Hot Spots
• Construction of a Soil Barrier System
• Bulkhead Reconstruction

This alternative consists of excavation of fill containing lead "hot spots" and installation of a soil barrier system over the entire site. No PCB-contaminated fill would be excavated. The bulkhead

along the entire waterfront would be reconstructed, and the floating product collection IRM would be continued until all LNAPL is recovered.

Present Worth:	$ 17,600,000
Capital Cost:	$ 10,500,000
Annual O&M:	$ 246,000
Time to Implement	12 Months

Alternative 11:

• Containment of Water Tower and Northwest Corner Areas
• Excavation of PCB-Contaminated Fill to Multiple Depths (3, 9, and 12 feet)
• Excavation of Lead Hot Spots
• Construction of a Soil Barrier System
• Bulkhead Reconstruction

This alternative consists of a mixture of on-site containment and excavation in the Northwest Corner and Water Tower areas.

Based on the FS' conclusion that the maximum feasible depth of dry excavation is 12 feet, this alternative would excavate to 12 feet in areas where this would remove all fill containing greater than 10 ppm PCBs. In certain areas of the site, the full extent of PCBs exceeding 10 ppm could be removed by excavation to a shallower depth of 9 feet. Where a 12-foot excavation would not remove all PCBs exceeding 10 ppm, excavation would be limited to 3 feet, and the location would be included in the containment system area.

A containment system would be installed around the Water Tower and Northwest Corner areas of the site where deep PCBs would remain after excavation is complete. This deep contamination would include high concentrations of PCB, including elastic matrix. The estimated acreage for this area would be 1.3 acres, which would be restricted from development. The area outside of the containment area would be free of PCBs exceeding NYSDEC cleanup objectives.

The estimated total volume of PCB-impacted fill (as measured in place) that would be excavated and disposed of off-site is approximately 48,000 cubic yards.

In addition to the PCB excavation, lead "hot spots", as described in Alternative 2, would also be excavated. A soil barrier system, as described above, would be installed over the entire site. Finally, the bulkhead along the entire waterfront would be reconstructed to prevent erosion of fill material and particulate transport into the Hudson River. This alternative would remove approximately 15% of the existing mass of PCB contamination from the site.

Present Worth:	$ 52,500,000
Capital Cost:	$ 46,100,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 12 Group:

• Containment of the Northwest Corner and Water Tower Areas
• Excavation of Lead Hot Spots
• Soil Barrier System
• Excavation of PCB-Contaminated Fill to a Range of Depths
• Bulkhead Reconstruction

The Alternative 12 group of alternatives was developed to evaluate a range of depths for excavation of subsurface PCBs. Each of the sub-alternatives described below specifies a maximum depth of excavation inside the containment area. Alternatives 12A, 12B, and 12C were developed as an addendum to the Feasibility Study. Alternatives 12D, 12E and 12F were developed by the Village of Hastings, Riverkeeper and ARCO as part of settlement negotiations for their RCRA citizens lawsuit. Alternatives 12D, 12E and 12F below correspond to Alternatives 1, 2, and 3 in the Settlement Term Sheet with respect to depths of excavation. For all of these alternatives, surface soils that exceed 1 ppm PCBs would be removed.

All of these depths are associated with dry excavation techniques. Even using dry methods, the difficulty of excavation and associated costs increase with depth, as does the amount of PCBs removed. By considering a range of depths, the trade off between the degree of PCB removal versus the difficulty and costs is evaluated.

Because the boundaries of the containment area are determined by the extent of deep PCBs, the acreage of the containment area is not changed by the depth of dry excavation. For all the following sub-alternatives, the containment area would comprise 1.3 acres, as in Alternative 11. Each of these alternatives would leave high concentrations of PCBs, including elastic matrix material, at the site within the long-term containment structure. Outside of the containment area, excavation would be performed to the depth which would remove all PCBs greater than 10 ppm. Based on existing sampling data, this is expected to be 12 feet or less, except in 3 locations. Because deep contamination at these locations appears to be isolated, it would be contained in individual containment cells if it cannot be removed.

For all these alternatives, lead “hot spots” identified in Alternative 2 would be excavated and disposed off-site. A soil barrier system would be installed over the entire site, and the shoreline bulkhead would be reconstructed.

Alternative 12A:

• Excavation of PCB-Contaminated Fill to the Maximum Depth Feasible by Dry Excavation

As part of the technical review of the FS, the NYSDEC contracted with an independent engineering consulting firm to perform a third-party evaluation of the feasible depth of excavation using dry methods. The purpose of this effort was to determine whether excavation could safely proceed to depths greater than 12 feet by dry methods. An excavation approach was developed that would enable fill to be removed to a depth of 15 feet. Technical discussions were conducted with ARCO and their consultants, and the differences in assumptions, soil structural properties and approach

were identified. As part of these discussions, ARCO provided sufficient cost and mass removal data for the NYSDEC to develop an additional alternative for dry excavation to 15 feet.

In addition to different assumptions concerning soil structural properties, a key difference in excavation approach is the installation of the sheet pile shoring system through the marine silt and into the basal sands. The remaining sub-alternatives would have shoring installed only as deep as the top of the marine silt to avoid the potential for carrying contamination down into the basal sands.

Alternative 12A would remove PCB-contaminated fill to a depth of 15 feet. This corresponds to an excavation volume of 73,000 cubic yards, and removal of approximately 60% of the mass of PCBs from the site.

Present Worth:	$ 77,300,000
Capital Cost:	$ 70,900,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 12B:

• Excavation of PCB-Contaminated Fill to a Maximum Depth of 12 feet

This alternative is similar to Alternative 11, except that excavation would proceed to a maximum of 12 feet both inside and outside of the containment area. Where all PCBs could be removed from a location by shallower excavation (i.e., 9 feet), the maximum depth would not be necessary.

This alternative would result in the removal of 66,500 cubic yards of material, and would remove approximately 52% of the mass of PCBs from the site.

Present Worth:	$ 74,500,000
Capital Cost:	$ 68,100,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 12C:

• Excavation of PCB-Contaminated Fill to a Maximum Depth of 9 feet in the Containment Area

PCB-contaminated fill would be excavated to a maximum depth of 9 feet inside of the containment area, and to a maximum of 12 outside of the containment area. A conceptual drawing of the excavation depths and containment area in the Northwest Corner and Northern Shoreline, based on current data, is provided in Figure 6.

This alternative would result in the removal of 60,100 cubic yards of material, and would remove approximately 45% of the mass of PCBs from the site.

Present Worth:	$ 62,800,000
Capital Cost:	$ 55,200,000

Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 12D:

• Excavation of PCB-Contaminated Fill to a Maximum Depth of 7 feet in the Containment Area

Similar to Alternative 12C, this alternative would remove a maximum of 7 feet of PCB-contaminated fill inside of the containment area, and to a maximum of 12 outside of the containment area.

This alternative would result in the removal of 55,800 cubic yards of material, and would remove approximately 36% of the mass of PCBs from the site.

Present Worth:	$ 59,900,000
Capital Cost:	$ 53,500,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 12E:

• Excavation of PCB-Contaminated Fill to the Following Maximum Depths:
Northwest Corner Containment Area - 7 feet
Shoreline Containment Area - 9 feet
Other Non-Contained Areas - 12 feet

This alternative would remove fill containing PCBs greater than 10 ppm to differing depths across the site. In the Northwest Corner and Shoreline areas, where long term containment will be necessary for deep contamination, excavation would be limited to 7 feet and 9 feet respectively. Elsewhere, PCBs greater than 10 ppm can be fully removed with a maximum excavation depth of 12 feet.

This alternative would result in the removal of 58,200 cubic yards of material, and would remove approximately 40% of the mass of PCBs from the site.

Present Worth:	$ 62,000,000
Capital Cost:	$ 55,600,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

Alternative 12F:

• Excavation of PCB-Contaminated Fill to the Following Maximum Depths:
Northwest Corner Containment Area - 9 feet
Shoreline Containment Area - 12 feet
Other Non-Contained Areas - 12 feet

Similar to Alternative 12E, this alternative would remove fill containing PCBs greater than 10 ppm to differing depths across the site. In the Northwest Corner and Shoreline areas, excavation would

be limited to 9 feet and 12 feet respectively. Elsewhere, PCBs greater than 10 ppm would be removed to a maximum excavation depth of 12 feet.

This alternative would result in the removal of 62,300 cubic yards of material, and would remove approximately 45% of the mass of PCBs from the site.

Present Worth:	$ 65,000,000
Capital Cost:	$ 58,600,000
Annual O&M:	$ 221,000
Time to Implement	12 Months

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the NYSDEC has determined to be applicable on a case-specific basis.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectivness. Capital costs and operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. The costs for each alternative are presented in Table 6.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix C) presents the public comments received and the manner in which the NYSDEC addressed the concerns raised.

In general the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix D) and the discussion presented below, the NYSDEC has selected Alternative 12C, as the remedy for this site. As discussed below, Alternative 12C provides the best balance of implementability, permanence, short-term effectiveness, and long-term effectiveness of the alternatives under consideration. It will achieve the remediation goals for the site by removing the most accessible PCB-contaminated fill and highest levels of lead-contaminated fill from the site and managing the remainder with a containment cell for PCBs and a contact barrier and soil cover for the remaining contaminants. The elements of this remedy are described at the end of this section.

The selected remedy is based on the results of the RI and the evaluation of alternatives presented in the FS. This selection is based on the findings that the remedy will be protective of human health and the environment. The key factors that the NYSDEC considered were the implementability and short-term risks associated with deeper excavation versus the benefits of removing additional mass of PCB from the site. The NYSDEC also considered the residual threat that will remain under this proposal, the associated controls that will be necessary to protect public health and the environment, and whether deeper excavation would alleviate these factors.

The NYSDEC believes that PCB-contaminated soil should be removed from the site to the extent possible, without creating an undue risk of spreading contamination during the removal process. PCBs that would remain at the site represent a potential ongoing source of groundwater contamination and a potential exposure threat to future users of the property. Alternatives that rely exclusively on containment and long-term management of PCBs would not provide sufficient long-term effectiveness, and would limit the opportunities for re-development of the site. Long-term effectiveness and protection of public health and the environment increase as excavation depth and PCB mass removal increase. However, at depths where flooded excavation is necessary, the short-term risks outweigh the long-term benefits, as discussed below. Because they do not call for the removal of any PCB-contaminated fill, the No Action Alternative and Alternative 10 are not recommended.

Alternatives 7 and 8, which would excavate PCB-contaminated soil to 6 feet and the water table respectively, would both leave approximately 3.8 acres of the site requiring long-term containment. This acreage would be restricted from any development involving the installation of pile-supported structures. Because the acreage of the containment area can be reduced to 1.3 acres by excavating

to depths ranging from 7 to 9 feet, the NYSDEC believes it is worthwhile to do so. As a result, Alternatives 7 and 8 are not recommended.

Pilot tests conducted on in-situ stabilization did not show any significant reduction in the leachability or mobility of PCBs. For this reason, Alternative 9 is not recommended.

The short-term impacts associated with deeper excavation are potentially severe. Deep, flooded excavation would increase the risk of collapse, which could result in worker injury or even death, release of contaminants to the Hudson River, and contamination of the Basal Sands Unit. Because this deep contamination can be effectively contained, with no likely route of exposure to receptors at the surface or in the river ecosystem, the risk of encountering a severe short-term impact in order to proceed deeper is not justified.

The NYSDEC is particularly concerned where structural piles are present in the excavation area that penetrate through the Marine Silt into the Basal Sand Unit. For dry excavation to 15 feet or less, these piles will be cut at the bottom of the excavation and the upper portion will be removed. In a flooded excavation however, the depth and lack of visibility into the hole would preclude the piles from being cut, and instead they would have to be pulled out. As the piles are pulled out through the Marine Silt layer, the resulting void could act as a conduit for contaminant migration into the Basal Sand. This would be exacerbated by the additional head of water in a flooded excavation, which would serve as a downward driving force for contamination that is suspended in the excavation. Together, an open conduit and downward force would threaten to contaminate the Basal Sand Unit, a regional groundwater resource that is currently not impacted by the site.

A preliminary analysis indicates that dry excavation to 15 feet could be achieved, but this would require driving the shoring system sheeting through the Marine Silt Unit and into the underlying Basal Sands. This creates two possible pathways for contamination of the Basal Sand Unit: carrying contamination down on the piles as they are driven, and creating conduits for groundwater and contaminant migration when they are withdrawn. Although not as severe as the potential risks associated with flooded excavation, the NYSDEC believes that these risks are not offset by the benefits of excavating additional fill between 12 and 15 feet below ground surface.

For these reasons, the NYSDEC did not select an alternative that would require excavation below 12 feet in an area as large as the Northwest Corner or Northern Shoreline areas. As a result, alternatives whose goal is to remove all PCBs that exceed the cleanup objective (Alternatives 2, 3, and 4), or to remove the elastic matrix (Alternatives 5 and 6) was not selected. Similarly, Alternative 12A was not selected.

Alternatives 11 and 12 (B, C, D, E and F) would all result in contaminated fill remaining in the Northwest Corner and Water Tower areas, where contamination is present below 12 feet, and would excavate PCB-contaminated fill to a maximum depth of 12 feet outside those areas. These alternatives differ in the depth to which contaminated fill would be excavated inside the containment areas. These depths range from 3 feet (Alternative 11) to 12 feet (Alternative 12B), with various depths and combinations of depths in between. The key trade-off between these alternatives is the amount of PCB-contaminated fill that would be removed from the site versus the amount and depth that would be managed in the long term.

The acreage of deep PCB contamination in the Northern Shoreline and Water Tower areas that would remain and require long-term management are the same for all excavation depths between 7 and approximately 20 feet. These areas would be restricted from the construction of pile-supported structures, and would require installation and maintenance of an impermeable cap to prevent infiltration into the containment cells. Although increasing the maximum depth of excavation would remove additional mass of contamination, it would not reduce the acreage that would be contained and restricted from development. Removal of greater amounts of PCB-contaminated fill would reduce the reliance on long-term controls, to prevent migration and the possibility of exposure. Deeper excavation and associated clean backfill would also increase the separation distance between contamination remaining at the site and potential receptors at the surface.

The table below lists the percentage of PCB mass that would be removed from the site for each of the alternatives and excavation depths under consideration. These range from 15% for excavation to 3 feet, to 52% for excavation to 12 feet in both the Northwest Corner and Water Tower areas.

Alternative #	Excavation Depth Inside Containment Areas (feet)	%PCB removal [1]	Cost
11	3	15%	$52.5 M
12D	7	38%	$59.9 M
12E	7 NW Corner 9 Shoreline	40%	$62.0 M
12C	9	45% [2]	$62.8 M
12F	9 NW Corner 12 Shoreline	45% [2]	$65.0 M
12B	12	52%	$74.5 M

[1] Based on a total of approximately 88,250 lbs of PCB currently at the site, each 5% removed is 4,413 lbs

[2] Alternative 12F removes more PCB than Alternative 12C. However the difference is within the range of precision of the estimation method.

This data shows that significant increases in PCB removal can be achieved at moderate increases in cost up to an excavation depth of 9 feet. The difference between excavating 3 feet and 9 feet in the containment area would triple the amount of PCB removed at an increase of $10 million. However, increasing from 9 to 12 feet would only increase the PCB mass removal by 7%, while adding $11.7 million in costs. This is due to the increased costs for jet grouting to safely excavate more than 9 feet deep. A comparison of Alternatives 12C and 12F indicates that excavating an additional 3 feet in the Shoreline Area removes a minor amount of PCB mass but increases costs by $2.2 million. Because there is no apparent benefit in reducing the size of the containment area or eliminating a significant mass of contamination, the additional cost of Alternative 12F is not justified.

Excavation of fill to a depth of 12 feet outside the long-term containment areas will be sufficient to remove all PCB-contaminated fill, except in 3 known locations beneath Buildings 51 and 52B in the northern third of the site. PCB concentrations and the corresponding depths at these locations were 58 ppm (18-22 feet), 15 ppm (18-22 feet) and 180 ppm (10-14 feet). PCB concentrations from samples collected within 50 feet of these locations were less than 10 ppm at depths exceeding 12 feet. Because deep contamination at these locations appears to be isolated, it will be contained in individual containment cells if it cannot be removed. Alternatively, it may be feasible to remove small, isolated pockets of deep contamination by alternative excavation techniques, such as augering or small scale flooded excavation. The feasibility of conducting small-scale deep removal versus long-term management and the associated land use restrictions for these isolated areas will be further evaluated during the remedial design phase.

With regard to other contaminants, including lead, the selected remedy will remove surface soils (0'-2') contaminated with high levels of lead (greater than 1,000 ppm). This will also remove several areas where copper levels in shallow soil exceed 10,000 ppm. The NYSDEC believes that the ease of excavating surface soils and the clear distinction between lead and copper concentrations in the "hot spots" compared to the surrounding soils justifies removing them. Because these hot spots are above the water table, and the soil cover for this part of the site will not be an impermeable cap, removing them will reduce the potential for migration of lead and copper from soil into groundwater.

The remaining areas of high copper, lead and PAH contamination cover a broad area of the site, and at some locations exceed the depth at which dry excavation is feasible. This contamination will be managed by the soil barrier system to prevent direct human exposures, and by the reconstructed shoreline bulkhead to prevent discharges of fill and contaminated groundwater to the Hudson River.

Surface soils contaminated with dioxin above the ATSDR action level (1 ppb TEQ) will be removed under this remedy because they are co-located with PCBs.

In summary, Alternative 12C provides the best balance of contaminant removal with implementability, cost effectiveness, and risk of short-term impacts. It will protect public health and the environment by removing the most accessible contamination and effectively containing the remainder. The engineering controls (containment cell, soil cover, shoreline bulkhead), in conjunction with institutional controls, will be reliable methods of preventing human exposure to contaminants and the further migration of contaminants to the Hudson River.

The NYSDEC notes that an agreement reached between the Village of Hastings, Hudson Riverkeeper and ARCO requires the installation of a 5-foot contact barrier and soil cover over the site. That system will consist of 6 inches of asphalt or concrete, 48 inches of soil or clean fill, and 6 inches of topsoil. That cover system will generally fulfill the requirements of this remedy, provided that the upper 24 inches of the soil cover is composed of 18 inches of soil and 6 inches of topsoil. Clean fill, as defined in 6NYCRR Part 360, which is permitted by the agreement, and could consist of construction and demolition debris such as uncontaminated concrete, asphalt pavement, brick, and/or glass, could not be used in the upper 24 inches of the cover system. The cover system installed over the containment area must also fulfill the requirements for a multilayer impermeable cap that minimizes infiltration.

The estimated present worth cost to implement the remedy is $ 62,800,000. The cost to construct the remedy is estimated to be $ 55,200,000 and the estimated average annual operation, maintenance, and monitoring costs for 30 years is $ 221,000.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.

2. Excavation of surface soil (0-12 inches) containing greater than 1 ppm PCB and subsurface soil containing greater than 10 ppm PCB, to a maximum depth of 9 feet in the Northwest Corner of the site and along the Northern Shoreline,

3. Containment of the Northwest Corner and Northern Shoreline areas using a slurry wall along the upland perimeters, watertight sheet piles along the shoreline, and an impermeable cap consistent with 6NYCRR Part 360. This containment system will be monitored and maintained to ensure that groundwater does not build up within it.

4. Excavation of all soil located outside of the Northwest Corner and Northern Shoreline containment areas that contains greater than 1 ppm PCB in surface soil and 10 ppm PCB in subsurface soil, to a maximum of 12 feet. Subsurface soils containing greater than 10 ppm PCB at depths exceeding 12 feet will either be excavated by alternative methods, or contained within a watertight sheet pile structure and capped.

5. Excavation of shallow soils from the southern portion of the site that are identified as lead "hot spots". These correspond to lead levels between 2160 ppm and 43,200 ppm.

6. Reconstruction of the shoreline bulkhead using a watertight steel sheet pile system with cathodic protection and hydraulic relief,

7. Installation of a 2-foot thick soil barrier system over the areas of the site not covered by the impermeable cap associated with containment areas,

8. Development of a site management plan to: a) address residual contaminated soils that may be excavated from the site during future redevelopment. The plan will require soil characterization, proper health and safety procedures for subsurface excavation and, where applicable, disposal/reuse in accordance with NYSDEC regulations; and b) evaluate the potential for vapor intrusion for any buildings developed on the site, including provisions for mitigating any impacts identified.

9. Annual certification by the property owner, prepared and submitted by a professional engineer or environmental professional acceptable to the NYSDEC, that the institutional controls and engineering controls put in place pursuant to the Record of Decision are unchanged from the previous certification and nothing has occurred that would impair the ability of the controls to

protect public health and the environment or that constitutes a failure to comply with any operation, maintenance or monitoring requirement, or the site management plan.

10. An institutional control, in such form as the NYSDEC may approve, that:
    a) Requires compliance with the approved site management plan,
    b) Prohibits the construction of pile-supported structures over the Northwest Corner and Northern Shoreline containment areas,
    c) Prevents the use of groundwater as a source of potable or process water without necessary water quality treatment as determined by the NYSDEC and Westchester County Department of Health
    d) Requires the property owner to prepare and submit an annual certification to the NYSDEC

11. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program will be instituted. This program will include water quality and water elevation monitoring inside the containment area to ensure that the impermeable cap, slurry wall, and sealed sheet piles are properly functioning and that excessive groundwater does not accumulate. This will also include groundwater monitoring outside the containment area to demonstrate the effectiveness of the watertight shoreline bulkhead and associated groundwater diversion structures. The impermeable cap and soil cover system will be inspected and maintained as necessary to ensure that their function has not been impaired by erosion or activities at the site. This program will allow the effectiveness of the remedy to be monitored and will be a component of the operation, maintenance, and monitoring for the site.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- Repositories for documents pertaining to the site were established.

- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.

- In September 1998, a fact sheet was prepared and mailed to the public contact list that summarized the results of the initial RI/FS, discussed the remedy proposed in the September 1998 Proposed Remedial Action Plan (PRAP), and announced the public meeting and comment period.

- A public meeting was held on September 24, 1998 to present and receive comment on the September 1998 PRAP.

- In October 1998, a public notice was sent to the contact list that extended the comment period on the PRAP until mid-November 1998.

- In January 1999 a fact sheet was prepared and mailed to the public contact list that answered commonly asked questions about the September 1998 PRAP.

- In January 1999, a public notice was sent to the contact list that announced an extension of the comment period on the September 1998 PRAP indefinitely.

- In December 2000, a fact sheet was mailed to the public contact list that summarized the progress made since September 1998. This included the completion of the RI for OU#2, the revised RI for OU#1 and IRMs to address the southern shoreline bulkhead and the presence of exposed PCB contamination in the water tower area.

- In October 2003, a fact sheet was mailed to the public contact list that summarized the results of the revised RI/FS, discussed the proposed remedy for the site, and announced the public meeting and comment period. The fact sheet and PRAP were also placed in the document repositories.

- A public meeting was held on November 13, 2003 to present and receive comment on the PRAP.

- A Responsiveness Summary (Appendix C) was prepared to address the comments received during the public comment period for the PRAP.

TABLE 1
Nature and Extent of Contamination
December 1995 - January 2000

SURFACE SOIL (0-12")	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
PCB/Pesticides	PCBs	ND[c] - 4,000	1	32 of 36
	Dioxins (TEQ[d])	0.19 - 8.3 ppb	1 ppb	5 of 7
Semivolatile Organic Compounds (SVOCs)	Benz(a)anthracene	ND - 4.2	0.224	3 of 7
	Benzo(a)pyrene	ND - 3.5	0.061	7 of 7
	Benzo(b)fluoranthene	ND - 5.0	1.1	3 of 7
	Benzo(k)fluoranthene	ND - 4.4	1.1	2 of 7
	Chrysene	ND - 4.4	0.4	5 of 7
	Dibenzo(a,h)anthracene	ND - 0.72	0.014	3 of 7
Inorganic Compounds	Arsenic	ND - 20.4	7.5	2 of 7
	Barium	ND - 1890	300	1 of 5
	Berylium	ND - 1.2	0.16	2 of 7
	Chromium	ND - 296	50	1 of 7
	Copper	ND - 6750	25	6 of 7
	Lead	ND - 43,200	400	4 of 7
	Mercury	ND - 1.5	0.1	1 of 4
	Nickel	ND - 21.2	13	3 of 7
	Silver	ND - 3.5	2.5	1 of 6
	Zinc	ND - 1460	20	6 of 7

SUBSURFACE SOIL (>12")	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
PCB/Pesticides	PCB	ND - 380,000	10	278 of 842

SUBSURFACE SOIL (>12")	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
Semivolatile Organic Compounds (SVOCs)	Anthracene	ND - 56	50	1 of 145
	Benz(a)anthracene	ND - 95	0.224	72 of 145
	Benzo(a)pyrene	ND - 90	0.061	81 of 145
	Benzo(b)fluoranthene	ND - 65	1.1	43 of 145
	Benzo(k)fluoranthene	ND - 62	1.1	30 of 145
	Chrysene	ND - 120	0.4	25 of 145
	Dibenzo(a,h)anthracene	ND - 29	0.014	35 of 145
	Dibenzofuran	ND - 26	6.2	4 of 145
	Indeno(1,2,3-cd)pyrene	ND - 40	3.2	19 of 145
	Phenanthrene	ND - 180	50	8 of 145
	Pyrene	ND - 160	50	5 of 145
Inorganic Compounds	Arsenic	ND - 727	7.5	61 of 123
	Barium	ND - 3010	300	19 of 145
	Berylium	ND - 2.2	0.16	107 of 154
	Cadmium	ND - 52.1	10	3 of 154
	Chromium	ND - 3940	50	14 of 154
	Cobalt	ND - 71.8	30	6 of 154
	Copper	ND - 202,000	25	135 of 164
	Lead	ND - 30,900	400	36 of 153
	Mercury	ND - 9.6	0.1	69 of 152
	Nickel	ND - 236	13	70 of 154
	Selenium	ND - 11.6	2.0	12 of 142
	Silver	ND - 70.7	2.5	9 of 151

SUBSURFACE SOIL (>12")	Contaminants of Concern	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)[a]	Frequency of Exceeding SCG
	Vanadium	ND - 1980	150	2 of 152
	Zinc	ND - 5830	20	143 of 149

GROUNDWATER Filtered Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
PCB/Pesticides	PCB	ND - 1.0	0.09	3 of 24
Semivolatile Organic Compounds (SVOCs)	2-Chloronaphthalene	ND - 21	10	1 of 16
	Benzo(a)anthracene	ND - 0.9	0.002	1 of 16
	Benzo(a)pyrene	ND - 0.6	ND	1 of 16
	Benzo(b)fluoranthene	ND - 0.7	0.002	1 of 16
	Chrysene	ND - 1	0.002	1 of 16
	Naphthalene	ND - 30	10	2 of 16
	Phenol	ND - 150	1.0	2 of 16
Inorganic Compounds	Antimony	ND - 4.1	3	5 of 20
	Barium	ND - 1030	1000	1 of 20
	Cadmium	ND - 11.4	5	1 of 20
	Copper	ND - 283	200	1 of 24
	Lead	ND - 832	25	5 of 26
	Thallium	ND - 12.3	0.5	7 of 20

GROUNDWATER Unfiltered Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
PCB/Pesticides	PCB	ND - 390,000	0.09	24 of 35

GROUNDWATER Unfiltered Groundwater	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Semivolatile Organic Compounds (SVOCs)	2-Chloronaphthalene	ND - 38	10	2 of 24
	Benzo(a)anthracene	ND - 3	0.002	10 of 27
	Benzo(a)pyrene	ND - 4	ND	10 of 27
	Benzo(b)fluoranthene	ND - 2	0.002	10 of 27
	Bis(2-ethylhexyl) phthalate	ND - 6	5	1 of 27
	Chrysene	ND - 3	0.002	10 of 27
	Indeno (1,2,3-cd)pyrene	ND - 2	0.002	7 of 27
	Naphthalene	ND - 37	10	2 of 27
	Phenol	ND - 220	1.0	5 of 27
Inorganic Compounds	Antimony	ND - 22	3	5 of 20
	Arsenic	ND - 124	25	2 of 20
	Barium	ND - 2840	1000	2 of 20
	Beryllium	ND - 5.5	3	1 of 20
	Cadmium	ND - 19.5	5	4 of 20
	Copper	ND - 11300	200	11 of 24
	Lead	ND - 2660	25	20 of 26
	Nickel	ND - 264	100	1 of 20
	Selenium	ND - 10.2	10	1 of 20
	Thallium	ND - 16.6	0.5	10 of 20
	Zinc	ND - 5650	2000	2 of 20

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water and ug/kg in soil;
ppm = parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;

[b] SCG = standards, criteria, and guidance values; {list SCGs for each medium}

[c]ND = Not Detected

[d]TEQ - Toxicity Equivalents - Individual dioxins are normalized to the equivalent toxicity of 2,3,7,8 TCDD by multiplying their concentration by a Toxicity Equivalency Factor (TEF). The total TEQ is the sum of these normalized toxicity equivalents for all dioxin compounds detected. See "Dioxin and Dioxin-Like Compounds in Soil", ATSDR Interim Policy Guideline, August 21, 1997

Table 2: Summary of Remedial Alternatives

Alternative #	Excavation Elements				Containment Elements			Cost (Present Worth)
	PCB Excavation Criteria	Excavation of...		Excavation Volume (cu yds)	NW Corner & Shoreline Area Containment Cell and Cap	Remaining Site-wide Cover/Cap Type	Shoreline Protection	
		Lead Hot Spots	Other Contaminants	%PCB removal				
Alternative 1	No Action			0 cy 0%	No Action		Yes	$ 17 M
Alternative 2	All fill >10 ppm PCB	Yes	None	111,000 cy 99 %	No	None	Yes	$ 150 M
Alternative 3	All fill >10 ppm PCB	Yes	All fill above water table	287,000 cy 99 %	No	None	Yes	$ 225 M
Alternative 4	All fill >10 ppm PCB	Yes	None	111,000 cy 99 %	No	Impermeable Cap	Yes	$ 167 M
Alternative 5	Elastic Matrix (>1000 ppm) and > 10 ppm PCB outside containment area	Yes	All fill above water table	236,000 cy 98 %	Yes	None	Yes	$ 165 M

Alternative #	Excavation Elements				Containment Elements			Cost (Present Worth)
	PCB Excavation Criteria	Excavation of...		Excavation Volume (cu yds)	NW Corner & Shoreline Area Containment Cell and Cap	Remaining Site-wide Cover/Cap Type	Shoreline Protection	
		Lead Hot Spots	Other Contaminants	%PCB removal				
Alternative 6	Elastic Matrix (>1000 ppm)	Yes	None	28,000 cy 97%	Yes	Impermeable Cap	Yes	$ 132 M
Alternative 7	>10 ppm above the water table	Yes	None	42,000 cy 29%	Yes	Soil Barrier System	Yes	$ 46 M
Alternative 8	> 10 ppm above the water table outside the containment area	Yes	None	10,000 cy 1 %	Yes	Soil Barrier System	Yes	$ 33 M
Alternative 9	> 10 ppm above the water table outside the containment area (+ In-Situ Stabilization)	Yes	None	10,000 cy 1%	Yes	Soil Barrier System	Yes	$ 37M
Alternative 10	None	Yes	None	1000 cy 0%	No	Soil Barrier System	Yes	$ 17.5 M

Alternative #	Excavation Elements				Containment Elements			Cost (Present Worth)
	PCB Excavation Criteria	Excavation of...		Excavation Volume (cu yds)	NW Corner & Shoreline Area Containment Cell and Cap	Remaining Site-wide Cover/Cap Type	Shoreline Protection	
		Lead Hot Spots	Other Contaminants	%PCB removal				
Alternative 11	>10 ppm, depth not to exceed: 3 feet inside the containment area 12 feet elsewhere	Yes	None	49,000 cy 15%	Yes	Soil Barrier System	Yes	$ 52.5 M
Alternative 12A	>10 ppm depth not to exceed 15 feet inside and outside of the containment area	Yes	None	73,000 cy 60%	Yes	Soil Barrier System	Yes	$ 77.3 M
Alternative 12B	>10 ppm, depth not to exceed 12 feet inside and outside of the containment area	Yes	None	67,000 cy 52%	Yes	Soil Barrier System	Yes	$ 74.5 M
Alternative 12C	>10 ppm, depth not to exceed: 9 feet inside the containment area (Shoreline & NW Corner) 12 feet elsewhere	Yes	None	60,000 cy 45%[1]	Yes	Soil Barrier System	Yes	$ 62.8 M
Alternative 12D	>10 ppm, depth not to exceed: 7 feet inside the containment area (Shoreline & NW Corner) 12 feet elsewhere	Yes	None	56,000 cy 38%	Yes	Soil Barrier System	Yes	$ 59.9 M

Alternative #	Excavation Elements				Containment Elements			Cost (Present Worth)
	PCB Excavation Criteria	Excavation of...		Excavation Volume (cu yds)	NW Corner & Shoreline Area Containment Cell and Cap	Remaining Site-wide Cover/Cap Type	Shoreline Protection	
		Lead Hot Spots	Other Contaminants	%PCB removal				
Alternative 12E	>10 ppm, depth not to exceed: 7 feet in the Northwest Corner 9 feet in the Shoreline Area 12 feet elsewhere	Yes	None	58,200 40%	Yes	Soil Barrier System	Yes	$ 62.0 M
Alternative 12F	>10 ppm, depth not to exceed: 9 feet in the Northwest Corner 12 feet in the Shoreline Area 12 feet elsewhere	Yes	None	62,300 45%[1]	Yes	Soil Barrier System	Yes	$ 65.0 M

[1] Alternative 12F removes more PCB than Alternative 12C. However the difference is within the range of precision of the estimation method.

Table 3
Remedial Alternative Costs

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
Alternative 1	$ 0	$ 0	$ 0
Alternative 1A	$ 10,500,000	$ 220,000	$ 16,800,000
Alternative 2	$ 149,000,000	$ 12,000	$ 150,000,000
Alternative 3	$ 224,000,000	$ 25,000	$ 225,000,000
Alternative 4	$ 158,000,000	$ 311,000	$ 167,000,000
Alternative 5	$ 162,000,000	$ 111,000	$ 165,000,000
Alternative 6	$ 123,000,000	$ 309,000	$ 132,000,000
Alternative 7	$ 39,400,000	$ 221,000	$ 45,800,000
Alternative 8	$ 25,900,000	$ 246,000	$ 33,000,000
Alternative 9	$ 30,800,000	$ 221,000	$ 37,200,000
Alternative 10	$ 10,500,000	$ 246,000	$ 17,600,000
Alternative 11	$ 46,100,000	$ 221,000	$ 52,500,000
Alternative 12A	$ 70,900,000	$ 221,000	$ 77,300,000
Alternative 12B	$ 68,100,000	$ 221,000	$ 74,500,000
Alternative 12C	$ 55,200,000	$ 221,000	$ 62,800,000
Alternative 12D	$ 53,500,000	$ 221,000	$ 59,900,000
Alternative 12E	$ 55,600,000	$ 221,000	$ 62,000,000
Alternative 12F	$ 58,600,000	$ 221,000	$ 65,000,000

Date: 08 Feb 02 09:25:50 Friday
/usr3/hastings/drq.map

Location Map
NYSDEC Harbor at Hastings Site
Hastings - on - Hudson, New York

DRAWING NUMBER 806938B11

APPROVED BY	
CHECKED BY	
DRAWN BY	MW/SSH 05-21-02
OFFICE	Pittsburgh/Albany

E 661,200 | E 661,500 | E 661,800 | E 662,100 | E 662,400

N 786,700 | N 786,900 | N 787,100 | N 787,200 | N 787,400 | N 787,500 | N 787,600 | N 787,800 | N 788,100 | N 788,400 | N 788,700

TAPPAN TERMINAL

SOUTHERN AREA

CENTRAL AREA

NORTHWEST CORNER AREA

WATER TOWER AREA

RECREATIONAL AREA

METRO NORTH

14 15 51 52 52A 52B 53 54 57 72A

A B C D E

LEGEND:

54 BUILDING DESIGNATION

APROXIMATE SITE BOUNDARY

APROXIMATE SITE BOUNDARY

-5- DEPTH TO CONTAMINATION CONTOUR

INTERIM REMEDIAL MEASURES

A BUILDING 14 SUMP CLOSURE IRM

B SEPARATE PHASE LIQUID RECOVERY IRM

C NORTHWEST CORNER IRM

D SOUTHWEST CORNER BULKHEAD IRM

E BUILDING 57 SHORELINE IRM

SCALE

0 200 400 FEET

REFERENCES:

1. TOPOGRAPHY AND PLANIMETRICS PROVIDED BY GEOD PHOTOGRAMMETRIC SCIENCES SURVEY TECHNOLOGIES. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN 12-08-1995. GRIDS BASED ON NEW YORK 1988 STATE PLANE COORDINATE SYSTEM. VERTICAL DATUM IS BASED ON NAD 1983. RI SAMPLE LOCATIONS SURVEYED BY GEOD.
2. EXISTING BUILDING DESIGNATIONS ARE BASED ON DOLPH ROTFELD ASSOCIATES FIGURE 4, DATED NOVEMBER 1996. BUILDING INTERIOR DIVISION LOCATIONS ARE APPROXIMATE ONLY.

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ATLANTIC RICHFIELD COMPANY

FIGURE 2

SITE AREA MAP
HARBOR AT HASTINGS
HASTINGS-ON-HUDSON, NEW YORK

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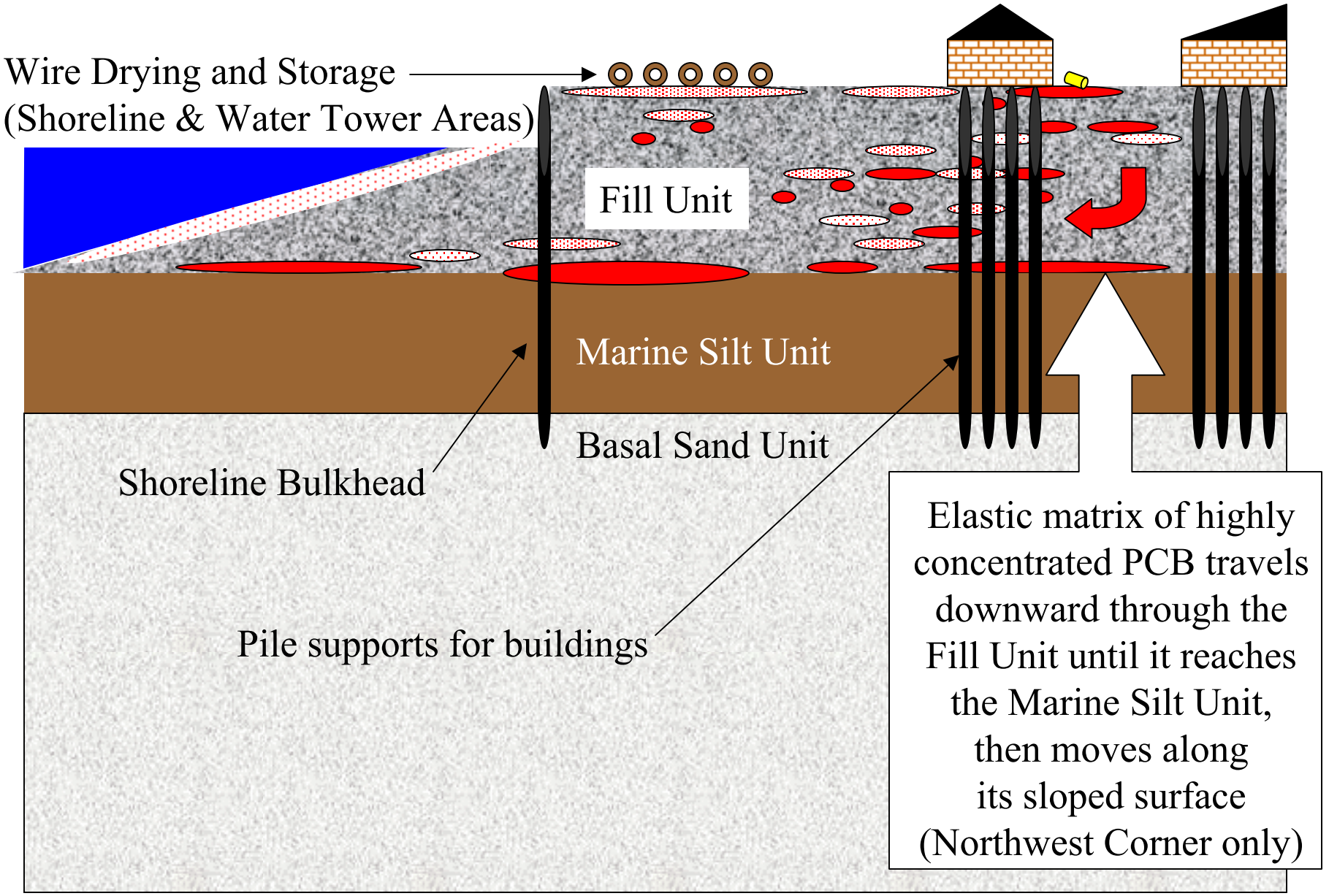
Figure 3: Conceptual Model of PCB Migration



PCBs in Fill
Concentrations > 10 mg/kg at a Depth of 1 Foot

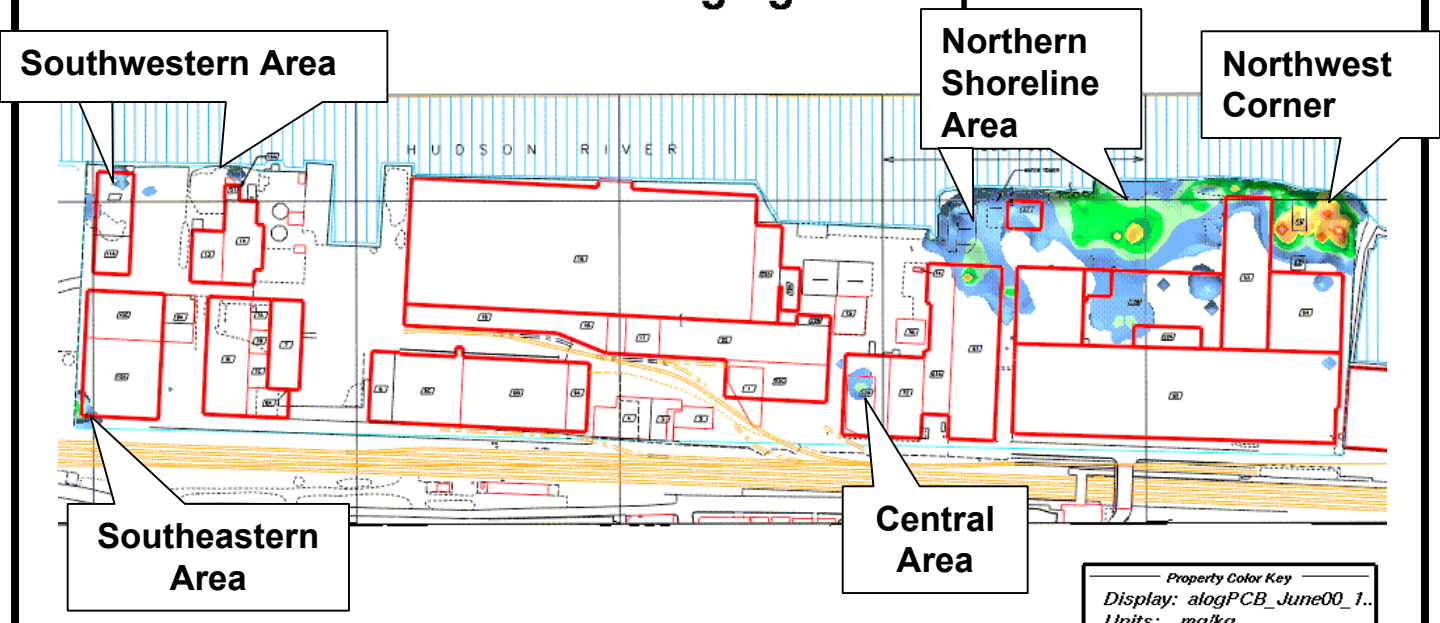
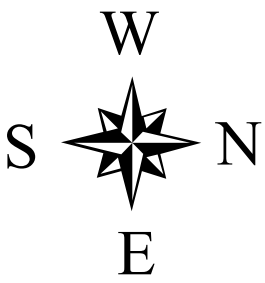
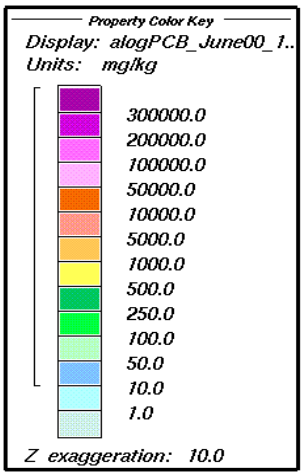
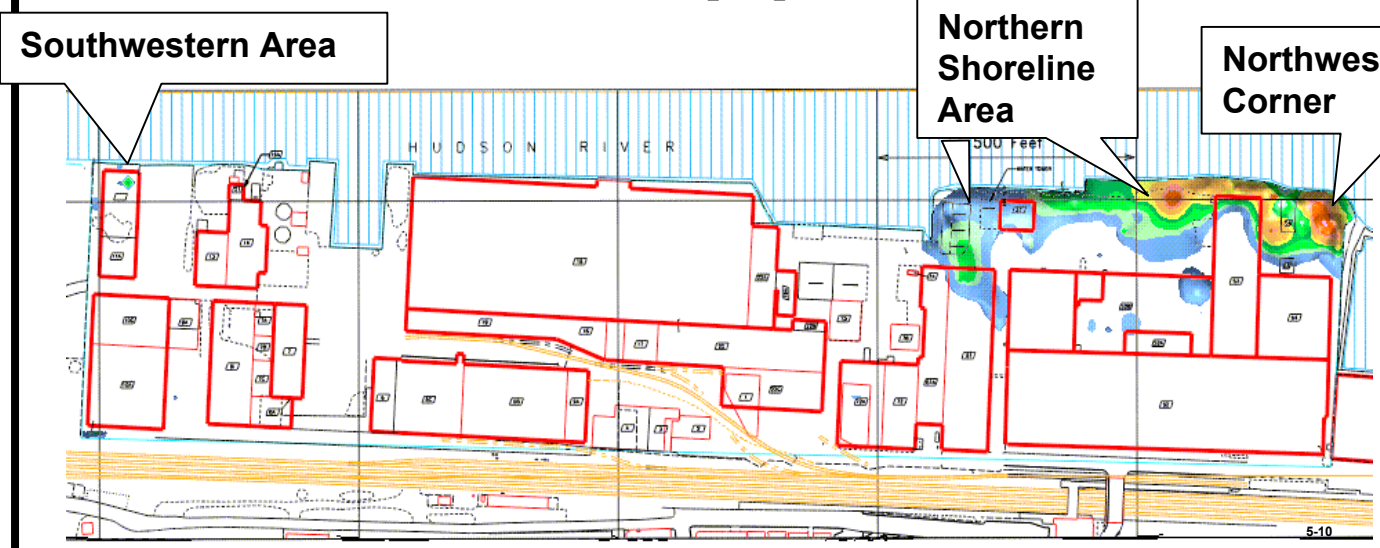


Figure 4A:
Extent of PCBs in Soil
(1 foot and 6 feet Deep)





PCBs in Fill
Concentrations > 10 mg/kg at a Depth of 6 Feet



PCBs in Fill
Concentrations > 10 mg/kg at a Depth of 10 Feet

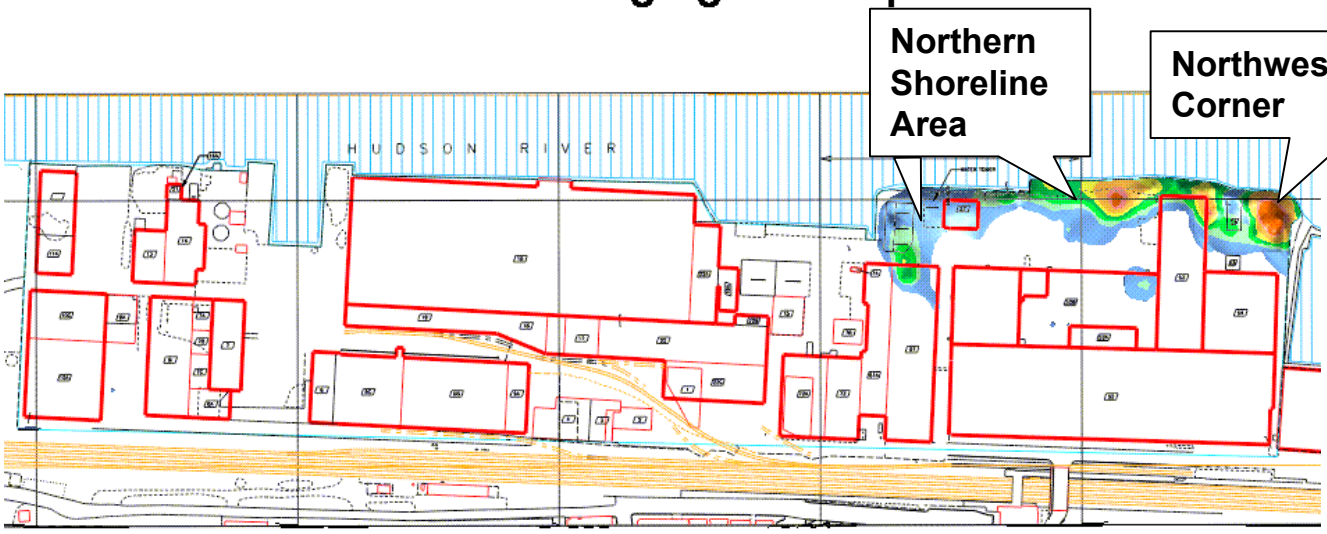
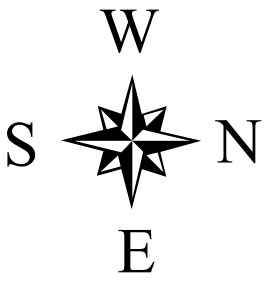
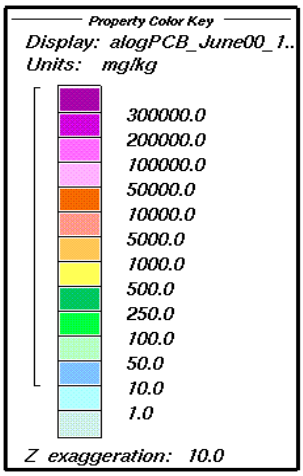
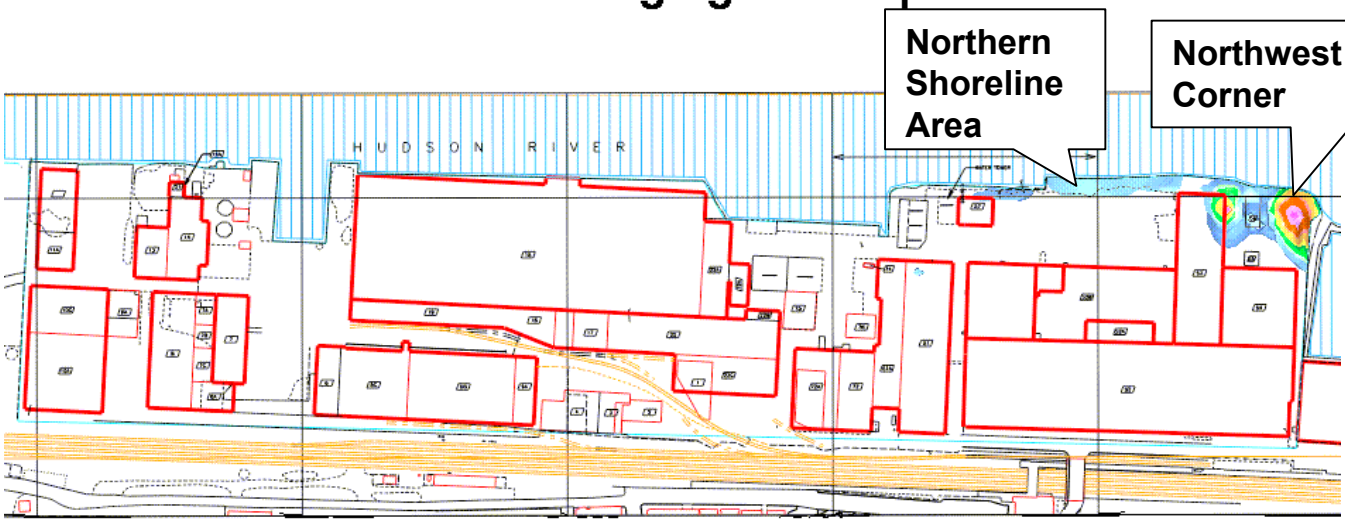


Figure 4B:
Extent of PCBs in Soil
(10 feet and 20 feet Deep)

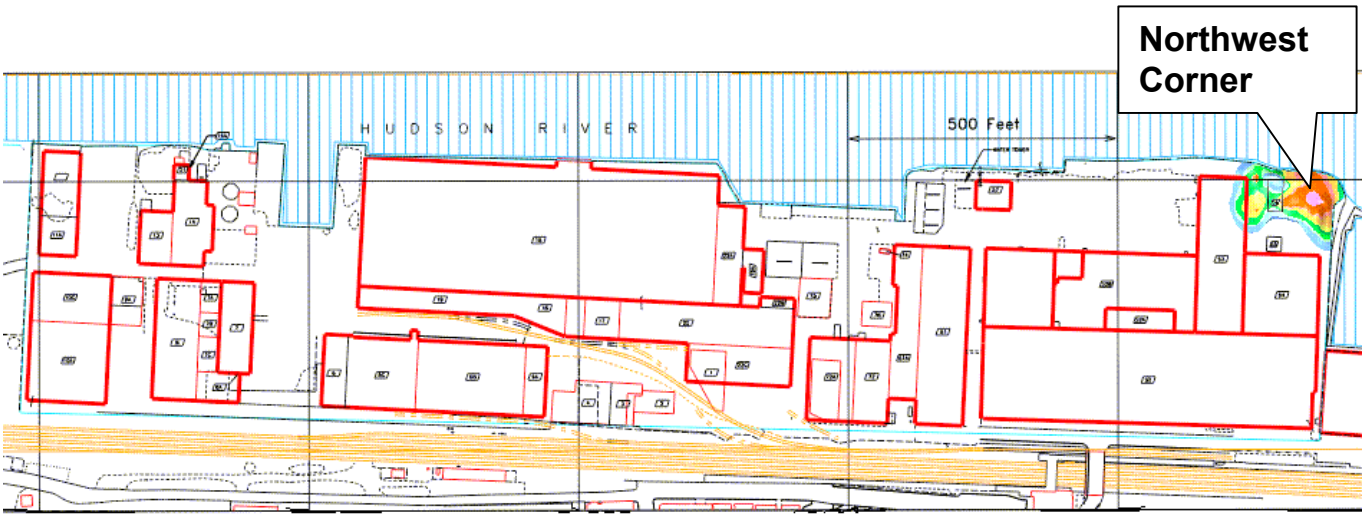




PCBs in Fill
Concentrations > 10 mg/kg at a Depth of 20 Feet



PCBs in Fill
Concentrations > 10 mg/kg at a Depth of 30 Feet



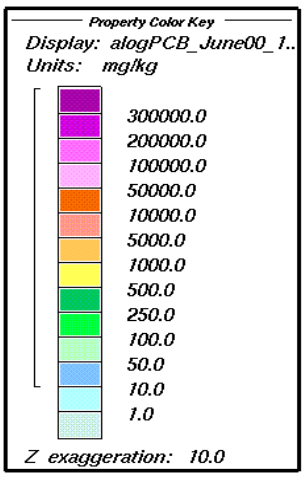


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Figure 4C:
Extent of PCBs in Soil
(30 feet Deep)

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APPROVED BY

CHECKED BY

DRAWN BY MW/SSH 05-21-02

OFFICE Pittsburgh/Albany

E 661,200 | E 661,500 | E 661,800 | E 662,100 | E 662,400

N 785,700 | N 786,000 | N 786,300 | N 786,600 | N 786,900 | N 787,200 | N 787,500 | N 787,800 | N 788,100 | N 788,400 | N 788,700

N

TAPPAN TERMINAL

SOUTHERN AREA

CENTRAL AREA

WATER TOWER AREA

NORTHWEST CORNER AREA

RECREATIONAL AREA

METRO NORTH

A B C D E

LEGEND:

- 15 — BUILDING DESIGNATION
- APROXIMATE SITE BOUNDARY
- APROXIMATE SITE BOUNDARY
- –5 — DEPTH TO CONTAMINATION CONTOUR

INTERIM REMEDIAL MEASURES

- (A) BUILDING 14 SUMP CLOSURE IRM
- (B) SEPARATE PHASE LIQUID RECOVERY IRM
- (C) NORTHWEST CORNER IRM
- (D) SOUTHWEST CORNER BULKHEAD IRM
- (E) BUILDING 57 SHORELINE IRM

Former incinerator or burn area investigated for chlorinated dioxins and dibenzofurans

Lead "Hot Spot"

SCALE

0 200 400 FEET

REFERENCES:

1. TOPOGRAPHY AND PLANIMETRICS PROVIDED BY GEOD PHOTOGRAMMETRIC SCIENCES SURVEY TECHNOLOGIES. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN 12-08-1995. GRIDS BASED ON NEW YORK 1988 STATE PLANE COORDINATE SYSTEM. VERTICAL DATUM IS BASED ON NAD 1983. RI SAMPLE LOCATIONS SURVEYED BY GEOD.
2. EXISTING BUILDING DESIGNATIONS ARE BASED ON DOLPH ROTFELD ASSOCIATES FIGURE 4, DATED NOVEMBER 1996. BUILDING INTERIOR DIVISION LOCATIONS ARE APPROXIMATE ONLY.

Shaw Shaw E & I, Inc.

ATLANTIC RICHFIELD COMPANY

Figure 5□
Lead Hot Spots and □
Areas Investigated for Dioxins

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NORTHWEST CORNER

SHORELINE AREA

PERIMETER OF CONTAINMENT CELL

REFERENCE:

TOPOGRAPHY AND PLANIMETRICS PROVIDED BY GEOD PHOTOGRAMMETRIC SCIENCES SURVEY TECHNOLOGIES. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN 12-08-1995. GRIDS BASED ON NEW YORK 1988 STATE PLANE COORDINATE SYSTEM. VERTICAL DATUM IS BASED ON NAD 1983. RI SAMPLE LOCATIONS SURVEYED BY GEOD.

LEGEND:

9 EXCAVATION DEPH

SCALE
0 30 60 90

Shaw Environmental, Inc.

ARCO

Figure 6
Alternative 12C - Northern End

HARBOR AT HASTINGS
HASTINGS-ON-HUDSON, NEW YORK

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ALBANY, NY	S. SHKOLNIK 05-14-03			806938D(ALT.3)

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Appendix A: Sample Requirements for Institutional Controls for the Harbor at Hastings Site.

The owner of the site will submit to the NYSDEC for review and approval a legal instrument, to run with the land, that will in perpetuity notify any potential purchasers of the property of the contamination present at the property and of the engineering and institutional controls necessary to protect public health and the environment. At a minimum, the language of the instrument will include provisions that:

1. State that soil with elevated levels of PCBs, lead, polycyclic aromatic hydrocarbons, and other contaminants is being left in place on-site and that this contamination may pose an unacceptable health risk should the soil be improperly handled, managed or disposed,

2. Require that any institutional and engineering controls specified in the Record of Decision shall continue in full force and effect and shall be maintained unless the owner first obtains permission from the NYSDEC to discontinue such controls,

3. Require annual certification by the property owner, prepared and submitted by a professional engineer or environmental professional acceptable to the NYSDEC, that the institutional controls and engineering controls put in place pursuant to the Record of Decision are unchanged from the previous certification and nothing has occurred that would impair the ability of the controls to protect public health and the environment or that constitutes a failure to comply with any operation, maintenance or monitoring requirement, or the site management plan.

4. Identify the presence and location of the PCB containment area and prohibit any activity that may breach the containment structures, including, but not limited to, excavation through the impermeable cap and installation of piles,

5. Identify the presence of the demarcation layer separating clean cover soil from contaminated fill,

6. Prohibit the extraction of water from beneath the surface of the property other than for remedial purposes without specific approval from the NYSDEC and the Westchester County Department of Health,

7. Notify future land owners, that under the authority of the New York State Department of Environmental Conservation, an existing hazardous waste remedial program is ongoing to address the on-site and off-site contamination in soils, sediments, surface water and groundwater.

8. Provide that the declaration is a covenant that shall run with the land and shall be binding upon all future owners of the Property, and shall provide that the owner and its successors and assigns consent to enforcement by the NYSDEC of these prohibitions and restrictions, and agree not to contest the authority of the NYSDEC to seek enforcement.

9. Prohibit the excavation of soils at the facility or removal of soil from the facility unless undertaken in accordance with a NYSDEC-approved Site Management Plan developed as part of the ROD that describes procedures for soil excavation and removal of soils from the facility and that are designed to protect human health and the environment. At a minimum, such a plan shall include:

   A. a provision for prior notification of NYSDEC and NYSDOH for any intrusive activities that could result in exposure to contaminated soils beneath the demarcation layer.

   B. protocols and procedures for sampling soils to determine the concentration of contaminants,

   C. a description of the health and safety requirements and general procedures to be followed during the excavation of soils. The plan shall be designed to minimize the possibility that personnel at the facility and the surrounding community will be injured or exposed to site contaminants during excavation of such soils.

   D. should soil be disposed off-site, a hazardous waste determination to verify whether deposition into a secure hazardous waste landfill or a solid waste landfill is necessary.

   E. a provision for submittal of a construction completion report to the NYSDEC for all activities conducted pursuant to the Site Management Plan.

The proponent may implement the Site Management Plan at any time after NYSDEC approval.

This instrument will be recorded and filed with the Westchester County Clerk, and proof of recording and filing will be submitted to the NYSDEC within thirty days of the Department's approval of the language of the instrument.

Appendix B: Generic Community Air-Monitoring Plan

A community air-monitoring plan (CAMP) will be developed for the Harbor at Hastings site. The CAMP will include monitoring for airborne particulates and PCBs during ground-intrusive remedial activities. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of remedial work activities.

The following are examples of typical air-monitoring plans for particulates and PCBs. Site-specific conditions may require more stringent monitoring or response levels than those shown below.

Particulates

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities.

If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings will be recorded and available for State (DEC and DOH) personnel to review.

PCBs

The scope of sampling PCBs in air will include collection of at least five ambient air samples: one collected as a representative background sample (preferably upwind), one at the downwind perimeter of the exclusion zone, and three air samples near community occupied structures or recreational areas (preferably downwind from the work site). Samples will be taken at the following intervals:

- twice, prior to the initiation of removal activities; and
- daily, after removal activities are initiated.

The samples will be collected and analyzed for PCBs using NYS DOH Method 311-1. Each sample batch and a field blank will be sent to the NYSDEC/NYSDOH-approved laboratory for analysis with each sample shipment. The samples will be delivered to the lab on the same day of collection. PCB samples will be analyzed and results will be made available within 24-hours following delivery. Documentation of the sample results will be provided to the on-site coordinator and the State for immediate review.

A threshold value of 100 nanograms per cubic meter (ng/m^3) will be used for the site to minimize community exposures. If total PCB concentrations at the perimeter of the exclusion zone exceed 100 ng/m^3 above previous background samples taken in the area, activities will be examined and engineering controls considered to mitigate off-site emissions. If a sample collected near the community contains total PCB concentrations that equal or exceed 100 ng/m^3, activities will be temporarily terminated and modifications employed to reduce off-site emissions. If either action level is exceeded, additional sampling will be necessary to determine whether the modifications implemented successfully reduced emissions.

APPENDIX C

Responsiveness Summary

RESPONSIVENESS SUMMARY

Harbor at Hastings Site
Operable Unit No. 1
Village of Hastings-on-Hudson, Westchester County New York
Site No. 360022

The Proposed Remedial Action Plan (PRAP) for the Harbor at Hastings site was prepared by the New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), and was issued to the document repositories on October 27, 2003. The PRAP outlined the remedial measure proposed for the contaminated soil and groundwater at the Harbor at Hastings site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on November 13, 2003, which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on December 29, 2003.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the NYSDEC's responses:

Verbal Comments

The following verbal comments and questions were received during the November 13, 2003 public meeting:

General Comments Concerning the PRAP, ROD and Remedial Design

COMMENT 1: The PRAP complements the settlement reached between the Village of Hastings, ARCO and Riverkeeper. It is protective of public health and the environment, provides similar measures as the settlement, and in certain areas, provides additional protection.

RESPONSE 1: The NYSDEC acknowledges the Village of Hastings-on-Hudson's support of the PRAP.

COMMENT 2: In terms of timing, what is the plan for the release of the RODs and the implementation of the remedies for Operable Unit 1 and Operable Unit #2?

RESPONSE 2: Based on a request from the Village of Hastings, the NYSDEC extended the comment period on the OU#2 PRAP until January 28, 2004. Combined with the large volume of public comments that have already been received on the OU #2 PRAP, the NYSDEC has decided to proceed with issuance of this OU#1 ROD while the OU#2 PRAP comments are addressed and the ROD is prepared.

As far as timing, the NYSDEC expects that the OU#1 remedy will be constructed prior to the OU#2 remedy. This is desirable because it will eliminate the migration of additional contamination of the river sediments by controlling the on-site source first. The time frame for implementing these remedies will also depend on the progress of legal negotiations towards an Order on Consent for the remedial design and remedial action phases of the project.

COMMENT 3: The remedial design process should provide opportunities for continuing public comment.

RESPONSE 3: A citizen participation plan will be developed as part of the remedial design work plan that will identify the milestones and methods for keeping the public informed.

COMMENT 4: The ROD should structure the excavation depths as performance standards, rather than including a figure, such as PRAP Figure 6, in which the excavation depth in each area appears to be prescribed. Additional sampling needs to be performed to precisely delineate the excavated area, and structuring the ROD as a performance standard is the proper way to accommodate new data.

RESPONSE 4: The NYSDEC agrees in principle with this comment. The reference to Figure 6 in the ROD text has been clarified to indicate that it is a conceptual representation of Alternative 12C based on current data. The NYSDEC believes that Figure 6 should be retained in the ROD to help the public conceptualize the remedy, and other commenters have suggested that additional such figures should be included. The selected remedy, as detailed in the Declaration and Section 8 of the ROD, is based on the performance standard stated therein. The NYSDEC expects that some additional sampling will be necessary during the remedial design phase to further delineate the extent and

depth of excavation. This sampling will likely be done around the perimeter of the known area of contamination to determine whether the excavation area should be expanded. If additional areas are identified that meet the performance standard for excavation, these will be excavated.

COMMENT 5: If new data finds additional contamination, will the remedial plan be adjusted?

RESPONSE 5: See Response #4 above.

Comments Concerning the Soil Barrier System, Membrane, and Drainage

COMMENT 6: How will the impermeability of the barrier layer that is part of the deep PCB containment system hold up over time? How can the membrane be maintained in the long term if it's under soil?

RESPONSE 6: Research on the durability of geomembranes, such as high density polyethylene (HDPE), has identified and modeled the mechanisms of degradation, and the service conditions which would accelerate such degradation. Much of this research has focused on the use of HDPE as a municipal landfill liner, in which the material is in contact with leachate, and where temperatures in the landfill may be elevated due to waste decomposition. Studies that are relevant to a capping application, such as this project, indicate that the service life of an HDPE membrane is at least 200 to 400 years. Copies of the articles "Durability of HDPE Membranes" and "The Durability of HDPE Membranes" are included in the Administrative Record for reference.

COMMENT 7: Is the material for the demarcation layer of the soil barrier system specified in the PRAP? When will this be decided?

RESPONSE 7: A single material is not specified in the ROD. The alternatives developed in the FS specify an asphalt barrier, but the NYSDEC has concerns that large areas of impervious subsurface asphalt could cause unacceptable drainage problems. As a result, the ROD also provides for the use of geotextiles or other materials as the demarcation layer. The final decision will be made during the project design phase.

COMMENT 8: A 6-inch asphalt layer is preferable to snow fencing or other plastic material as a demarcation layer because it is hard and will cause a contractor to stop digging when they hit it. However, proper drainage

must be designed if asphalt is used.

RESPONSE 8: The NYSDEC agrees that proper drainage is essential. The use of permeable geotextiles, such as snow fencing, is retained in the ROD as an alternative to asphalt if these drainage issues cannot be resolved. Another concern with the use of asphalt is its common occurrence at former industrial sites. Geotextiles may be more effective as a warning layer because they are typically not encountered during excavations.

COMMENT 9: Asphalt alone should not be used as the demarcation layer. The NYSDEC should require the use of both asphalt and a membrane for this purpose.

RESPONSE 9: The NYSDEC does not see the justification for the use of a redundant demarcation layer. Asphalt deterioration is likely to result in cracking, but would leave evidence of the overall asphalt barrier still apparent. Because this layer is not intended to function as an impermeable layer, any such cracking would not reduce the effectiveness of the remedy.

COMMENT 10: How will utilities be installed and maintained to avoid damage to the soil cap? What about the "river" that runs beneath the site?

RESPONSE 10: Utilities that must be placed below the demarcation layer would have to be installed in a manner that complies with the Site Management Plan. This plan would have to address health and safety of workers and the community, restoration of the demarcation layer and soil cover, and proper management of any excavated fill. Utilities should be installed in a sufficiently large trench of clean soil, underlain by a demarcation layer, so that future maintenance can be performed without the need to encounter contaminated fill.

The "river" in this comment refers to surface water that flows down the ravine to the east of the Metro North railroad tracks and passes under the railroad tracks and the site before entering the Hudson River. This flow is directed under the tracks through a culvert and discharges into the river at an unknown location along the site shoreline, in the vicinity of the North Boat Slip. This flow will have to be maintained or improved during implementation of the remedy to avoid an unacceptable buildup of water behind the bulkhead.

COMMENT 11: The PRAP proposes to "entomb" PCBs (in the impermeable containment structure), but only to cover the other contaminants with soil. Will this allow the other contaminants to migrate to the Hudson

River? Why are the PCBs being treated more seriously than other contaminants.?

RESPONSE 11: The remedy will prevent contaminants from migrating to the Hudson River by sealing off the shoreline with a water tight bulkhead and covering surface soils with a soil cover. The PCBs are treated more seriously because their concentrations are much higher, and they would pose a much greater health risk if people were to be exposed to them.

COMMENT 12: I am concerned that without adequate surface and subsurface drainage, the site will become a bathtub, and runoff and groundwater will have no place to go.

RESPONSE 12: The NYSDEC agrees with this comment. The need for proper drainage, including active pumping of groundwater from within the containment area, was discussed in the PRAP and is retained in this ROD.

Comments Concerning Health and Air Monitoring

COMMENT 13: Who will be legally responsible if people living at the site become sick in the future?

RESPONSE 13: The NYSDEC does not handle "liability" issues relating to people who may get sick from contamination at a site. That is more in the nature of a toxic tort case. Instead, the Department's responsibility is to make sure that an appropriate clean-up of the site is completed. To the extent that the cleanup does not sufficiently address the contamination at the site, and such contamination is determined to be causing people to get sick, the Department would require appropriate additional remediation and/or controls to be performed at the site by the Responsible Parties.

With respect to the future liability of the Responsible Parties, should it be determined that contamination left at the site is causing people to get sick, generally liability in this type of case would be determined in a civil proceeding, not by the NYSDEC.

COMMENT 14: I am concerned that people, particularly the residents of Hastings, will become sick (due to contaminant exposure) as a result of the soil removal process.

RESPONSE 14: Contaminated soil will be excavated and removed from the site in a manner that minimizes the exposure to site workers and the surrounding community. Air monitoring will be performed in the work area, at the site boundary, and in the community to ensure that unacceptable levels of airborne contamination are identified and mitigated. Site-specific action levels and contingency measures will be developed in the remedial design phase to ensure that health risks to the community are minimized.

COMMENT 15: I would like to see some justification that there is less risk to public health associated with performing the proposed remedy than with leaving the site in its current condition. If the risk to the community is greater to have the contamination removed than to leave it in place, then it should not be removed.

RESPONSE 15: The February 2001 Human Health Risk Assessment (HHRA) determined that the cancer risks associated with potential future uses of the unremediated site exceed New York State's guideline of 1 in 1,000,000 (10^{-6}). For the park and commercial/industrial scenarios, the excess cancer risk was estimated to be 1 in 1000 (10^{-3}), and for the residential scenario, the risk was estimated to be 1 in 100 (10^{-2}). These estimates are presented in Table 5-1b of the HHRA.

The HHRA also estimated potential exposures and the associated risks for maintenance workers who could breathe contaminated dusts over the long term under an uncontrolled future use scenario. This exposure scenario is different than potential community exposures during short term removal operations, but provides a conservative reference point for comparison. Short term community exposures during excavation are expected to be less than long term maintenance worker exposures. For the latter, inhalation of particulate fill particles is estimated to result in an excess cancer risk of 1.3 in 1 million (1.3×10^{-6}). This is presented in the "Attachment to Appendix" of the HHRA, page 15 of 18. The Hazard Quotient, which evaluates non-cancer health effects, is 0.016 for this scenario, well below the target Hazard Quotient of 1.0 (Attachment to Appendix, page 16 of 18).

In summary, the risk associated with long term inhalation of contaminated dust by maintenance workers was estimated to be much less than the risks associated with future residential, recreational or commercial use of the unremediated property. With proper implementation of a Community Air Monitoring Plan, the short term risk to the community during excavation will be much less than the long term risk to maintenance workers.

COMMENT 16: What is the basis for the 100 ng/m^3 action level for PCBs in ambient air

that is included in the Community Air Monitoring Plan in Appendix B?

RESPONSE 16: Appendix B is a generic Community Air Monitoring Plan (CAMP) that is included in the ROD as an example for the community and a baseline for the development of a site-specific CAMP. The 100 ng/m^3 action level for PCBs is a level that the NYSDEC has used on recent PCB removal projects. An ambient air PCB action level is also currently being developed for the Upper Hudson River remediation project. Rather than setting this action level in the ROD, the site-specific action level will be developed and documented during the remedial design phase.

For comparison, the EPA developed a screening level for PCBs in ambient air to interpret the results of air monitoring conducted after the September 11, 2001 World Trade Center attack. This screening level is 730 ng/m^3. According to EPA, this screening level is set well below exposure levels shown to cause cancer in animals, as well as those associated with any other health effects, based on continuous exposure for one year.

Another comparison is the exposure concentration used in the HHRA to model the hypothetical exposures to the maintenance worker, as discussed in Response #15 above. The subsurface fill exposure level used is 9.6 x 10^{-4} mg/m^3 of combined Aroclors 1254 and 1260, which is equivalent to 960 ng/m^3. [Attachment to HHRA Appendix, Table "Estimated Concentrations (mg/m^3) in Ambient Air", page 1 of 1] As discussed in Response #15, this resulted in an excess cancer risk of 1.3 in 1 million to the maintenance worker.

COMMENT 17: Will air monitoring continue after the construction phase is complete?

RESPONSE 17: The NYSDEC does not foresee the need for post-construction air monitoring. However, any excavation activities in contaminated fill that are conducted during the post-construction monitoring and maintenance period will likely be required to monitor for air quality.

Comments Concerning Building Piles

COMMENT 18: Will any new buildings constructed at the site be supported by piles driven through the fill? What kind of monitoring will be done for penetrations of the soil cover by new building piles? Would it be safer to build on top of the existing foundations so that new piles don't have to be driven through the fill?

RESPONSE 18: New buildings constructed at the site will need pile-supported foundations

for long-term stability. Modern designs typically do not employ wooden timber piles, but rather steel columns or concrete-filled steel tubes. Steel H piles are less likely to carry down contaminated fill as they are driven than wooden timber piles due to their profile. Steel-jacketed concrete piles would likely be installed by augering in hollow steel tubes and then filling them with concrete, rather than driving or vibrating the filled pile. This would cause contaminated fill to be brought to the surface by the augers, rather than driving the contaminants downward. As with any excavation, contaminated fill brought to the surface must be managed in accordance with an NYSDEC-approved site management plan.

Penetrations beneath the soil cover system will have to be documented by "as-built" drawings of their location and a description of their installation. The NYSDEC will require compliance with the Site Management Plan.

Provided that existing foundations are adequate to support new construction, it would be preferable to use them and avoid any penetrations of the marine silt layer.

COMMENT 19: Will the existing piles eventually disintegrate, and will this open a conduit for PCBs to migrate down to the Basal Sand aquifer?

RESPONSE 19: Many of the existing piles at the site have been there for more than 100 years and are still functional. Piles that support buildings are expected to have a much longer life than piles installed along the shoreline, which are subject to much more physical weathering along with insect and bacterial action. Piles beneath buildings will eventually decompose, but this will happen very slowly, allowing the Marine Silt to fill into any voids that are created. It is unrealistic to expect that a conduit through the Marine Silt could be created by disintegrating building piles.

COMMENT 20: Could the installation of new piles drive contamination down into the Basal Sand aquifer?

RESPONSE 20: See Response #18 above.

COMMENT 21: If concrete jacketed piles are used for new construction, I am concerned that the salt water of the Hudson River will corrode them.

RESPONSE 21: The sealed shoreline bulkhead will further minimize the potential for saline or brackish water to infiltrate into the site.

Comments Concerning the Shoreline Bulkhead

COMMENT 22: Who will be responsible for the repair and replacement of the bulkhead in the future?

RESPONSE 22: The NYSDEC will negotiate an Order on Consent with the responsible party for the design, construction, monitoring and maintenance of the remedy. If ARCO enters into this Order on Consent, they would be responsible for the maintenance of the bulkhead as an element of the site remedy.

COMMENT 23: Will cathodic protection of the shoreline bulkhead, as specified in the PRAP be extended to the section that has already been built along the southern shoreline? Will the design of the new bulkhead be the same as the southern section?

RESPONSE 23: Yes, cathodic protection will be installed on the entire shoreline bulkhead, including the section along the southern shoreline that has already been installed. The design of the new bulkhead will generally be the same as for the southern section. Potential differences will be the final height of the steel (see Comment #52 below), and the need for hydraulic relief to avoid groundwater accumulation behind the barrier wall. The latter may result in design variations along certain sections of the wall to allow filtered water to pass.

COMMENT 24: Is the existing southern bulkhead 5 feet higher than the land behind it, or will it have to be raised to accommodate the soil cover? I don't want a sloped surface down to the bulkhead because the shoreline won't be usable.

RESPONSE 24: This comment was repeated in a letter. Please see response #52 below.

Other Comments

COMMENT 25: How do we know the annual certification will be truthful? Who is responsible for reviewing and approving the annual certification, and will there be any verification of it?

RESPONSE 25: Generally, the NYSDEC will rely on a licensed professional, such as a registered Professional Engineer, to prepare and certify the annual certification of institutional and engineering controls. That professional would risk being fined or disciplined, or potentially losing their license for

making false statements. At a minimum, the NYSDEC will be responsible for tracking and reviewing the annual certifications.

COMMENT 26: Benzene is a potent carcinogenic chemical that has not been given sufficient attention in the PRAP.

RESPONSE 26: Benzene was detected in only one sample collected from the site. This was in the liquid elastic matrix found in one monitoring well in the Northwest Corner. The presence of benzene and toluene in this more fluid sample of elastic matrix led ARCO and the NYSDEC to conclude that this was a remnant of the original solvent in which the Aroclor was dissolved. Because benzene was only found in one sample, and because this sample also contained a very high concentration of PCB, benzene will be addressed by the overall site remedy.

COMMENT 27: Has stabilization of inorganic contamination, particularly lead and arsenic, been considered? What about the use of HRC, ORC and MRC to degrade or bind the contaminants in place?

RESPONSE 27: Please see responses #28 and #31 below.

COMMENT 28: Have alternative treatment methods been considered for the excavated soils, other than disposal at a landfill?

RESPONSE 28: Solidification/stabilization of excavated fill was considered in the Feasibility Study, but was not retained because it is significantly more costly than landfilling. In-situ (in-place) solidification was not retained because the high organic content of the fill and the saline/brackish groundwater conditions would reduce the effectiveness of the solidification process. Treatment or incineration of all or some of the excavated fill may be necessary to comply with land disposal restrictions or other EPA regulatory policies. This will be addressed during the remedial design phase.

COMMENT 29: Why is the NYSDEC allowing a higher concentration of PCBs in groundwater than in soil?

RESPONSE 29: The NYSDEC is not allowing higher concentrations in groundwater. The groundwater standard for PCBs in groundwater is 0.09 parts per billion (ppb), while the cleanup objective for soils is 1,000 ppb (1.0 ppm) at the surface and 10,000 ppb (10 ppm) in the subsurface. A higher level of PCBs in subsurface soils is acceptable because direct human exposure is less likely than for surface soils. The subsurface cleanup objective is established based on the soil concentration (10,000 ppb PCB) that would

enable the groundwater moving through it to meet water quality standards (0.09 ppb PCB).

COMMENT 30: Provisions for a citizen's volunteer monitor, both during construction and in the long term, should be included in the remedy.

RESPONSE 30: It is not clear what is envisioned by "monitoring" in this comment. The NYSDEC would welcome citizen monitoring of long-term compliance with the institutional controls to be enacted at the site. However, the NYSDEC would have concerns with citizens performing air or other media monitoring, in which proper training, particularly health and safety training, is required.

Written Comments:

The following written comments were received during the public comment period:

Mr. Jacques Padawer submitted a letter dated December 6, 2003 which included the following comments:

COMMENT 31: The remedy should include the use of Oxygen Release Compound (ORC), Hydrogen Release Compound (HRC), Metals Remediation Compound (MRC) and bacterial enrichment to address metal contaminants, including arsenic and chromium, that are not removed from the site.

RESPONSE 31: ORC is an applicable technology for treating arsenic that is dissolved in groundwater under chemically reducing conditions, and which is migrating from a source area. These conditions typically occur in leachate from municipal landfills where arsenic-bearing wastes were disposed. The technology works by raising the redox conditions of the aquifer, precipitating out iron that is also dissolved in groundwater, and causing the arsenic to adsorb onto the iron precipitate. The technical literature provided by the ORC vendor states that lead is also adsorbed by this process, but that zinc and cadmium are less adsorbed. Similarly, MRC is a technology for removing dissolved metals from groundwater and immobilizing them as insoluble sulfide minerals. HRC is primarily used for treating chlorinated solvents and nitrogen-bearing contaminants. Although the vendor's literature suggests HRC can treat chromium and certain other metals, it provides no detailed information or case studies in this regard.

Groundwater monitoring data from the Hastings site indicates that arsenic does not exceed water quality standards in dissolved form; it exists

primarily in particulate form without ORC or MRC treatment. Use of this technology would not address the direct exposure of future site users to contaminated soils, nor would it address the migration of particles through groundwater and into the Hudson River. As a result, the soil cover and shoreline bulkhead would still be required.

The vendor's technical literature also states that this technology is effective, provided that oxidant can be delivered to the soil volume of interest. It is questionable whether oxidant could be effectively delivered to the widespread area of inorganic contamination that exists at the site. Chemical oxidants are also preferentially consumed by organic matter in the soil matrix. The fill material at this site contains an average of 10.2% total organic carbon, indicating that a significant amount of the oxidant would be consumed by the formation before iron would begin to be oxidized.

Due to the current lack of dissolved arsenic contamination, the unlikely ability to effectively deliver oxidant to the formation, and the fact that a cover system and shoreline barrier would still be necessary, the NYSDEC does not believe that ORC and MRC are feasible technologies for this site.

COMMENT 32: The variable concentration of lead at different depths may be due to the differing retention qualities of the fill. High levels of lead at intermediate depths may have been caused by the leaching of process-related wastes that were preferentially retained by the fill at these depths. Similarly, arsenic contamination may be attributed to wire manufacturing process, since arsenic was used to increase the ductile properties of copper in wire drawing.

RESPONSE 32: The NYSDEC agrees. The text of the ROD has been modified accordingly.

COMMENT 33: Lower molecular weight Aroclors, which were reportedly found in the southern portion of the site, are more mobile and more toxic than the Aroclor 1260 found in the northern areas. Where do these lower molecular weight Aroclors come from, and what are the Aroclors involved?

RESPONSE 33: The lowest molecular weight Aroclor reported in the southern part of the site was Aroclor 1254. These may be related to the storage of transformers in this area of the site.

COMMENT 34: Interviews with surviving Anaconda workers should have been conducted as a source of additional information.

RESPONSE 34: The NYSDEC reviewed the depositions of former Anaconda employees, the records held by the Hastings Historical Society, and received written comments from several former Anaconda employees. These provided valuable information concerning past operations.

COMMENT 35: Both asphalt and a membrane should be used for added safety and redundancy.

RESPONSE 35: It is unclear whether this comment pertains to the design of the containment cell or the soil cover system. Please also see Responses 7 and 9.

Mr. Werner Sicvol of Atlantic Richfield Company (ARCO) submitted a letter dated December 23, 2003, supporting the proposed remedy and offering the following comments:

COMMENT 36: As part of ARCO's Consent Decree negotiations with the Village of Hastings and Riverkeeper, public meetings were held, and a public comment period was provided. Examples of favorable public reaction were attached to the comment letter, along with the final Consent Decree, an expert report and an analytical data package. ARCO requests that these documents be included in the Administrative Record for the site.

RESPONSE 36: ARCO's letter and associated attachments will be included in the Administrative Record for the ROD, as are all written comments received on the PRAP.

COMMENT 37: Recent sampling results of soil material in floor drains and pipe locations in Building 52 indicate that PCBs exceed their soil cleanup objective. These locations should therefore be required to be remediated in accordance with the framework established in the PRAP.

RESPONSE 37: The NYSDEC agrees that the area in question meets the criteria for excavation in this ROD. Additional sampling in this area may be necessary to fully delineate the extent of required excavation.

Ms. Eileen Badell, owner of the Hudson Valley Health & Tennis Club and the restaurant Blu, submitted a letter dated December 23, 2003 which included the following comments concerning Operable Unit #1:

COMMENT 38: Air monitoring should be conducted throughout all remedial work to ensure the health and safety of the community, specifically patrons and employees of the restaurant and tennis club that lie in close proximity to the northwest corner of the site.

RESPONSE 38: Based on the proximity of the restaurant and tennis club to the areas of highest contamination and prevailing wind direction, this location is a likely "community occupied structure" targeted for PCB monitoring during remediation activities, as discussed in the generic Community Air-Monitoring Plan (Appendix B). As discussed in Response 48 below, the details of the site-specific air monitoring plan will be developed during the remedial design phase.

COMMENT 39: The permanency and aesthetics of the land remediation and bulkhead construction should be considered with respect to the preservation of a rustic waterfront. Plans for these activities should be developed in consultation with the community.

RESPONSE 39: The permanency of the land remediation and bulkhead construction is an important aspect of the remedial program for this site. The NYSDEC will develop, or require ARCO to develop, a Citizen Participation Plan to keep the public informed during the design and construction phases of the project.

COMMENT 40: For any operations conducted on her property, written access agreements or easements must be obtained.

RESPONSE 40: The NYSDEC agrees with this comment, and typically executes Temporary Use and Occupancy agreements with landowners for State-funded construction activities conducted on private property. For work conducted by responsible parties, such access agreements are the responsibility of the private parties involved.

Ms. Lisa Rosman of the National Oceanic and Atmospheric Administration (NOAA) submitted a letter dated December 24, 2003 which included the following comments concerning Operable Unit #1:

COMMENT 41: The PRAPs are difficult to evaluate. So many alternatives were presented that it is difficult to evaluate the relative merits of each. Diagrams should be included that highlight the areas targeted under each alternative.

RESPONSE 41: For more detailed information concerning each alternative, including figures showing the areas targeted, the reader is referred to the Feasibility Study.

COMMENT 42: The detailed discussion of the Alternative 12 group should clarify that surface soils exceeding 1 ppm PCB would be removed along with subsurface soils exceeding 10 ppm PCB at the various depths.

RESPONSE 42: The ROD has been revised accordingly.

COMMENT 43: The status of on-going IRMs should be discussed relative to the Alternative 12 group, as they are for the other alternatives presented. These include IRMs to recover PCB-contaminated oil from the water tower area and interim cover in the Northwest Corner of the site.

RESPONSE 43: For all alternatives that would remove PCB-contaminated soil to a depth below the water table, the NYSDEC expects that all floating oil will also be removed. Similarly, the excavation and backfill provided by the Alternative 12 will remove the contaminated fill and interim cover that was placed on the Northwest Corner of the site, and replace it with at least 14 feet of clean fill (9 feet of backfill plus 5 feet of a soil cover system). As a result, neither IRM will be continued after the remedy is completed.

COMMENT 44: Alternatives 11 and 12 should discuss the removal of the "elastic matrix" of highly contaminated material. The PRAP should clarify how the elastic matrix will be addressed by the proposed alternative.

RESPONSE 44: Alternatives 11 and 12 were developed based on excavation depths and the associated technical feasibility and balance of criteria. The elastic matrix would be removed to the extent that it is within the excavation depths associated with each alternative and sub-alternative. Elastic matrix that is present below the targeted excavation depth would not be removed, and would be managed by the long-term containment system. The ROD was revised to reflect that high concentrations of PCB, including elastic matrix, would remain at the site.

COMMENT 45: The PRAP does not provide the most comprehensive remedy available, and addresses only 45% of the mass of PCBs present in soils at the site. NOAA supports Alternative 4, which removes 99% of PCBs from the site, along with lead hot spots, and would provide an impermeable cap. This would minimize the future migration of contaminants to the Hudson River.

RESPONSE 45: As discussed in the PRAP, the NYSDEC believes that the risks associated with extensive, deep excavation do not justify the additional removal of PCB mass from the site. These risks include the risk of additional releases to the Hudson River. With proper monitoring and maintenance of the selected remedy, the future migration of contaminants to the Hudson River will be eliminated.

COMMENT 46: Of the Alternative 12 group, both Alternatives 12A and 12B would remove a higher percentage of PCBs from the site with an insignificant

increase in cost. These alternatives should be given further consideration.

RESPONSE 46: As discussed in the PRAP, the additional excavation to remove higher percentages of PCB mass from the site does not change the need for long-term containment, nor the size of the containment area. Excavation below 9 feet requires the use of jet grouting, which adds to the unit cost of excavation. The cost to excavate an additional 3 feet would be $11.7 million, and would be $14.5 million for an additional 6 feet. These costs are significant, and are not offset by any significant benefit, such as a reduction in the area requiring long-term management. Because the NYSDEC believes that this remaining contamination can be effectively managed, Alternatives 12A and 12B were not selected.

COMMENT 47: The long term monitoring program should target areas where contaminants will remain. Both soil and water samples should be analyzed for PCBs and metals. Surficial soil sampling should also be conducted in areas where an impermeable cap is not constructed to evaluate the potential for contaminant runoff into the Hudson River.

RESPONSE 47: The NYSDEC generally agrees with this comment. Section 8 of the ROD is revised to clarify that the soil cover must also be inspected and maintained as necessary to ensure it functions properly. However, the utility of sampling the surface of the clean cover system to evaluate surface runoff over the long term is questionable. Provided that this material does not become contaminated during construction activities, the likelihood of site-related contamination migrating through 2 feet of soil is minimal. The site will comply with applicable requirements for point source and non point source runoff to the Hudson River.

Mr. Rich Schiafo of Scenic Hudson submitted a letter dated December 29, 2003 which expressed general support for the proposed remedy, and included the following comments concerning Operable Unit #1:

COMMENT 48: The remedial design process should be open and transparent, and should provide specific opportunities for public input in shaping the remedies.

RESPONSE 48: The NYSDEC agrees. Specific milestones will be identified in the Citizen Participation Plan for the remedial design phase for the distribution of design documents to the community. The NYSDEC recognizes that air monitoring is a particular concern of the community, and commits to developing the air monitoring plan with community input.

COMMENT 49: There is concern that the PCBs remaining at the site pose a potential threat to the Hudson River and future users of the property. The NYSDEC

should pursue the alternative excavation methods outlined in the PRAP for removing small pockets of deep contamination. Small-scale flooded excavations should be evaluated for the three areas outside of the containment area that contain PCBs greater than 10 ppm at depths exceeding12 feet.

RESPONSE 49: The provisions in the PRAP that relate to alternative excavation methods remain as elements of the selected remedy.

COMMENT 50: Deep excavation can occur in areas of the northwest corner and northern shoreline that did not contain pile-supported structures. One of the PRAP's principal arguments against flooded excavation is the presence of piles and the risks associated with pulling them during excavation. An excavation approach using reinforced sheetpiles and grout injection could make deep excavation possible in areas where no piles are present.

RESPONSE 50: While the presence of piles is a particular concern that could result in the release of contaminants, it is not the only factor that makes flooded excavation more difficult. The presence of turbid, contaminated water makes the excavation difficult to monitor and control, and is likely to re-contaminate the clean soil used to backfill the hole. Also, Figure 1-3 of the Feasibility Study indicates that most of the 1.3-acre area where deep contamination is present contains piles that were apparently associated with historical buildings, docks, and bulkheads. If deep excavation were attempted in areas where no piles are present, this would result in pockets of removal, and an irregularly-shaped containment structure for the remaining contamination.

COMMENT 51: The grading and drainage of the soil barrier system are important for controlling runoff and infiltration. The stormwater collection system should be carefully designed to protect the water quality of the Hudson River.

RESPONSE 51: The NYSDEC agrees.

COMMENT 52: The southern bulkhead that was installed as an IRM in 2000 must now accommodate the 5 feet of cover that results from the Riverkeeper/Village/ARCO settlement agreement. Scenic Hudson recommends that a new bulkhead be installed outboard of the IRM bulkhead that is 5 feet higher, so the cover can be properly placed behind the wall.

RESPONSE 52: The southern bulkhead IRM was installed approximately 2.4 feet higher than the existing surrounding grade, and can accommodate some of the

added cover material. Details as to how the cover system will be integrated with the existing bulkhead and new shoreline containment system will be determined during the design phase.

COMMENT 53: The new shoreline barrier should be designed with an outer bulkhead and tiebacks sufficient to support the future berthing of vessels. Berthing vessels directly to the shoreline barrier could damage the integrity of the containment system. An institutional control should be added to protect the shoreline bulkhead barrier against damage from the berthing of vessels.

RESPONSE 53: The NYSDEC agrees that this is an important consideration. The ability of the bulkhead to withstand stresses and impacts from berthing will be evaluated during the remedial design phase, along with the need for additional structures and/or institutional controls to protect the barrier.

COMMENT 54: The OU1 PRAP does not clearly describe how the excavated soils will be handled. Will the dewatering facility be designed for both remedial projects (OU#1 and OU#2)?

RESPONSE 54: The "Excavation Alternatives" sidebar summarizes how the excavated soils will be handled on-site, transported off-site and disposed. Additional detail may also be found in the Feasibility Study. Because the soil type and moisture content of OU#1 excavated soils and OU#2 dredged sediments are widely different, the dewatering facility is not expected to be shared by both projects. However, certain process elements, such as filter presses, lime addition and carbon filtration units may have use in both treatment trains.

COMMENT 55: Annual certification of the institutional controls is essential. The NYSDEC should work closely with the Village of Hastings-on-Hudson to ensure that they are strictly enforced.

RESPONSE 55: The NYSDEC agrees.

COMMENT 56: The PRAP does not clearly state how long monitoring and maintenance will be required. Scenic Hudson recommends a minimum of a 100-year monitoring and maintenance program.

RESPONSE 56: As stated at the beginning of Section 7, for alternatives with an indefinite duration of long term monitoring and maintenance, a convention of 30 years is used for the purpose of cost comparison. This does not imply that these activities will cease after 30 years. Monitoring and maintenance of the remedy for this site will continue until the remedial goals for the site

are fulfilled and the NYSDEC, in consultation with the NYSDOH and community, determines that they are no longer required.

COMMENT 57: A comprehensive air monitoring program should be set up during the design phase to establish a baseline for assessing impacts during remedial construction. The Community Health and Safety Plan should provide a mechanism for keeping the community informed about health and safety issues, including air monitoring during the construction phase.

RESPONSE 57: The NYSDEC agrees.

COMMENT 58: Other community issues, such as noise, odor and traffic should be part of the Community Health and Safety Plan.

RESPONSE 58: Odors associated with remedial activities are typically addressed in Community Health and Safety Plans (CHASP). Noise and traffic are beyond the scope of the CHASP, and the NYSDEC typically defers to municipal ordinances regulating these concerns.

COMMENT 59: Releases of contaminants to the Hudson River should be minimized during the remedial construction. There should be baseline, short term and long term monitoring of both the fill and the river for all contaminants of concern to assess the performance of the containment system.

RESPONSE 59: The NYSDEC agrees.

COMMENT 60: There does not appear to be a sufficient number of samples to accurately characterize the concentrations of contaminants throughout the entire 30-foot (+) depth of soil. During the remedial design, data should be collected at least every 5 feet in key areas of the site.

RESPONSE 60: The NYSDEC believes that there are a sufficient number of samples to characterize the nature and extent of contamination at the site, and to develop a conceptual excavation remedy. Certain areas of the site may have data gaps that preclude an accurate delineation of the excavation area. These areas will be identified and sampled as necessary during the remedial design phase. Because the depth of excavation is limited by feasibility, the NYSDEC does not expect to sample the full 30-foot (+) depth of soil in this effort, but rather only those depths that would potentially be excavated.

COMMENT 61: More data on groundwater flow volume and velocities are necessary to design the containment system.

RESPONSE 61: The NYSDEC agrees with this comment. The groundwater flow regime must be thoroughly evaluated and, if necessary, modeled during the design of the containment system and the shoreline bulkhead. This is necessary to properly design the groundwater diversion and relief structures, or any groundwater withdrawals that may be necessary to prevent groundwater from accumulating within the containment area or behind the shoreline bulkhead.

COMMENT 62: To address the deep contamination that will be left at the site and the movement of groundwater that may transport contaminants to the Hudson River, was the feasibility of installing recovery wells considered? Was the feasibility of a tunnel and drain system, as is proposed for the GE Hudson Falls plant site, considered for this site?

RESPONSE 62: The feasibility of installing recovery wells as a remedy for deep PCB contamination was not considered because this contamination is not significantly mobile. Due to Aroclor 1260's very low solubility (2.7 ppb), it is not realistic to expect that groundwater pumping would remove significant amounts of PCBs. However, groundwater pumping may become necessary to prevent groundwater from accumulating within the containment area or behind the shoreline bulkhead. The tunnel and drain system proposed at the Hudson Falls site is a remedy to collect a mobile PCB dielectric fluid (primarily Aroclor 1242) from a shale bedrock aquifer system. Because these conditions are not present at the Harbor at Hastings site, this type of system was not considered.

Ms. Nancy Mattson submitted a letter dated January 1, 2004 which included the following comments:

COMMENT 63: A former employee at the Anaconda Wire and Cable mill reported to her that beryllium was used as a wire alloy. Beryllium should be specifically included in the long term monitoring plans for the site.

RESPONSE 63: Based on the high frequency of beryllium detections and it's reported use as in alloying at the site, the ROD was modified to include beryllium as a listed contaminant of concern. Beryllium will be included, along with lead, copper and other inorganic contaminants in long term monitoring plans.

APPENDIX D

Administrative Record

Administrative Record

Harbor at Hastings
Operable Unit No. 1
Site No. 360022

1. Proposed Remedial Action Plan for the Harbor at Hastings site, Operable Unit No.1, dated October 2003, prepared by the NYSDEC.

2. Order on Consent between NYSDEC and Atlantic Richfield Company, executed on November 16, 1995.

3. “Remedial Investigation/Feasibility Study Work Plan”, October 1995, Golder Associates

4. “Summary and Evaluation of Existing Data”, October 1995, Golder Associates

5. “Remedial Investigation/Feasibility Study Work Plan, Addendum 1", November 1995, Golder Associates

6. “Closure Report - Interim Remedial Measure, Building 14 sumps/Trench Closure”, February 1998, GT Engineering

7. “Final Report, Phase I Treatability Study”, April 1998, Fluor Daniel GTI

8. “Sampling Plan, Northwest Corner Investigation, Phase II”, May 1998, Fluor Daniel GTI

9. “Performance Report, Interim Remedial Measure, Northwest Corner”, October 1998, GT Engineering, Inc.

10. “Southwest Corner Bulkhead Interim Remedial Measure, Final Work Plan”, March 23, 2000, IT Corporation

11. “Final Project Work Plan - Building Demolition”, July 2000, IT Corporation

12. “Remedial Investigation Report, Volume 1 - Report Text”, October 27, 2000, IT Corporation

13. “Remedial Investigation Report, Volume 2 - Figures”, October 27, 2000, IT Corporation

14. “Remedial Investigation Report, Volume 3 - Tables”, October 27, 2000, IT Corporation

15. “Remedial Investigation Report, Volume 4 - Appendices A through D”, October 27, 2000, IT Corporation

16. "Remedial Investigation Report, Volume 5 - Appendices E and F", October 27, 2000, IT Corporation

17. "Remedial Investigation Report, Volume 6 - Appendix G", October 27, 2000, IT Corporation

18. "Remedial Investigation Report, Volume 7 - Appendix H", October 27, 2000, IT Corporation

19. "Remedial Investigation Report, Volume 8 - Appendix I", October 27, 2000, IT Corporation

20. Fact Sheet, December 2000, announcing completion of the revised RI for OU#1 and shoreline bulkhead IRM.

21. "Human Health Risk Assessment", February 2001, ENVIRON Corporation

22. "Project Work Plan, Demolition of Buildings 5A, 5B, 5C", November 29, 2001, IT Corporation

23. "Fill, Fill Water and Groundwater Sampling Results", January 11, 2002, IT Corporation

24. "Building Decontamination and Demolition Report", August 23, 2002, Shaw Environmental and Infrastructure, Inc.

25. "Feasibility Study Report", September 18, 2002, Shaw Environmental and Infrastructure, Inc. and Haley & Aldrich

26. Fact Sheet, October 2003, announcing the PRAP, public meeting and comment period.

27. "DEC Waterfront Tape Transcription" (Transcript of November 13, 2003 PRAP Public Meeting), Esquire Deposition Services

28. "The Durability of HDPE Membranes", Tisinger, L.G. and Giroud, J.P., Geotechnical Fabrics Report, September 1993

29. "Durability of HDPE Geomembranes", Rowe, R. K. and Sangam, H. P., Geotextiles and Geomembranes, #20, 2002.

30. Letter dated December 6, 2003 from Mr. Jacques Padawer

31. Letter dated December 23, 2003 from Werner Sicvol, Atlantic Richfield Corporation, including exhibits

32. Letter dated December 23, 2003 from Ms. Eileen Badell, owner of the Hudson Valley

Health & Tennis Club and the restaurant Blu.

33. Letter dated December 24, 2003 from Ms. Lisa Rosman of the National Oceanic and Atmospheric Administration (NOAA)

34. Letter dated December 29, 2003 from Mr. Rich Schiafo of Scenic Hudson

35. Letter dated January 1, 2004 from Ms. Nancy Mattson

OU-1 ROD AMENDMENT – MARCH 2012

HALEY ALDRICH

RECORD OF DECISION AMENDMENT

Harbor at Hastings
Operable Unit Number 01: On-Site Contamination
State Superfund Project
Hastings-on-Hudson, Westchester County
Site No. 360022
March 2012

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION AMENDMENT

Harbor at Hastings
Operable Unit Number: 01: On-Site Contamination
State Superfund Project
Hastings-on-Hudson, Westchester County
Site No. 360022
March 2012

Statement of Purpose and Basis

This Record of Decision Amendment presents the selected remedy for Operable Unit Number 1 of the Harbor at Hastings site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit Number: 01 of the Harbor at Hastings site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD Amendment.

Description of Selected Remedy

The elements of the amended remedy listed below are identified as unchanged, modified or new when compared to the original 2004 ROD:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would

otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development (modified)

2. At the Northwest Corner of the site and along the Northern Shoreline, excavation of surface soil (0-12 inches) containing greater than 1ppm PCB and subsurface soil containing greater than 10 ppm PCB to a maximum depth of 9 feet. Outside of the Northwest Corner and the Northern Shoreline areas, excavation of surface soil (0-12 inches) containing greater than 1ppm PCB and subsurface soil containing greater than 10 ppm PCB, to a maximum depth of 12 feet. (modified)

3. Outfalls and associated pipe bedding from Building 52 that are potential PCB source areas will be excavated, sampled and removed, or decommissioned as approved by the Department. (new)

4. Excavation of shallow soils from the southern portion of the site that are identified as "lead hotspots". These correspond to lead levels between 2,160 ppm and 43,200 ppm. (unchanged)

5. In conjunction with OU2, installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of PCB DNAPL onshore and offshore of the northwest corner of the site. The location and alignment of the proposed sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River. The area behind the sheet pile wall will be filled with soil and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater discharging to the river. (new)

6. The shoreline south of the northwest area, will either be a steel bulkhead or construction of a sloped shoreline cover system. The sloped shoreline cover system will be designed and constructed such that no additional fill material will be placed into the Hudson River, and will require the removal of sediment or fill below the current sediment or water elevation for placement of a cover system. The sloped shoreline cover system will be designed with the following layers: an isolation layer of soil or geotextile designed to prevent the migration of contaminated soil particles into the Hudson River; an erosion protection layer; and a habitat/surface substrate layer. The habitat/surface substrate layer will be designed to restore aquatic, intertidal and stream bank habitats while taking into account erosional forces, such as waves and currents. (new)

7. Construction and operation of a recovery system for PCB DNAPL, consisting of a series of wells and an active pumping system to remove fluid PCB material as it collects. (new)

8. A site cover will be required to allow for restricted residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). However, pile-supported structures will not be permitted in any areas where PCB material is potentially present. Where the soil cover is required, it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer with appropriate natural species. (modified)

9. Imposition of an institutional control in the form of an environmental easement for the controlled property, that will:

a. require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);

b. allow the use and development of the controlled property for restricted-residential, uses as defined by Part 375-1.8(g) which are consistent with the remedial elements, although land use is subject to local zoning laws;

c. restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;

d. prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and

e. require compliance with the Department approved Site Management Plan. (new)

10. A Site Management Plan will be required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 9 above.

Engineering Controls: The soil cover discussed in Paragraph 8; groundwater treatment system; and PCB DNAPL recovery system.

This plan includes, but may not be limited to:

i. an Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination;

ii. descriptions of the provisions of the environmental easement including any land use, groundwater and/or surface water use restrictions, which include a prohibition on pile supported structures over areas with PCB material;

iii. provisions for the management and inspection of the identified engineering controls;

iv. maintaining site access controls and Department notification; and

v. the steps necessary for the periodic reviews and certification of the institutional and engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

i. monitoring groundwater quality and elevation to assess the performance and effectiveness of the remedy;

ii. soil cover system inspection and maintenance as necessary to ensure its function is not impaired by erosion or activities at the site;

iii. shore protection system (sheet pile and sloped areas) will be periodically monitored for erosion, corrosion, damage or deterioration; shoreline elevation; and

iv. a schedule of monitoring and frequency of submittals to the Department;

c. an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of for any mechanical or physical components of the remedy. The plan includes, but is not limited to:

i. compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;

ii. maintaining site access controls and Department notification; and

iii. providing the Department access to the site and O&M records (modified)

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 30,2012

Date

Robert W. Schick, P.E., Acting Director
Division of Environmental Remediation

RECORD OF DECISION AMENDMENT
HARBOR AT HASTINGS SITE
OPERABLE UNIT 1 – ON-SITE CONTAMINATION

Village of Hastings on Hudson / Westchester County / Site No. 360022 March 2012

Prepared by the New York State Department of Environmental Conservation
Division of Environmental Remediation

SECTION 1: PURPOSE AND SUMMARY OF THE RECORD OF DECISION AMENDMENT

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is selecting an amendment to the Record of Decision (ROD) for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the modification to the remedy identified by this ROD Amendment. The disposal of hazardous wastes at this site, as more fully described in the original ROD and Section 6 of this document, has contaminated various environmental media. The selected amendment is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This amendment identifies the new information which has lead to this selected amendment and discusses the reasons for the preferred remedy.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

On March 18, 2004, the New York State Department of Environmental Conservation (Department) signed a ROD which selected a remedy to cleanup the Harbor at Hastings Site Operable Unit No. 1 (OU1), the on-site soils area. The ROD outlined a set of remedial actions for the site that included partial excavation, containment, groundwater management, and installation of a soil cover. Following the issuance of the ROD, design investigations for OU1 were completed by Atlantic Richfield Company to resolve investigation uncertainties and provide a basis for the remedial design.

The remedial design for OU1 identified constructability issues with the design of the proposed remedy and the need to integrate the OU1 and OU2 (off-site impacts to the Hudson River) remedies. The issues and concerns are related to the alignment of the sheeting at the existing shoreline, the geotechnical stability of the shoreline, and significant new information regarding the presence and extent of dense non-aqueous phase liquid (DNAPL) beneath the Northwest Corner of the site. In addition, the Department issued shoreline protection guidance in 2007 which identified a preference for approaches other than the installation of vertical sheet pile bulkheads, where feasible and appropriate.

The Department is amending the ROD for OU1 of the Harbor at Hastings Site. The selected changes include:

- Modifying the alignment of the sheet pile wall offshore of the northwest corner of the site to extend

into the Hudson River in conjunction with the selected OU2 remedy, to provide containment and enable the recovery of PCB DNAPL;

- Allowing installation of either a sheet pile wall or construction of a sloped shoreline cover system along the shoreline in areas that do not require containment of PCB DNAPL;

- Containing the remaining on-site contamination in the Northwest Area using a shoreline barrier in conjunction with a groundwater control and treatment system, a soil cover system, and monitoring to address groundwater and storm water management;

- Elimination of a slurry wall from the Northwest Corner containment area;

- Construction and operation of a recovery system for PCB DNAPL; and

- Excavating and sampling outfalls and associated pipe bedding from Building 52.

In addition, while the criteria for excavation of PCB-contaminated soils have not changed, the new information collected during the design of the original remedy indicates that the extent of the excavation area is significantly increased.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held between January 10 and March 12, 2012, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

Hastings Public Library
7 Maple Avenue
Hastings-on-Hudson, NY 10706
Mon - Wed: 9:30 - 8:30, Thur: 9:30 - 6:00,
Sat: 9:30 - 5:00, Sun 1:00 - 5:00
Phone: (914) 478-3307

NYSDEC Region 3 Office
21 South Putt Corners Road
New Paltz, NY 12561-1696
Attention: Michael Knipfing
Monday – Friday: 8:30 – 4:30
Phone: (845) 256-3154

Village Clerk
Municipal Offices
7 Maple Avenue
Hastings on Hudson, NY 10706
Mon - Fri: 8:30 - 4:00
Phone:(914)478-3400

A public meeting was also conducted. At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were

accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The site is located on approximately 28 acres along the Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The site is bounded on the north and west by the Hudson River and to the south by the Tappan Terminal site. A former marina borders the site to the north.

Site Features: Most of the site is covered by pavement or concrete building slabs. One building remains at the site (Building 52). The shoreline consists of areas of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting.

Current Zoning and Uses: The site is zoned general industrial, and is the subject of planning studies by the Village of Hastings-on-Hudson. Several temporary trailers are in use for security and remedial activities.

Historic Uses: The site is the former Anaconda Wire and Cable Company, which ceased operations in 1974. Wire manufacturing operations during a portion of the operating period caused the release of PCBs and metals to site soil, groundwater and sediments. A site investigation was performed in 1986-87 in connection with a potential real estate development. This investigation led to the discovery of high levels of PCBs beneath the northwest corner of the site.

Operable Units: The site is divided into two operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Operable Unit 1 (OU1) is the on-site soils area west of the railroad tracks. OU2 is the off-site impacts to the Hudson River.

Site Geology and Hydrogeology: The landmass of the property was constructed by placement of fill material into the Hudson River until the early 1900s. This fill material is approximately 10-20 feet thick along the railroad tracks, and 20-40 feet thick along the river. Beneath the fill layer lies the Marine Silt,

which is a structurally weak clayey silt material that is approximately 40 feet thick along the shoreline. Beneath the Marine Silt lies the Basal Sand unit, a very dense sand and gravel material, into which all structural piles for site buildings were placed. Groundwater is approximately 2 to 8 feet below ground surface in the fill material, and is influenced by tidal variation. Groundwater in the Basal Sand unit is confined by the Marine Silt unit and is present in an artesian condition. The shoreline shows signs of historical erosion due to storm events and wave action. Low-lying parts of the site have been flooded during larger storms.

Operable Unit (OU) Number 01 is the subject of this document.

A Record of Decision was issued previously for OU 01 in March 2004.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted residential use as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for restricted use of the site.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The Department and ARCO entered into Consent Orders in 1995 and March 2005. These Orders obligate ARCO to implement a RI/FS and RD/RA for OU1.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,

- Sampling of surface water and sediment,

- Ecological and Human Health Exposure Assessments.

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in the March 2004 ROD for OU1, which is included as Exhibit A, list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Information

The analytical data collected on this site includes data for:

- groundwater
- surface water
- soil
- sediment
- surface soil

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in March 2004 ROD for OU1 which is included as Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

polychlorinated biphenyls (PCB)
copper
beryllium
lead
zinc

As illustrated in the original 2004 ROD for OU1 of this site, the contaminant(s) of concern exceed the applicable SCGs for:

soil
groundwater

Since the issuance of the Feasibility Study (FS) and ROD, significant new information about the site has

been obtained. The most significant finding is the presence of separate phase PCB material, including liquid PCB Material or DNAPL, beneath Northwest Corner of the site, and along the alignment of the sheet pile wall specified in the original 2004 OU1 ROD. The extent of separate phase PCB is shown in Figure 3.

6.3: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

For OU-1: The site is completely fenced, which restricts public access. Some contaminated soils remain at the site below concrete and/or clean fill; therefore, people will not come in contact with contaminated soil unless they dig below the surface materials. Contaminated groundwater at the site is not used for drinking or other purposes as the site is served by a public water supply that obtains water from a different source not affected by this contamination. For OU-2: People using the river for recreational purposes such as swimming and boating may come into direct contact with site related contaminants. The river is not a source of potable water in this area. People may come in contact with contaminants present in shallow sediment while entering and exiting the river. Fish in the river are likely to contain the same contaminants that are present in surface water and sediment; therefore, people who consume fish from the river are likely to be consuming these contaminants as well. For specific advisories on fish consumption in this area please refer to NYSDOH's Health Advise on Eating Sportfish and Game. http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/docs/advisory_booklet_2011.pdf

6.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

The Fish and Wildlife Resources Impact Analysis (FWRIA) for OU 01, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

The primary contaminants of concern for the site are PCBs (Aroclors 1260 and 1262) and metals, including copper, lead, and zinc from historic wire manufacturing operations. For OU1, soil and groundwater beneath the site are contaminated with PCBs and metals, including beryllium, above standards, criteria and guidance values. For OU2, PCBs and metals have also contaminated Hudson River surface water and sediments, and site-related PCBs have been detected in resident fish.

The site presents a significant environmental threat due to ongoing releases from contaminated soils and/or sediments to groundwater, surface water and the Hudson River ecosystem. Metals in sediment pose a toxicity threat to benthic organisms, and PCBs in sediment pose a toxicity and bioaccumulation threat to fish and wildlife.

SECTION 7: SUMMARY OF ORIGINAL REMEDY AND ROD AMENDMENT

7.1 Original Remedy

In the March 2004 ROD for OU1 the NYSDEC selected partial excavation, long-term containment, and deed restrictions. The components of the original remedy were as follows:

- Excavation and off-site disposal of PCB-contaminated soil to a maximum depth of 9 feet in the Northwest Corner and along the Northern Shoreline of the site;

- Containment of remaining deep contamination in the Northwest Corner and Northern Shoreline areas using a slurry wall, sealed sheet pile bulkhead, and an impermeable cap;

- Outside of the Northwest Corner and Northern Shoreline containment areas, excavation, to a maximum depth of 12 feet, of all PCB-contaminated soil. For the few areas where PCB contamination exceeds 12 feet, soil would either be excavated by alternative methods, or contained within a watertight sheet pile structure and capped;

- Excavation of lead "hot spots" in shallow soils, corresponding to lead levels between 2,160 ppm and 43,200 ppm;

- Installation of a watertight steel sheet pile bulkhead along the site shoreline;

- Installation of a 2-foot thick barrier system, consisting of a demarcation layer and soil cover over areas not covered by an impermeable cap;

- Institutional controls to prevent exposure to contaminated soils and groundwater beneath the site, and to preserve the integrity of the cover system and containment cells;

- Annual certification that the institutional controls are in place and effective; and

- Long term monitoring.

7.2 New Information

Since the issuance of the FS and ROD, significant new information about the site has been obtained. The most significant finding is the presence of liquid PCB material beneath the Northwest Corner of the site in close proximity to the Hudson River, and along the alignment of the sheet pile wall specified in the original 2004 OU1 ROD. Sheet piles cannot be driven through this material without dragging down or creating a conduit for migration of PCBs into the underlying aquifer. In addition, environmental and geotechnical investigations conducted for OU2 led to a better understanding of the relationship between the OU2 alternatives under consideration and the remedy for OU1. Geotechnical evaluations conducted for OU2 determined that the full extent of contamination beneath the river could not be removed without de-stabilizing the Northwest Corner shoreline and causing a collapse. Because PCB DNAPL was also found beneath the Northwest Corner in close proximity to the river in this area, the original alignment of the sheet pile wall would not have fully contained this PCB Material. Also, pilot tests conducted on both vertical and angled wells have determined that recovery of PCB DNAPL is feasible. An evaluation of groundwater

treatment technologies has determined that the low level of PCBs dissolved in groundwater can be feasibly removed by a system of adsorptive panels or canisters installed in the containment wall. With new options for removing PCB DNAPL and treating dissolved contamination, certain elements of the fully-enclosed containment system, the upgradient slurry wall and impermeable membrane, are no longer needed. Therefore, based on the new information submitted, and the need to integrate the proposed remedy for OU2, the Department is amending the ROD for Operable Unit No. 1 at the Harbor at Hastings Site.

7.3 Selected Changes

The selected changes include:

- The alignment of the sheet pile wall, which previously would have followed the existing shoreline, will extend into the Hudson River to provide containment and allow for the recovery of PCB DNAPL located beneath the sediment in this area. The containment element for the northwest on-site contamination (formerly identified as the Northwest Corner and Northern Shoreline Area) will be modified to include recovery of DNAPL; containment of DNAPL by a sheet pile wall with sealed joints installed along the new shoreline alignment; and treatment of groundwater to remove PCBs.

- The proposed change to the shoreline protection component of the remedy is the installation of either a steel bulkhead or an engineered slope along the shoreline in areas which do not require containment of separate phase PCB material. This change allows the flexibility of using the engineered slope instead of the steel bulkhead in areas that do not require PCB containment. In addition to protecting the shoreline, the engineered slope will be designed to prevent the migration of contaminated soil particles into the Hudson River.

- Construction and operation of a recovery system for PCB DNAPL, consisting of a series of vertical and angled wells and an active pumping system to remove fluid PCB material as it collects.

- The outfalls and associated pipe bedding from Building 52 will be excavated, sampled and removed or decommissioned as approved by the Department.

SECTION 8: EVALUATION OF PROPOSED CHANGES

8.1 Remedial Goals

Goals for the cleanup of the site were established in the original ROD. The goals selected for this site are:

- Reduce, control, or eliminate to the extent practicable the contamination present within the soils and fill on site, and thereby eliminate the significant threat posed by the presence of hazardous wastes at the site.

- Eliminate the potential for direct human or animal contact with the contaminated soils or groundwater on site.

- Eliminate the threat to surface waters and sediments by eliminating surface run-off and subsurface releases of fill from the site.

- Eliminate, to the extent practicable, the migration of PCBs, metals and other contaminants into the Hudson River by surface and subsurface erosion of contaminated soils, transport of contaminated groundwater, and migration of PCBs in both elastic material and petroleum phases.

- Prevent, to the extent possible, migration of contaminants at the site to groundwater and surface water.

Further, the remediation goals for the site include attaining to the extent practicable:

- Provide for attainment of SCGs for groundwater quality at the limits of the site.

8.2 Evaluation Criteria

The criteria used to compare the remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each criterion, a brief description is provided. A detailed discussion of the evaluation criteria and comparative analysis is contained in the original Feasibility Study.

The first two evaluation criteria are called threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The selected ROD amendment remedy will be more protective of human health and the environment when compared to the original remedy. The revised sheet pile wall alignment in the Northwest Corner provides better overall protection of human health and the environment than the original alignment by more effectively containing PCB DNAPL; enhancing PCB DNAPL recovery options; and preventing PCB contaminated groundwater from entering the Hudson River. It provides better containment of the PCB source area when compared to the original remedy based on the new information regarding the nature and extent of PCB DNAPL. Groundwater treatment will be equally protective of the environment and will be monitored.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The most important SCGs of concern are the ambient groundwater and surface water standards (6NYCRR Parts 700-705) and the 6NYCRR Part 375 Soil Cleanup Objectives (SCOs) for PCBs. The installation of the sheet pile wall creates a barrier to the groundwater flow to the river and allows collection and treatment of groundwater and DNAPL in the northwest extension area of the site. The engineered sloped shoreline will also prevent the discharge of particles in the historic fill to the Hudson River, which will be equivalent to the original remedy in the areas of the site where separate phase PCB material is not a concern. The provision for an engineered sloped shoreline is also consistent with recent Department shoreline protection guidance,

issued in 2007, which identifies a hierarchy of approaches to be used for shore line stabilizations, with preference given to biotechnical approaches over vertical sheet pile bulkheads, where feasible and appropriate. The removal of the former outfalls and pipe bedding from Building 52 will remove additional PCB source areas which may contribute to exceedances of the ambient groundwater standards. The proposed amendment will fully contain the PCB DNAPL which provides the best option for source control of the PCB DNAPL.

The revised sheet pile alignment will need to address the SCGs found in 6NYCRR Part 608 and Environmental Conservation Law Article 15 due to the proposed filling into the Hudson River. This requirement will address the associated filling of approximately 0.88 acres of the Hudson River. Mitigation will be necessary for placement of fill in any river areas which raises the existing sediment grade. The filling activities will be mitigated through the creation of new wetlands areas or improvement of degraded wetlands.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

The short-term impacts of vehicle traffic, contaminated material excavation and handling, and soil backfill will represent noise, dust and emission concerns which will need to be controlled with health and safety plans and engineering controls. The proposed changes represent a decrease in short term impacts due to the generation of less noise and disturbance to the community and the river due to a reduced length of sheet pile wall installation. The short term impacts due to the excavation volume, potential odors, truck traffic and project duration will be equivalent to the original remedy. However, routine procedures will be used to monitor and mitigate odor and dust resulting from the construction activities.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

The revised sheet pile wall alignment will provide a higher degree of long-term effectiveness than the original location which would have passed through the PCB DNAPL and PCB material. The PCB DNAPL in the Northwest Corner Area will be contained, collected from the new land area created within the Hudson River, and properly disposed off-site.

Both the original remedy and the selected change will require monitoring of the groundwater. The risk associated with the potential release of contaminated groundwater under the selected alternative will be equivalent to the original remedy.

The time needed to achieve compliance with groundwater SCGs across the site is expected to be equivalent

for the amended remedy due to the depth of excavation of PCB contaminated soil.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The selected amendment will create a barrier and remove PCB DNAPL for off-site disposal, which will provide a permanent reduction in volume. Similarly, PCBs dissolved in groundwater will be removed by a passive recovery system, avoiding the potential for discharge into the river. By comparison, the remedy selected in the 2004 ROD would have relied more heavily on containment, and may not have reduced the volume through treatment. New information indicates, the original remedy may have increased the potential mobility of PCB DNAPL contamination by driving the sheets through the DNAPL along the shoreline which could have created a pathway into uncontaminated zones. The selected amendment will reduce the mobility of this contamination by creating a barrier beyond the known limits of contamination, and allowing further delineation and recovery in the Northwest Extension Area. The amended remedy will therefore provide a greater reduction in mobility of PCBs than the original remedy.

6. Implementability. The technical feasibility and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

The selected amendment and original remedy pose different implementability challenges at this site. The selected modification of the sheet pile wall alignment is more technically implementable in comparison to the original remedy because it will avoid the known area of PCB DNAPL and will not result in the potential destabilization of the shoreline during pre-clearing of the rip-rap at the shoreline. The modified alignment will also avoid creating or causing a pathway for PCB migration of the newly identified PCB DNAPL in the subsurface along the wall alignment into deeper uncontaminated zones. Administratively, the construction of the sheet pile wall further out into the Hudson River may be more difficult because it will require permits and approval from the United States Army Corps of Engineers and approval of a wetlands mitigation plan. Installation of groundwater treatment at the shoreline instead of construction of a slurry wall and impermeable cover is more readily implementable.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The estimated present worth cost to carry out the amended remedy is $163,000,000, including annual costs for 30 years. The estimated present worth to complete the original remedy was $63,000,000 including annual costs for 30 years. The cost to construct the amended remedy is estimated to be $155,000,000 and the estimated average annual cost is $271,000 per year for 30 years.

The costs are significantly different between the original remedy and amended remedy because the new information obtained during the 50 percent design and subsequent work has been used to update the cost

estimate from the original Feasibility Study. The major changes in cost include updated pricing, additional scope items identified during the 50 percent design process, an allowance for work associated with Building 52, a modified approach to shore stabilization, the DNAPL extraction system and the relocation of existing utilities.

Shore stabilization was included in the original OU-1 remedy cost; however, the costs for the new sheet pile wall which extends into the Hudson River (estimated to be approximately $36,000,000) are now included in the OU-2 cost estimate and therefore not included in the OU-1 amended remedy estimate.

This final criterion is considered a modifying criterion and is considered after evaluating those above. It is focused upon after public comments on the proposed ROD amendment have been received.

8. Community Acceptance. Concerns of the community regarding the proposed changes have been evaluated. A responsiveness summary was prepared that presents the public comments received and the manner in which the Department addressed the concerns raised.

SECTION 9: SUMMARY OF ROD AMENDMENT

The Department has amended the Record of Decision (ROD) for the Harbor at Hastings Site OU1.
The estimated present worth cost to carry out the amended OU1 remedy is $163,000,000. The estimated present worth to complete the original remedy was $63,000,000. The cost to construct the amended remedy is estimated to be $155,000,000 and the estimated average annual cost for 30 years is $271,000.

The elements of the amended remedy listed below are identified as unchanged, modified or new when compared to the original 2004 ROD:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gas and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - Maximizing habitat value and creating habitat when possible;
    - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
    - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development (modified)

2. At the Northwest Corner of the site and along the Northern Shoreline, excavation of surface soil (0-

12 inches) containing greater than 1ppm PCB and subsurface soil containing greater than 10 ppm PCB to a maximum depth of 9 feet. Outside of the Northwest Corner and the Northern Shoreline areas, excavation of surface soil (0-12 inches) containing greater than 1ppm PCB and subsurface soil containing greater than 10 ppm PCB, to a maximum depth of 12 feet. (modified)

3. Outfalls and associated pipe bedding from Building 52 that are potential PCB source areas will be excavated, sampled and removed, or decommissioned as approved by the Department. (new)

4. Excavation of shallow soils from the southern portion of the site that are identified as "lead hotspots". These correspond to lead levels between 2,160 ppm and 43,200 ppm. (unchanged)

5. In conjunction with OU2, installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of PCB DNAPL onshore and offshore of the northwest corner of the site. The location and alignment of the proposed sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River. The area behind the sheet pile wall will be filled with soil and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater discharging to the river. (new)

6. The shoreline south of the northwest area, will either be a steel bulkhead or construction of a sloped shoreline cover system. The sloped shoreline cover system will be designed and constructed such that no additional fill material will be placed into the Hudson River, and will require the removal of sediment or fill below the current sediment or water elevation for placement of a cover system. The sloped shoreline cover system will be designed with the following layers: an isolation layer of soil or geotextile designed to prevent the migration of contaminated soil particles into the Hudson River; an erosion protection layer; and a habitat/surface substrate layer. The habitat/surface substrate layer will be designed to restore aquatic, intertidal and stream bank habitats while taking into account erosional forces, such as waves and currents. (new)

7. Construction and operation of a recovery system for PCB DNAPL, consisting of a series of wells and an active pumping system to remove fluid PCB material as it collects. (new)

8. A site cover will be required to allow for restricted residential use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper two feet of exposed surface soil will exceed the applicable soil cleanup objectives (SCOs). However, pile-supported structures will not be permitted in any areas where PCB material is potentially present. Where the soil cover is required, it will be a minimum of two feet of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer with appropriate natural species. (modified)

9. Imposition of an institutional control in the form of an environmental easement for the controlled property, that will:

a. require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);

b. allow the use and development of the controlled property for restricted-residential, uses as defined by Part 375-1.8(g) which are consistent with the remedial elements, although land use is subject to local zoning laws;

c. restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;

d. prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and

e. require compliance with the Department approved Site Management Plan. (new)

10. A Site Management Plan will be required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 9 above.

Engineering Controls: The soil cover discussed in Paragraph 8; groundwater treatment system; and PCB DNAPL recovery system.

This plan includes, but may not be limited to:

i. an Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination;

ii. descriptions of the provisions of the environmental easement including any land use, groundwater and/or surface water use restrictions, which include a prohibition on pile supported structures over areas with PCB material;

iii. provisions for the management and inspection of the identified engineering controls;

iv. maintaining site access controls and Department notification; and

v. the steps necessary for the periodic reviews and certification of the institutional and engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

i. monitoring groundwater quality and elevation to assess the performance and effectiveness of the remedy;

ii. soil cover system inspection and maintenance as necessary to ensure its function is not impaired by erosion or activities at the site;

iii. shore protection system (sheet pile and sloped areas) will be periodically monitored for erosion, corrosion, damage or deterioration; shoreline elevation; and

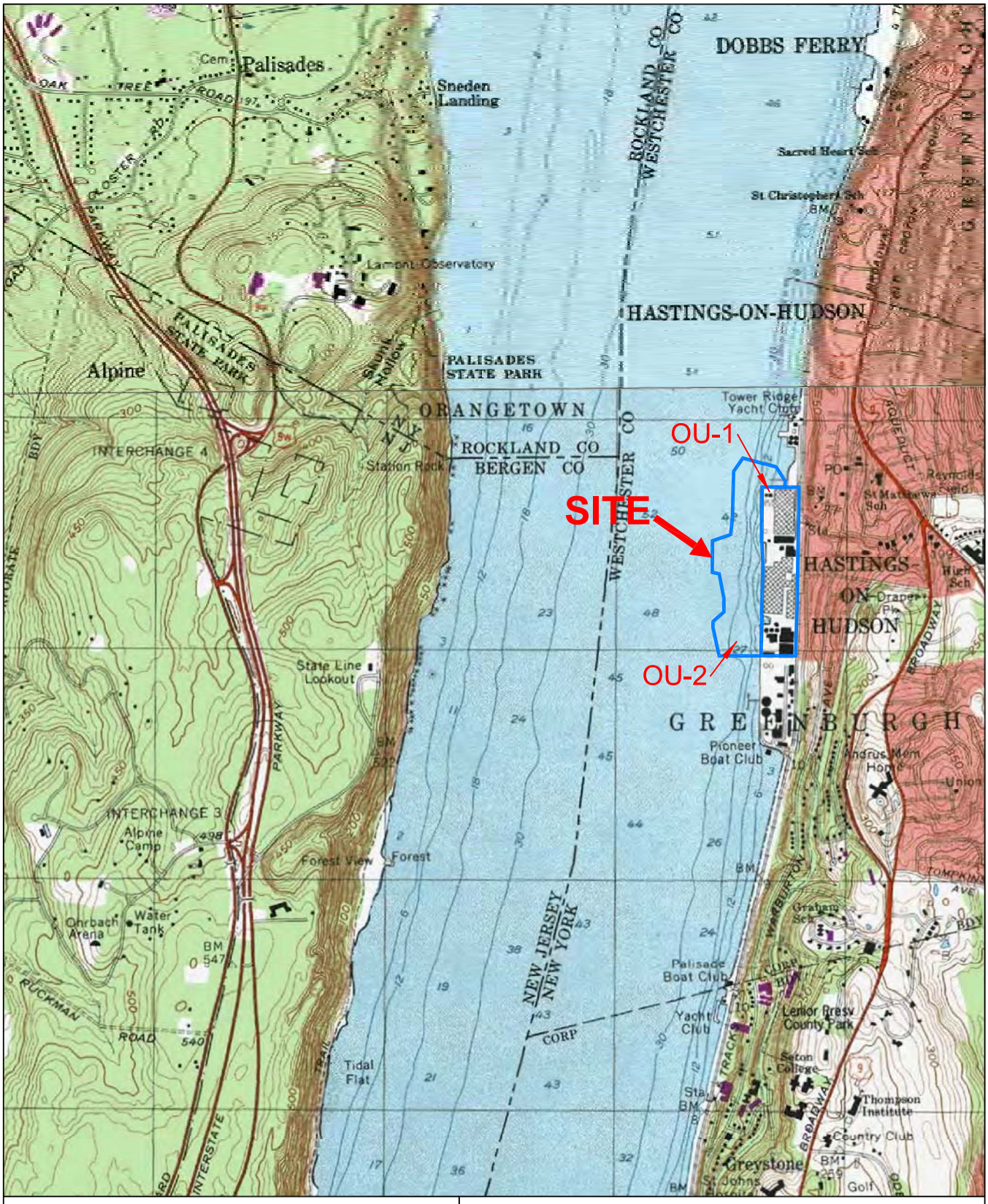
iv. a schedule of monitoring and frequency of submittals to the Department;

c. an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of for any mechanical or physical components of the remedy. The plan includes, but is not limited to:

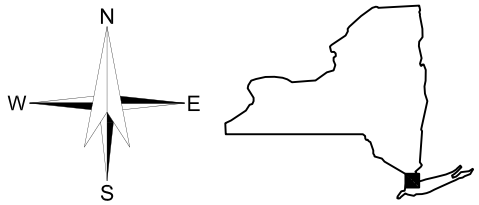
i. compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;

ii. maintaining site access controls and Department notification; and

iii. providing the Department access to the site and O&M records (modified)



SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Site Location

SCALE: 1:24000
MAY 2011

FIGURE 1

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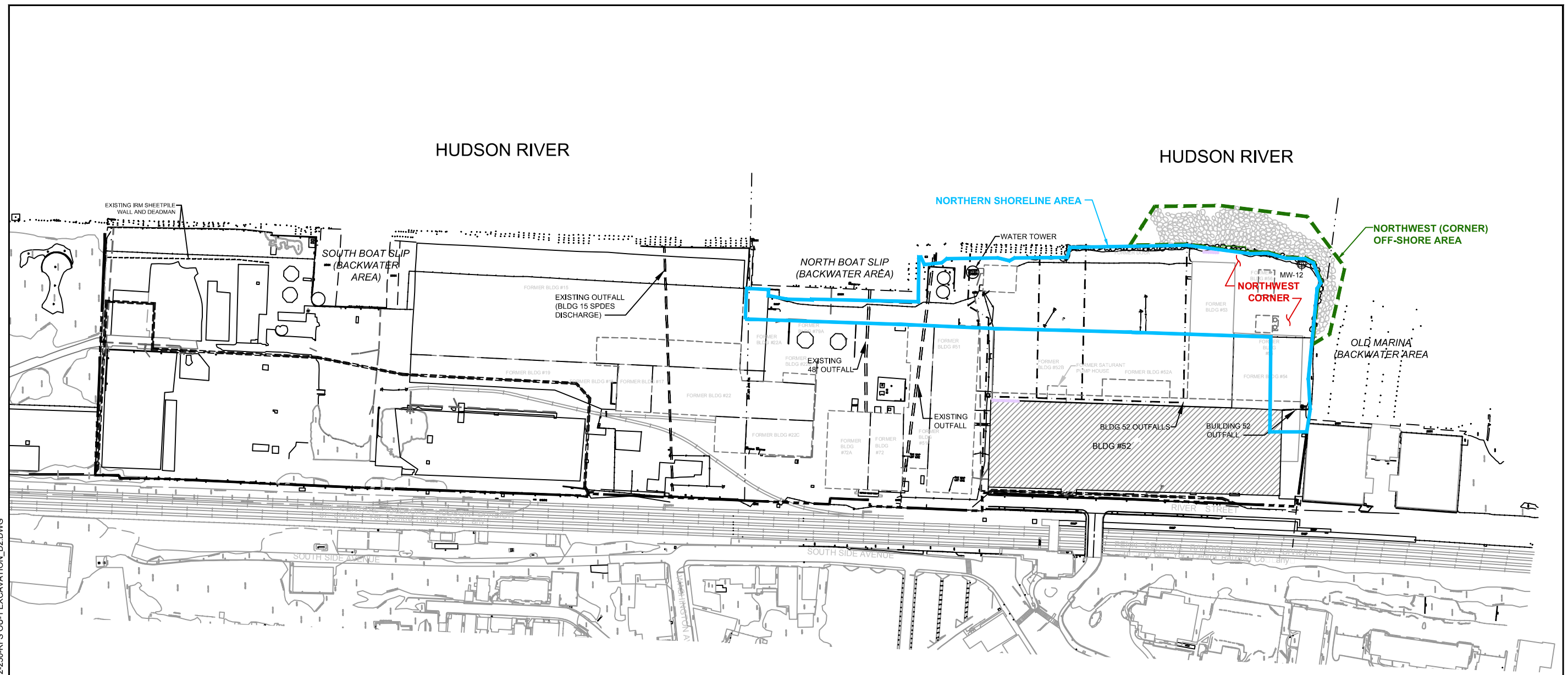


LEGEND:

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- RIP-RAP
- BUILDING 52 OUTFALLS
- EXISTING OFFSITE OUTFALLS
- MONITORING WELL
- NORTHERN SHORELINE AREA
- NORTHWEST (CORNER) OFF-SHORE AREA

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
4. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.

W S Z E

0 200 400

SCALE IN FEET

HALEY & ALDRICH

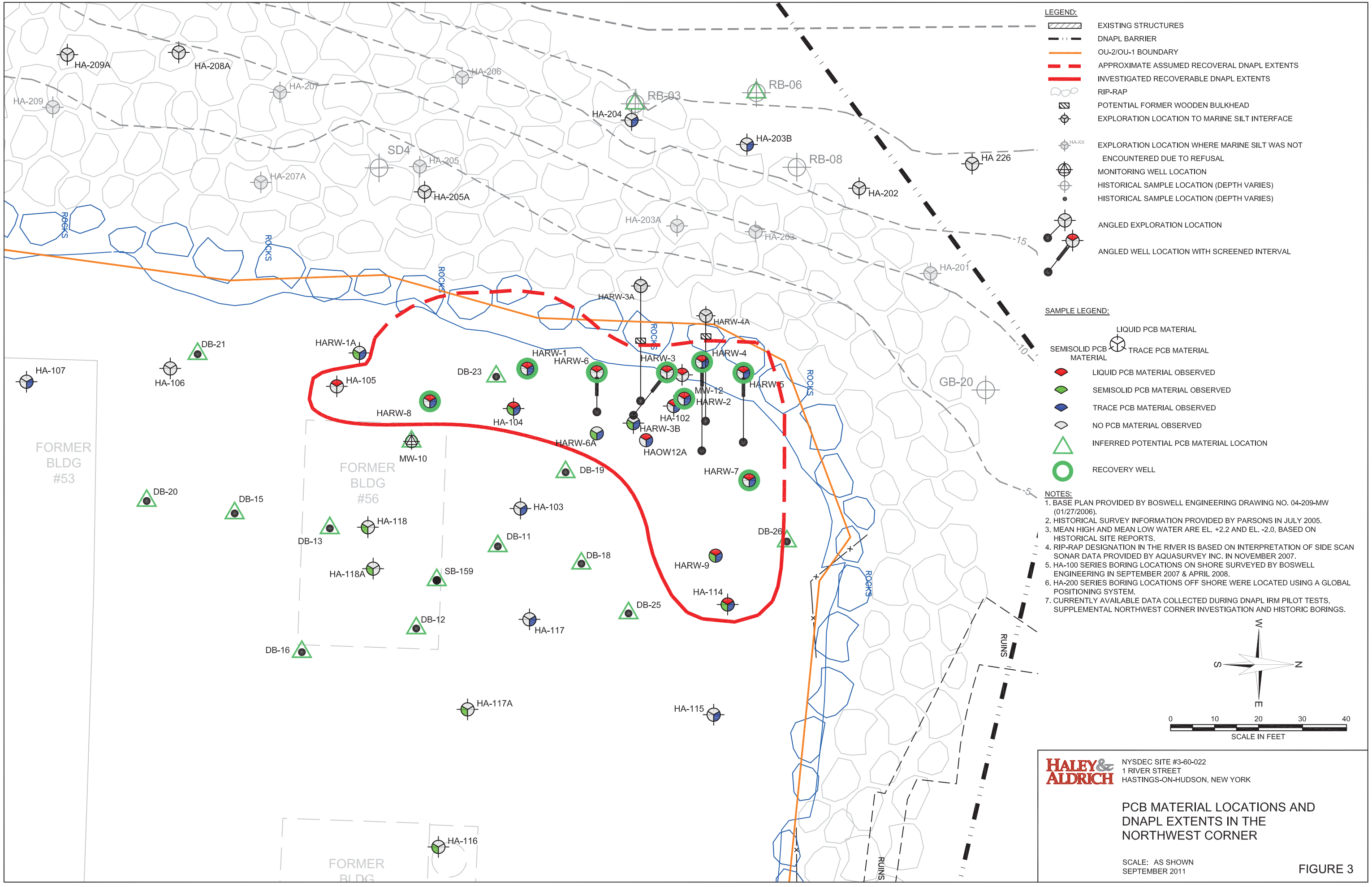
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OU-1 SITE FEATURES

SCALE: AS SHOWN
FEBRUARY 2012

FIGURE 2

G:\PROJECTS\286122265 - FINAL RFS\CAD\FINAL PLAN VIEWS AND SECTIONS\286122250-RFS OU-1 EXCAVATION_D2.DWG



LEGEND:

- EXISTING STRUCTURES
- DNAPL BARRIER
- OU-2/OU-1 BOUNDARY
- APPROXIMATE ASSUMED RECOVERAL DNAPL EXTENTS
- INVESTIGATED RECOVERABLE DNAPL EXTENTS
- RIP-RAP
- POTENTIAL FORMER WOODEN BULKHEAD
- EXPLORATION LOCATION TO MARINE SILT INTERFACE
- HA-XX — EXPLORATION LOCATION WHERE MARINE SILT WAS NOT ENCOUNTERED DUE TO REFUSAL
- MONITORING WELL LOCATION
- HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
- HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
- ANGLED EXPLORATION LOCATION
- ANGLED WELL LOCATION WITH SCREENED INTERVAL

SAMPLE LEGEND:

- LIQUID PCB MATERIAL
- SEMISOLID PCB MATERIAL
- TRACE PCB MATERIAL
- LIQUID PCB MATERIAL OBSERVED
- SEMISOLID PCB MATERIAL OBSERVED
- TRACE PCB MATERIAL OBSERVED
- NO PCB MATERIAL OBSERVED
- INFERRED POTENTIAL PCB MATERIAL LOCATION
- RECOVERY WELL

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. HA-100 SERIES BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. HA-200 SERIES BORING LOCATIONS OFF SHORE WERE LOCATED USING A GLOBAL POSITIONING SYSTEM.
7. CURRENTLY AVAILABLE DATA COLLECTED DURING DNAPL IRM PILOT TESTS, SUPPLEMENTAL NORTHWEST CORNER INVESTIGATION AND HISTORIC BORINGS.

W S N E

0 10 20 30 40

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

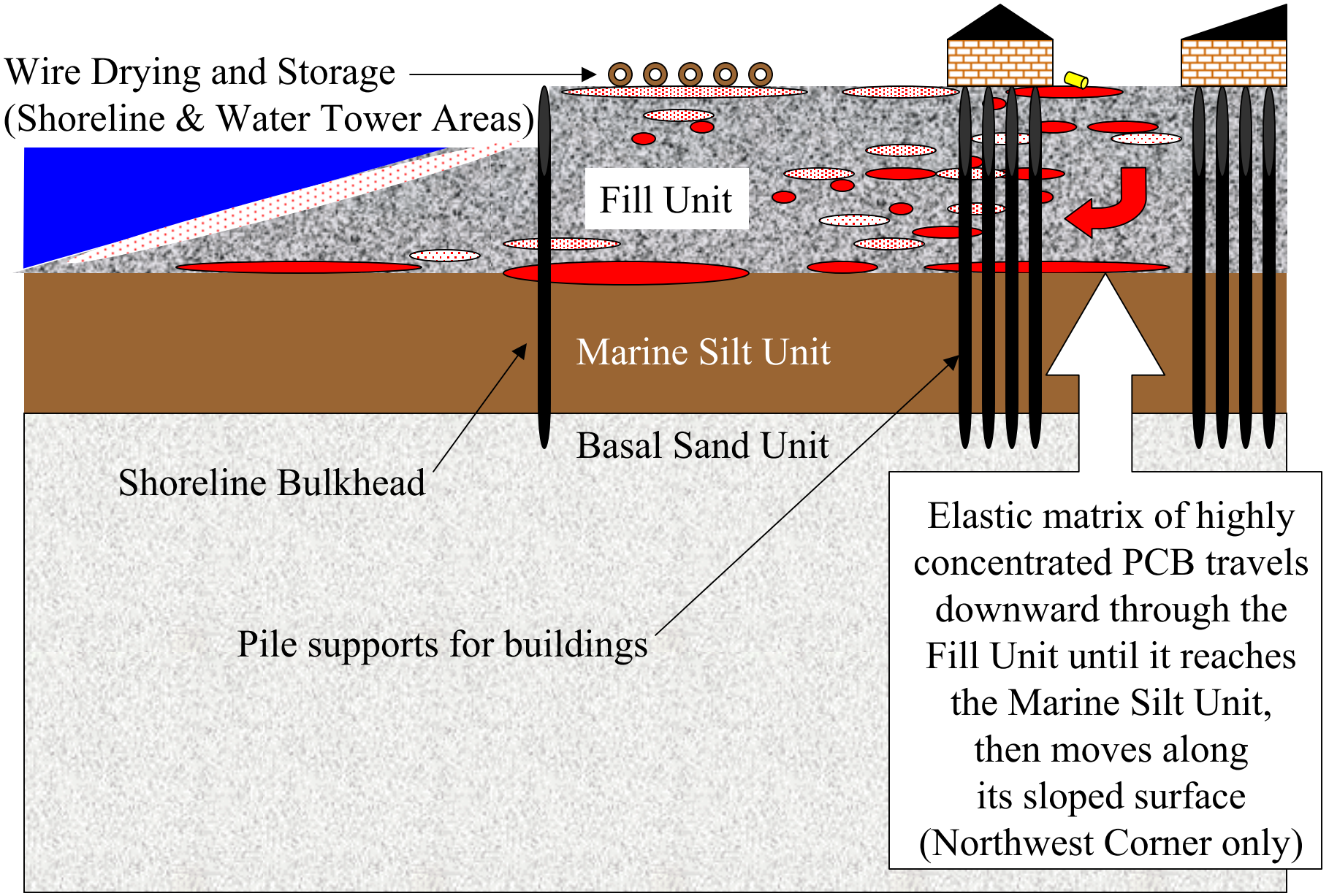
PCB MATERIAL LOCATIONS AND DNAPL EXTENTS IN THE NORTHWEST CORNER

SCALE: AS SHOWN
SEPTEMBER 2011

FIGURE 3

G:\PROJECTS\28612\250 - RFS\COMMUNICATIONS\2011-09-29 DEC FIGURE\28612-PCB MATERIAL EXTENTS_DF.DWG

Figure 4: Conceptual Model of PCB Migration



APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Harbor at Hastings
Operable Units No. 1 and 2
State Superfund Project
Village of Hastings on Hudson, Westchester County, New York
Site No. 360022

The Proposed Remedial Action Plan (PRAP) for the Harbor at Hastings site, was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on January 2012. The PRAP outlined the remedial measure proposed for the contaminated soil, sediment, surface water, groundwater at the Harbor at Hastings site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on January 26, 2012, which included a presentation of the remedial investigation and feasibility study (RI/FS) for the Harbor at Hastings as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period was to have ended on February 10, 2012, however it was extended to March 12, 2012, at the request of the public.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Justification of the 1ppm PCB cleanup goal for soils should be provided through risk assessment modeling.

RESPONSE 1: The 1 ppm soil cleanup objective (SCO) is set forth in 6 NYCRR 375-6.8, and this SCO is protective for residential and ecological resources as well as the future intended use of the site for restricted-residential. The 1 ppm SCO was adopted from EPA and was based on risk management considerations for high occupancy scenarios as described in section 6 of the Development of Soil Cleanup Objectives Technical Support Document, September 2006, which may be found at http://www.dec.ny.gov/chemical/34189.html

COMMENT 2: What are the health hazards of the proposed sediment processing operation?

RESPONSE 2: The NYSDEC and NYSDOH pay close attention to the quality of life for the surrounding community during all parts of the remedial work at a site, including the sediment processing portion of the cleanup. All concerns will

be addressed whether it is noise, odor or dust migration in a manner that will monitor and minimize any release or potential for exposure. See response number 11 for CAMP details. Monitoring and other appropriate engineering controls will be in place to assure no hazards result from this or any other operations required to implement the selected remedy.

COMMENT 3: Will BP/ARCO reimburse the State for its costs?

RESPONSE 3: Yes, reimbursement of New York State costs is expected as part of the consent order negotiated with BP/ARCO, the responsible party.

COMMENT 4: Has soil beneath Building 52 been sampled to determine if contamination is beneath it?

RESPONSE 4: Yes the soil beneath Building 52 was sampled and characterized to determine the levels of contaminants below the building.

COMMENT 5: How much semi-solid PCBs are present beneath the river?

RESPONSE 5: The presence of semi-solid PCB has been identified in the areas shown on Figure 3 of the ROD. The full extent and amount of semi-solid PCBs present beneath the river has been difficult to estimate due to the difficulty in installing borings and sampling the area immediately offshore of the Northwest Corner. This area was not extensively sampled because the equipment needed to penetrate the rip rap could not access areas of shallow water under current conditions.

COMMENT 6: Is it safe to use Kinnally Cove for recreational wading in the water and sediments due to potential contamination?

RESPONSE 6: Yes, Kinnally Cove may be used for recreational wading in the water with respect to the contamination associated with the site. Sediments in Kinnally Cove were sampled for PCBs by the Department in 2001, the range of concentrations detected were 0.088 and 1.5 ppm of total PCBs.

COMMENT 7: Will the proposed Northwest extension include cathodic protection of the steel sheeting?

RESPONSE 7: Yes the Northwest extension will include cathodic protection of the steel sheeting.

COMMENT 8: There is concern for sea level rise greater than predicted by the USACE. The remedy needs to add additional rip rap and foundation to accommodate the potential rise in sea level.

RESPONSE 8: The remedial design will include design considerations which take into account estimated sea level changes. Shore protection will be designed to prevent erosion of the shore due to the action of wind, waves and other forces to prevent damage to on-shore development or potential exposure and subsequent transport of contaminated soils.

COMMENT 9: We support the proposed restricted residential use of the site.

RESPONSE 9: Comment noted.

COMMENT 10: What is the scientific basis for the two-foot cover system for restricted residential use of the site?

RESPONSE 10: The basis for the 2 foot cover system is 6NYCRR Part 375, and the associated 2006 Technical Support Document, which may be found at http://www.dec.ny.gov/chemical/34189.html

COMMENT 11: When the CAMP is developed, we are concerned for using the standard particulate action level as a proxy for airborne PCBs. Before construction begins, the community needs a presentation of how the action level for PCBs is developed as part of the CAMP.

RESPONSE 11: In the remedial design phase a site specific Community Air Monitoring Plan (CAMP) will be developed which will specify the action levels for dust, volatile organic compounds and PCBs. Before implementation of the remedy a public meeting will be held and will explain in further detail how the CAMP will be protective of the community.

COMMENT 12: The green remediation elements of the PRAP are too vague. More specific requirements should be stated to minimize construction impacts to Village. These include requirements for barge and/or train transport of contaminated and clean soil, filtered diesel emissions, use of ultra low sulfur diesel fuels and Tier 3 diesel emission standards.

RESPONSE 12: The green remediation elements presented are there to acknowledge the DEC's commitment to green remediation, specific green remediation elements will be identified in the remedial design. The goal will be to minimize construction impacts to the Village to the extent feasible while implementing the remedy.

COMMENT 13: Will the two foot soil cover be able to be breached to construct building foundations?

RESPONSE 13: In areas where building will be permitted, the two foot soil cover may be disturbed provided the requirements included in the approved Site Management Plan are followed.

COMMENT 14: The annual cost of the two-foot cover system is underestimated because it does not include the additional cost for implementing the Site Management Plan during development.

RESPONSE 14: The annual cost does not factor in the costs for development, since these are beyond the scope of this ROD.

COMMENT 15: Who is responsible for the annual costs that are presented in the PRAP?

RESPONSE 15: ARCO will be responsible for the annual operation and maintenance costs.

COMMENT 16: What are potential health effects of other metals in the sediment, such as nickel, mercury and arsenic?

RESPONSE 16: In order to have health effects from metals present in the sediment there first has to be direct contact with these contaminants. Presented below are potential health effects if exposure occurred and at high concentrations.

Nickel: The most common reaction is a skin rash at the site of contact. The skin rash may also occur at a site away from the site of contact. Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized people react when they consume food or water containing nickel or breathe dust containing it.

Mercury: Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

Arsenic: Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Additional information on these metals can be found on the Agency for Toxic Substances and Disease Registry's website.
http://www.atsdr.cdc.gov/substances/index.asp

COMMENT 17: Will there be any stipulated penalties in the Order on Consent to ensure compliance with the schedule for implementing the remedy?

RESPONSE 17: Stipulated penalties will be subject to negotiations between ARCO and the Department concerning the OU2 Order on Consent. Note that Environmental

Conservation Law also provides for penalties for non-compliance with the terms and conditions of orders on consent.

COMMENT 18: When will the remedial work start and end?

RESPONSE 18: The remedial work will begin after an Order on Consent that includes the OU2 remedy is signed and the remedial design is completed. The public will be notified at important milestones. The Department anticipates the project will take approximately 5 years to complete.

COMMENT 19: What are likely impacts upstream and downstream of the dredging project? We are concerned about this project harming the ongoing efforts to establish oyster beds just upstream of the site.

RESPONSE 19: The impacts upstream and downstream from implementing the remedy are expected to be minimal as a result of the controls that will be in place. This is based on the nature of the contamination and knowledge gained at other sediment remedial projects. The majority of the dredging will be performed using silt curtains which will minimize resuspension from dredging. Monitoring will be performed to identify acceptable requirements to protect water quality in upstream and downstream locations. It is also our understanding of the proposal that the oyster beds are not intended for human consumption.

COMMENT 20: The Department and/or ARCO should use additional outreach such as social media methods to keep residents apprised of the remedial progress and address concerns for airborne exposures during construction. Information should be disseminated in layman's terms using hubs in the Village such as coffee shops, the train platform, etc. as posting locations.

RESPONSE 20: The Department has successfully used websites which provide weekly updates, construction status and daily monitoring, and will work with the PRP explore and implement a website or additional outreach to keep the community informed during the remedial design and construction.

COMMENT 21: Is the proposed 2-foot cover consistent with the five foot cover that is required by the Village and Riverkeeper's Federal Consent Decree with ARCO?

RESPONSE 21: The proposed 2-foot cover is consistent with the Village and Riverkeeper's Federal Consent Decree with ARCO.

COMMENT 22: The Department should request and review ARCO's proposed lighting plan as part of the remedial design.

RESPONSE 22: The need for extensive construction lighting will depend on the nature and schedule of the work to be performed. Decisions concerning work hours and

the need for supplemental lighting to safely conduct the work will be made in consultation with the Village of Hastings-on-Hudson.

COMMENT 23: What is included in the proposed restricted residential use? Why are single family homes not permitted?

RESPONSE 23: Restricted residential use is the land use category when there is to be common ownership or a single owner/managing entity for the site. Therefore apartment buildings, condominiums and recreational uses would be allowed that are managed by a single entity pursuant to a site management plan (SMP). It prohibits single family housing because managing and restricting the use of property would be more difficult, and could result in a greater possibility for individual owners and hired contractors to take actions not in conformance with the SMP. Furthermore, agriculture or vegetable gardens on the controlled property would be prohibited with the exception of community gardens with the approval of the Department.

COMMENT 24: Where will additional sampling be conducted in pre-design? Not just in the Northwest Area.

RESPONSE 24: Additional sediment sampling will be performed to identify depths of sediment contamination that will be removed in both nearshore and deepwater areas. Baseline monitoring will also be performed for the long-term monitoring plan to determine the pre-remedial conditions. The baseline monitoring plan will include sampling at background locations to determine ambient contaminant levels that are unrelated to the Harbor at Hastings site.

COMMENT 25: Will the liquid PCB removal operation affect the ability to use the northwest corner and northwest extension area?

RESPONSE 25: The remedial design will seek to minimize the impact of PCB recovery operations on the future use of the northwest extension area.

COMMENT 26: Can some of the shoreline be used for deep water dock access?

RESPONSE 26: The future use of portions of the shoreline for deep water dock access would need to be identified during the remedial design to assure the design takes this into account.

COMMENT 27: Does the PRAP provide for financial assurance to ensure long term monitoring and maintenance of the remedy?

RESPONSE 27: The PRAP and Record of Decision do not include financial assurance to ensure the long term monitoring and maintenance of the remedy. However, the Department has regulatory authority to require financial assurance, and could consider this option during the negotiation of the Order on Consent.

COMMENT 28: What information and experience from the Upper Hudson remediation will be utilized in the design and implementation of this remedy?

RESPONSE 28: While representing a different set of site specific conditions, the applicable information and experience from the Upper Hudson, will be used extensively to design and implement this remedy. Experience concerning the types and frequency of monitoring, community interaction issues, debris removal, air monitoring, dredge techniques, and silt controls will be used in developing the remedial design.

COMMENT 29: Where will the PCBs be taken after they are removed from the site?

RESPONSE 29: The dewatered PCB sediment will be taken to a facility which is permitted to accept PCB waste of the type and concentration removed.

COMMENT 30: Barge and rail transport of both clean and contaminated soils and sediments should be evaluated during the remedial design.

RESPONSE 30: The modes of transport for both clean and contaminated soils and dewatered sediment will be evaluated in the remedial design.

COMMENT 31: Is there a plan for diverting and/or protecting river traffic during the dredging operation?

RESPONSE 31: The appropriate navigational warnings will need to be reviewed and approved for conformance with US Coast Guard requirements before they are deployed.

COMMENT 32: Discuss the significance of the “drag-down” concept.

RESPONSE 32: The “drag down” refers to the potential for the liquid and semisolid PCB material to adhere to the steel sheet piles as they are driven through these materials into deeper into uncontaminated zones. The concern is that PCBs would be carried down into an uncontaminated area during the driving of the piles or flow as a dense non-aqueous phase liquid (DNAPL) through a newly-created migration pathway.

COMMENT 33: Are the proposed new wells in the northwest extension area just to monitor PCBs?

RESPONSE 33: The remedy anticipates installing new wells to both monitor and recover the PCB DNAPL, if present. The details of the additional work will be identified in the remedial design and site management plan.

COMMENT 34: How much of the PCBs have you removed so far in terms of the total amount there?

RESPONSE 34: The amount of PCB DNAPL present was not estimated due to the difficulty in obtaining samples from the immediate offshore area. As a result, the proportion of PCBs removed has not been calculated, but to date approximately 500 gallons of PCB DNAPL have been collected and disposed off-site.

COMMENT 35: Were samples for metals treated with acid to allow for metals speciation?

RESPONSE 35: Yes, samples for metals analysis were acidified, and therefore the results represent total metals in the sample. However, metal speciation was not performed.

COMMENT 36: Were single or duplicate assays performed?

RESPONSE 36: Most samples were single analysis. However, a certain number of samples were analyzed as duplicates, in accordance with generally-accepted practice for conducting environmental investigations.

COMMENT 37: Do you have to do more investigation to determine whether the new bulkhead will go into the liquid PCB pool?

RESPONSE 37: More investigation will be performed during remedial design to determine the final alignment of the sheet pile wall. Previous probing work identified a proposed location which is shown on Figure 7. The major factor concerning the alignment is the presence of the rip rap which will need to be avoided or moved during installation.

COMMENT 38: How long will the monitoring wells be there?

RESPONSE 38: The monitoring wells will remain in place as long as they are needed to monitor contamination in the groundwater.

COMMENT 39: Are you getting pure PCBs out of the recovery wells now?

RESPONSE 39: The material being removed from the wells contains approximately 30-40 % PCB.

COMMENT 40: As to backfilling the site, it is underwater at times. The Army Corps of Engineers (ACOE) guidelines you are following need to be enhanced.

RESPONSE 40: The remedial design will evaluate design considerations which take into account estimated sea level changes. Shore protection will be designed to prevent erosion of the shore due the action of wind, waves and other forces to prevent damage to on-shore development or potential exposure and

subsequent transport of contaminated soils. These design elements will also be part of the review by the ACOE as part of their permitting process.

COMMENT 41: What action levels will be used in the CAMP? How can you justify 1ppm for baseline? How, during a limited public comment period, can the public determine whether the 1ppm is sufficiently protective?

RESPONSE 41: The 1 ppm action level is the soil cleanup objective for soil. The Community Air Monitoring Plan (CAMP) still needs to be developed, and it will define the site specific action level for airborne PCBs. The Department has used a 100 ng/m^3 action level for PCBs on recent PCB removal projects. However, the site-specific action level will be developed and documented in the CAMP during the remedial design phase.

COMMENT 42: Has contamination from the upper Hudson River dredging released contamination to the lower Hudson River down to this location, will it?

RESPONSE 42: In 2009 and 2011, the General Electric Company under the oversight of the US Environmental Protection Agency dredged PCB contaminated sediment from stretches of the Upper Hudson River as part of the Hudson River PCB Superfund Site. During dredging, Hudson River water quality was monitored daily at several locations downstream of operations in the Upper Hudson (north of Troy) and samples were collected monthly in the Lower Hudson River at Albany and Poughkeepsie. Water quality was also monitored in the Upper Hudson during the off-season when no dredging was underway. Most relevant based on proximity to the Harbor at Hastings Site are the PCB levels measured in water samples collected from Poughkeepsie; these sample results indicate that PCB levels in river water at Poughkeepsie during dredging are consistent with levels measured before dredge operations began. Water quality will continue to be closely monitored as dredge operations continue.

Jacques Padawer, Ph.D. submitted a letter via email dated February 1, 2012, which included the following comments:

COMMENT 43: Does the DEC have chromatographic and elemental profiles of these three (or more) PCB species in the Arco property? This is critical, should be available, and should be disclosed.

RESPONSE 43: Chromatograms may be found in several documents, including the January 2005 "Field Work Summary Report for Fall 2004" Appendix C, and the November 2009 "Report on Supplemental Northwest Corner Investigation Findings". These documents are available for public review in the repositories.

COMMENT 44: Low chlorination PCBs (“liquid?”) of relatively higher vapor pressure are known to be sequestered by the liver, bind to DNA, and induce liver

carcinomas. What modified precaution(s) does the DEC propose to use to monitor the new threats?

RESPONSE 44: In order to have health effects from these PCBs there first has to be exposure to them. In the remedial design phase a site specific Community Air Monitoring Plan (CAMP) will be developed which will specify the action levels for these PCBs. Before implementation of the remedy a public meeting will be held and will explain in further detail how the CAMP will be protective of the community.

Jeremiah Quinlan a Trustee with the Village of Hastings-on-Hudson submitted a letter dated February 29, 2012 which included the following comments:

COMMENT 45: Evaluate and, as appropriate, remediate sanitary/process sewers on site

RESPONSE 45: The process sewers and floor drains from Building 52 are identified for removal. Other sanitary and process sewers will be further identified during the remedial design and will be evaluated for remediation as appropriate.

COMMENT 46: Evaluate the use of the adjacent railroad thoroughly and use it to the extent reasonable.

RESPONSE 46: See Response 30.

COMMENT 47: Disposal of on-site sediments: Strict standards are needed to avoid future issues. Clean and sandy sediments will have less future risk of being a future contamination issue and will have fewer compaction/settlement issues.

RESPONSE 47: The remedial design will identify the parameters for reusing sediment on-site. The reuse of sediments on-site has the benefit of reducing transportation related impacts for both contaminated material and backfill.

COMMENT 48: Where a sloped shoreline will be employed, heavy armoring will provide better protection during storms.

RESPONSE 48: The type of armoring will be identified in the remedial design and the protection during storm events will be evaluated as a factor in identifying the proper size of the material.

COMMENT 49: Concerns on how will the IRM wells be protected from the public in the northwest corner that will be a public park.

RESPONSE 49: The recovery wells in the Northwest Extension Area will be protected from the public in anticipation that the area may be used for public access. This area may need to be temporarily closed during operation and maintenance activities. The remedial design will identify approaches, such as flush

mounting the wells; dedicated vaults; or other engineering controls to protect the public while allowing the operation of the wells for their intended purpose.

Eileen Bedell, the property owner of the Hudson Valley Health & Tennis Club, submitted a letter dated March 9, 2012 which included the following comments:

COMMENT 50: I would like the plan to show my property lines reflected on all drawings. My deed includes both shallow and deep water riparian rights. In fact, all of the "Old Marina" is owned by Hudson Valley Health & Tennis Club, although I have no objection to the use of "Old Marina" on your diagrams.

RESPONSE 50: The property lines will be shown on the future drawings and plans in the remedial design. The Department acknowledges the ownership and potential future use of the marina and the need to gain access.

COMMENT 51: I would like the plan to be modified to take into consideration my future plans for reopening the marina. This includes depth, configuration and access issues.

RESPONSE 51: The sediment removal areas are based on the contamination identified in the remedial investigation phases. The approved plans for potential re-use of the marina will be factored into the remedial design with the objective of reducing the footprint of the Northwest Extension Area and minimizing backfill in the marina area. The backfill requirements will be evaluated and adjusted for the future and reasonably anticipated use of the sediment removal area of the marina. However, any additional or future dredging for the marina project must obtain approvals through the regular permitting process, including ECL Article 15 or 6NYCRR Part 608. As noted earlier, additional investigations will be needed before the final sheet pile wall alignment is determined.

COMMENT 52: The metals and PCB contamination plan is inconsistent with the data ARCO has provided me. In addition, test sampling was often restricted by the logistics of sample extraction.

RESPONSE 52: The extent of metals and PCB contamination is identified in the Feasibility Study, Appendix C. The sediment results are presented based on the depth below the sediment/water interface, and are consistent with previous reports. The Department agrees that data gaps exist in the marina area due to the inability to physically access certain locations. For this reason additional sediment sampling will be performed during the design phase and the obstructions are removed.

COMMENT 53: I would like the plan to clarify how future zoning changes for the ARCO property apply or do not apply to my property.

RESPONSE 53: The easement placed on the ARCO property pursuant to the ROD will not apply to the Hudson Valley Health & Tennis Club property. Concerns related to future zoning issues should be directed to the Village of Hastings-on-Hudson.

COMMENT 54: I would like clarification as to whether piles and pile-supported structures will be permitted in the marina.

RESPONSE 54: Restrictions on the installation of piles and pile-supported structures outside of Northwest Extension Area (NEA) are not planned. The installation of piles will not be restricted in the marina area provided that PCB DNAPL is not present. The remedial design will determine the precise boundaries of the NEA.

COMMENT 55: I have no need for backfilling of the marina post dredging. In addition I welcome reuse of the silt as landfill on the OU1 site.

RESPONSE 55: The comment is noted. See Response 51.

COMMENT 56: As you are aware from our discussions, I am opposed to the plan as drafted, particularly based on #2 and #3 above (*as referenced in the letter*). Without modification, I would be unwilling to grant access for executing the work.

RESPONSE 56: The Department acknowledges the plans for re-use of the marina. Additional work will be performed during the remedial design to minimize or eliminate the sheet pile wall on your property, to the extent it can be while still meeting the ROD objectives, to allow implementation of both the remedy and the proposed marina.

Daniel E. Estrin and Justin M. Davidson from Riverkeeper submitted a letter dated March 12, 2012 which included the following comments:

COMMENT 57: Riverkeeper is particularly concerned with the PRAP's general lack of clarity regarding the cleanup procedures that will be followed. In the interest of providing an open and transparent dialogue around the Department's efforts to remediate the site, we want to ensure that the public is well informed as to the particular processes that will be employed during the long-awaited cleanup of the Site.

RESPONSE 57: The cleanup procedures will be identified in the remedial design. The Department shares Riverkeeper's concern that the public should remain well informed during the remedial design and implementation of the remedy. Additional outreach activities will be scheduled at appropriate milestones in the project.

COMMENT 58: The PRAP is unclear as to where additional delineation sampling and study will be conducted. Before dredging and removal activities commence in the deepwater portion of the site, additional delineation sampling must be conducted in order to entirely understand and characterize the full extent of contamination. In particular, paragraph 6 of the proposed remedy provides, "the specific area where fixed sediment resuspension controls can be feasibly deployed will be evaluated during design based on the water depth and velocity conditions. Alternative designs for fixed resuspension controls will be evaluated to increase the depth of feasible resuspension controls." Paragraph 7 of the proposed remedy – which deals with "removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water" – explains that "during design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging." Taken in conjunction, these two statements suggest that the PRAP fails to define with reasonable specificity the areas where these additional sampling efforts will take place. Particularly, it is not clear whether this sampling will be confined to the immediate vicinity of the northwest extension area, or whether it will appropriately extend downriver to other areas where earlier incomplete and insufficient sampling indicates the possible presence of PCB concentrations.

RESPONSE 58: Additional sampling will be performed in both the near shore and deepwater areas where data gaps exist to provide a precise delineation of sediment to be removed. Such additional sampling is not confined to the immediate vicinity of the Northwest Area.

COMMENT 59: Definition of the areas to be sampled and the associated extent of the potential dredging are essential elements of efforts to evaluate the potential for resuspension and contaminant dispersion and the need for and type of resuspension controls. Recent experience in the upper Hudson near Fort Edward, New York indicates that the combination of equipment selection and dredging protocols can substantially reduce downstream dispersion and in many cases have the potential to eliminate the need for fixed controls such as silt curtains. This potential should be carefully evaluated with full consideration of complications associated with water depths in excess of 15 feet and/or energetic river and/or tidal flows after specification of the area and associated contaminant mass to be dredged. It does not appear to Riverkeeper that such an evaluation has been conducted to date.

RESPONSE 59: The Department has determined that resuspension controls will be used where feasible to reduce and minimize the dispersion of contaminants and will require that the extent of contamination, and the associated extent of the potential dredging, be determined during the design in order to design the controls necessary to address resuspension and contaminant dispersion. The

recent experience in the upper Hudson River has provided information that can be applied to the remedial design of this dredging project. However this experience has limitations since the river velocities in the upper Hudson River are less than the current velocities near Hastings-on-Hudson. Also the sediment matrix at this site is also much finer than in the upper Hudson. These site-specific factors will be evaluated in the remedial design to choose the appropriate resuspension controls. The Department contacted a silt curtain manufacturer and a remedial contractor to independently verify the limitations for resuspension controls based on the site specific conditions in selecting the remedy.

COMMENT 60: During the Public Meeting on January 26, 2012, held in the Village of Hastings-on-Hudson, DEC Staff (Mr. George Heitzman) explained that during design, additional delineation sampling will be conducted "throughout." However, it is still unclear where precisely this additional sampling will be conducted, and a thorough explanation should be described in the Record of Decision ("ROD") for OU-2. DEC Staff further explained that additional sampling will be conducted only in areas where previous sampling results indicated "contiguous or concentrated" concentrations over 50 ppm of PCB, rather than "one hit" concentrations above 50 ppm. Earlier sampling that was conducted in portions of the deepwater site outside the northwest extension area was incomplete and unable to accurately define the full extent of contamination, so it would be erroneous to base future sampling efforts on what was conducted previously. Extensive additional delineation sampling should be conducted throughout the entire deepwater portion of the site to best understand precisely where these contiguous or concentrated zones exist and to allow accurate definition of the mass of PCB in each zone.

RESPONSE 60: The previous sampling provided sufficient information to allow the selection of remedy, but the remedy calls for additional sediment sampling in the deepwater areas to further delineate the areas to be dredged to meet the cleanup goals for PCBs. Post-ROD delineation sampling is routinely conducted at remediation sites to more precisely determine removal limits. The Department also agrees that additional sampling is needed to identify whether, and where, contiguous or concentrated zones may exist to allow accurate definition of the sediment to be dredged.

COMMENT 61: Because of the ambiguity surrounding the additional delineation sampling, Riverkeeper requests that an Additional Delineation Sampling Workplan be developed to describe with specificity the locations, actions, and timing of the additional delineation sampling to be conducted. In light of the lack of detail in the PRAP concerning additional in-river sampling to be conducted, we believe this Workplan should be publicly noticed and made available for public comment.

RESPONSE 61: The Department will require the development of a Sediment Delineation Sampling Work Plan as an element of the design and it will be publicly noticed and made available for public review.

COMMENT 62: The proposed action level of 50 ppm for the OU-2 deepwater area is premature, and a more stringent action level threshold below 50 ppm is necessary to protect the benthic community. The PRAP indicates that dredging of sediment in the deepwater portion of OU-2 will be conducted in areas defined by PCB concentrations greater than 50 ppm to six feet below the existing bottom. However, the PRAP completely fails to explain the technical rationale for the proposed 50 ppm action level. According to the DER-10, a PRAP must summarize the "alternatives considered and discuss the reasons for proposing the remedy," which has not been done here with respect to this proposed action level. During the Public Meeting on January 26, 2012, DEC Staff stated that a 50 ppm action level "struck the right balance," given the practical concerns and difficulties with dredging in deeper water. While Riverkeeper understands these concerns, this narrative answer can not suffice as a cogent technical basis to support 50 ppm as the appropriate action level. A satisfactory technical explanation must be made so the public can be informed and properly analyze the bases for selecting an action level that is relatively high.

In addition, on choosing a 50 ppm action level, the PRAP only states that "Targeting deepwater areas with PCBs above 50 ppm reduces the time needed to complete dredging activities when compared to deepwater areas above 1 ppm." However, when asked at the Public Meeting about whether NYSDEC calculated or estimated exactly how much longer dredging would take under a more stringent action level, DEC Staff (Mr. William Ports) responded that DEC had not calculated the time. The PRAP should not conclude without technical backup that choosing a higher action level of 50 ppm will reduce the amount of time needed for dredging when the Department has not calculated or estimated any such temporal differences.

The matter of remedial criteria warrants careful elaboration in the ROD for OU-2. Under the NYCRR, the goal of any remedial program for a specific site is to "restore the site to pre-disposal conditions, to the extent feasible. At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles." These words are echoed verbatim in the PRAP as two of its stated goals. The selection of the higher threshold of 50 ppm, without sufficient technical support and explanation supporting that action level, does not appear consistent with this legal mandate and the PRAP's stated goals.

While Riverkeeper understands that this higher threshold selection may be based on concerns that dredging will facilitate dispersion and ultimately increase contaminant bio-availability beyond current levels, such concerns must be based on hard data with particular emphasis on the mass of contaminant to be addressed by dredging. In the presence of a small mass – *i.e.*, a discrete area containing less than several pounds of PCBs where that mass is subject to continuing deposition and minimal erosion – the higher threshold of 50 ppm *may* be justified. However, for larger masses, lower thresholds are recommended with 10 ppm being the highest consistent with values used in other sites in the Hudson River and New England when dealing with significant masses of PCB. Because the data available in the PRAP and Revised Feasibility Study (RFS) do not provide sufficient information to properly assess the mass of PCB concentrations throughout the extent of the Site, the public is unable to determine whether the contamination presents "significant" threats to the public health and environment. As a result, the specification of the threshold is at the very least, premature. The present protocols specified in the PRAP do not appear to be sufficient to provide the necessary level of specificity, and the current approach based on sparse sampling and assumptions of costs should be reconsidered. The ROD for OU-2 must provide the basis for quantitative evaluation of the extent of contamination allowing subsequent evaluation and definition of the threshold criteria.

RESPONSE 62: As discussed in the Basis for Selection section of the ROD, the 50 ppm action level for deepwater sediments balances the potential for construction-related impacts associated with disturbance to the river bottom and migration of suspended sediments with the removal of sediments which have the highest levels of PCBs and the greatest potential to migrate and be an on-going source to the environment. The deepwater sediments present a number of concerns which were factored into the decision to remediate sediments in the site specific deepwater areas. These include environmental consequences of resuspending contaminated sediments without resuspension controls in these areas, the potential for remaining contaminated sediments to be disturbed in the future, the proximity of contamination to the sediment surface, and the concentration of contaminants. The Department evaluated the degree and extent of contamination for different action levels based on currently available information. The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs.

The time to remove the sediments in the deepwater areas was estimated for different action levels and is presented in the table below. These estimates are based on standard production rates and do not account for certain site-specific factors. The estimated volume of deepwater sediments that contain greater than 50 ppm PCBs is approximately 5000 cubic yards. The size of the mechanical dredge was assumed to be 5 cubic yards, with a production rate of 80 cubic yards per hour. Time estimates were prepared for both an 8-hour dredge day, and a 4-hour dredge day. The latter estimate reflects an attempt to limit deepwater dredging to the slack period during each daylight portion of the tidal cycle to minimize the migration of fines from the dredge area.

Deepwater PCB Remedial Goal	Estimated Volume of Sediment yd^3	Estimated Time in hours of Dredging	Estimated Days (8 hrs/day)	Estimated Days (4 hrs/day)
50 ppm	5000	64	8	16
10 ppm	20,000	250	31	62
1 ppm	53,000	662	83	166

The Department notes that comparison to action levels for unspecified sites in the upper Hudson River and New England site (presumably the Housatonic River) may not be valid due to the site-specific conditions encountered at this site. Sediments in the deepwater portion of the Harbor at Hastings site are significantly finer, comprising approximately 90% fines passing the #200 sieve, as compared to around 40% fines for the upper Hudson River project. Combined with the greater water depth and current velocity, the potential for uncontrolled dispersion during dredging is much greater at this site. The Department also notes that the Housatonic River project was performed by diverting the river and dredging in a dewatered condition, which provides a high degree of migration control, but is not a feasible approach at this site. As a result, the site-specific action levels that resulted from the balancing of criteria for those sites are not comparable to the Harbor at Hastings site.

To the extent feasible the site will be restored in a manner that will be protective of both the environment and public health. The remedy described in this ROD acknowledges the added difficulties of attaining pre-disposal conditions in an environment that contains levels of PCBs that are above standards in upstream locations not affected by the site. However, through implementation of engineering and institutional controls selected in the remedy, significant threats to public health and the environment will be mitigated.

COMMENT 63: As the Department is aware, on September 8, 2011, Riverkeeper submitted to NYSDEC a position statement for proposed PCB and removal criteria for the offshore areas of the Hastings site prepared by our technical consultant, Dr. W. Frank Bohlen, PhD. *See* Exhibit 3. In that statement, Riverkeeper suggested that sampling should be conducted at sites with PCB concentrations

of 10 ppm at the surface (0-6 inches) or 50 ppm on the vertical between 0.5 and 3.0 feet below the sediment-water interface, unless the site was surrounded by a minimum of four (4) other cores spaced around the acre surface centered on the high concentration site. Supplementary sampling should consist of four (4) sediment cores each to six (6) feet below the sediment-water interface with each taken at the midpoint (or some reasoned alternative) of the perimeter boundaries of a one acre square centered on the high concentration site. Each core should to be sectioned and analyzed to determine PCB concentrations over the vertical for the 0-6 inches, 0.5-3.0 feet, and 3.0-6.0 feet segments. These data will be compiled with concentrations on the 0-3 feet interval used for computation of the area weighted average (AWA) concentrations. The data detailing concentrations in the 3-6 feet layer would be retained for informational purposes.

RESPONSE 63: This approach will be considered in the development of the Sediment Delineation Sampling Work Plan during the remedial design.

COMMENT 64: Department Staff apparently propose to reject Riverkeeper's position statement as a reasonable way to proceed with additional sampling and PCB remediation in the Deepwater areas. Riverkeeper continues to believe that a more stringent action level below 50 ppm is necessary to protect the benthic community, and in turn, human health and safety. Dr. Bohlen advises that a lower threshold concentration of 10 ppm for the first six inches of sediment would greatly reduce the potential for the bio-accumulation of PCBs by the local marine biological community. *See* Exhibit 3. Dr. Bohlen's specification of the 10 ppm threshold is based on distributions of higher concentrations of PCBs residing below that level as shown in the May 2011 data set in the Revised Feasibility Study. If additional sampling shows that these distributions are very localized or that the deeper sediments contain lower concentrations, then leaving them in place *may* be justified. However, that conclusion cannot be made until a more substantive and robust discussion of the issue supported by data is presented.

RESPONSE 64: The Department has not rejected Riverkeeper's approach to additional sampling and remediation in deepwater areas. The Department will consult with the interested stakeholders after the additional sampling data is obtained.

COMMENT 65: First among the nine factors used in selecting a remedy for a site is the "Overall protectiveness of the public health and the environment." Indeed, the PRAP recognizes that "[t]o be selected, the remedy must be *protective of human health and the* environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable." In order to meet the PRAP's stated goal to "eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site," Riverkeeper believes that DEC

must consider and adequately study the feasibility of dredging in deepwater areas with a 10 ppm action level for the first six inches below surface ground. This includes additional sampling and study required to properly assess the mass of PCB concentrations. In fact, as DEC Staff explained in the January 26, 2012 Public Meeting, one of the key lessons learned from the GE Site remediation is to "fully characterize" the contamination. As per DEC's own guidance and experience, therefore, DEC is obligated to fully investigate the extent of contamination, which requires more than a superficial examination and testing of potentially contaminated areas.

RESPONSE 65: See Response 62 above. The Department and NYSDOH believe the selected remedy is protective of human health and the environment because it is unlikely for recreational users of the river to be exposed to site-related contaminants through the incidental ingestion of contaminated surface water and direct contact with contaminated sediments in the deepwater area, the primary human exposure pathway is through the consumption of contaminated fish tissue. One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. For specific advisories on fish consumption in this area please refer to NYSDOH's annual Health Advise on Eating Sportfish and Game.
http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/docs/advisory_booklet_2011.pdf

COMMENT 66: The ROD for OU-2 should describe the equipment or technology to be used for the in-water dredging activities. In discussing the proposed elements of the cleanup of the OU-2 portion of the site, the PRAP does not describe what types of technology or equipment will be used during the dredging activities. Section 375-1.8(a)(4) of the NYCRR provides that "Remedy selection at a site may consider the use of innovative technologies which are demonstrated to be feasible to meet the remediation requirements." The upriver dredging operations at the GE site provided for several technical advancements in dredging and re-suspension technologies. Even though the PRAP represents the initial stages of the design effort, it would be important to see the use of advanced technologies evaluated in the ROD and implemented at the Hastings site.

RESPONSE 66: In general there are two types of dredging technologies which are applicable to the Harbor at Hastings site. These include mechanical and hydraulic dredging equipment, both types of dredges will be evaluated during the design. Debris removal will be performed before sediment dredging begins.

COMMENT 67: The DEC should consider effects of flooding and sea level rise in its site design. The PRAP makes no mention of potential effects on OU-1 and OU-2 due to flooding of the adjoining upland portions of the site. Although some accommodation has been made in the preliminary OU-1 designs for expected long-term sea-level rise (accepting the Army Corps of Engineers' two-foot fill layer recommendation), there is also the matter of direct rainfall, storm surge and/or high river stage effects on OU-1 to consider. Over the past several years this area of the Hudson River has experienced several extreme storm events resulting in standing water on the site. In fact, as several local Hastings-on-Hudson residents attested to at the January 26, 2012 Public Meeting, the area around the Site has experienced several major flood events over the past several years, indicating a possible change in climate conditions and storm patterns that should be accounted for in DEC's evaluation and design. Depending on source, volume, and velocity, such waters have the potential to overwhelm proposed containment/treatment facilities and destabilize portions of the shoreline and/or groundcover. The displacement of any contaminants from these areas may in turn affect portions of the adjoining offshore. The ROD for OU-1 and OU-2 should include efforts to demonstrate the adequacy of proposed designs to effectively armor the site and minimize sensitivity to storm impacts.

RESPONSE 67: The Department shares the concerns expressed regarding the potential influence of climate change and rising sea level on the long-term effectiveness of the remedy to contain contamination during large storm events. The remedial design will consider future storm events and rising sea level that are likely to result in more intense storms, higher water events, and greater erosive forces on the site than have been documented in the past.

Eric Larson with ARCO submitted a letter dated March 9, 2012 which included the following comments:

COMMENT 68: We anticipate that remediation (both in OU-1 and in OU-2) may need to be coordinated with anticipated site redevelopment. While future uses of the site have not been resolved, we understand that Atlantic Richfield supports the concept of beneficial reuse of this site and anticipates working closely with the Village and other stakeholders in this regard. We would request that the ROD allow for some flexibility in design so that remediation does not unnecessarily impede redevelopment efforts while still maintaining environmental effectiveness.

RESPONSE 68: The Department agrees with this comment and will implement additional discussions to address issues and concerns with the Village and stakeholders while the remedial design proceeds. However, implementation of the remedy will not be delayed due to development-related issues.

COMMENT 69: Targeted Deepwater Dredging: In the October 2003 PRAP for OU-2, consistent with the scope of the RI work and data developed as part of the administrative record, NYSDEC did not propose to conduct any dredging in the deepwater area. Instead, the 2003 PRAP proposed a long term monitoring program for the deepwater area. Since that time, and consistent with the RI scope, there has been only limited additional analysis of the issues surrounding deepwater dredging as proposed in the current OU-2 PRAP. Silt curtains and other resuspension controls are unlikely to be feasible in this environment, nor are they likely to serve as effective barriers to the transport of resuspended sediments at these depths and flows. Therefore, any targeted dredging must balance the negative environmental consequences of resuspending contaminated sediment with the environmental benefits of conducting this dredging. These considerations weigh in favor of conducting limited targeted dredging for shallow (0-2 feet) hot spots (50 ppm or greater) in areas of scour that show a contiguous and concentrated pattern of sediment contamination. Consideration should be given to an alternative deepwater cleanup level at or below the 335 ppm Level of Protection screening criterion included in Table 3 of the PRAP.

We suggest that deepwater dredging of sediments deeper than about 2 feet, particularly in areas that do not appear to be subject to scour, does not provide an environmental benefit that outweighs the potential negative consequences associated with resuspension and transport of contaminated sediments. The deepwater areas identified in the PRAP on Figure 7 are generally consistent with this remediation approach and we do not believe additional dredging in other areas is warranted based on a review of the existing data and the multiple lines of evidence that suggest a consistently depositional environment. The current geometric weighted average concentration of PCBs in surface sediments is approximately 1.3 ppm for all areas outside the proposed deepwater dredge extents.

In this regard, we asked two reviewers, Dr. Michael Palermo and Dr. Victor Magar to review the proposed remedy with respect to the targeted deepwater dredging and we have attached their comments as well.

RESPONSE 69: The areas of targeted dredging in the deepwater areas will be further refined in the remedial design. The Department recognizes that standard silt curtains will not be effective in this environment. However, the Department does not want to predicate the means and methods of minimizing or reducing sediment resuspension in the deepwater areas. The dredging in the deepwater areas must balance the distribution of contaminants and the feasibility of removal. Therefore when additional sediment data is available from the deepwater areas the following factors will be considered: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, and 5) the duration of dredging required and associated potential for migration

of resuspended sediments, and 6) the area weighted surface concentration of PCBs.. The Department rejects using the PCB cleanup level of 335 ppm in the deepwater areas because it would protect the environment based only on acute toxicity to benthic organisms, and it is feasible to achieve a higher level of protection. The Department believes that the 50 ppm cleanup in targeted areas provides the best balance of the selection criteria given site specific conditions at the site.

COMMENT 70: Metals: Nearshore, Old Marina, North Boat Slip

The OU-2 PRAP proposes dredging sediments to depths of up to 6 feet below the current sediment surface in the nearshore area, Old Marina, and North Boat Slip. There appear to be several rationales for this dredging including: (a) removal of sediments exceeding the PCB remediation criteria; (b) removal of sediments exceeding the PRAP's selected metals criteria; and (c) the provision of sufficient depth to install backfill or a cap to isolate remaining contamination and/or protect against scour or erosion.

The metals remediation criteria selected in the PRAP do not reflect metals toxicity and are not indicative of ecological risk. Indeed, site related investigations into metals toxicity have demonstrated the absence of toxicity at levels much higher than the criteria established in the PRAP. Thus, this approach is not consistent with EPA policy and guidance regarding the evaluation of sediment toxicity and the selection of sediment remedies. For this reason, we do not support the metals criteria set forth in the PRAP. We asked Dr. Kenneth Jenkins to review the PRAP with respect to metals criteria, ecological risk, and evidence of site-related toxicity. We have attached his comments in that regard.

Although metals concentrations in sediments do not justify nearshore dredging up to 6 feet in depth as a general approach, we recognize that site-specific evidence suggests that there may be some benthic toxicity associated with copper concentrations in excess of 982 ug/l, in nearshore sediments if they were to become exposed to biota through inadequate separation. In these targeted areas, near two outfalls along the southern portion of the site, metals concentrations in sediment may support dredging sufficient to protect against scour and provide physical separation from biota.

In addition, as a practical matter, there may be other reasons why some of the proposed nearshore dredging may be appropriate for the ROD. For example, much of this dredging will also remove sediments contaminated with PCBs. For areas without PCB contamination, considerations of site-specific scour potential and the need to improve site-specific aquatic habitat depth could also support portions of the proposed dredging. For this reason, we would urge that the ROD provide for dredging of up to 6 feet in depth while allowing

some flexibility in remedial design to determine whether certain nearshore areas could be dredged to less than 6 feet in depth.

While returning sediments to pre-existing conditions to the extent feasible is an RAO, there may be little to no ecological benefit from the removal of metals above the remediation criteria set in the PRAP. As a result, short and long term impacts should be the primary consideration for the feasibility of additional dredging, and the ROD should provide some flexibility to reduce nearshore dredging depths during remedial design to minimize short and long term adverse impacts of dredging, particularly in areas where PCB contamination is absent while accounting for aquatic habitat depth, the integration of a sloped shoreline between OU-1 and OU-2, and other localized factors as may be appropriate.

RESPONSE 70: The metals remediation criteria in the PRAP are based on background concentrations of metals in the sediment. The use of a background concentration as a basis for cleanup concentrations is not based on toxicity but on the occurrence and concentration of the metals in the surrounding area. Toxicity testing conducted on the site was not sufficiently robust to develop a site-specific toxicity threshold. The dredging depth was established to allow for the feasible removal of contaminated sediments and the restoration of the river bed following the remediation. Actual dredge depth will be determined during design based on sampling that indicates the actual depth at which the sediments exceed the cleanup criteria. If other feasibility concerns arise during design, consideration will be given to adjusting dredging appropriately.

COMMENT 71: Capping and Backfilling in the Nearshore Area

The PRAP also proposes the use of backfill and/or capping materials in the nearshore area to protect against scour or erosion, to return the area to pre-dredge depths, and to provide isolation from remaining contamination. Regardless of whether the material is backfill or a cap, 6 feet of fill is not necessary to protect human health and the environment from any contamination that may remain. The analysis presented in the RFS indicated that 3 feet was sufficient. The need for anything more than engineered controls that provide physical separation or isolation is unnecessary. A cover of 6 feet far exceeds any cover necessary to provide separation or isolation of remaining contamination. It is also far more than necessary to provide a substrate for biological activity that would be protected from contact with site-related contaminants. We asked Dr. Danny Reible to review this issue, and we have attached his comments.

Further, in some cases, the requirement for up to 6 feet of backfill may impede the coordination of redevelopment and remediation. The ROD should provide flexibility for backfill/capping in the nearshore areas with between 2 and 6 feet of material and should allow both the full extent of the cap/backfill and

the type and nature of soils, sands, or gravels to be used will be determined in remedial design.

RESPONSE 71: Flexibility regarding backfill is provided for in the ROD. Other than the isolation capping layer, the specific substrate for backfill is not specified. Additionally, the remedy allows for a river flow and deposition study to consider allowing natural in-filling following dredging. As noted in the ROD the purpose of the backfill is to "isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer". Depending on dredging depth and location, replacement of riverbed materials with significantly less than what is removed during dredging would not meet all of these goals. See also Response 51.

COMMENT 72: Certain technical challenges have been deferred to design. Perhaps the most significant is whether resuspension/transport controls might be effective in deeper water to allow the expansion of the nearshore dredging area. We have conducted an initial investigation as part of the studies previously submitted to NYSDEC, which shows that the current limits established in the RFS and PRAP for the implementation of resuspension/transport controls are accurate. Our investigation indicates that there is no demonstrated feasible technology that would allow us to significantly expand the proposed dredging limits without creating a substantial risk of contaminant resuspension and transport. In fact, the limits proposed are at the outer edge of silt curtain effectiveness. Thus, consideration of any expansion of the nearshore area in the design phase is unwarranted. There is no compelling reason to treat this technical issue any differently than other technical issues where future improvements during the design process are always possible and are taken into account if and when they are identified.

In this regard, we asked Dr. Palermo to review this issue, and we have attached his comments as well.

RESPONSE 72: The comment is noted.

COMMENT 73: Long Term Monitoring of the Remedy

The RAOs selected in the PRAP are generic and not site-specific. This presents various potential issues including long term monitoring to evaluate the success of the remedy. In particular, the Hudson River (and particularly the lower Hudson) is a highly urbanized watershed that has been home to industry for over 150 years. As a result, the Hudson River has substantial, system-wide contamination that is not related to the Hastings site, including PCB and metals contamination. We note that concentrations of PCBs in Hudson River reference sediments upstream of the Site range from 1 ppm to 2.1 ppm in a background sample within the 0-2 foot interval. As a result, even with successful remediation, site sediments will eventually "equilibrate" with

urbanized background concentrations of PCBs, metals, and other pollutants, making the generic RAOs difficult to achieve. The presence of this background industrial contamination must therefore be taken into account in the design and implementation of a long term monitoring plan. Metrics like PCB concentrations in fish tissue, for example, which are more likely to reflect Hudson River conditions in general rather than site specific conditions, are not suitable for inclusion in a long term monitoring program.

We have attached the comments of Dr. Magar on this issue.

RESPONSE 73: The Department has used monitoring to discern different PCB source conditions in urban watersheds. These include PCB congener analysis; analysis of recently deposited surface sediment concentration; analysis of the source of the metals; and other techniques that have been used on other sediment remediation sites. The Department acknowledges that there are other sources of contamination that are unrelated the Harbor at Hastings site. The long-term monitoring plan described in the PRAP is expected to include the consideration of other industrial inputs in the river mainly through the use of baseline and reference sampling during monitoring. Previous data on the site indicated a local effect of increased PCBs in eels associated with the site. Since PCBs will remain in the river and the remedy will depend on engineering controls to prevent continued release of PCBs long-term monitoring of organisms in the river, including fish, is necessary to demonstrate the effectiveness of the remedy to decrease the site-specific influences on the local fish and therefore, must be retained as a component of the monitoring plan.

COMMENT 74: An expected schedule for the combined remedy in OU-1 and OU-2, exclusive of the regulatory process leading up to initiation of design, is included in the RFS. Note that the PRAP has added investigation and scope to the alternative recommended in the RFS.

RESPONSE 74: The Department understands and recognizes the added investigation and scope to the remedy will take additional time.

COMMENT 75: A transportation study regarding the handling of materials being brought into the site and leaving the site is specifically indicated in the RFS and will be part of the design process. The RFS assumptions provide a basis for comparison but do not limit the outcome of the transportation study.

RESPONSE 75: The comment is noted

COMMENT 76: Current Zoning and Uses. Portions of the site are no longer leased to other parties.

RESPONSE 76: The comment is noted and the ROD has been revised to reflect this.

COMMENT 77: Historical Uses. Wire manufacturing duration was much longer than the duration that manufacturing involving PCBs. PCBs were used in the manufacture of wire and cable only during the World War II period.

RESPONSE 77: The comment is noted and the ROD has been revised to clarify that PCBs were only used during a portion of the operation period.

COMMENT 78: Operable Units. This section describes "the site" as two operable units, however, in other sections OU-1 is described as "on site" while OU-2 is described as "off-site". The use of the word "site" in two different contexts is confusing. Note that there are some references to "on-site" within the document that specifically refer to OU-2. Also note that when the term "off-site" is used to reference OU-2 portions of the project the term should not reflect the status of ownership of said area.

RESPONSE 78: The Department acknowledges this comment.

COMMENT 79: Atlantic Richfield Company has in fact been participating in the site investigation and the remedy evaluation process for many years and voluntarily developed the feasibility study for OU-2.

RESPONSE 79: The comment is noted the ROD was revised to reflect ARCO's voluntary efforts in developing the remedy for the site.

COMMENT 80: Paragraph 6.3. It should be noted that specific fish advisories in the area of the site are primarily due to regional contamination issues and would remain in effect regardless of any remedial actions taken at this site.

RESPONSE 80: The Department acknowledges that certain contaminants in the fish tissue of certain species are attributable to regional contamination issues. However it is not clear whether for certain species, the fish advisory would remain regardless of remedial actions taken at the site.

COMMENT 81: Paragraph 6.4. Paragraph 6.1.2 states the contaminants of concern (COCs) as PCBs, copper, lead and zinc. Paragraph 6.4 re-states theses as the "primary" COCs for the site (previously defined as OU-1) and then describes a different list of COCs related to OU-1. Clarifying the terminology would assist understanding.

RESPONSE 81: As stated in Exhibit A, primary contaminants of concern are those that drive the remedy. The COCs for OU1 and OU2 are slightly different because beryllium was found in OU1 soils but was not found in OU2.

COMMENT 82: Paragraph 6.4. "Metals in sediment pose a toxicity threat to benthic organisms," Multiple investigations previously conducted indicate that

toxicity levels are significantly higher background. We have attached Dr. Jenkins' comments on this issue.

RESPONSE 82: The metals remediation criteria in the PRAP are based on background concentrations of metals in the sediment. The use of a background concentration as a basis for cleanup concentrations is not based on toxicity but on the occurrence and concentration of the metals in the surrounding area. Toxicity testing conducted on the site was determined to be not sufficiently robust to develop a site-specific toxicity threshold.

COMMENT 83: Paragraph 6.5. The RAOs assigned in the PRAP are generic and not Site-Specific. Due to the regional contamination issues, achievement of the specific objectives listed, especially for surface water, are not controlled by the site conditions. We have attached Dr. Magar's comments on this issue.

RESPONSE 83: The comment is noted. However, the surface water contributions from the site will be controlled by the remedy. Baseline and long term monitoring will be implemented to determine the effectiveness of the remedy.

COMMENT 84: Paragraph 1. The reference to the "FS" is presumed to be to the 2011 Revised Feasibility Study (RFS).

RESPONSE 84: The comment is correct.

COMMENT 85: Element 2. The Dense Non-Aqueous Phase Liquid (DNAPL) observed in OU-1 consists of approximately 30-40% PCBs dissolved in a solvent. The DNAPL occupies the void space within the existing fill otherwise occupied by water. The Revised Feasibility Study (2011) used the term "DNAPL" or Liquid PCB Material. Liquid PCBs were not used in the manufacturing process and have not been observed in OU-1 or OU-2. During the World War II era, PCBs were delivered to the site in the form of powder and then mixed with a solvent on site before application in the manufacturing process as a viscous cable coating for certain shipboard cables made for the United States Navy. This war time use of PCBs is the only known manufacturing use of PCBs in cable production at the site.

RESPONSE 85: The comment is noted and the ROD was revised to eliminate references to "liquid PCBs" in favor of "Liquid PCB Material".

COMMENT 86: Element 5. Text variations within the PRAP resulted in inconsistencies with respect to the proposed dredge in the Nearshore and Backwater areas. NYSDEC has prescribed specific areas of potential/anticipated additional dredging in the Old Marina and North Boat Slip that would be in addition to those described in Alternative 6 as shown on the PRAP Figure 7. This additional dredge scope is consistent with the description of the modified Alternative 6 found in exhibit B which states that "This alternative has been

modified from the alternative developed in the FS to include additional dredging in deepwater, old marina, and north boat slip areas, as shown on Figure 7." And goes on to explain that "This approach would dredge sediments in targeted areas which contain the most highly impacted sediment for PCB and metals and therefore presents a greater sediment volume than the original Alternative 6." To be consistent with the Exhibit B description and Figure 7, along with the associated volume and cost estimate presented in the PRAP, the description of the proposed remedy in this section should include a more precise description of the dredging limits required to satisfy the remedial goals. For example: "Removal of Nearshore and targeted Backwater sediment and fill..."
An updated figure titled Plan View Modified Alternative 6 (attached) shows the dredge extents proposed for Alternative 6 along with the additional areas delineated in Figure 7 of the PRAP. This would represent the anticipated dredge extents for the modified alternative 6 that was recommended in the PRAP.

RESPONSE 86: The removal of sediment from the Backwater areas falls under the existing remedy component for sediment removal where silt curtains may be feasibly installed in less than 15 feet of water. The additional dredging scope was explicitly added to the alternative description in Exhibit B to clearly distinguish the PRAP alternative from the similar alternative developed in the FS.

COMMENT 87: Element 6. The requirement for evaluation of alternative resuspension control designs is open ended. In order to maintain a reasonable project schedule, the extent of the evaluation should be limited to the current standard or proven practice for similar settings at the time the evaluation is conducted. As noted in the introduction of these comments, no feasible alternatives or proven technologies that would be appropriate for the existing river conditions were identified in the RFS process based on our contact with a supplier of mobile silt curtains. We have attached Dr. Palermo's comments on this issue.

RESPONSE 87: The Department agrees that a limited evaluation will be performed regarding alternative resuspension control designs in the deepwater areas. This will include current standard or proven applications in similar settings.

COMMENT 88: Element 7. We do not believe that additional sampling is required in the deepwater area because the data collected to date indicates a high degree of heterogeneity with average concentrations near background. The average surface sediment concentration of PCBs is 1.3 ppm outside of the currently proposed deepwater dredge areas which suggests that contamination is neither contiguous nor concentrated and that the distribution of the relatively few exceedances of 50 ppm are not significant or that dredging would be warranted in light of the negative short and long term impacts associated with dredging in these water depths. If additional sampling is included in the ROD,

it should be limited to delineating areas as shown on Figure 7 of the PRAP and where existing data indicates the potential need for targeted dredging. We have attached Dr. Magar's comments on this issue.

RESPONSE 88: The Department will require additional sediment sampling to determine the distribution of PCB sediments in the deepwater areas to delineate areas to be dredged. This comment is also addressed in Responses 24, 58, 60, 61, 62 and 69.

COMMENT 89: Element 9. Not all elements of an "isolation" cap as defined by the PRAP are necessary at all locations where remaining contamination is above background concentrations. The ROD should allow for the selection of backfill material and capping components to accommodate design for factors including erosion protection requirements (i.e. riprap) and residual contamination as well as provide flexibility for equivalent methods for chemical isolation and habitat creation. For example, areas subject to high erosion forces would require riprap or other appropriate erosion protection at the surface and would not allow for the placement and retention of a 24 inch habitat layer of fine grained silt. Additionally, the migration of divalent metals (including copper) from pore water is improbable and would not require a sand isolation layer in addition to the backfill. We have attached Dr. Reible's comments on this issue. Note that: It is known that this reach of the river has levels of total organic carbon (TOC) with a range of 2.2 – 3.2% (Llansó and Southerland, 2006). This range is considerably elevated compared to other sediment samples obtained from the Hudson (Llansó, R.J. and Southerland, M., 2006). In estuarine/marine systems, copper (Seligman and Zirino, 1998; 2002; Rivera-Duarte, 2006) and other metals (Di Toro et al., 2005;) are known to bind strongly to organic carbon and will be retained even under fairly rigorous extraction procedures (Daminouka and Katsiri, 2009). The likelihood of metals, particularly copper, desorbing from organic ligands in OU-2 sediment is therefore negligible. Previous studies that measured the capacity of naturally occurring sulfides (S-2) to bind divalent metals in both sediment grabs and cores showed that the vast majority of samples had concentrations of S-2 that were greatly in excess of the amount of metals that could be simultaneously extracted with acid (and therefore not bioavailable). Based on equilibrium partitioning sediment benchmarks derived for the protection of benthic organisms to metal mixtures, these levels of sulfides will afford considerable excess binding capacity of any freely dissolved divalent metals in pore water. In addition to this, the placement of backfill would inhibit overlying oxygen in the water column from diffusing into the naturally occurring sediment and therefore encourage anaerobic conditions which, in turn, will stimulate the generation of S-2. The latter would bind to divalent metals, rendering them immobile. Remedial design will consider backfill material and composition for factors including erosion protection requirements (i.e. riprap) and residual contamination concentrations. The ROD should provide flexible language similar the language in the OU-1 ROD

Amendment "The habitat/surface substrate layer will be designed to restore …"

RESPONSE 89: The PRAP identified isolation capping material, but did not specify the specific substrate that should be used for the site backfill. The substrates to be used for restoration will be determined during design and the substrates can vary depending on location in the River.

COMMENT 90: Element 11.a. It is presumed that the phrase "remain in place" with respect to the sediment containment system does not include the habitat layer but rather is intended to ensure that the erosion protection and isolation layers remain in place and are effective.

RESPONSE 90: The comment is correct and is intended for the erosion protection and isolation layers to remain in place. In addition, the habitat layer will be designed to remain in place.

COMMENT 91: Element 11.a.i. The term Northwest Area is introduced in this paragraph and is not defined or shown on the figures. For the purposes of OU-2, it is presumed that this restriction applies to the Northwest Extension Area ("NEA") as defined in the PRAP. Restrictions on the currently existing land in OU-1 are addressed in the OU-1 Proposed ROD Modification.

RESPONSE 91: This element was revised in the ROD to read "Northwest Extension Area", which is located in Operable Unit 2.

COMMENT 92: Element 11.b. After remediation is complete, surface sediments and biota will continue to be affected over time by regional Hudson River contamination that is not associated with the Site, including regional PCB contamination. As a result, it is probable that neither (a) future monitoring of the presence and concentrations of contaminants in surficial sediment nor (b) future monitoring of fish and other migratory species tissue concentrations, or other biologic metrics will provide reliable indicators of the performance of the site remedy. Because these types of monitoring metrics cannot reliably distinguish between local site-related issues and regional contamination, any monitoring program should focus on other parameters, such as bathymetric analysis, to provide information about performance of the remedy. The ROD should provide for sufficient flexibility in the design of a long term monitoring program to allow for these issues to be evaluated during remedial design.
For example, one approach to be considered is evaluating restoration of remediated areas by monitoring for re-colonization by native invertebrate communities. Re-colonization should be weighted more heavily as a monitoring metric than biotic tissue concentrations because of known and ongoing PCB flux from upstream sources and ongoing remediation. Similarly, if re-colonization occurs, benthic macroinvertebrate body burdens should be considered as a more reliable line of evidence for potential site-

related contributions of PCB to biota than would tissue concentrations of other aquatic species. However, benthic macroinvertebrate data would need to be evaluated in the context of sediment and porewater vertical profiles and any protocol for such evaluation must take into account the potential for post-remediation contamination of surficial sediments through deposition from regional non-site related sources.
Fish tissue PCB concentrations should not be considered for monitoring remedy effectiveness because of the conditions throughout the river.
Surface water quality compliance is difficult to measure at the SCG (0.001 parts per trillion). Surface water measurements are potentially confounded by inclusion of suspended particles, which may emanate from multiple sources, including sources unrelated to the site. An apparent absence of migration of site contaminants through porewater to surface water should preclude the need for monitoring biotic tissue, recognizing that the potential tissue concentrations to be influenced by other in-river sources. We have attached Dr. Magar's comments on this issue.

RESPONSE 92: The Department disagrees with the comment regarding the ability of the long term monitoring to be able to distinguish between the site specific PCB sources and those unrelated to the site. Fish tissue samples have been analyzed previously in areas adjacent to the site and have shown site specific influences from the site. The results are reported in the Department's report *1999 As A Special Spatial Year For PCBs in Hudson River Fish*, May 2002.

COMMENT 93: Element 11.b.i and 11.b.ii. The specific baseline and long-term sampling requirements should be developed during design and should consider methods that would provide reliable conclusions that consider regional contamination impacts. We have attached Dr. Magar's comments on this issue.

RESPONSE 93: The Department agrees with the comment that baseline and long-term monitoring should consider methods that would provide reliable conclusions that consider regional contamination impacts.

COMMENT 94: Element 11.c.ii. Regarding "maintaining site access controls", there are no site access controls currently in place for OU-2. A perimeter fence exists in OU-1 along the shore but will be removed as part of the OU-1 remedy implementation.

RESPONSE 94: The comment is noted and the ROD has been revised to reflect this understanding.

COMMENT 95: Page 2. Note that OU-2 samples containing PCB Material have only observed Semi-Solid or Trace PCB Material. No DNAPL has been observed in sediment samples.

RESPONSE 95: The Department does not disagree with the comment that no liquid PCB material have been observed in sediment samples, however the investigation of sediments beneath the rip rap slope has been limited by the inability to obtain samples.

COMMENT 96: Page 3. Surface Water data as summarized on page 3 and in Table 1 requires additional analysis since the conclusions presented are not consistent with other data. Specifically: PCBs; We do not agree with the PRAP's conclusion regarding Surface Water that the degree of chlorination "…results suggest that the Site is the source of PCB contamination in the Hudson River." Any conclusions regarding the source of PCBs within a regional water system like the Hudson River, where there are multiple sources, must be carefully analyzed based on the weight of evidence. For example, while PCBs may be present in samples taken from different locations, sampling results may show differing congener patters, differing degrees of chlorination, or different weathering patterns each of which must be accounted for in attempting to correlate any result to a particular "source." Once in the environment the composition of PCBs changes over time due to various physicochemical properties and biological processes: vapor pressure, solubility, octanol-water partitioning, adsorption, and biodegradation. As the number of chlorine atoms increases, both vapor pressure and water solubility decrease, while adsorption and the octanol-water partitioning coefficient increase. Dechlorination of PCBs occurs primarily through aerobic and anaerobic microbial degradation. Aerobic bacteria preferentially dechlorinate less-chlorinated PCBs resulting in an increase in the degree of chlorination residual over time (i.e., within decades a less chlorinated Aroclor will look more like a more chlorinated Aroclor). Anaerobic bacteria preferentially dechlorinate more highly chlorinated PCBs, mainly by replacement of meta and para positioned chlorine atoms with hydrogen atoms, resulting in predominately ortho substituted mono- through tetra-chlorobiphenyls (i.e., a more chlorinated Aroclor will look more like a less chlorinated Aroclor over time). Additionally, less-chlorinated PCB congeners are less persistent in the environment due to volatilization and solubility; more-chlorinated PCBs are more persistent in the environment due to adsorption. Therefore, over time, under common sediment conditions, an initial release of a less chlorinated Aroclor will often subsequently "weather" in the environment such that sediment samples will present as a more chlorinated Aroclor in laboratory analyses. In summary, the composition of an original PCB mixture released to the environment can be expected to change due to a combination of the processes mentioned above. Therefore, any attempt to determine the source of the PCBs or Aroclors identified in an environmental sample must be approached with caution. Furthermore, Hudson River PCB concentrations show that surface water sample concentrations sampled at the Site are consistent with background concentrations based on all sample locations from 1975 through 2007, summarized in the Injury Determination Report Hudson River Surface Water Resources, Hudson River Natural Resource Damage

Assessment. In addition, surface water PCB concentrations show significantly higher PCB concentrations at upstream sampling locations. Site concentrations show Site levels are consistent with sampling locations immediately upstream and immediately downstream. Therefore, Site surface water PCB concentrations are at, and in most cases below, background PCB levels which suggests that the Site is not a significant contributor of PCBs to the Hudson River. Also note that Site PCB data reports the concentrations of PCBs as Aroclors, whereas the recent NYSDEC results reports the concentrations of PCBs as congeners. During performance studies conducted by EPA for the development of EPA Method 8082, the concentrations determined as Aroclors were larger than those obtained using the congener method, which suggests that Site PCB concentrations reported as Aroclors may be biased high. It should also be considered that, based on initial hydraulic calculations, the pore water volume exiting the site is a small fraction of the surface water and would not be capable of significantly changing the surface water concentrations from background or impacting surface water to the levels indicated in the samples presented within the PRAP. It is unclear if adequate precautions were taken to acquire samples at a location where interference from bottom sediments were eliminated to avoid samples results that were biased high.

RESPONSE 96: The comment is noted.

COMMENT 97: Lead; We do not agree with the conclusion that "The primary surface water contaminants are…lead associated with historical manufacturing and disposal at the site." Based on Gibbs (1994), total suspended sediment concentrations 1 meter above the river bottom increased from approximately 10 mg/kg at the ocean (Varrazano Narrows Bridge, ~45-50 km downstream) to 140 mg/kg in the middle of Haverstraw Bay (~25 km upstream). This work also demonstrated that suspended sediments have metal concentrations much higher (2 to 3 orders of magnitude) than bottom sediments. Site, total and dissolved, lead porewater concentrations as shown in Appendix C of the Field Work Summary Report for Fall 2004 Atlantic Richfield Supplemental Offshore Investigation Former Anaconda Plant Site Operable Unit No. 2 report were reviewed. For the 18 samples collected, all dissolved lead concentrations ranged from non-detect (<0.24 ug/L) to 1.9 µg/L, well below the SCG lead value of 8 µg/L. The total pore water lead concentration averaged 4.7 µg/L and ranged from 0.5 µg/L to 13.2 µg/L; only one sample, which measured 13.2 µg/L lead and was collected in one area south of the south boat slip, exceeded the SCG lead value of 8 µg/L. Given the low Site pore water lead concentrations and the study performed by Gibbs, demonstrating an increase in suspended sediments concentration and associated metals concentration further upstream, one can conclude that the Site is not a significant contributor of lead to the Hudson River.

RESPONSE 97: The Department has a different interpretation of the article by Gibbs. The suspended sediment concentrations measured in the water column for lead will be different from the lead concentration measured in the sediment next to the site. The Department maintains that the lead concentrations found in the sediments near the site are primarily from Harbor at Hastings source areas in OU1, which were identified and found to be related to the former manufacturing and direct discharges into the Hudson River.

COMMENT 98: Page 4. Movement of PCB Material as DNAPL through the fill in OU-1 has historically occurred vertically and, to a limited extent, horizontally along the interface with the Marine Silt. It appears that there has been some historical movement of DNAPL along the Marine Silt interface near the boundary between OU-1 and OU-2. However, there are also other transport mechanisms by which PCBs were likely deposited in OU-2. For example, PCB Material was likely associated with the outfalls of pipes associated with Building 52 and other manufacturing operations on OU-1. In addition, historic activities such as the mixing of PCB manufacturing ingredients along the Northwest Corner may have resulted in the overland transport of PCBs to the River, and other historic activities along the old dock and pier structures may also have resulted in PCB deposition in river sediments. Finally, prior to the installation of the IRM in the northwest corner, PCB contaminated soils may have washed or eroded from the upland surface soils.

RESPONSE 98: The comment is noted and the ROD has been revised accordingly.

COMMENT 99: Page 4, "Screening Criteria for Metals". As noted in the RFS, the ER-L and ER-M values do not account for site-specific conditions. These values are typically used to initially identify contaminated sediment. As stated in the 1999 NYSDEC Technical Guidance for Screening Contaminated Sediments, "Once a sediment has been identified as contaminated, a site-specific evaluation procedure must be employed to quantify the level of risk, establish remediation goals, and determine the appropriate risk management actions. The site-specific evaluation might include for example: additional chemical testing; sediment toxicity testing; or sediment bioaccumulation tests". If criteria are exceeded then sediment contamination is quantified, evaluated with respect to exposure to biota and the significance of exceedances are described in terms of the predicted effects. The guidance also states that "If sediment concentrations of a compound are less than all of the sediment criteria for that substance, aquatic resources can be considered to be not at risk (from that compound)." Given this procedure for evaluating sediments, if the sediment is not considered or shown to be a risk, then remedial action is not necessary. A discussion of previous studies and standard practices is provided hereafter as it pertains to toxicity evaluation of metals in sediment.
The biogeochemistry of sediments influences environmental risk for metals contaminants more than for any other category of environmental contaminants. The PRAP includes provisions for remedial goals based on

background, or ambient concentrations of metals in sediments. Based on empirical evidence and relevant site characteristics, metals in OU-2 sediments are expected to pose no risk to human health or the environment at concentrations much greater than background or ambient concentrations. The proper evaluation of environmental risks caused by sediment contamination typically requires the evaluation of three lines-of-evidence: bulk sediment chemistry, sediment toxicity, and the native benthic invertebrate community. These three lines of evidence (LOEs) (often referred to as a Sediment Quality Triad or SQT) are then evaluated relative to a background or 'reference' area(s), to make an overall conclusion (i.e. a 'weight-of-evidence' or WOE) about risks that contaminated sediments pose to ecological receptors.

Accordingly, remedial goals should consider actual risks to human health and the environment associated with sediment, acknowledging that background conditions may constrain the levels to which cleanup can be sustained. Because of the many factors governing the potential toxicity of metals in sediments, sediment quality values (SQVs) are particularly suspect for metals, and therefore inadequate for basing remedial action decisions without supporting lines of evidence. If toxicity and benthic community results were to reflect an absence of chemical affect on the sediment habitat, metals concentrations exceeding SQVs should not be given greater weight than the other biological lines of evidence. Studies within OU-2 (e.g., Llansó and Southerland, 2006; BB&L, 2006) have identified conditions that indicate a reduction in both the surface sediment concentrations and potential risks of divalent metals (and also PCBs) in the biologically active sediment zone, including:

Deposition of sediments at background concentrations: the OU-2 reach adjacent to the site is "depositional," accumulating suspended sediment from upstream sources (~1 inch/year based on the RI). Ongoing deposition has resulted in levels of constituents of potential concern (CPOCs) that are near background conditions.

Elevated TOC: levels of total organic carbon are greater than most Hudson River reaches (recent data suggests an average of 2.96%), which aids in binding contaminants in sediments, reducing bioavailability to invertebrates and fish; and

Strongly reducing conditions in sediment and a marked excess of acid-volatile (AVS): both contribute to limit or eliminate metals bioavailability - no benthic toxicity is predicted for this type of sediment per the USEPA metals mixtures guidance and should be taken into consideration at this site.

It should also be noted that non-chemical stressors at OU-2 likely affect the benthic community more than site-related COPCs. The degraded conditions at 'reference' locations support this conclusion (e.g., at Greystone.) Also note that the native benthic communities are similar at locations upstream and downstream of OU-2.

It is important that metrics that consider the above lines of evidence be included as a component of remedy selection activities. We have attached Dr. Jenkin's comments on this issue.

RESPONSE 99: This statement is not an accurate summary of the sediment criteria. The criteria indicate a need for analysis of potential toxicity is necessary if the criteria are exceeded. A lack of appropriate investigation cannot be used as a basis to assume the lack of risk from exceedance of the criteria. Toxicity and AVS/SEM testing at this site were not sufficiently robust to determine a site-specific toxicity threshold. Therefore, there has been no demonstration that site-specific factors are ameliorating the expected effects associated with metals concentrations above the sediment criteria.

COMMENT 100: Page 4 "Background Contamination" We note that Site Specific Background Values attributed to our site are similar to background values identified in the TAPPAN ZEE HUDSON RIVER CROSSING PROJECT Draft Environmental Impact Statement. The 95th Percentile concentrations for the 313 samples analyzed for the Tappan Zee Bridge were similar to the background samples selected for OU-2. This data shows that the concentrations upriver of OU-2 were much higher than background in some locations:
Copper 1,550 ppm
Lead 604 ppm
Zinc 399 ppm
PCBs 1.2 ppm

RESPONSE 100: The comment is noted. The Department also notes that the cited values are the maximum values of the Tappan Zee DEIS data set, and may have been taken from a distinct source area that does not represent the potential for remediated sediments to be recontaminated.

COMMENT 101: Table 1. The text indicates the maximum detection was 62.4 ppt, the table indicates 57.0 ppt.

RESPONSE 101: The correction was made in the ROD.

COMMENT 102: Table 2 footnotes, last sentence. "If only the ER-L is impacted …" should read " If only the ER-L is exceeded …"

RESPONSE 102: The correction was made in the ROD.

COMMENT 103: Table 3. Note that a site-specific organic carbon content of 2.96% was measured in more recent investigations which would raise the site-specific screening criteria applicable to this project.

RESPONSE 103: The Department used the organic carbon content value of 2.43% which represents all the reported values including the more recent investigations.

COMMENT 104: Northwest Extension Area. The term "sealed sheet pile wall" is presumed to mean a sheet pile wall with sealed joints as described in the RFS.

RESPONSE 104: Yes.

COMMENT 105: Alternative 6. Clarification. The text refers to "site-specific cleanup goals" in Table 2. Based on Figure 2 it appears that the 95th percentile value in the column labeled "Site Derived Value" in Table 2 is the reference. The ROD should explicitly state the Site-specific Cleanup Levels. The values stated by NYSDEC during the Public Meeting were as follows:
Copper 129 ppm
Lead 132 ppm
Zinc 234 ppm

RESPONSE 105: Footnote c of Table 2 indicates that the site-derived cleanup values are the range of the 90^{th} to 95^{th} percentile values of the background data set.

COMMENT 106: The reference in the first paragraph to Section 7.2 is presumed to be a reference to Section 7 of the PRAP.

RESPONSE 106: The correction is noted and incorporated into the ROD.

COMMENT 107: Basis for Selection, 2nd paragraph, 5th line. Regarding the statement that "Dredging to a depth of 6 feet removes sediment that has the potential to be scoured and migrate." The preceding sentence implies this statement is applicable to both nearshore and backwater areas. In the backwater areas, the natural deposition cited in other sections does not indicate that scour is likely to a depth of 6 feet. Preliminary estimates do not indicate that scour in the nearshore would reach 6 feet and wherever dredging and backfill occurs the backfill will be designed for the river conditions, therefore, dredge to 6 feet is not required to eliminate the potential for scour of contaminated sediment. We have attached Dr. Reible's comments on this issue.

RESPONSE 107: The comment is noted and the ROD is modified to include additional language to justify the removal of sediments to 6 feet. The decision to select the 6 feet is based on the removal of sediment to pre-release conditions to the extent feasible, consistent with the remainder of the site.

COMMENT 108: Criteria 1. The correct increased cost for Alternative 9 is $140 million.

RESPONSE 108: The correction was made in the ROD

COMMENT 109: Figure A. The areas identified as Northwest Off-shore and On-shore Area are presumed to be the Northwest Corner Off-shore and On-shore Areas.

RESPONSE 109: The correction was made in the ROD

COMMENT 110: Note that Atlantic Richfield Company has not declined to implement a remedial program as stated.

RESPONSE 110: The OU1 ROD Amendment is modified to reflect that ARCO has agreed to implement the OU1 remedial program. The OU2 ROD was revised to state that the PRPs for the site declined to implement the remedial investigation and feasibility study portion of the remedial program for OU2 when first requested by the Department. Since 2003 the PRPs have voluntarily performed additional investigations and submitted work plans and reports which include a feasibility study to advance the remedial program.

COMMENT 111: Paragraph 6.1.2. The DNAPL is a PCB mixture, not liquid PCBs. Only Semi-Solid and Trace PCB Material has been observed in sediment. The potential presence of DNAPL (i.e. Liquid PCB Material) beneath the rip-rap has been assumed by NYSDEC but has not yet been confirmed.

RESPONSE111: The comment is correct concerning the Department's expectation of the presence of Liquid PCB Material beneath the rip-rap based on the finding of this material in close proximity to the shoreline. Further delineation will be performed in this area to verify this expectation.

COMMENT 112: Paragraph 6.4. It should be noted that beryllium in groundwater was only slightly exceeded in one out of twenty samples and was non-detect in 20 pore water samples collected during the 2005 OU-2 sampling event. Existing conditions do not suggest the need to include beryllium in long term monitoring plans.

RESPONSE 112: The Department believes that beryllium should be included as a baseline monitoring parameter in the long term monitoring plan. If it is not detected, the monitoring plan may be revised to omit it.

COMMENT 113: Paragraph 6.4. It should be noted that PCBs in groundwater are limited by the extremely low solubility of site-specific Aroclors that are associated with the DNAPL and the mobility of local concentrations is restricted by other site factors including organic content of the soil.

RESPONSE 113: The statements in the comment are accurate, however, PCBs have been detected in unfiltered groundwater samples at the site which exceed the Department's ambient groundwater standards. The selected remedy is intended to prevent contaminated groundwater from leaving the site, and monitoring will be performed to identify PCB concentrations in groundwater.

COMMENT 114: Paragraph 7.2. As previously noted, the presence of Liquid PCB Material off-shore has not been confirmed. Semi-Solid PCB Material has been observed but "PCB DNAPL" has not been "found beneath the river".

RESPONSE 114: See Response #111

COMMENT 115: Paragraph 7.3. Since the westward extent of the DNAPL is unconfirmed, we believe that once the area is accessible during construction, delineation should precede installation of recovery wells.

RESPONSE 115: The Department agrees that delineation of PCB/ DNAPL will precede installation of recovery wells.

COMMENT 116: Paragraph 7.3. The sentence "The containment element for the Northwest On-Site Contamination (formerly identified as the Northwest Corner and Northern Shoreline Area)..." uses an undefined Northwest On-site Contamination term. It is presumed that this statement should be as follows "The containment element for the northwest on-site contamination (formerly identified within the Northwest Corner and Northern Shoreline Area)..."

RESPONSE 116: The comment is correct and the change will be incorporated into the ROD Amendment.

COMMENT 117: Element 2. Note that one of the "additional scope" items referred to in Section 8, Paragraph 7 is an expansion of the extent of excavation (and therefore the areas) in the Northwest Corner and Northern Shoreline areas (see Figure 2 comment below).

RESPONSE 117: The Department acknowledges this increased scope based on the additional information gathered during the pre-design investigations. Although the excavation criteria have not changed, the increased extent will be noted in the ROD Amendment.

COMMENT 118: Element 5. The term "sealed sheet pile wall" is presumed to mean a sheet pile wall with sealed joints as described in the RFS.

RESPONSE 118: Agreed.

COMMENT 119: Element 6. We propose the ROD incorporate the flexibility to accommodate constructability limitations, e.g. "eliminate to the extent practicable any additional fill material…"

RESPONSE 119: The Department agrees with the concept of maintaining flexibility to accommodate constructability limitations during remedial design. There will likely be modifications to the remedial design which were not anticipated at

the issuance of the Record of Decision. These will be documented and addressed on a case by case basis and the Department will follow its guidance and policy regarding such modifications.

COMMENT 120: Element 7. Operation of recovery systems should be continued only as long as recoverable DNAPL is observed.

RESPONSE 120: The shutdown criteria for recovery of DNAPL will be identified in the Site Management Plan. Recoverable DNAPL will be defined and provisions will be included which identify periodic monitoring to determine if the shutdown criteria is acceptable or additional recovery is necessary.

COMMENT 121: Element 10.bi. Groundwater quality and elevation monitoring does not provide data regarding the remedy performance and should not be required for such purposes. The compliance monitoring in Paragraph 10.c.i would provide the required data.

RESPONSE 121: The Department disagrees with the comment. Groundwater quality and elevation monitoring will be needed to evaluate the remedy performance and evaluate any corrective measures needed should they arise in the future. The Department is willing to evaluate and reduce the frequency based on the results obtained.

COMMENT 122: Element 10.b. Consideration should be given to regional contamination when establishing long term monitoring and criteria for groundwater discharged from the Northwest Extension Area. Groundwater treatment may not be necessary based on the extremely low solubility of site-specific Aroclors that are associated with the DNAPL and their concentrations relative to background surface water contamination.

RESPONSE 122: The PCB groundwater results will be evaluated and used to determine appropriate treatment of groundwater. The PCB groundwater results from the site indicate that levels exceed New York State Ambient Groundwater Standards.

COMMENT 123: Element 10.b.iv is presumed to be part of the previous bullet.

RESPONSE 123: The correction was made in the ROD

COMMENT 124: Figure 2. An updated version of Figure 2 that has been updated for the new data and uses the nomenclature in the text of the proposed modification is attached.

RESPONSE 124: The revised figure will be included.

APPENDIX B

Administrative Record

Administrative Record

Harbor at Hastings
Operable Unit No. 1
State Superfund Project
Village of Hastings on Hudson, Westchester County, New York
Site No. 360022

1. Proposed Remedial Action Plan for the Harbor at Hastings site, Operable Unit No.1, dated October 2003, prepared by the NYSDEC.

2. Record of Decision, Harbor at Hastings Site, Operable Unit No.1, dated March 2004, prepared by the NYSDEC and includes Appendix D, Administrative Record (Appendix D attached)

3. Proposed Record of Decision Amendment for the Harbor at Hastings site, Operable Unit No.1, dated January 2012, prepared by the NYSDEC

4. Order on Consent between NYSDEC and Atlantic Richfield Company, executed on November 16, 1995

5. Order on Consent between NYSDEC and Atlantic Richfield Company, executed on March 25, 2005

6. Remedial Design Work Plan, Haley & Aldrich, May 2005

7. 50% Design Report for Operable Unit No.1 (OU1), Former Anaconda Wire and Cable Plant Site, NYSDEC Site # 3-60-22, Volumes I, July 2006

8. 50% Design Report for Operable Unit No.1 (OU1), Former Anaconda Wire and Cable Plant Site, NYSDEC Site # 3-60-22, Volume II, July 2006

9. 50% Design Report for Operable Unit No.1 (OU1), Former Anaconda Wire and Cable Plant Site, NYSDEC Site # 3-60-22, Volume III, July 2006

10. Supplemental Northwest Corner Investigation Findings Report, NYSDEC Site # 3-60-22, January 2009

11. DNAPL Interim Remedial Measures Workplan, Former Anaconda Wire and Cable Plant Site, Hastings-on-Hudson, New York, NYSDEC Site # 3-60-22, July 2009

12. Revised Feasibility Study – OU2, Haley & Aldrich, October 2011

13. Letter dated February 1, 2012 from Jacques Padawer, Ph. D

14. Letter dated February 29, 2012 from Jeremiah Quinlan, Village of Hastings-on-Hudson Trustee

15. Letter dated March 9, 2012 from Eric Larson with ARCO, including attachments

16. Letter dated March 9, 2012 Ms. Eileen Bedell, owner of the Hudson Valley Health & Tennis Club, including attachment

17. Letter dated March 12, 2012 from Daniel E. Estrin and Justin Davidson with the Pace Environmental litigation Clinic, Inc. representing Riverkeeper, Inc., including Exhibits

APPENDIX C

OU-2 ROD

RECORD OF DECISION

Harbor at Hastings
Operable Unit Number 02: Hudson River Sediments
State Superfund Project
Hastings-on-Hudson, Westchester County
Site No. 360022
March 2012

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

Harbor at Hastings
Operable Unit Number: 02
State Superfund Project
Hastings-on-Hudson, Westchester County
Site No. 360022
March 2012

Statement of Purpose and Basis

This document presents the remedy for Operable Unit Number: 02: Hudson River Sediments of the Harbor at Hastings site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit Number: 02 of the Harbor at Hastings site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;

- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development

2. Installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of liquid PCB DNAPL offshore of the northwest corner of the site. The location and alignment of the northwest extension area (NEA) sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River while enabling effective DNAPL containment and recovery and maintaining stability of the site. It is estimated that this area of fill will encompass 0.88 acres. The area behind the sheet pile wall will be filled with soil and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater before discharge to the river.

3. Mitigation of fill placed into the Hudson River to replace the aquatic habitat that will be lost as a result of the NEA. Mitigation will involve the creation and/or restoration of river habitat in accordance with a Department-approved plan.

4. Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the northwest corner of the site and the NEA.

5. Removal of sediment and fill that contains PCB concentrations greater than 1 ppm and/or copper, zinc and lead concentrations above the background concentrations listed in Table 2 of Exhibit A, to a maximum excavation depth of 6 feet within the area where sediment resuspension controls, such as a fixed silt curtain, are feasible. This area generally corresponds to a water depth of 15 feet and a distance from the shoreline into the river of approximately 60 to 80 feet and along approximately 2000 feet of shoreline.

6. The specific area where fixed sediment resuspension controls can be feasibly deployed will be evaluated during design based on the water depth and velocity conditions at the site. Alternative designs for fixed resuspension controls will be evaluated to increase the depth of feasible resuspension controls. Designs for mobile resuspension controls will also be evaluated and developed for dredging in deeper water, if necessary.

7. Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to a maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging.

8. On-site dewatering of dredged and excavated sediments for off-site transportation and disposal or onsite reuse, as appropriate. On-site reuse of sediments will be evaluated during

design. Water removed from the sediment will be treated and discharged back to the river in compliance with regulatory requirements.

9. Backfill of dredged areas with Department-approved material. Dredged areas within the resuspension controls will be backfilled with clean material to isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. In nearshore areas which have contamination remaining above background concentrations, isolation capping will be placed following dredging. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer. The isolation and armoring layer thicknesses and materials of the cap will be established in the remedial design. As part of the design, a river flow and deposition study will be conducted to determine approximate sedimentation rates and the acceptability that up to 12 inches of the habitat layer may fill in by natural deposition within a reasonable duration of time after installation of the remainder of the isolation cap. Additional backfill needed to reach bathymetry requirements will be placed between the erosion protection layer and habitat layer. The habitat layer will be designed to restore aquatic habitat. Dredged areas that are outside the near shore area will be backfilled with appropriate river substrate to within 12 inches of the pre-dredge elevation provided that the sedimentation study demonstrates that sufficient deposition will occur within a reasonable time frame. All activities associated with the excavation and restoration of Hudson River sediments will meet the requirements of 6NYCRR Part 608.

10. Imposition of an institutional control in the form of an environmental easement for the NEA which will be included with the environmental easement for OU1 that will:

a. require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

b. allow the use and development of the controlled property for restricted residential uses as defined by Part 375-1.8(g), consistent with the OU1 ROD, as amended,, although land use is subject to local zoning laws;

c. restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;

d. prohibit agriculture or vegetable gardens on the controlled property; and

e. require compliance with the Department approved Site Management Plan.

11. A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 10 above.
Engineering Controls: The sediment containment system and cover discussed in Paragraphs 2 and 9.

This plan includes, but may not be limited to:

i. Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination and includes a prohibition on the construction of pile-supported structures within the Northwest Extension Area;

ii. descriptions of the provisions of the environmental easement including any land use, groundwater, and surface water use restrictions;

iii. provisions for the management and inspection of the identified engineering controls;

iv. maintaining site access controls and Department notification; and

v. the steps necessary for the periodic reviews and certification of the institutional and engineering controls.

b. a monitoring plan to assess the performance and effectiveness of the remedy. The plan will be designed to measure PCB and metals concentrations and evaluate the long-term contaminant trends in the affected media (biota, sediment, water). One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. The plan includes, but may not be limited to:

i. baseline sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and habitat characterization;

ii. long-term sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and restoration success to assess the performance and effectiveness of the remedy; and

iii. a schedule of monitoring and frequency of submittals to the Department.

c. an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

i. compliance monitoring of treatment systems to ensure proper O&M as well as providing

the data for any necessary permit or permit equivalent reporting;

ii. providing the Department with required notifications and access to the site and O&M records.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 30, 2012

Date

Robert W. Schick, P.E., Acting Director
Division of Environmental Remediation

RECORD OF DECISION

Harbor at Hastings
Hastings-on-Hudson, Westchester County
Site No. 360022
March 2012

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of hazardous wastes at this site, as more fully described in this document, has contaminated various environmental media. The remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This Record of Decision (ROD) identifies the selected remedy, summarizes the other alternatives considered, and discusses the reasons for selecting the remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repositories:

Hastings Public Library
Attn: Susan Feir
7 Maple Avenue
Hastings-on-Hudson, NY 10706

Phone: 914-478-3307

NYSDEC Region 3
Attn: Call for Appointment

21 South Putt Corners Road
New Paltz, NY 12561
Phone: 845-256-3154

Village Clerk
Municipal Offices
7 Maple Avenue
Hastings on Hudson, NY 10706
Mon - Fri: 8:30 - 4:00
Phone (914) 478-3400

A public meeting was also conducted. At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The site is located on approximately 28 acres along the Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The site is bounded on the north and west by the Hudson River and to the south by the Tappan Terminal site. A former marina borders the site to the north.

Site Features: Most of the site is covered by pavement or concrete building slabs. One building remains at the site (Building 52). The shoreline consists of areas of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting.

Current Zoning and Uses: The site is zoned general industrial, and is the subject of planning studies by the Village of Hastings-on-Hudson. Several temporary trailers are in use for security and remedial activities.

Historic Uses: The site is the former Anaconda Wire and Cable Company, which ceased operations in 1974. Wire manufacturing operations during a portion of the operating period caused the release of PCBs and metals to site soil, groundwater and sediments. A site investigation was performed in 1986-87 in connection with a potential real estate development. This investigation led to the discovery of high levels of PCBs beneath the northwest corner of the site.

Operable Units: The site is divided into two operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Operable Unit 1 (OU1) is the on-site soils area west of the railroad tracks. OU2 is the off-site impacts to the Hudson River.

Site Geology and Hydrogeology: The landmass of the property was constructed by placement of fill material into the Hudson River until the early 1900s. This fill material is approximately 10-20 feet thick along the railroad tracks, and 20-40 feet thick along the river. Beneath the fill layer lies the Marine Silt, which is a structurally weak clayey silt material that is approximately 40 feet thick along the shoreline. Beneath the Marine Silt lies the Basal Sand unit, a very dense sand and gravel material, into which all structural piles for site buildings were placed. Groundwater is approximately 2 to 8 feet below ground surface in the fill material, and is influenced by tidal variation. Groundwater in the Basal Sand unit is confined by the Marine Silt unit and is present in an artesian condition. The shoreline shows signs of historical erosion due to storm events and wave action. Low-lying parts of the site have been flooded during larger storms.

Operable Unit (OU) Number 02 is the subject of this document.

A Record of Decision was issued previously for OU 01.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to restricted-residential use (which allows for commercial use and industrial use) as described in Part 375-1.8(g) were/was evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the RI to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Atlantic Richfield Company (ARCO)

The Department and ARCO entered into Consent Orders in 1995 and March 2005. These Orders obligate ARCO to implement a RI/FS and RD/RA for OU1.

The PRPs for the site declined to implement the remedial investigation and feasibility study portion of the remedial program for OU2 when first requested by the Department. Since 2003 the PRPs have voluntarily performed additional investigations and submitted work plans and reports which include a feasibility study to advance the remedial program. After the remedy is selected, the PRPs will again be contacted to execute an order on consent for the OU2 remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- surface water

- soil
- sediment

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

Polychlorinated Biphenyls (PCB)	Lead
Copper	Zinc

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- surface water
- sediment

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

There were no IRMs performed at this site during the RI.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

The Fish and Wildlife Resources Impact Analysis (FWRIA) for OU 02, which is included in the RI report, presents a detailed discussion of the existing and potential impacts from the site to fish and wildlife receptors.

The primary contaminants of concern for the site are PCBs (Aroclors 1260 and 1262) and metals, including copper, lead and zinc from historic wire manufacturing operations. For OU1, soil and groundwater beneath the site are contaminated with PCBs and metals, including beryllium, above standards, criteria and guidance values. For OU2, PCBs and metals have also contaminated Hudson River surface water and sediments, and site-related PCBs have been detected in resident fish.

The site presents a significant environmental threat due to ongoing releases from contaminated soils and/or sediments to groundwater, surface water and the Hudson River ecosystem. Metals in sediment pose a toxicity threat to benthic organisms, and PCBs in sediment pose a toxicity and bioaccumulation threat to fish and wildlife.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

For OU-1: The site is completely fenced, which restricts public access. Some contaminated soils remain at the site below concrete and/or clean fill, therefore, people will not come in contact with contaminated soil unless they dig below the surface materials. Contaminated groundwater at the site is not used for drinking or other purposes as the site is served by a public water supply that obtains water from a different source not affected by this contamination. For OU-2: People using the river for recreational purposes such as swimming and boating may come into direct contact with site related contaminants. The river is not a source of potable water in this area. People may come in contact with contaminants present in shallow sediment while entering and exiting the river. Fish in the river are likely to contain the same contaminants that are present in surface water and sediment; therefore, people who consume fish from the river are likely to be consuming these contaminants as well. For specific advisories on fish consumption in this area please refer to NYSDOH's Health Advise on Eating Sportfish and Game. http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/docs/advisory_booklet_2011.pdf

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to

pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Surface Water

RAOs for Public Health Protection

- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminant of concern.
- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

Sediment

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria).
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
- Restore sediments to pre-release/background conditions to the extent feasible.

SECTION 7: SUMMARY OF THE SELECTED REMEDY

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study (FS) report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation,

maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's remedy is set forth at Exhibit D.

The selected remedy is referred to as the Nearshore Dredge to 6 feet, Limited Deepwater Dredge and Northwest Extension remedy.

The estimated present worth cost to implement the remedy is $105,000,000. The cost to construct the remedy is estimated to be $95,200,000 and the estimated average annual cost is $454,000.

The elements of the selected remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. Green remediation principals and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development

2. Installation of a sheet pile wall within the Hudson River to provide containment and allow for the recovery of liquid PCB DNAPL offshore of the northwest corner of the site. The location and alignment of the northwest extension area (NEA) sheet pile wall will be verified during the remedial design to minimize filling into the Hudson River while enabling effective DNAPL containment and recovery and maintaining stability of the site. It is estimated that this area of fill will encompass 0.88 acres. The area behind the sheet pile wall will be filled with soil and/or lightweight aggregate as approved by the Department. The sheet pile wall will include sealed joints, installation of tie-rods, upland anchors, and cathodic protection. The wall system will also include groundwater filtration units to adsorb contaminants that may be present in groundwater before discharge to the river.

3. Mitigation of fill placed into the Hudson River to replace the aquatic habitat that will be lost as a result of the NEA. Mitigation will involve the creation and/or restoration of river habitat in accordance with a Department-approved plan.

4. Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the northwest corner of the site and the NEA.

5. Removal of sediment and fill that contains PCB concentrations greater than 1 ppm and/or copper, zinc and lead concentrations above the background concentrations listed in Table 2 of Exhibit A, to a maximum excavation depth of 6 feet within the area where sediment resuspension controls, such as a fixed silt curtain, are feasible. This area generally corresponds to a water depth of 15 feet and a distance from the shoreline into the river of approximately 60 to 80 feet and along approximately 2000 feet of shoreline.

6. The specific area where fixed sediment resuspension controls can be feasibly deployed will be evaluated during design based on the water depth and velocity conditions at the site. Alternative designs for fixed resuspension controls will be evaluated to increase the depth of feasible resuspension controls. Designs for mobile resuspension controls will also be evaluated and developed for dredging in deeper water, if necessary.

7. Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to a maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging.

8. On-site dewatering of dredged and excavated sediments for off-site transportation and disposal or onsite reuse, as appropriate. On-site reuse of sediments will be evaluated during design. Water removed from the sediment will be treated and discharged back to the river in compliance with regulatory requirements.

9. Backfill of dredged areas with Department-approved material. Dredged areas within the resuspension controls will be backfilled with clean material to isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. In nearshore areas which have contamination remaining above background concentrations, isolation capping will be placed following dredging. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer. The isolation and armoring layer thicknesses and materials of the cap will be established in the remedial design. As part of the design, a river flow and deposition study will be conducted to determine approximate sedimentation rates and the acceptability that up to 12 inches of the habitat layer may fill in by natural deposition within a reasonable duration of time after installation of the remainder of the isolation cap. Additional backfill needed to reach bathymetry requirements will be placed between the erosion protection layer and habitat layer. The habitat layer will be designed to restore aquatic habitat. Dredged areas that are outside the near shore area will be backfilled with

appropriate river substrate to within 12 inches of the pre-dredge elevation provided that the sedimentation study demonstrates that sufficient deposition will occur within a reasonable time frame. All activities associated with the excavation and restoration of Hudson River sediments will meet the requirements of 6NYCRR Part 608.

10. Imposition of an institutional control in the form of an environmental easement for the NEA which will be included with the environmental easement for OU1 that will:

a. require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

b. allow the use and development of the controlled property for restricted residential uses as defined by Part 375-1.8(g), consistent with the OU1 ROD, as amended,, although land use is subject to local zoning laws;

c. restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;

d. prohibit agriculture or vegetable gardens on the controlled property; and

e. require compliance with the Department approved Site Management Plan.

11. A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:
Institutional Controls: The Environmental Easement discussed in Paragraph 10 above.
Engineering Controls: The sediment containment system and cover discussed in Paragraphs 2 and 9.

This plan includes, but may not be limited to:

i. Excavation and Sediment Management Plan which details the provisions for management of future excavations in areas of remaining contamination and includes a prohibition on the construction of pile-supported structures within the Northwest Extension Area;

ii. descriptions of the provisions of the environmental easement including any land use, groundwater, and surface water use restrictions;

iii. provisions for the management and inspection of the identified engineering controls;

iv. maintaining site access controls and Department notification; and

v. the steps necessary for the periodic reviews and certification of the institutional and engineering controls.

b. a monitoring plan to assess the performance and effectiveness of the remedy. The plan will be designed to measure PCB and metals concentrations and evaluate the long-term contaminant trends in the affected media (biota, sediment, water). One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. The plan includes, but may not be limited to:

i. baseline sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and habitat characterization;

ii. long-term sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and restoration success to assess the performance and effectiveness of the remedy; and

iii. a schedule of monitoring and frequency of submittals to the Department.

c. an Operation and Maintenance Plan to ensure continued operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

i. compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;

ii. providing the Department with required notifications and access to the site and O&M records.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants are arranged into two categories: pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the SCGs are provided for each medium.

The former manufacturing operations within OU 1 caused the release of PCBs and metals to site soil, groundwater and sediments at the Harbor at Hastings Site. The nature and extent of contamination found in OU 1 is important to understanding the contamination found in the sediments of OU 2. The areas of concern include the Northwest Corner On-Shore Area, Building 52 outfalls, Building 15 Outfall, and Sluice Area have been identified as areas which have caused the release and discharge of contaminants from portions of OU 1 to the OU 2 sediments. These areas are shown on Figure 2.

The OU 2 portion of the site is divided into different areas which has been useful to define the nature and extent of contamination and evaluate alternatives. These areas are described below and are labeled on Figure 2.

Near Shore Area: The area of sediments along the shore defined by the feasible limit of resuspension controls on the west and the existing bulkhead between OU1/OU2 boundary on the east. This area is generally within 60 to 80 feet from the shoreline. This area does not include the Backwater Area or the Northwest Corner Off-Shore Area.

Backwater Areas: These sediment areas include the Old Marina, North Boat Slip, and South Boat Slip and are areas with lower river velocities and have been identified with increased sediment deposition.

Deepwater Area: Sediment areas beyond the feasible deployment of resuspension controls. The furthest extent of contamination is approximately 400 feet west of the OU 1 shoreline and 300 feet north, and adjacent to the OU1 southern boundary.

Northwest Corner Off-Shore Area: The area of rip rap that is offshore of the Northwest Corner On-Shore Area of OU1. This area extends approximately 100 feet from the shoreline and represents an area of approximately 0.88 acres.

The Northwest Corner On-Shore Area: The area of OU1 where PCB DNAPL has been found and current PCB DNAPL recovery is occurring.

Waste/Source Areas

As described in the RI and Feasibility Study reports, waste/source materials were identified at the site and are impacting sediment.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site were substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and Source areas were identified at the site in sediment areas in close proximity to outfalls and manufacturing buildings.

The highest levels of PCB in sediments at the site were found in the Northwest Corner Off- Shore Area and were associated with separate phase PCB material that varies in consistency from a fluid dense non-aqueous phase liquid (DNAPL) to an elastic material that resembles rubber cement. This PCB material is the Aroclor wire insulating mixture that was formulated in the Northwest Corner On-Shore Area of the property in Building 56. This material apparently migrated through the soil beneath the property in its fluid form and was also discharged into the Hudson River through outfalls; by runoff; and eroded surface soil from areas where wire reels were dried or stored on the site.

The PCB Material has been classified in three different physical states, the variation in the physical state of the material represents weathering changes since the material was released:

Liquid PCB (LPCB) Material or Dense Non-aqueous Phase Liquid was observed to be amber in color, is less viscous than the Semi-Solid or Trace PCB Material and is highly to moderately mobile, readily flowing into monitoring wells when it is encountered.

Semi-Solid PCB (SSPCB) Material was generally observed to be more viscous than Liquid PCB Material and appeared grayish-brown in color. Based on visual observations, SSPCB has a sticky, string-like consistency. Although not as fluid or capable of migration, large deposits of semi-solid PCBM have been identified.

Trace PCB (TPCB) Material, when observed, consists of small quantities of TPCB Material intermingled with the soil and was more difficult to visually observe. Like the Semi-Solid PCB Material, the Trace PCB Material had a string-like consistency (small strings and hair-like filaments) and appeared grayer in color.

Samples containing PCB Material were found in sediments adjacent to the northwest corner of the property, as indicated on Figure 3. Samples outside this area generally contained lower levels of PCBs, indicating that the contamination is sorbed onto the sediment particles. The precise locations in the subsurface and boundaries between the different forms of PCB material is not currently known, due to the limitations to perform investigation borings to the targeted depth in the area of rip rap immediately off-shore of the site.

With limited exceptions, the depth of PCB migration in both OU1 and OU2 is controlled by the marine silt layer, which is present between 30 and 42 feet beneath the site. The surface of the marine silt, which generally tilts towards the Hudson River, is also characterized by troughs and ridges. These features may be directing the migration of the Liquid PCB Material beneath the site, creating preferential pathways and depressions where the material may pool.

Investigations beginning in 2006 and continuing into 2011 identified locations at which Liquid PCB Material is present beneath the Northwest Corner On-Shore Area shoreline in both monitoring wells and DNAPL recovery wells. Soil and sediment sampling has generally identified the PCB nature and distribution in the shoreline and sediment area. The location where PCB DNAPL was identified in monitoring and recovery wells is shown on Figure 3.

The waste/source areas identified will be addressed in the remedy selection process.

Surface Water

Surface water samples were collected during the RI from upstream and on-site locations in the Hudson River. The samples were collected to assess the surface water conditions on and off-site. The results indicate that polychlorinated biphenyls (PCBs) and lead in surface water at the site exceed the Department's Surface Water Quality Standards. Levels of PCB in Hudson River surface water were higher than the 0.001 parts per trillion (ppt) standard in all of the 5 samples taken. The highest level, 62.4 ppt, was found in the North Boat Slip area of the site. Elevated levels were also found in samples taken offshore of Dobbs Ferry, the background location (57.0 ppt), in the former marina area (52.7 ppt), and offshore of the northwest corner (46.6 ppt). The sample taken offshore of Dobbs Ferry was significantly more turbid than the others, and elevated levels seen there may have resulted from suspended material in the sample. A much lower level (18.0 ppt) was found in the south boat slip.

The PCB analysis for these samples was congener-specific, so an evaluation of Aroclor patterns was not performed. However, the highest degree of chlorination, which is consistent with the higher numbered Aroclors (eg. Aroclor 1260) found at the site, was found in the sample collected from the old marina. The lowest degree of chlorination was found in the sample collected from Dobbs Ferry, the upstream location. These results suggest that the site is a source of dissolved PCBs in the Hudson River.

Table 1 - Surface Water

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb) or (ppt)	Frequency Exceeding SCG
Metals			
Lead	6.3 to 23.1 ppb	8.0 ppb	2 of 4
Pesticides/PCBs			
PCBs, total	18.0 to 57.0 ppt	0.001 ppt	4 of 4

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b-SCG: Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1) and 6 NYCRR Part 703: Surface Water and Groundwater Quality Standards.

The primary surface water contaminants are polychlorinated biphenyls (PCBs) and lead associated with historical manufacturing and disposal at the site. The primary surface water contamination is found where high levels of PCBs were found in soils and sediments near the Northwest Corner Off-Shore Area.

Based on the findings of the Remedial Investigation, the presence of PCB in soils and sediment has resulted in the contamination of surface water. The site contaminants that are considered to be the primary contaminants of concern in surface water which will be addressed by the remedy selection process are PCBs and lead.

Sediments

Sediment samples were collected during the RI and during additional investigations from the Hudson River and at locations upstream, adjacent and downstream of the site along the Hudson River. The samples were collected to

assess the potential for impacts to river sediment from the site related contaminants. The results indicate that sediment in the Hudson River exceed the Department's sediment SCGs for PCBs, copper, lead, mercury, nickel, silver and zinc. The following is a summary of the SCGs and patterns of detection for these metals and PCBs.

The highest PCB concentrations in shallow and deeper sediment were found offshore of the northwest corner of the property. The samples included PCB material identified as semisolid PCB material. Movement of PCB Material as DNAPL through the fill in OU-1 has historically occurred vertically and, to a limited extent, horizontally along the interface with the Marine Silt. It appears that there has been some historical movement of DNAPL along the Marine Silt interface near the boundary between OU-1 and OU-2. However, there are also other transport mechanisms by which PCBs were likely deposited in OU-2. For example, PCB Material was likely associated with the outfalls of pipes associated with Building 52 and other manufacturing operations on OU-1. In addition, historic activities such as the mixing of PCB manufacturing ingredients along the Northwest Corner may have resulted in the overland transport of PCBs to the River, and other historic activities along the old dock and pier structures may also have resulted in PCB deposition in river sediments. Finally, prior to the installation of the IRM in the northwest corner, PCB contaminated soils may have washed or eroded from the upland surface soils. It appears that the PCB Material moved through the more permeable fill unit and into the sediments. A conceptual model of PCB migration showing the PCB migration pathways is shown in Figure 4.

Screening Criteria for PCBs

For PCBs and other organic contaminants, the "Technical Guidance for Screening Contaminated Sediments" lists four screening values that correspond to different levels of protection. The values for these criteria were calculated using the site-specific values of organic carbon content, as directed by the guidance, and are listed in Table 3.

Remediation Goals That Account for Background Contamination

Because sediments in the lower Hudson River are widely contaminated with low levels of PCBs that exceed some of these screening criteria, background levels were factored into the development of site-specific remediation goals. Background levels of PCBs in the 10 samples taken upstream and across the river from the site ranged from non-detectable to 7.0 ppm. The sediment containing the 7.0 ppm value was re-sampled and determined to contain 1.2 ppm PCB based on re-sampling. As a result, the Feasibility Study considered 1 ppm as a remedial goal based on background conditions. It should be noted that where background concentrations that exceed risk-based criteria for toxicity and/or bioaccumulation are used as remediation goals, some ecological risk is anticipated to remain in the unremediated sediments.

Screening Criteria for Metals

New York State sediment criteria for metals are based on their toxicity to sediment-dwelling (benthic) organisms. For each metal, the following criteria were considered. Specific values are listed in Table 2.

The following effects-based values are based on observed toxicity from field studies, as reported in the literature:

Effects Range - Low (ER-L) - The level of sediment contamination that can be tolerated by most benthic organisms, but still causes toxicity to a few species.

Effects Range - Median (ER-M) - The level at which significant harm to benthic aquatic life is anticipated.

Remediation Goals That Account for Background Contamination

Because sediments in the lower Hudson River are widely contaminated with some metals that exceed effects-based levels, background levels were factored into the development of site-specific remediation goals. The site-derived background concentrations were determined based on a combined sediment data set from the 2003 Feasibility Study and "Hudson River Estuary Sediments – Metals" (NYSDEC 2009). The 90^{th} and 95^{th} percentile values of the background data set were used to determine the range of site-specific background concentrations of metals.

Copper concentrations exceeded the effects range median (ER-M) of 270 ppm in shallow sediment at three locations: offshore of the sluice discharge area, offshore of the Building 15 SPDES discharge pipe, and in the northwest area over the Fill Unit. The extent of copper concentrations in the deeper sediments was greater in comparison to the shallow sediments.

Lead concentrations also exceeded the ER-M of 218 ppm in sluice area, the northwest area over the Fill Unit, and a location off-shore. The detection of high concentrations of lead were similar to copper, but at a lesser distance from shore.

The range of mercury contamination in shallow sediments (0.018 to1.4 ppm) is similar to background levels (0.41 to 2.5). The pattern of mercury contamination shows that levels are higher near shore and near the former marina, which are both sediment deposition areas. Because mercury levels are consistent with background, and there is no pattern of mercury contamination near OU 1 source areas, mercury appears to be caused by regional or upstream contaminant sources.

Nickel exceeded the ER-M of 52 ppm in both the shallow and deeper sediments at the same locations, off-shore of the sluice and water tower areas.

Silver exceeded the ER-M of 3.7 ppm in two locations of the northwest area of the site for the shallow sediments and broad areas offshore of the south boat slip, north boat slip, and old marina for the deeper sediments. Silver was not identified as a contaminant of concern on the OU 1 property, and the pattern of silver contamination is not consistent with the presence of the on-site source areas.

Zinc exceeded the ER-M of 410 ppm offshore of the sluice area and the water tower area for the shallow sediments. The deeper sediments exceeded the ER-M offshore of the sluice, Building 15 discharge pipe, and offshore of the water tower area.

The highest concentrations of metals in sediments are found in the offshore of the sluice area, Building 15 discharge pipe, and water tower area. The concentrations of metals found in these areas are much lower past approximately 100 feet of the shoreline. The deeper sediments within 100 feet of shore, up to 6 feet, generally have higher concentrations than the shallow sediments (0- 2 feet).

Figure 5 and 6 present the areas identified with PCB and metals sediment contamination from the site.

Table 2 - Sediment

Detected Constituents	Concentration Range Detected (ppm)[a]	SCG[b] (ppm)	Frequency Exceeding SCG	Site Derived Value [c] (ppm)	Frequency Exceeding Site Derived Value
Metals					
Arsenic	1.5 – 44.4	ER-L 8.2 ER-M 70	330 of 543 0 of 543		
Cadmium	ND – 87.3	ER-L 1.2 ER-M 9.6	376 of 574 181 of 574		
Copper	ND -4301	ER-L 34 ER-M 270	393 of 546 92 of 546	104 to 129	219 of 546 190 of 546
Lead	ND- 2,700	ER-L 46.7 ER-M 218	359 of 523 15 of 523	110 to 132	153 of 523 105 of 523
Mercury	ND – 4.0	ER-L 0.15 ER-M 0.71	360 of 492 284 of 492		
Nickel	ND- 1,390	ER-L 20.9 ER-M 51.6	391 of 523 8 of 523		
Silver	ND -11.9	ER-L 1.0 ER-M 3.7	284 of 523 65 of 523		
Zinc	ND- 6,450	ER-L 150 ER-M 410	278 of 523 35 of 523	203 to 234	153 of 523 111 of 523
PCBs					
	ND-5,200	See Table 3		1	314 of 1014

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment;
b - SCG: The Department's "Technical Guidance for Screening Contaminated Sediments."
c – Site Derived Value: Background range for metals (copper, lead and zinc) is the 90th to 95th percentile values of the metals background data set.
ER-L = Effects Range – Low and ER-M = Effects Range – Median. A sediment is considered contaminated if either of these criteria is exceeded. If the ER-M criteria are exceeded, the sediment is severely impacted. If only the ER-L is impacted, the impact is considered moderate.

Table 3 PCB Screening Criteria for Alternate Levels of Protection

LEVEL OF PROTECTION	PCB SCREENING CRITERION	FREQUENCY OF EXCEEDANCE IN SURFACE SEDIMENT (0-6")	FREQUENCY OF EXCEEDANCE IN SUBSURFACE SEDIMENT (>6")
Human Health Bioaccumulation	0.019 ppb[a]	85/153	380/863
Wildlife Bioaccumulation	34.2 ppb	85/153	380/863
Benthic Aquatic Life Chronic Toxicity	1.010 ppm	46/153	271/863
Benthic Aquatic Acute Toxicity	335 ppm[a]	0/153	21/863

These are site-specific values calculated based on the average measured organic carbon content of the sediment of 2.43%.

a - ppb: parts per billion, which is equivalent to micrograms per kilogram, ug/kg, in sediment;
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in sediment;

Based on the findings of the Remedial Investigation, the presence of PCBs, copper, lead, mercury, nickel, silver and zinc have resulted in the contamination of sediment. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of sediment to be addressed by the remedy selection process are PCBs, copper, zinc and lead.

Exhibit B

Description of Remedial Alternatives

Site Specific Conditions Limiting the Development of Alternatives

Geotechnical instability associated with the northwest corner is a critical factor in the development of the alternatives. Global stability refers to the ability of a slope or retaining wall to resist a rotational or sliding failure that would cause destabilization. A slope or retaining wall failure in the northwest corner would release contaminated soil into the Hudson River and cause damage to the site. It is generally recognized that the global stability factor of safety of 1.5 is the minimum allowable for design of a slope or retaining wall. The global stability factor of safety for the existing condition in the northwest corner is approximately 1.0, indicating that the slope is marginally stable. Removal of existing rip rap from along this portion of the shoreline, even temporarily, would reduce the resistance to rotational failure (the "buttressing effect"), and increase the potential for contaminant release.

Because the contamination in the Northwest Corner Off-Shore Area cannot be fully removed, the following two remedial approaches are used in the alternatives to address the unique site conditions in the Northwest Corner Off-Shore Area.

Northwest Sloped Cap: This is a subaqueous cap which provides chemical and physical isolation of contamination from the environment. The cap would be placed in layers after sufficient dredging to allow the cap's final grade to approximate the existing bathymetry.

Northwest Extension Area:

This remedial approach involves the Northwest Corner Off-Shore Area of the site which is distinguished by the presence of rip rap and PCB Material that will be contained by a proposed sealed sheet pile wall. The sheet pile wall will contain PCB Material and prevent further release into the environment, and will be filled with lightweight fill to an elevation that rises to meet the OU 1 grade. To meet the requirements of Article 15 and 6 NYCRR Part 608, the sheet pile wall alignment will be placed to minimize filling of the Hudson River while still meeting the remedial goals. The alignment is anticipated to be along the toe of the rip-rap slope. Fill behind the wall will be minimized to reach the minimal necessary elevation for remedial actions. The location of the sheet pile wall was also chosen to avoid drag down of the PCB Material (liquid or semi-solid) or creation of vertical flow pathways along sheet piles into underlying uncontaminated layers. Due to the potential presence of PCB Material throughout this area, pile-supported structures will not be permitted on the Northwest Extension. This remedial approach will require aquatic habitat mitigation for placing fill into the Hudson River.

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A:

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Alternative 2: Near Shore Cap and Northwest Sloped Cap

Alternative 2 includes installation of a 3-foot subaqueous cap in the near shore area with associated sediment dredging to maintain the existing bathymetry; targeted dredging and placement of a subaqueous cap or backfill in backwater and deepwater areas, as appropriate; dredging and installation of a sloped subaqueous cap in the northwest area; institutional controls and monitoring. The overall thickness of the subaqueous cap in near shore areas may allow for up to 12 inches to be deposited naturally through sedimentation. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes an institutional control, in the form of a site management plan, necessary to protect the sediment cap, protect public health, and monitor the environment due to contamination remaining at the site.

Present Worth: $74,400,000
Capital Cost: $65,800,000
Annual Costs: $394,000

Alternative 3: Near Shore Dredge (up to 6-feet) and Backfill and Northwest Sloped Cap

Alternative 3 includes dredging up to 6 feet in near shore areas where sediments exceed the site-specific cleanup goals listed in Table 2; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; targeted dredging and placement of a subaqueous cap or backfill in backwater and deepwater areas, as appropriate; dredging and installation of a sloped subaqueous cap in the Northwest Corner Off-Shore area; institutional controls; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes institutional controls, in the form of a site management plan, necessary to protect the sediment cap, to protect public health, and to monitor the environment due to contamination remaining at the site.

Present Worth: $77,900,000
Capital Cost: $69,400,000
Annual Costs: $394,000

Alternative 4: Near Shore Dredge (up to 10-feet) and Backfill and Northwest Sloped Cap

Alternative 4 includes dredging up to 10 feet in near shore areas where sediments exceed the site specific clean-up goals listed in Table 2; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; targeted dredging and placement of a subaqueous cap or backfill in backwater and deepwater areas, as appropriate; dredging and installation of a sloped subaqueous cap in the Northwest Corner Off-Shore area; institutional controls; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes institutional controls, in the form of a site management plan, necessary to protect the sediment cap, to protect public health, and to monitor the environment due to contamination remaining at the site.

Present Worth: $78,600,000
Capital Cost: $70,100,000
Annual Costs: $394,000

Alternative 5: Near Shore Cap with Dredge (for cap) and Northwest Extension

Alternative 5 includes installation of a 3-foot subaqueous cap in the near shore area with associated dredging to maintain the existing bathymetry; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition ; targeted dredging in backwater and deepwater areas; extension of the Northwest Corner On-Shore Area to create an above-grade containment area; institutional controls for contaminated sediments; and long term monitoring. The Northwest Corner of the site property would be extended by installing a sealed sheet pile wall at a feasible location beyond the limits of Liquid PCB Material and backfilling it with clean material, while minimizing fill placed in the river. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. A mitigation plan would be developed and implemented to mitigate the habitat impacts associated with installation of the bulkhead wall and placement of fill into the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and to monitor the environment due to contamination remaining at the site.

Present Worth: $89,000,000
Capital Cost: $79,100,000
Annual Costs: $454,000

Alternative 6: Near Shore Dredge (up to 6-feet) and Backfill and Northwest Extension

Alternative 6 includes dredging up to 6 feet in near shore areas where sediments exceed the site specific clean-up goals listed in Table 2; placing subaqueous cap or backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; placing a subaqueous cap in backwater and deepwater areas; targeted dredging in backwater and deepwater areas; extension of the Northwest Corner as described in Alternative 5; institutional controls for contaminated sediments; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site reuse in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. A mitigation plan will be developed and implemented to mitigate the habitat impacts associated with the installation of the bulkhead wall and placement of fill into the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and to monitor the environment due to contamination remaining at the site.

This alternative has been modified from the alternative developed in the FS to include additional dredging in deepwater, old marina, and north boat slip areas, as shown on Figure 7. The FS evaluated dredging in the near shore area limiting the area to be dredged to a maximum water depth of 15 feet, which represents the limit of commercially-available silt curtains. The location and types of sediment resuspension controls in greater than 15 feet of water may include other innovative and customized approaches to extend areas of dredging to approximately 100 feet from shore, or approximately 20 feet of water for targeted areas. This approach would dredge sediments in targeted areas which contain the most highly impacted sediment for PCB and metals and therefore represents a greater sediment volume than the original Alternative 6. Targeted dredging is defined for deepwater areas where resuspension controls cannot be feasibly used due to water depth and current velocities. The areas were preliminarily identified as those containing PCB contaminated sediments with greater than 50 ppm.

Present Worth: $92,600,000
Capital Cost: $82,700,000
Annual Costs: $454,000

Modified Alternative 6 Costs

Present Worth: $105,000,000
Capital Cost: $95,200,000
Annual Costs: $454,000

Alternative 7: Near Shore Dredge (up to 10-feet) and Backfill, Northwest Extension

Alternative 7 includes dredging up to 10 feet where sediments exceed the site specific cleanup goals listed in Table 2; placing subaqueous backfill in near shore areas to restore dredged areas to existing grades, which may allow for natural deposition; placing subaqueous cap in backwater and deepwater areas; targeted dredging in backwater and deepwater areas; installing a bulkhead wall (steel sheeting) beyond PCB dense non-aqueous phase liquid (DNAPL) in the Northwest Corner Area; institutional controls for contaminated sediments; and monitoring. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site re-use will be developed during the remedial design. Mitigation of habitat impacts due the installation of the bulkhead wall and placing fill in the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and the environment from any contamination remaining at the site.

Present Worth: $93,300,000
Capital Cost: $83,400,000
Annual Costs: $454,000

Alternative 8: Near Shore/Backwater Dredge to Feasible Limits and Backfill, Limited Deepwater Dredging, Northwest Extension

This alternative would include dredging to the deepest feasible depth where sediments exceed the site specific clean-up goals listed in Table 2 in near shore and backwater areas; limited dredging in deepwater areas; placing subaqueous backfill in near shore, backwater, and deepwater areas, which may allow for natural deposition; installing a bulkhead wall (steel sheeting) beyond PCB dense non-aqueous phase liquid (DNAPL) in the Northwest Corner Area; institutional controls for contaminated sediments; and monitoring. The feasible dredging depth is defined as dredging all sediments that exceed site-specific clean-up levels to constructable limits. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site re-use will be developed during the remedial design. Mitigation of habitat impacts due the installation of the bulkhead wall and placing fill in the river. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and the environment from any contamination remaining at the site.

Present Worth: $185,000,000
Capital Cost: $179,000,000
Annual Costs: $272,000

Alternative 9: Dredge to Feasible Limits in All OU-2 Areas and Backfill, Northwest Sloped Cap

This alternative would include dredging to feasible limits where sediments exceed the site specific clean-up goals listed in Table 2; placing subaqueous backfill in near shore, backwater and deepwater areas, which may allow for

natural deposition; monitoring. The feasible limit to dredging in the Northwest Corner Off-Shore Area is based on driving steel sheeting along the toe of the rip rap to control DNAPL migration and removing all sediments that exceed site-specific cleanup levels to constructable limits. Sediment remaining in the Northwest Corner Off-Shore Area would be capped with a subaqueous cap. Disposal options for removed sediments include a combination of off-site disposal and potential on-site re-use in OU-1. The details and limitations for the on-site reuse will be developed during the remedial design. This alternative includes institutional controls, in the form of a site management plan, necessary to protect public health and the environment from any contamination identified at the site. The remedy will not rely on institutional or engineering controls to prevent future exposure. There is no Site Management, no restrictions, and no periodic review.

Present Worth: $245,000,000
Capital Cost: $242,000,000
Annual Costs: $174,000

Exhibit C
Remedial Alternative Costs

Remedial Alternative	Capital Cost[1] ($)	Annual Costs ($)	Total Present Worth[1] ($)
1. No Action	0	0	0
2. Near Shore Cap and Northwest Sloped Cap	$65,800,000	$394,000	$74,400,000
3. Near Shore Dredge (up to 6-feet) and Backfill and Northwest Sloped Cap	$69,400,000	$394,000	$77,900,000
4. Nearshore Dredge (up to 10-feet) and Backfill and Northwest Sloped Cap	$70,100,000	$394,000	$78,600,000
5. Nearshore Cap with Dredge (for cap) and Northwest Extension	$79,100,000	$454,000	$89,000,000
6. Nearshore Dredge (up to 6-feet) and Backfill and Northwest Extension	$82,700,000 ($95,200,000)[2]	$454,000	$92,600,000 ($105,000,000)[2]
7. Nearshore Dredge (up to 10-feet) and Backfill, Northwest Extension	$83,400,000	$454,000	$93,300,000
8. Nearshore/Backwater Dredge to Feasible Limits and Backfill, Limited Deepwater Dredging, Northwest Extension	$179,000,000	$272,000	$185,000,000
9. Dredge to Feasible Limits in All OU-2 Areas and Backfill, Northwest Sloped Cap	$242,000,000	$174,000	$245,000,000

[1] Capital Cost and Annual Costs include a 30% contingency in calculating Total Present Worth

[2] Modified Alternative 6 includes additional dredging in the following areas and increases the costs presented in Feasibility Study as follows:

Old Marina	6,000 yards^3 with an estimated cost of $600/ yards^3= $3,600,000
North Boat Slip	3,500 yards^3 with an estimated cost of $600/ yards^3= $2,100,000
Deepwater Areas for >50 ppm PCBs	4,700 yards^3 with an estimated cost of $1,200/ yards^3= $5,640,000

Exhibit D

SUMMARY OF THE SELECTED REMEDY

The Department has selected modified Alternative 6, Near Shore Dredge (up to 6 feet) and Backfill and Northwest Extension as the remedy for this site. The elements of this remedy are described in Section 7. The selected remedy is depicted in Figure 7.

Basis for Selection

The selected remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375.

The modified Alternative 6 was selected because, as described below, it satisfies the threshold criteria and provides the best balance of the balancing criteria described below. It achieves the remediation goals for the site by removing sediment containing greater than 1 ppm PCB and metals exceeding background from the near shore and backwater areas, where the potential for public health and environmental exposures are most likely. Dredging to a depth of 6 feet removes sediment that has the potential to be scoured and migrate, and thus represents an exposure pathway for human and environmental receptors. In deepwater areas, where dredging activities cannot be fully contained, the selected remedy removes PCBs in targeted areas at a higher threshold of 50 ppm up to a depth of 6 feet, thereby removing the highest levels of PCBs from the Hudson River environment. Targeting deepwater areas with PCBs above 50 ppm reduces the time needed to complete dredging activities when compared to deepwater areas above 1 ppm. While this action does not eliminate ecological exposures, it does limit the potential for construction-related impacts associated with disturbance to the river bottom and migration of suspended sediments. The majority of targeted PCB dredging areas identified in the deepwater are within the top two feet. Therefore, the targeted dredging will remove sediments which have the highest levels of PCBs and the greatest potential to migrate and be an on-going source to the environment.

In the Northwest Corner Off-Shore Area, where the full depth of sediment contamination cannot be feasibly excavated without destabilizing the shoreline, the selected containment of the area using sealed sheet piles provides the greatest degree of long term effectiveness by containing the material with the highest levels of PCBs. This extension also enables the more effective removal of Liquid PCB Material from the source area beneath the Northwest Corner On-Shore and Northwest Corner Off-Shore areas by creating a land platform to support additional investigation and removal activities. The sheet piles will be driven along an alignment that is known to be free of liquid or semi-solid PCBs, ensuring that drag down or migration of PCBs into the clean Basal Sand aquifer will not occur. Groundwater passing through the Northwest Corner On-Shore Area will be treated before entering the Hudson River, providing a higher degree of environmental protection and reliability than alternatives that rely on capping the Northwest Corner Off-Shore Area sediments in place. While creation of this filled area in the river results in greater impacts than the capping alternative in terms of loss of habitat, the need to eliminate environmental exposure to the PCBs in this area has been deemed to outweigh the loss of habitat. A mitigation plan will be developed and implemented to mitigate the habitat impacts associated with the installation of the bulkhead wall and placement of fill into the river.

Overall, Alternative 6 is an effective remedy which removes and isolates significant portions of the contamination from the environment that has the potential for exposure to the greatest feasible degree. The remaining known PCB material within the NEA is contained by a structure that provides the highest degree of environmental protection and reliability, and the greatest opportunity for removal of the most mobile material. This alternative creates the

conditions necessary for the restoration of surface water and sediment to the extent practicable when it is integrated with the remedy for OU1.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1 Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

Alternative 1, the No Action Alternative would not be protective of human health or the environment since it would not achieve remediation goals described in Section 6.5.

Alternatives 2 through 4 provide increasing protection for human health and the environment by removing sediment which exceeds cleanup levels for PCBs and metals. These three alternatives are comparable to Alternatives 5 through 7 because of the same depth of sediment removal outside of the Northwest Corner Off-Shore Area. Alternatives 2 through 4 and 5 through 7 involve the same increasing depths of sediment removal of up to 3, 6 and 10 feet, respectively. The removal of 3 feet of contaminated sediment would leave a greater amount of contaminated sediment than the removal of 6 feet of sediment. The removal of contaminated sediment to a depth of 6 feet provides greater overall protection by reducing the potential for sediment resuspension due to human activities or an extreme erosion event. Because sediment between 6 and 10 feet is not expected to migrate or become exposed, the removal of up to 10 feet of sediment would not provide a substantial increase in environmental protection in comparison to removing 6 feet of sediment. Alternative 6 provides the best balance in the level of protection for the Near Shore sediment because the highest levels of contamination will be removed.

For Alternatives 5 through 8, the installation of the sheet pile wall around the Northwest Extension is more protective of human health and the environment in comparison to the capping evaluated for the Northwest Corner Off-Shore Area in Alternatives 2 through 4 and 9. The sheet pile wall provides better overall protection of public health and the environment than the capping alternatives by more effectively containing PCB DNAPL; enhancing PCB DNAPL recovery options; and preventing PCB contaminated groundwater from entering the Hudson River. By minimizing the further release of PCBs to the Hudson River, the sheet pile wall will prevent site-related contributions to exceedances of surface water standards that contribute to the current PCB contamination in fish tissues in the vicinity of the site. However, installation of the sheet pile and creation of the filled area in the river does result in greater habitat impacts than the capping alternative, which will require mitigation.

Alternative 9 includes an area of extensive deepwater dredging which provides the highest degree of protection for human health and the environment because it would remove a greater extent of contamination that could potentially cause impacts at its current location. However, the substantially increased cost of this alternative ($140 million) is not justified, especially considering the increased short-term risks to the environment due to extensive dredging without turbidity control which could mobilize contaminated sediment to other areas.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The primary chemical specific SCGs for the site are the surface water quality standards and sediment screening guidance values. The No Action Alternative would not meet these criteria because groundwater discharging into the

Hudson River would continue to materially contribute to the contravention of the PCB surface water standard. The PCB and metals concentrations found in sediments also exceed the guidance values for screening contaminated sediments and as well as site-specific background sediment concentrations. Therefore, Alternative 1 is rejected as a potential candidate for a remedy for OU 2 because it would not meet the threshold criteria of protecting public health and the environment and would not achieve the SCGs for surface water and sediment.

Alternatives 2 through 4 and 9 would not be as effective in complying with the PCB surface water standard in the Northwest Corner Off-Shore Area, as compared to Alternatives 5 through 8. The capping alternatives (Alternatives 2, 3, 4, and 9) would continue to allow the flow of groundwater through highly contaminated sediment and fill with subsequent discharge into the Hudson River. The resulting desorption of PCBs from sediment into the water column, which currently contributes to the contravention of PCB surface water standards, would continue. Because Alternative 9 removes greater depths of sediment in the different areas, it complies with the SCG for the sediment source to the greatest extent for the alternatives which involve capping the Northwest Off-Shore Area. Alternatives 5 through 8 are more effective at complying with the surface water standard through the installation of a sealed sheet pile wall to contain PCB in the Northwest Extension and treat the groundwater contamination. Groundwater will pass through gates in the wall and will be treated to remove PCBs before it passes into the river. These alternatives will therefore provide a higher degree of surface water protection than Alternatives 2 through 4 and 9. Because Alternative 8 removes greater depths of sediments, it complies with the SCG for the sediment to the greatest extent for the alternatives that involve construction of the Northwest Extension.

Alternatives 2 and 5, which remove 3 feet of sediment, would leave behind a greater mass of PCB and metals which exceed the sediment background and screening guidance concentrations. Alternatives 3 and 6, which remove up to 6 feet of sediment, would address the PCB and metals which exceed the sediment background and screening guidance concentrations to a greater degree than Alternatives 2 and 5. Alternative 4 and 7, which remove up to 10 feet of sediment, would address the PCB and metals which exceed the sediment background and screening guidance concentrations to a greater degree than Alternative to 3 and 6.

In addition, the alternatives will need to meet the substantive requirements of the applicable location-specific SCGs found in 6NYCRR Part 608 Use and Protection of Waters and Environmental Conservation Law Article 15 due to the dredging and filling in the Hudson River. These requirements apply most significantly to Alternatives 5 through 8 because of the construction of the Northwest Extension and associated filling of approximately 0.88 acres of the Hudson River. The allowance for filling the River is based on the findings of the stability analysis and the engineering determination that it is not feasible to address the PCBs in the northwest corner of the site without the Northwest Extension. The NEA extension will be designed to minimize the filling of the Hudson River; however, creation or restoration of river habitat will be required to mitigate for the placement of fill in the river.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

The short-term impacts to the community, workers, and environment for Alternatives 2 through 4 and 5 through 8 generally increase, and are proportional, to the additional material handling activities (dredging, capping and containment work) performed. These impacts include noise, air emissions, resuspension of contaminated sediment

from dredging and truck traffic. Alternatives 8 and 9 would have the greatest short-term impacts due to the greater area dredged and volume of sediment handled. The short term impacts from noise, air emissions, and resuspension would be controlled by monitoring and mitigation measures to protect human health and the environment and will be identified in the remedial design. Alternative 2 would have fewer short term impacts than Alternatives 3 and 4 for the dredging and capping alternatives. Alternatives 5 would have fewer short term impacts than alternatives 6 and 7 for the dredging, capping and containment alternatives.

The FS evaluated dredging in the near shore area limiting the area to be dredged to a maximum water depth of 15 feet, which represents the limit of commercially-available silt curtains. The location and types of sediment resuspension controls in greater than 15 feet of water may include other innovative and customized approaches to extend the area of dredging to approximately 100 feet from shore, or approximately 20 feet of water. The additional targeted dredging to approximately 100 feet from shore has the potential to increase the short term environmental impacts, but will increase long term effectiveness and overall environmental protection, provided the short term impacts can be controlled with the alternative approaches.

Short term environmental impacts with PCB resuspension for the dredging and capping Alternatives 2 through 4 and 9 will be greater than Alternatives 5 through 8 in the Northwest Corner Off-Shore Area. These short term impacts are greater because they involve dredging high levels of PCB sediment in the Northwest Corner Off-shore Area to install the cap as compared to containing the same area with the sealed sheet pile.

The short term environmental impacts of dredging in Deepwater Areas were also evaluated because complete resuspension control will not be feasible due to the water depths and velocities. Partial resuspension controls are available in the form of mobile containment systems that are suspended from dredging barges. These provide limited reductions in particle migration from the dredge, but are limited to the upper portion of the water column. The short term impacts for dredging PCB contaminated sediment in limited targeted Deepwater Areas (greater than 50 ppm PCB) in Alternatives 2 thorough 8 will provide long-term benefits by removing concentrated areas of PCBs, particularly in shallow sediments that are most vulnerable to migration and exposure.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2 through 4 would provide long-term effectiveness and permanence in increasing order by providing greater removal and capping of increased quantities of sediment. The capped or backfilled sediment layer represents a source of risk that is proportional to the remaining sediment contamination and its respective depth below the sediment surface. Of these alternatives, Alternative 2 will have the least long-term effectiveness and Alternative 4 will have the greatest for the capping alternatives. A monitoring and maintenance program will insure the reliability, but there are potential challenges to maintaining a cap at this location. There is the potential need to repair or replace portions of the cap if it is damaged or if contaminant breakthrough would occur, particularly for the PCB DNAPL beneath the Northwest Corner Off-Shore Area for Alternatives 2 through 4. Contaminant breakthrough is less likely where greater quantities of contaminated sediment are removed and there is a greater thickness of the cap or backfill materials placed over the remaining contaminated sediment. Additionally, the Department has concerns for the long-term stability of the northwest corner that are not addressed under Alternatives 2 through 4.

Alternatives 5 through 8 provide greater long-term effectiveness and permanence in increasing order of the alternative by the containment of PCB DNAPL in the Northwest Extension and dredging of sediments to greater

depths. There is an increase in the long-term reliability for the alternatives which remove greater quantities of contaminated sediment. The remaining source of risk from the sediments is directly proportional to the remaining sediment contamination and the respective depth below the sediment surface. Alternative 5 will have the greatest potential for long-term risk and alternative 8 will have the least potential. The sealed sheet pile wall in the Northwest Extension provides the greatest degree of long term effectiveness for containment of the highest levels of PCBs without compromising the geotechnical stability of this area. The extension area also enables the greatest removal of Liquid PCB Material from the source area beneath the Northwest Corner Off-Shore Area by creating a land platform to support delineation and removal activities. The sealed sheet pile wall in the Northwest Extension is considered to be more effective and permanent to control both Liquid PCB Material migration and dissolved groundwater contamination as compared to the sloped shoreline and capping approach in Alternative 9. Monitoring of habitat and biota will be required to ensure the long-term effectiveness of the remedy. However, installation of the sheet pile and creation of the filled area in the river does result in additional ecological impacts because of the loss of habitat.

The removal of up to 6 feet of PCB and metals contaminated sediment in Alternative 6 is more permanent and effective in the long-term due to the removal of greater quantities of PCB and metals contaminated sediments than Alternatives 5. This significantly and permanently reduces the potential for migration of site-related contaminants through erosion, resuspension and re-distribution of sediments, including, but not limited to those mobilized during extreme events or human activities.

Alternative 9 includes extensive deepwater dredging area which will increase short-term impacts due to dredging without turbidity control and migration of contaminated sediment to other areas, however, the long-term impacts will be reduced by removal of the greater volume of contaminated sediment.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

The alternatives under consideration reduce the mobility of contamination by removing metal and PCB-contaminated sediments from the river system and placing them in secure upland areas and/or landfills. Alternatives that remove greater quantities of sediment provide a greater reduction in potential mobility. However, because the potential for sediment scour at depths greater than 6 feet is less than for surficial sediments, there is little additional reduction in mobility provided by Alternatives 4 and 7 as compared to Alternatives 3 and 6. The toxicity, mobility and volume of wastes at the site are reduced to the degree that Liquid PCB Material is removed from the Northwest Corner Off-Shore Area and destroyed off-site. As a result Alternatives 5 through 8, which include the Northwest Extension and a greater opportunity to remove Liquid PCB Material, would reduce the toxicity, mobility and volume of the PCB DNAPL to a greater degree than Alternatives 2 through 4 and 9. For PCBs that cannot be removed using recovery wells, the sealed sheet pile wall of the Northwest Extension (Alternatives 5 through 8) also provides a greater reduction in mobility than capping the Northwest Corner Off-Shore Area (Alternatives 2 through 4 and 9).

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Dredging sediment for all alternatives poses implementation challenges related to water depths and flow dynamics, resuspension control and monitoring, and debris management. Proven technologies such as energy and turbidity

barriers, real-time turbidity monitors and a variety of dredging equipment are available to address these challenges. The OU 1 site property provides a large staging area for managing the sediments. The location of the site on a major navigable waterway and adjacent to a rail line greatly expands opportunities for dredged material transport. The major construction differences between alternatives involves the installation a sloped shoreline (Alternatives 2, 3, 4, and 9) versus a sheet pile wall (Alternatives 5, 6, 7, and 8) in the Northwest Corner Off-Shore Area; the depth for dredging sediments; and deepwater dredging. Both groups of alternatives are implementable and acceptable from a geotechnical perspective by using readily available, materials, equipment, and construction practices.

Alternatives 5 through 8 are more challenging to construct because they require the off-shore construction of a large bulkhead wall requiring heavy king pile construction; associated tie-rods and deadman system; and a corrosion protection system. The tie-rod and deadman system will need to be designed to accommodate settlement. Both groups of alternatives will require monitoring and maintenance to add fill for areas that experience settlement. For Alternatives 2, 3, 4, and 9 in Northwest Sloped Cap will require additional construction of erosion protection for wave, ice and potential scouring events to protect the capped areas. The maintenance of the sheet pile wall for repairs and cathodic protection is more specialized in comparison to the sloped shoreline.

Dredging contaminated sediments at deeper depths will require the same monitoring as for the shallower depths of dredging. Sediment resuspension controls will be used during dredging which are designed for the appropriate water depth and velocity conditions at the site. Dredging in the deepwater areas will be performed with limited resuspension controls in targeted areas, which may require site-specific evaluations to implement. Alternative 9, which requires extensive dredging in the Deepwater Areas is the most difficult alternative to implement.

The ability to monitor the effectiveness of the alternatives is more difficult for the Northwest Sloped Cap shoreline in Alternatives 2, 3, 4 and 9. The monitoring will need to determine if PCB breakthrough of the cap over the sloped shoreline area is occurring.

Both groups of alternatives will require a permit from the United States Army Corps of Engineers for construction within the in the navigable waters of the Hudson River. The administrative implementability is more challenging for Alternatives 5, 6, 7, and 8 than for Alternatives 2, 3, 4 and 9 due to the construction of the Northwest Extension into the Hudson River. Permitting and approvals will be required from local and federal agencies for all alternatives that involve fill being placed into the Hudson River and the installation of the sheetpile wall.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The no action alternative would be the least expensive to implement since there would be no cost associated with its implementation.

The costs associated with the alternatives for this site are substantial, and range from $74.4 to $245 million due to the size and complex nature of the site conditions. Alternatives 2 through 9 involve increasing present worth costs which vary with the extent of dredging, capping, backfilling, creating the Northwest Extension, and monitoring. These costs increase with the volume of material dredged and disposed. In general, Alternatives 2 through 4 have a lower present worth cost ($74.4 to $78.6 million) in comparison to Alternatives 5 through 7 ($89 to $93 million). The major reason for the increase in cost between the two sets of alternatives involves the higher cost to construct the Northwest Extension as compared to the installation of the Northwest Sloped Cap. However the extension of

land is cost effective because the sealed sheet piles provides a greater degree of long term effectiveness for containment of the highest levels of PCBs. This extension also enables the greatest removal of Liquid PCB Material from the source area beneath the Northwest Corner On-Shore Area by creating a land platform to support delineation, monitoring and removal activities.

Table 4 provides a summary of the total costs of Alternatives 2 through 9 with several measures of cost-effectiveness. The costs increase proportionally for dredging PCB and metals contaminated sediments at greater depths. The present worth cost for Alternative 3 is $3.5 million greater than Alternative 2 due to the additional sediment dredging depth (6 feet versus 3 feet) and material handling. Alternative 3 removes roughly the same amount of PCBs as Alternative 2 (2,610 pounds versus 2,590 pounds), but more than twice the amount of copper (19,440 pounds versus 8,240 pounds). The increased present worth cost for Alternative 4 is $0.7 million over Alternative 3 and removes the same amount of PCB and slightly more copper.

Of the alternatives that include the Northwest Extension, the present worth cost of Alternative 6 is $16 million greater than Alternative 5 for the additional sediment dredging depth and material handling. Alternative 6 removes roughly the same amount of PCB as Alternative 5 (610 pounds versus 590 pounds), but more than twice the amount of copper (18,240 pounds versus 7,040 pounds). The increased present worth cost for Alternative 7 is $4.3 million and represents removal of the same amount of PCB as Alternative 6 and a slight increase (1,000 pounds) in the amount of copper contaminated sediment. These estimates represent dredging to a maximum water depth of 15 feet. Other temporary containment approaches may extend the area of dredging to approximately 100 feet from shore and would similarly increase the estimated volume of sediment in each alternative.

The total present worth costs for Alternative 8 and Alternative 9 are $185 and $245 million, respectively. While these alternatives provide for greater sediment dredging and disposal, they are not considered cost effective due to the substantial increase in capital costs relative to the additional environmental benefit.

Table 4: Cost Effectiveness Measures of Alternatives 2 through 9

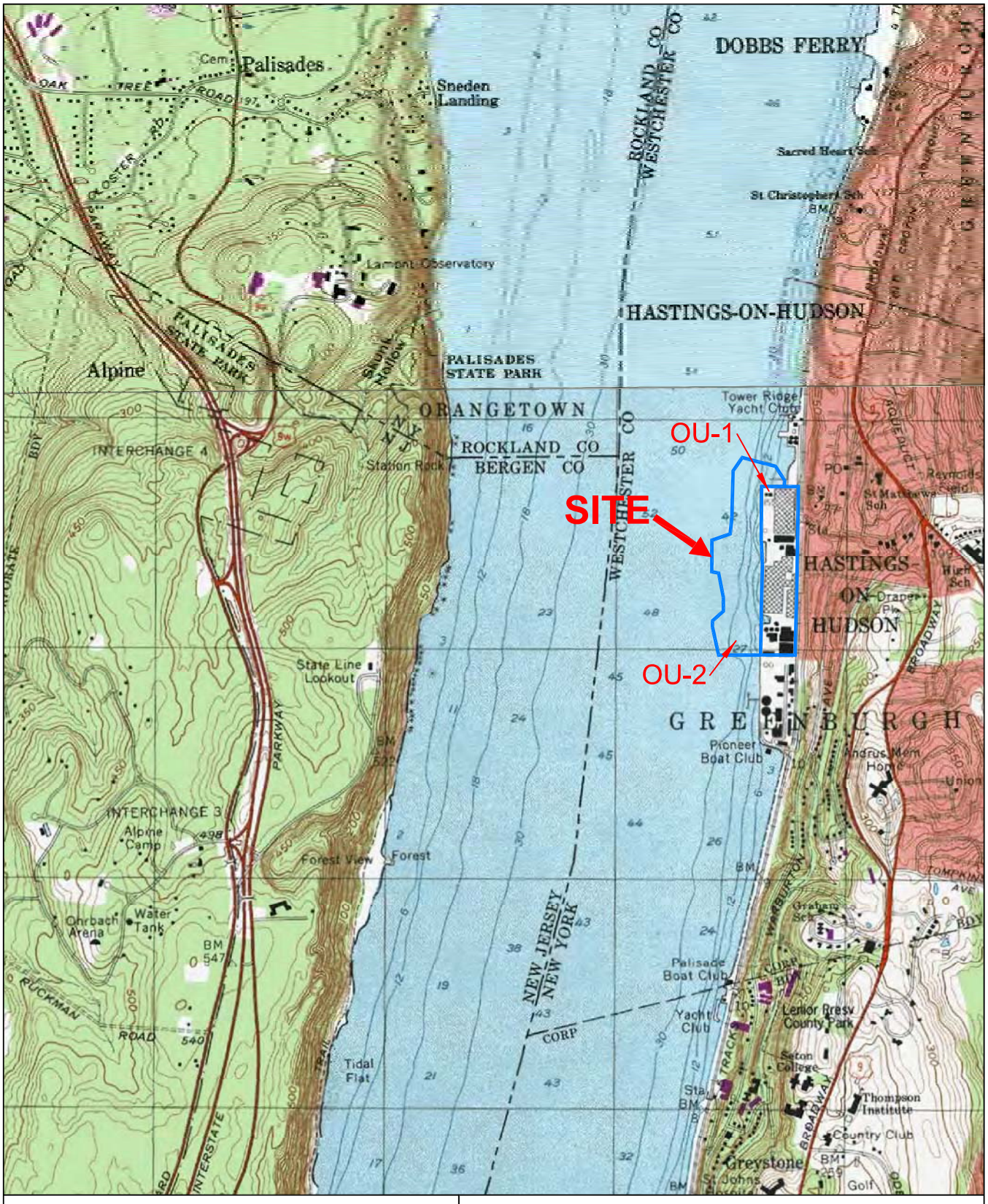
Alternative	Depth of Sediment Removal and volume[2]	Estimated PCB mass removal (contained) and percentage	Estimated Copper mass removal and percentage	Estimated Lead mass removal and percentage	Cost
2	3 feet 15,800 yd^3	2,590 lbs 25%	8,240 lbs 11%	10,100 lbs 45%	$74, 400,000
3	Up to 6 feet 22,400 yd^3	2,610 lbs 25%	19,440 lbs 27%	12,800 lbs 48%	$77,900,000
4	Up to 10 feet 23,300 yd^3	2,610 lbs 25%	20,440 lbs 29%	14,300 lbs 64%	$78,600,000
5[1]	3 feet 12,900 yd^3	590 lbs 6%	7,040 lbs 10%	8,600 lbs 39%	$89,000,000
6[1]	Up to 6 feet 19,500 yd^3	610 lbs 6%	18,240 lbs 25%	11,200 lbs 50%	$92,600,000 ($105,000,000)
7[1]	Up to 10 feet 20,800 yd^3	610 lbs 6%	19,240 lbs 27%	12,700 lbs 57%	$93,000,000
8[1] (NWE)	Greatest extent practicable nearshore and backwater areas 98,700 yd^3	3,000 lbs 29%	41,020 lbs 57%	19,400 lbs 87%	$185,000,000
9 (NW Slope)	Greatest extent practicable 168,300 yd^3	10,460 lbs 100%	71,500 lbs 100%	22,200 lbs 100%	$245,000,000

[1] Alternatives which include the Northwest Extension will contain approximately 2,000 pounds of PCBs within the sheetpile wall
[2] The estimated volume of sediment removed assumed dredging to a maximum water depth of 15 feet. Targeted dredging in deepwater areas would increase the estimated volume of sediment in each alternative.

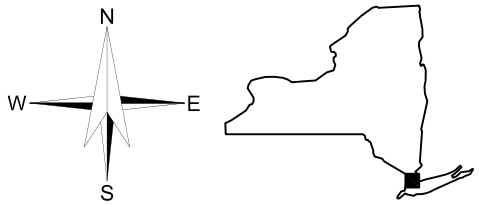
The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary has been prepared that describes public comments received and the manner in which the Department will address the concerns raised.

Alternative 6 has been selected because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.



SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

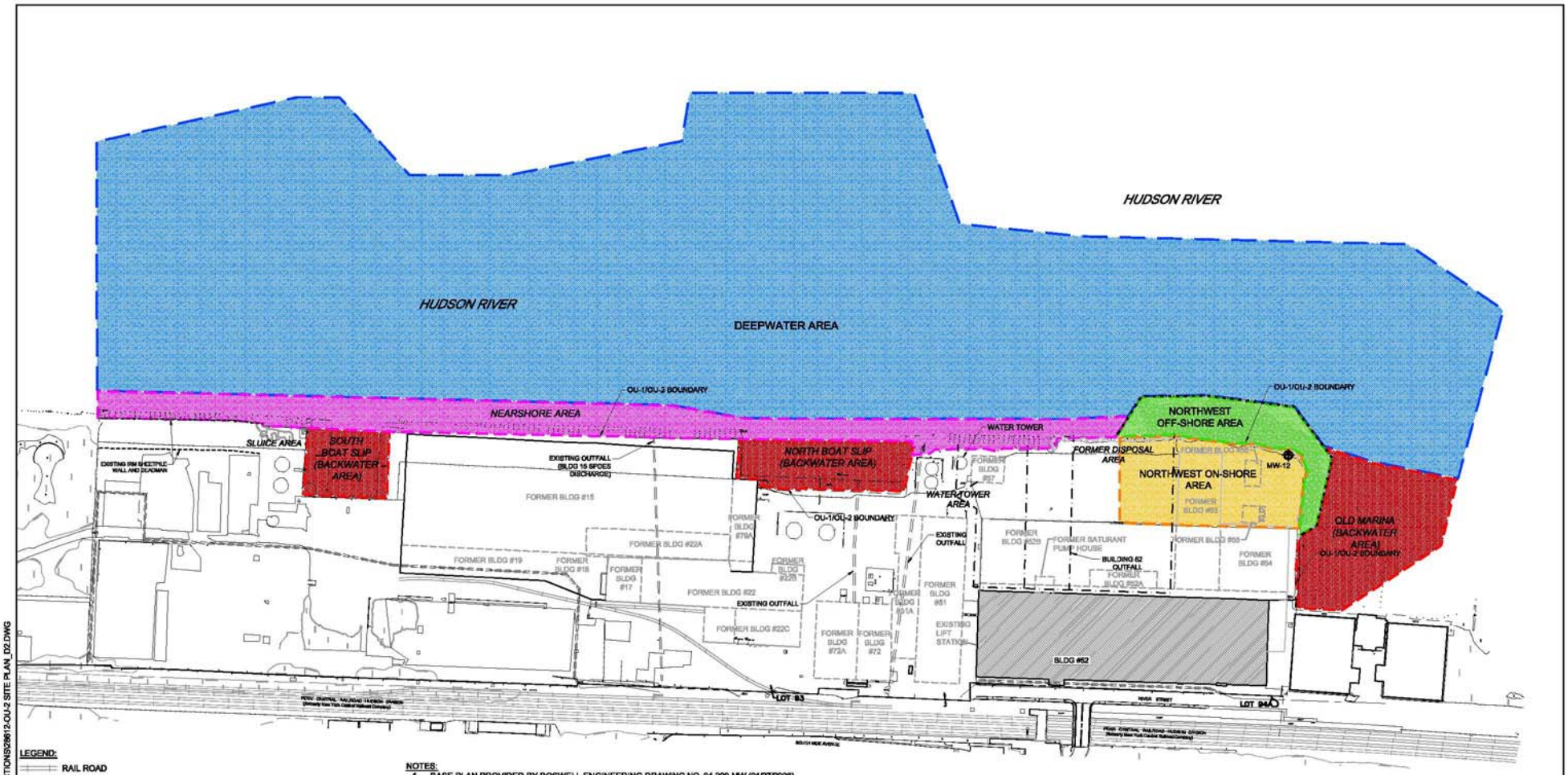
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS Site Location

SCALE: 1:24000
MAY 2011

FIGURE 1

G:\PROJECTS\28612\250 - RFS\CAD\PLAN VIEWS & SECTIONS\28612-LOCUS_D1.DWG



LEGEND:

- RAIL ROAD
- EXISTING STRUCTURES
- RIP-RAP
- BUILDING 52 OUTFALLS
- EXISTING OFFSITE OUTFALLS
- MONITORING WELL
- DEEPWATER AREA
- NEARSHORE AREA
- NORTHWEST OFF-SHORE AREA
- NORTHWEST ON-SHORE AREA
- BACKWATER AREA

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
4. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
4. THE OU-2/OU-1 BOUNDARY IS LOCATED AT THE MHW.

W S N E

0 200 400

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

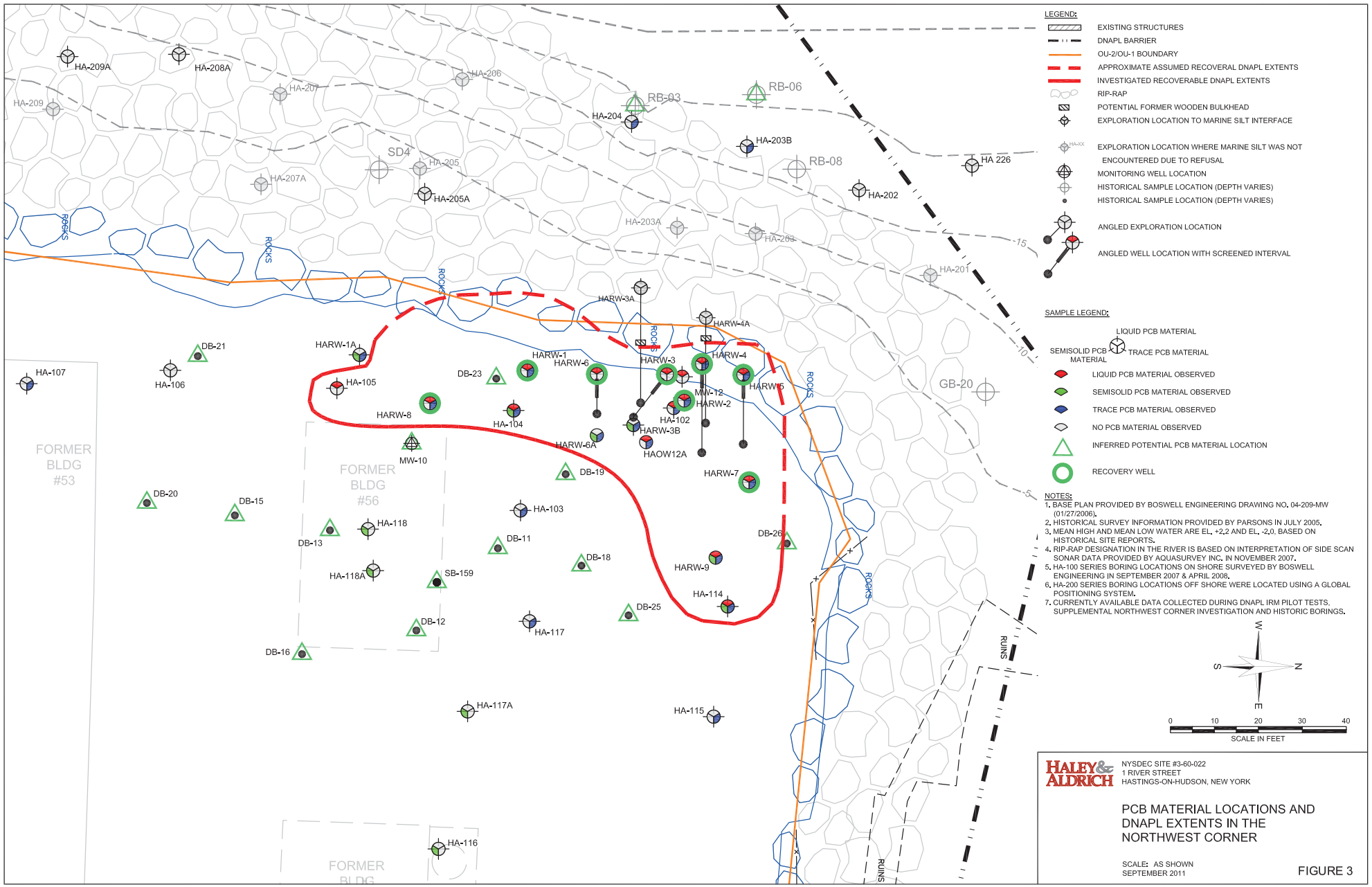
Site Features

OU-2 SITE PLAN WITH AREA DESCRIPTIONS

SCALE: AS SHOWN
MAY 2011

FIGURE 2

G:\PROJECTS\26812\250 - RFS\CAD\PLAN VIEWS & SECTIONS\26812-OU-2 SITE PLAN_D2.DWG


LEGEND:
EXISTING STRUCTURES
DNAPL BARRIER
OU-2/OU-1 BOUNDARY
APPROXIMATE ASSUMED RECOVERAL DNAPL EXTENTS
INVESTIGATED RECOVERABLE DNAPL EXTENTS
RIP-RAP
POTENTIAL FORMER WOODEN BULKHEAD
EXPLORATION LOCATION TO MARINE SILT INTERFACE
EXPLORATION LOCATION WHERE MARINE SILT WAS NOT ENCOUNTERED DUE TO REFUSAL
MONITORING WELL LOCATION
HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
ANGLED EXPLORATION LOCATION
ANGLED WELL LOCATION WITH SCREENED INTERVAL
SAMPLE LEGEND:
LIQUID PCB MATERIAL
SEMISOLID PCB MATERIAL
TRACE PCB MATERIAL
LIQUID PCB MATERIAL OBSERVED
SEMISOLID PCB MATERIAL OBSERVED
TRACE PCB MATERIAL OBSERVED
NO PCB MATERIAL OBSERVED
INFERRED POTENTIAL PCB MATERIAL LOCATION
RECOVERY WELL
NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. HA-100 SERIES BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. HA-200 SERIES BORING LOCATIONS OFF SHORE WERE LOCATED USING A GLOBAL POSITIONING SYSTEM.
7. CURRENTLY AVAILABLE DATA COLLECTED DURING DNAPL IRM PILOT TESTS, SUPPLEMENTAL NORTHWEST CORNER INVESTIGATION AND HISTORIC BORINGS.
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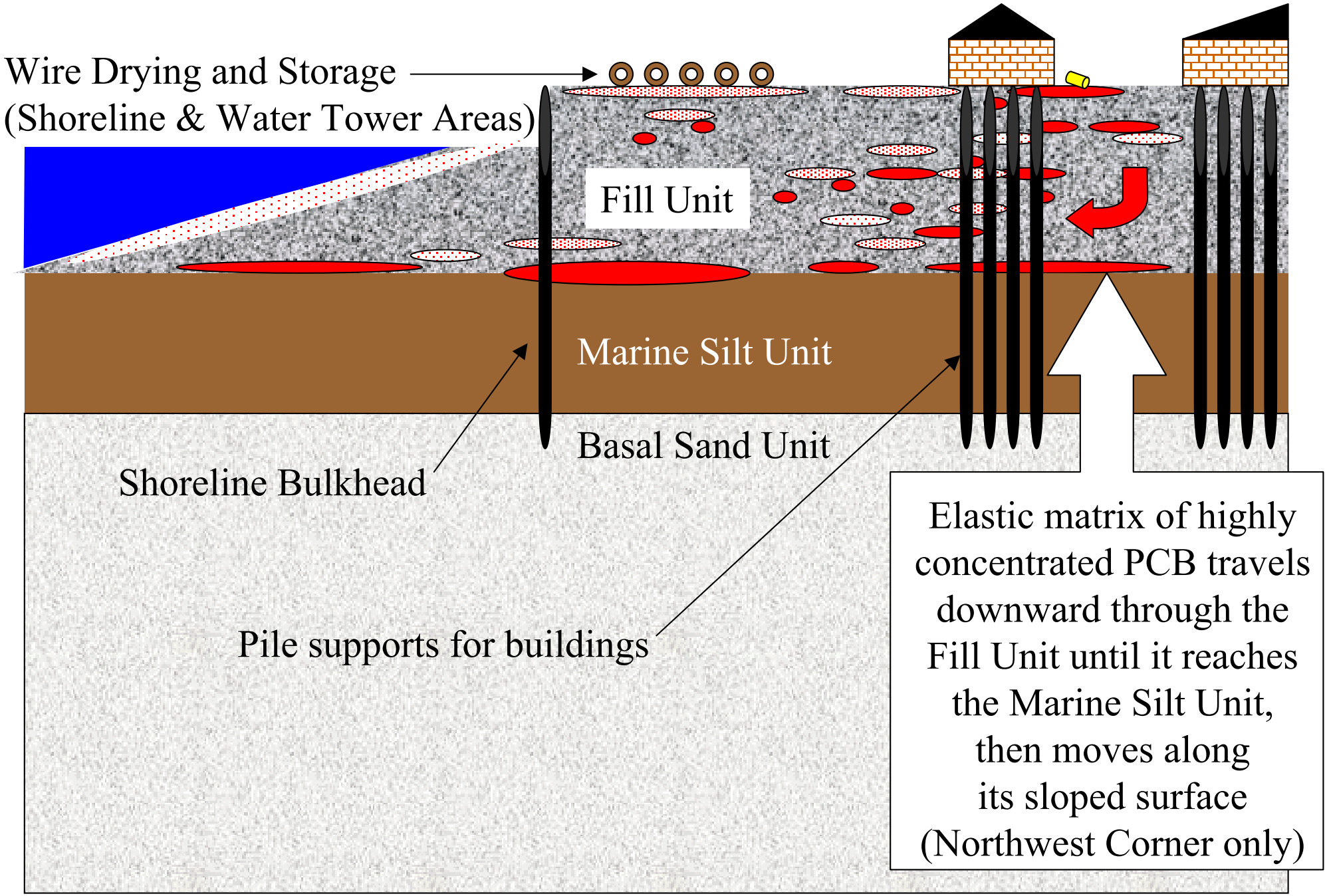
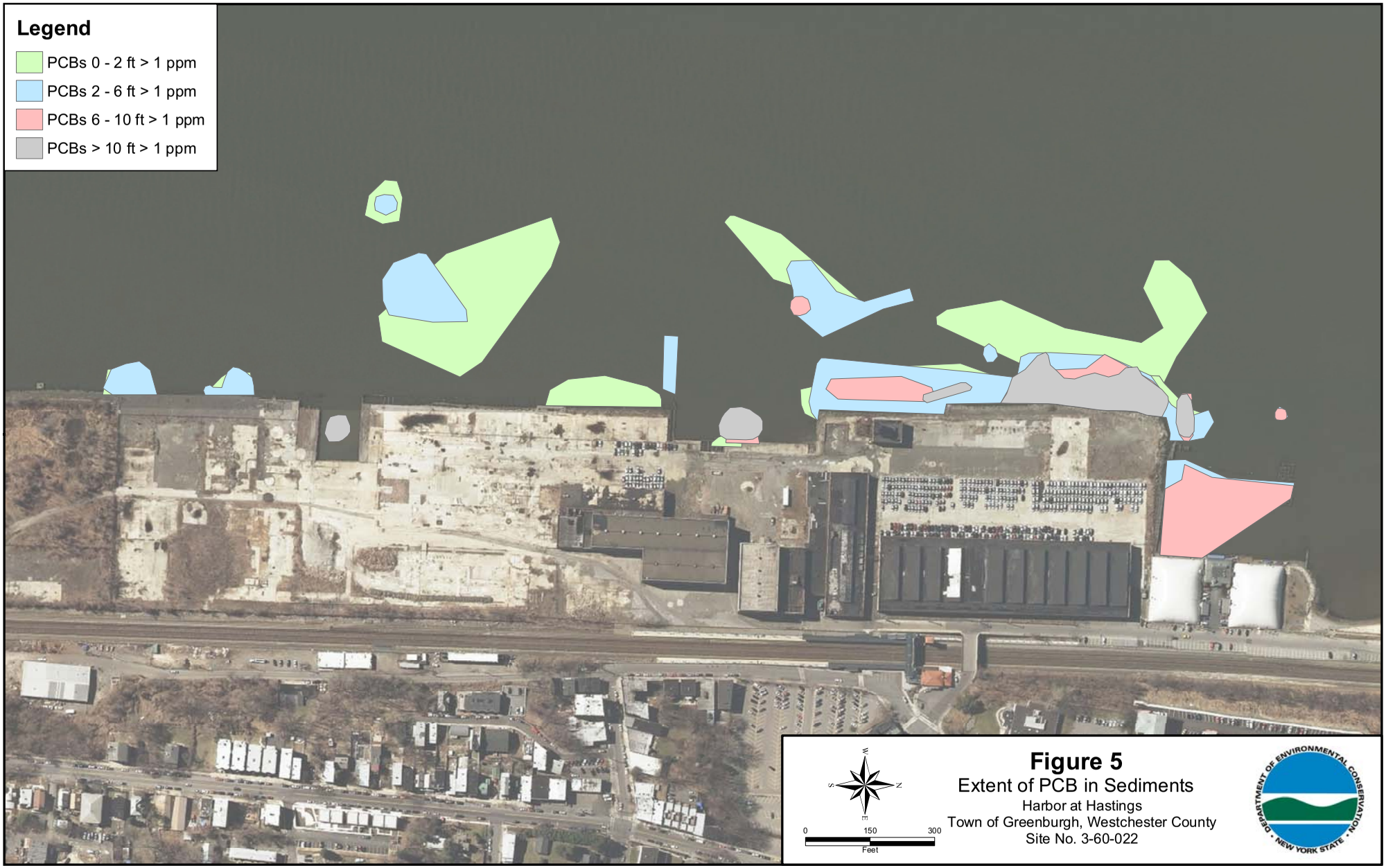
40
SCALE IN FEET
HALEY & ALDRICH
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK
PCB MATERIAL LOCATIONS AND DNAPL EXTENTS IN THE NORTHWEST CORNER
SCALE: AS SHOWN
SEPTEMBER 2011
FIGURE 3
G:\PROJECTS\28612\250 - RFS\COMMUNICATIONS\2011-09-29 DEC FIGURE\28612-PCB MATERIAL EXTENTS_DF.DWG

Figure 3: Conceptual Model of PCB Migration




Legend
PCBs 0 - 2 ft > 1 ppm
PCBs 2 - 6 ft > 1 ppm
PCBs 6 - 10 ft > 1 ppm
PCBs > 10 ft > 1 ppm
W
S
E
0
150
300
Feet
Figure 5
Extent of PCB in Sediments
Harbor at Hastings
Town of Greenburgh, Westchester County
Site No. 3-60-022
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE

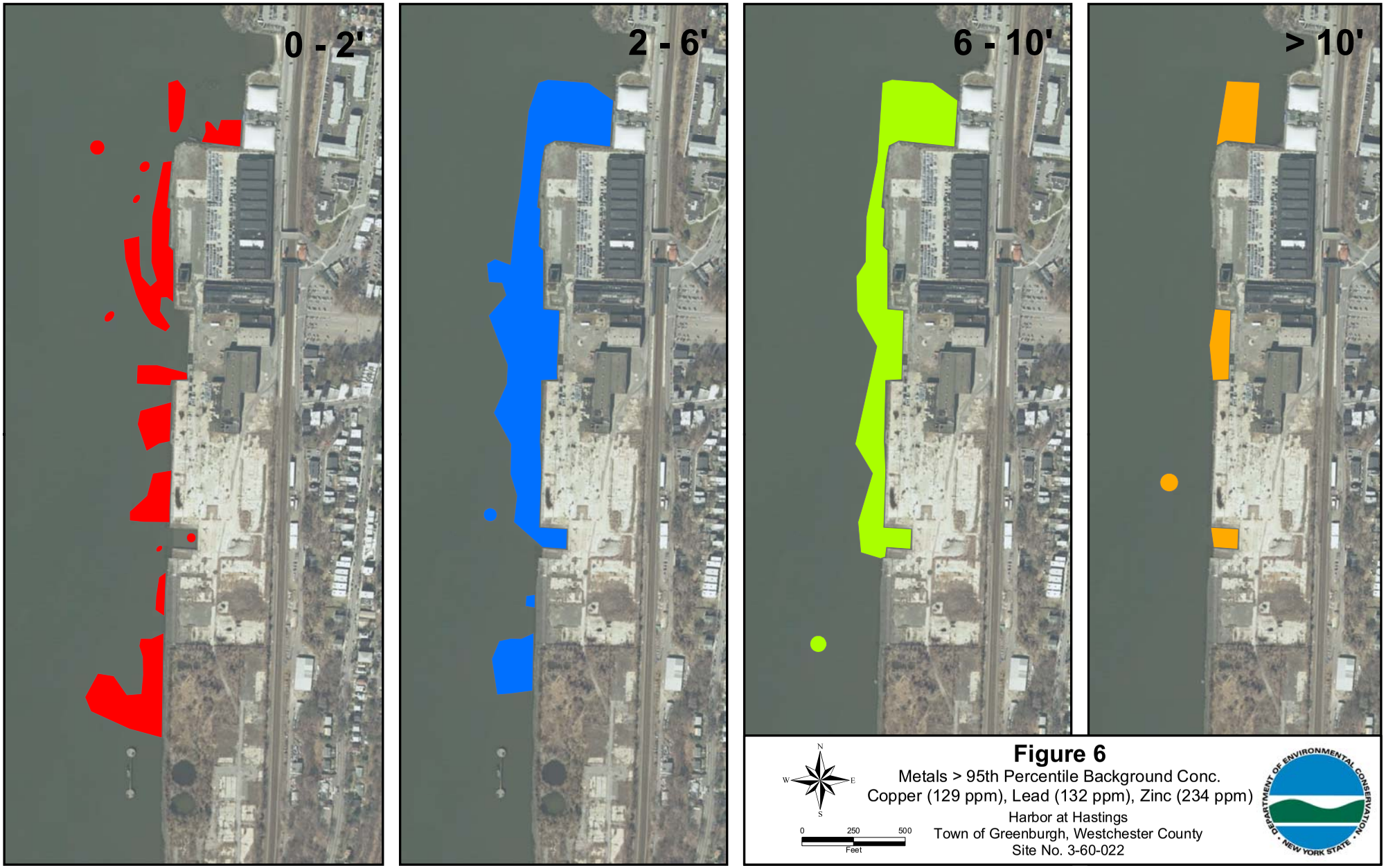
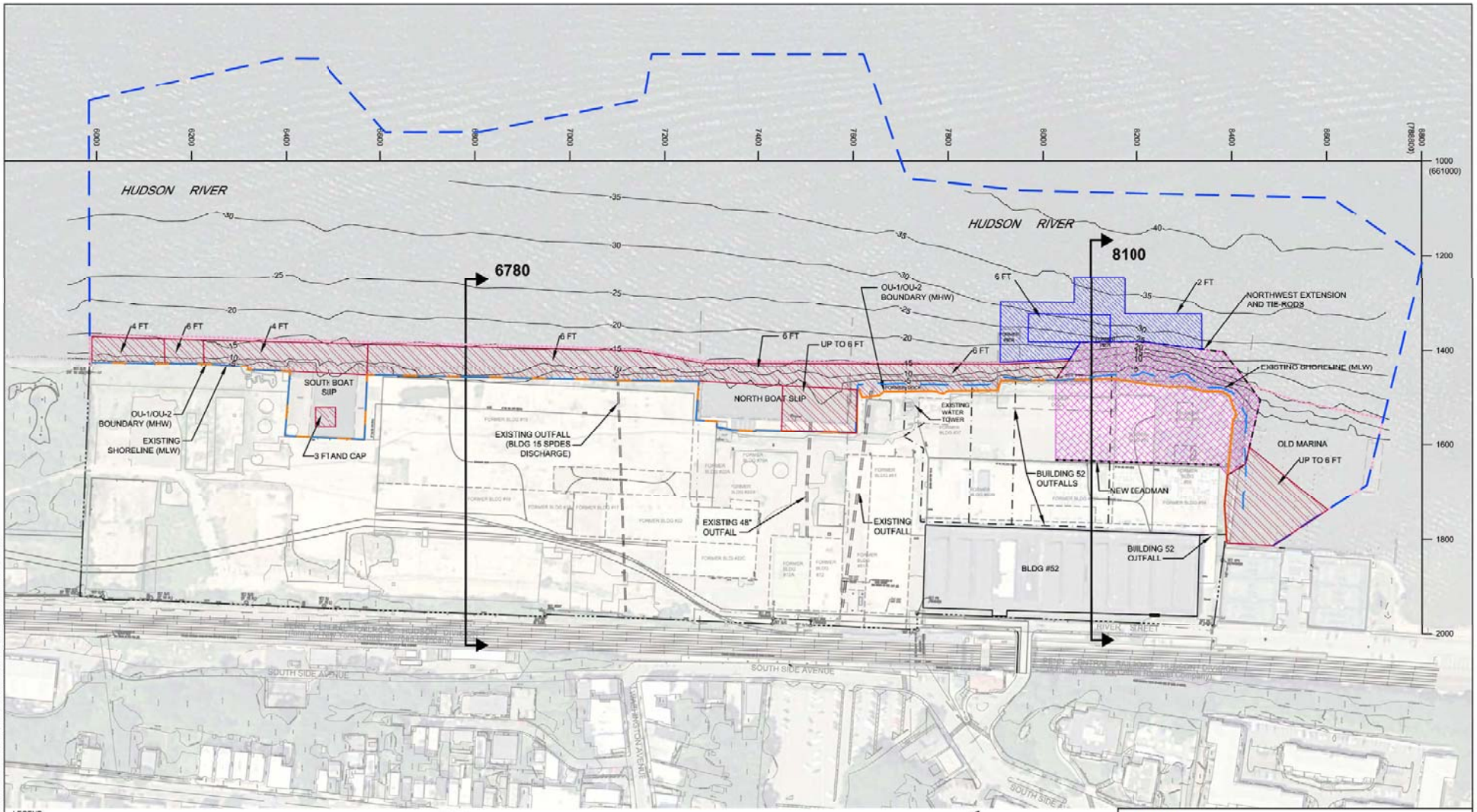


Figure 6

Metals > 95th Percentile Background Conc.
Copper (129 ppm), Lead (132 ppm), Zinc (234 ppm)

Harbor at Hastings
Town of Greenburgh, Westchester County
Site No. 3-60-022

DEPARTMENT OF ENVIRONMENTAL CONSERVATION · NEW YORK STATE ·



LEGEND:

- PROPERTY LINE
- RAIL ROAD
- FENCE
- RIP-RAP
- EXISTING OFFSITE OUTFALLS
- EXISTING SHORELINE (MLW)
- OU-1/OU-2 BOUNDARY (MHW)
- SILT CURTAIN
- OU-2 SECTION LINES
- NORTHWEST EXTENSION
- NEARSHORE AND BACKWATER DREDGE AREA
- DEEPWATER DREDGE ARIA
- BULKHEAD WALL
- OU-2 LIMITS

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MV (01/27/2006).
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. EXISTING 5 FT BATHYMETRY BASED ON DATA FROM ALPINE OCEAN SEISMC SURVEY (1997).
4. ELEVATION CONTOURS ARE BASED ON NAVD 88 DATUM.
5. BACKGROUND ORTHOIMAGERY FROM NAIP, 2010.
6. DREDGE DEPTHS ARE SHOWN AS MAXIMUM DEPTHS. ACTUAL DREDGE MAY BE CONSTRAINED BY CONSTRUCTIBLE LIMITS, AS SHOWN ON THE SECTIONS.
7. OU-1 REMEDIAL ACTIVITIES ARE SHOWN ON FIGURES 28 AND 30.
8. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.

W S N E

0 200 400

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PLAN VIEW
MODIFIED ALTERNATIVE 6

SCALE: AS SHOWN
FEBRUARY 2012

FIGURE 7

G:\PROJECTS\26812\265 - FINAL RFS\CAD\MODIFIED ALTERNATIVE 6\26812-265-PRAP MODIFIED ALT 6.DWG

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Harbor at Hastings
Operable Units No. 1 and 2
State Superfund Project
Village of Hastings on Hudson, Westchester County, New York
Site No. 360022

The Proposed Remedial Action Plan (PRAP) for the Harbor at Hastings site, was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on January 2012. The PRAP outlined the remedial measure proposed for the contaminated soil, sediment, surface water, groundwater at the Harbor at Hastings site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on January 26, 2012, which included a presentation of the remedial investigation and feasibility study (RI/FS) for the Harbor at Hastings as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period was to have ended on February 10, 2012, however it was extended to March 12, 2012, at the request of the public.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Justification of the 1ppm PCB cleanup goal for soils should be provided through risk assessment modeling.

RESPONSE 1: The 1 ppm soil cleanup objective (SCO) is set forth in 6 NYCRR 375-6.8, and this SCO is protective for residential and ecological resources as well as the future intended use of the site for restricted-residential. The 1 ppm SCO was adopted from EPA and was based on risk management considerations for high occupancy scenarios as described in section 6 of the Development of Soil Cleanup Objectives Technical Support Document, September 2006, which may be found at http://www.dec.ny.gov/chemical/34189.html

COMMENT 2: What are the health hazards of the proposed sediment processing operation?

RESPONSE 2: The NYSDEC and NYSDOH pay close attention to the quality of life for the surrounding community during all parts of the remedial work at a site, including the sediment processing portion of the cleanup. All concerns will

be addressed whether it is noise, odor or dust migration in a manner that will monitor and minimize any release or potential for exposure. See response number 11 for CAMP details. Monitoring and other appropriate engineering controls will be in place to assure no hazards result from this or any other operations required to implement the selected remedy.

COMMENT 3: Will BP/ARCO reimburse the State for its costs?

RESPONSE 3: Yes, reimbursement of New York State costs is expected as part of the consent order negotiated with BP/ARCO, the responsible party.

COMMENT 4: Has soil beneath Building 52 been sampled to determine if contamination is beneath it?

RESPONSE 4: Yes the soil beneath Building 52 was sampled and characterized to determine the levels of contaminants below the building.

COMMENT 5: How much semi-solid PCBs are present beneath the river?

RESPONSE 5: The presence of semi-solid PCB has been identified in the areas shown on Figure 3 of the ROD. The full extent and amount of semi-solid PCBs present beneath the river has been difficult to estimate due to the difficulty in installing borings and sampling the area immediately offshore of the Northwest Corner. This area was not extensively sampled because the equipment needed to penetrate the rip rap could not access areas of shallow water under current conditions.

COMMENT 6: Is it safe to use Kinnally Cove for recreational wading in the water and sediments due to potential contamination?

RESPONSE 6: Yes, Kinnally Cove may be used for recreational wading in the water with respect to the contamination associated with the site. Sediments in Kinnally Cove were sampled for PCBs by the Department in 2001, the range of concentrations detected were 0.088 and 1.5 ppm of total PCBs.

COMMENT 7: Will the proposed Northwest extension include cathodic protection of the steel sheeting?

RESPONSE 7: Yes the Northwest extension will include cathodic protection of the steel sheeting.

COMMENT 8: There is concern for sea level rise greater than predicted by the USACE. The remedy needs to add additional rip rap and foundation to accommodate the potential rise in sea level.

RESPONSE 8: The remedial design will include design considerations which take into account estimated sea level changes. Shore protection will be designed to prevent erosion of the shore due to the action of wind, waves and other forces to prevent damage to on-shore development or potential exposure and subsequent transport of contaminated soils.

COMMENT 9: We support the proposed restricted residential use of the site.

RESPONSE 9: Comment noted.

COMMENT 10: What is the scientific basis for the two-foot cover system for restricted residential use of the site?

RESPONSE 10: The basis for the 2 foot cover system is 6NYCRR Part 375, and the associated 2006 Technical Support Document, which may be found at http://www.dec.ny.gov/chemical/34189.html

COMMENT 11: When the CAMP is developed, we are concerned for using the standard particulate action level as a proxy for airborne PCBs. Before construction begins, the community needs a presentation of how the action level for PCBs is developed as part of the CAMP.

RESPONSE 11: In the remedial design phase a site specific Community Air Monitoring Plan (CAMP) will be developed which will specify the action levels for dust, volatile organic compounds and PCBs. Before implementation of the remedy a public meeting will be held and will explain in further detail how the CAMP will be protective of the community.

COMMENT 12: The green remediation elements of the PRAP are too vague. More specific requirements should be stated to minimize construction impacts to Village. These include requirements for barge and/or train transport of contaminated and clean soil, filtered diesel emissions, use of ultra low sulfur diesel fuels and Tier 3 diesel emission standards.

RESPONSE 12: The green remediation elements presented are there to acknowledge the DEC's commitment to green remediation, specific green remediation elements will be identified in the remedial design. The goal will be to minimize construction impacts to the Village to the extent feasible while implementing the remedy.

COMMENT 13: Will the two foot soil cover be able to be breached to construct building foundations?

RESPONSE 13: In areas where building will be permitted, the two foot soil cover may be disturbed provided the requirements included in the approved Site Management Plan are followed.

COMMENT 14: The annual cost of the two-foot cover system is underestimated because it does not include the additional cost for implementing the Site Management Plan during development.

RESPONSE 14: The annual cost does not factor in the costs for development, since these are beyond the scope of this ROD.

COMMENT 15: Who is responsible for the annual costs that are presented in the PRAP?

RESPONSE 15: ARCO will be responsible for the annual operation and maintenance costs.

COMMENT 16: What are potential health effects of other metals in the sediment, such as nickel, mercury and arsenic?

RESPONSE 16: In order to have health effects from metals present in the sediment there first has to be direct contact with these contaminants. Presented below are potential health effects if exposure occurred and at high concentrations.

Nickel: The most common reaction is a skin rash at the site of contact. The skin rash may also occur at a site away from the site of contact. Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized people react when they consume food or water containing nickel or breathe dust containing it.

Mercury: Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

Arsenic: Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Additional information on these metals can be found on the Agency for Toxic Substances and Disease Registry's website.
http://www.atsdr.cdc.gov/substances/index.asp

COMMENT 17: Will there be any stipulated penalties in the Order on Consent to ensure compliance with the schedule for implementing the remedy?

RESPONSE 17: Stipulated penalties will be subject to negotiations between ARCO and the Department concerning the OU2 Order on Consent. Note that Environmental

Conservation Law also provides for penalties for non-compliance with the terms and conditions of orders on consent.

COMMENT 18: When will the remedial work start and end?

RESPONSE 18: The remedial work will begin after an Order on Consent that includes the OU2 remedy is signed and the remedial design is completed. The public will be notified at important milestones. The Department anticipates the project will take approximately 5 years to complete.

COMMENT 19: What are likely impacts upstream and downstream of the dredging project? We are concerned about this project harming the ongoing efforts to establish oyster beds just upstream of the site.

RESPONSE 19: The impacts upstream and downstream from implementing the remedy are expected to be minimal as a result of the controls that will be in place. This is based on the nature of the contamination and knowledge gained at other sediment remedial projects. The majority of the dredging will be performed using silt curtains which will minimize resuspension from dredging. Monitoring will be performed to identify acceptable requirements to protect water quality in upstream and downstream locations. It is also our understanding of the proposal that the oyster beds are not intended for human consumption.

COMMENT 20: The Department and/or ARCO should use additional outreach such as social media methods to keep residents apprised of the remedial progress and address concerns for airborne exposures during construction. Information should be disseminated in layman's terms using hubs in the Village such as coffee shops, the train platform, etc. as posting locations.

RESPONSE 20: The Department has successfully used websites which provide weekly updates, construction status and daily monitoring, and will work with the PRP explore and implement a website or additional outreach to keep the community informed during the remedial design and construction.

COMMENT 21: Is the proposed 2-foot cover consistent with the five foot cover that is required by the Village and Riverkeeper's Federal Consent Decree with ARCO?

RESPONSE 21: The proposed 2-foot cover is consistent with the Village and Riverkeeper's Federal Consent Decree with ARCO.

COMMENT 22: The Department should request and review ARCO's proposed lighting plan as part of the remedial design.

RESPONSE 22: The need for extensive construction lighting will depend on the nature and schedule of the work to be performed. Decisions concerning work hours and

the need for supplemental lighting to safely conduct the work will be made in consultation with the Village of Hastings-on-Hudson.

COMMENT 23: What is included in the proposed restricted residential use? Why are single family homes not permitted?

RESPONSE 23: Restricted residential use is the land use category when there is to be common ownership or a single owner/managing entity for the site. Therefore apartment buildings, condominiums and recreational uses would be allowed that are managed by a single entity pursuant to a site management plan (SMP). It prohibits single family housing because managing and restricting the use of property would be more difficult, and could result in a greater possibility for individual owners and hired contractors to take actions not in conformance with the SMP. Furthermore, agriculture or vegetable gardens on the controlled property would be prohibited with the exception of community gardens with the approval of the Department.

COMMENT 24: Where will additional sampling be conducted in pre-design? Not just in the Northwest Area.

RESPONSE 24: Additional sediment sampling will be performed to identify depths of sediment contamination that will be removed in both nearshore and deepwater areas. Baseline monitoring will also be performed for the long-term monitoring plan to determine the pre-remedial conditions. The baseline monitoring plan will include sampling at background locations to determine ambient contaminant levels that are unrelated to the Harbor at Hastings site.

COMMENT 25: Will the liquid PCB removal operation affect the ability to use the northwest corner and northwest extension area?

RESPONSE 25: The remedial design will seek to minimize the impact of PCB recovery operations on the future use of the northwest extension area.

COMMENT 26: Can some of the shoreline be used for deep water dock access?

RESPONSE 26: The future use of portions of the shoreline for deep water dock access would need to be identified during the remedial design to assure the design takes this into account.

COMMENT 27: Does the PRAP provide for financial assurance to ensure long term monitoring and maintenance of the remedy?

RESPONSE 27: The PRAP and Record of Decision do not include financial assurance to ensure the long term monitoring and maintenance of the remedy. However, the Department has regulatory authority to require financial assurance, and could consider this option during the negotiation of the Order on Consent.

COMMENT 28: What information and experience from the Upper Hudson remediation will be utilized in the design and implementation of this remedy?

RESPONSE 28: While representing a different set of site specific conditions, the applicable information and experience from the Upper Hudson, will be used extensively to design and implement this remedy. Experience concerning the types and frequency of monitoring, community interaction issues, debris removal, air monitoring, dredge techniques, and silt controls will be used in developing the remedial design.

COMMENT 29: Where will the PCBs be taken after they are removed from the site?

RESPONSE 29: The dewatered PCB sediment will be taken to a facility which is permitted to accept PCB waste of the type and concentration removed.

COMMENT 30: Barge and rail transport of both clean and contaminated soils and sediments should be evaluated during the remedial design.

RESPONSE 30: The modes of transport for both clean and contaminated soils and dewatered sediment will be evaluated in the remedial design.

COMMENT 31: Is there a plan for diverting and/or protecting river traffic during the dredging operation?

RESPONSE 31: The appropriate navigational warnings will need to be reviewed and approved for conformance with US Coast Guard requirements before they are deployed.

COMMENT 32: Discuss the significance of the “drag-down” concept.

RESPONSE 32: The “drag down” refers to the potential for the liquid and semisolid PCB material to adhere to the steel sheet piles as they are driven through these materials into deeper into uncontaminated zones. The concern is that PCBs would be carried down into an uncontaminated area during the driving of the piles or flow as a dense non-aqueous phase liquid (DNAPL) through a newly-created migration pathway.

COMMENT 33: Are the proposed new wells in the northwest extension area just to monitor PCBs?

RESPONSE 33: The remedy anticipates installing new wells to both monitor and recover the PCB DNAPL, if present. The details of the additional work will be identified in the remedial design and site management plan.

COMMENT 34: How much of the PCBs have you removed so far in terms of the total amount there?

RESPONSE 34: The amount of PCB DNAPL present was not estimated due to the difficulty in obtaining samples from the immediate offshore area. As a result, the proportion of PCBs removed has not been calculated, but to date approximately 500 gallons of PCB DNAPL have been collected and disposed off-site.

COMMENT 35: Were samples for metals treated with acid to allow for metals speciation?

RESPONSE 35: Yes, samples for metals analysis were acidified, and therefore the results represent total metals in the sample. However, metal speciation was not performed.

COMMENT 36: Were single or duplicate assays performed?

RESPONSE 36: Most samples were single analysis. However, a certain number of samples were analyzed as duplicates, in accordance with generally-accepted practice for conducting environmental investigations.

COMMENT 37: Do you have to do more investigation to determine whether the new bulkhead will go into the liquid PCB pool?

RESPONSE 37: More investigation will be performed during remedial design to determine the final alignment of the sheet pile wall. Previous probing work identified a proposed location which is shown on Figure 7. The major factor concerning the alignment is the presence of the rip rap which will need to be avoided or moved during installation.

COMMENT 38: How long will the monitoring wells be there?

RESPONSE 38: The monitoring wells will remain in place as long as they are needed to monitor contamination in the groundwater.

COMMENT 39: Are you getting pure PCBs out of the recovery wells now?

RESPONSE 39: The material being removed from the wells contains approximately 30-40 % PCB.

COMMENT 40: As to backfilling the site, it is underwater at times. The Army Corps of Engineers (ACOE) guidelines you are following need to be enhanced.

RESPONSE 40: The remedial design will evaluate design considerations which take into account estimated sea level changes. Shore protection will be designed to prevent erosion of the shore due the action of wind, waves and other forces to prevent damage to on-shore development or potential exposure and

subsequent transport of contaminated soils. These design elements will also be part of the review by the ACOE as part of their permitting process.

COMMENT 41: What action levels will be used in the CAMP? How can you justify 1ppm for baseline? How, during a limited public comment period, can the public determine whether the 1ppm is sufficiently protective?

RESPONSE 41: The 1 ppm action level is the soil cleanup objective for soil. The Community Air Monitoring Plan (CAMP) still needs to be developed, and it will define the site specific action level for airborne PCBs. The Department has used a 100 ng/m^3 action level for PCBs on recent PCB removal projects. However, the site-specific action level will be developed and documented in the CAMP during the remedial design phase.

COMMENT 42: Has contamination from the upper Hudson River dredging released contamination to the lower Hudson River down to this location, will it?

RESPONSE 42: In 2009 and 2011, the General Electric Company under the oversight of the US Environmental Protection Agency dredged PCB contaminated sediment from stretches of the Upper Hudson River as part of the Hudson River PCB Superfund Site. During dredging, Hudson River water quality was monitored daily at several locations downstream of operations in the Upper Hudson (north of Troy) and samples were collected monthly in the Lower Hudson River at Albany and Poughkeepsie. Water quality was also monitored in the Upper Hudson during the off-season when no dredging was underway. Most relevant based on proximity to the Harbor at Hastings Site are the PCB levels measured in water samples collected from Poughkeepsie; these sample results indicate that PCB levels in river water at Poughkeepsie during dredging are consistent with levels measured before dredge operations began. Water quality will continue to be closely monitored as dredge operations continue.

Jacques Padawer, Ph.D. submitted a letter via email dated February 1, 2012, which included the following comments:

COMMENT 43: Does the DEC have chromatographic and elemental profiles of these three (or more) PCB species in the Arco property? This is critical, should be available, and should be disclosed.

RESPONSE 43: Chromatograms may be found in several documents, including the January 2005 "Field Work Summary Report for Fall 2004" Appendix C, and the November 2009 "Report on Supplemental Northwest Corner Investigation Findings". These documents are available for public review in the repositories.

COMMENT 44: Low chlorination PCBs (“liquid?”) of relatively higher vapor pressure are known to be sequestered by the liver, bind to DNA, and induce liver

carcinomas. What modified precaution(s) does the DEC propose to use to monitor the new threats?

RESPONSE 44: In order to have health effects from these PCBs there first has to be exposure to them. In the remedial design phase a site specific Community Air Monitoring Plan (CAMP) will be developed which will specify the action levels for these PCBs. Before implementation of the remedy a public meeting will be held and will explain in further detail how the CAMP will be protective of the community.

Jeremiah Quinlan a Trustee with the Village of Hastings-on-Hudson submitted a letter dated February 29, 2012 which included the following comments:

COMMENT 45: Evaluate and, as appropriate, remediate sanitary/process sewers on site

RESPONSE 45: The process sewers and floor drains from Building 52 are identified for removal. Other sanitary and process sewers will be further identified during the remedial design and will be evaluated for remediation as appropriate.

COMMENT 46: Evaluate the use of the adjacent railroad thoroughly and use it to the extent reasonable.

RESPONSE 46: See Response 30.

COMMENT 47: Disposal of on-site sediments: Strict standards are needed to avoid future issues. Clean and sandy sediments will have less future risk of being a future contamination issue and will have fewer compaction/settlement issues.

RESPONSE 47: The remedial design will identify the parameters for reusing sediment on-site. The reuse of sediments on-site has the benefit of reducing transportation related impacts for both contaminated material and backfill.

COMMENT 48: Where a sloped shoreline will be employed, heavy armoring will provide better protection during storms.

RESPONSE 48: The type of armoring will be identified in the remedial design and the protection during storm events will be evaluated as a factor in identifying the proper size of the material.

COMMENT 49: Concerns on how will the IRM wells be protected from the public in the northwest corner that will be a public park.

RESPONSE 49: The recovery wells in the Northwest Extension Area will be protected from the public in anticipation that the area may be used for public access. This area may need to be temporarily closed during operation and maintenance activities. The remedial design will identify approaches, such as flush

mounting the wells; dedicated vaults; or other engineering controls to protect the public while allowing the operation of the wells for their intended purpose.

Eileen Bedell, the property owner of the Hudson Valley Health & Tennis Club, submitted a letter dated March 9, 2012 which included the following comments:

COMMENT 50: I would like the plan to show my property lines reflected on all drawings. My deed includes both shallow and deep water riparian rights. In fact, all of the "Old Marina" is owned by Hudson Valley Health & Tennis Club, although I have no objection to the use of "Old Marina" on your diagrams.

RESPONSE 50: The property lines will be shown on the future drawings and plans in the remedial design. The Department acknowledges the ownership and potential future use of the marina and the need to gain access.

COMMENT 51: I would like the plan to be modified to take into consideration my future plans for reopening the marina. This includes depth, configuration and access issues.

RESPONSE 51: The sediment removal areas are based on the contamination identified in the remedial investigation phases. The approved plans for potential re-use of the marina will be factored into the remedial design with the objective of reducing the footprint of the Northwest Extension Area and minimizing backfill in the marina area. The backfill requirements will be evaluated and adjusted for the future and reasonably anticipated use of the sediment removal area of the marina. However, any additional or future dredging for the marina project must obtain approvals through the regular permitting process, including ECL Article 15 or 6NYCRR Part 608. As noted earlier, additional investigations will be needed before the final sheet pile wall alignment is determined.

COMMENT 52: The metals and PCB contamination plan is inconsistent with the data ARCO has provided me. In addition, test sampling was often restricted by the logistics of sample extraction.

RESPONSE 52: The extent of metals and PCB contamination is identified in the Feasibility Study, Appendix C. The sediment results are presented based on the depth below the sediment/water interface, and are consistent with previous reports. The Department agrees that data gaps exist in the marina area due to the inability to physically access certain locations. For this reason additional sediment sampling will be performed during the design phase and the obstructions are removed.

COMMENT 53: I would like the plan to clarify how future zoning changes for the ARCO property apply or do not apply to my property.

RESPONSE 53: The easement placed on the ARCO property pursuant to the ROD will not apply to the Hudson Valley Health & Tennis Club property. Concerns related to future zoning issues should be directed to the Village of Hastings-on-Hudson.

COMMENT 54: I would like clarification as to whether piles and pile-supported structures will be permitted in the marina.

RESPONSE 54: Restrictions on the installation of piles and pile-supported structures outside of Northwest Extension Area (NEA) are not planned. The installation of piles will not be restricted in the marina area provided that PCB DNAPL is not present. The remedial design will determine the precise boundaries of the NEA.

COMMENT 55: I have no need for backfilling of the marina post dredging. In addition I welcome reuse of the silt as landfill on the OU1 site.

RESPONSE 55: The comment is noted. See Response 51.

COMMENT 56: As you are aware from our discussions, I am opposed to the plan as drafted, particularly based on #2 and #3 above (*as referenced in the letter*). Without modification, I would be unwilling to grant access for executing the work.

RESPONSE 56: The Department acknowledges the plans for re-use of the marina. Additional work will be performed during the remedial design to minimize or eliminate the sheet pile wall on your property, to the extent it can be while still meeting the ROD objectives, to allow implementation of both the remedy and the proposed marina.

Daniel E. Estrin and Justin M. Davidson from Riverkeeper submitted a letter dated March 12, 2012 which included the following comments:

COMMENT 57: Riverkeeper is particularly concerned with the PRAP's general lack of clarity regarding the cleanup procedures that will be followed. In the interest of providing an open and transparent dialogue around the Department's efforts to remediate the site, we want to ensure that the public is well informed as to the particular processes that will be employed during the long-awaited cleanup of the Site.

RESPONSE 57: The cleanup procedures will be identified in the remedial design. The Department shares Riverkeeper's concern that the public should remain well informed during the remedial design and implementation of the remedy. Additional outreach activities will be scheduled at appropriate milestones in the project.

COMMENT 58: The PRAP is unclear as to where additional delineation sampling and study will be conducted. Before dredging and removal activities commence in the deepwater portion of the site, additional delineation sampling must be conducted in order to entirely understand and characterize the full extent of contamination. In particular, paragraph 6 of the proposed remedy provides, "the specific area where fixed sediment resuspension controls can be feasibly deployed will be evaluated during design based on the water depth and velocity conditions. Alternative designs for fixed resuspension controls will be evaluated to increase the depth of feasible resuspension controls." Paragraph 7 of the proposed remedy – which deals with "removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water" – explains that "during design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging." Taken in conjunction, these two statements suggest that the PRAP fails to define with reasonable specificity the areas where these additional sampling efforts will take place. Particularly, it is not clear whether this sampling will be confined to the immediate vicinity of the northwest extension area, or whether it will appropriately extend downriver to other areas where earlier incomplete and insufficient sampling indicates the possible presence of PCB concentrations.

RESPONSE 58: Additional sampling will be performed in both the near shore and deepwater areas where data gaps exist to provide a precise delineation of sediment to be removed. Such additional sampling is not confined to the immediate vicinity of the Northwest Area.

COMMENT 59: Definition of the areas to be sampled and the associated extent of the potential dredging are essential elements of efforts to evaluate the potential for resuspension and contaminant dispersion and the need for and type of resuspension controls. Recent experience in the upper Hudson near Fort Edward, New York indicates that the combination of equipment selection and dredging protocols can substantially reduce downstream dispersion and in many cases have the potential to eliminate the need for fixed controls such as silt curtains. This potential should be carefully evaluated with full consideration of complications associated with water depths in excess of 15 feet and/or energetic river and/or tidal flows after specification of the area and associated contaminant mass to be dredged. It does not appear to Riverkeeper that such an evaluation has been conducted to date.

RESPONSE 59: The Department has determined that resuspension controls will be used where feasible to reduce and minimize the dispersion of contaminants and will require that the extent of contamination, and the associated extent of the potential dredging, be determined during the design in order to design the controls necessary to address resuspension and contaminant dispersion. The

recent experience in the upper Hudson River has provided information that can be applied to the remedial design of this dredging project. However this experience has limitations since the river velocities in the upper Hudson River are less than the current velocities near Hastings-on-Hudson. Also the sediment matrix at this site is also much finer than in the upper Hudson. These site-specific factors will be evaluated in the remedial design to choose the appropriate resuspension controls. The Department contacted a silt curtain manufacturer and a remedial contractor to independently verify the limitations for resuspension controls based on the site specific conditions in selecting the remedy.

COMMENT 60: During the Public Meeting on January 26, 2012, held in the Village of Hastings-on-Hudson, DEC Staff (Mr. George Heitzman) explained that during design, additional delineation sampling will be conducted "throughout." However, it is still unclear where precisely this additional sampling will be conducted, and a thorough explanation should be described in the Record of Decision ("ROD") for OU-2. DEC Staff further explained that additional sampling will be conducted only in areas where previous sampling results indicated "contiguous or concentrated" concentrations over 50 ppm of PCB, rather than "one hit" concentrations above 50 ppm. Earlier sampling that was conducted in portions of the deepwater site outside the northwest extension area was incomplete and unable to accurately define the full extent of contamination, so it would be erroneous to base future sampling efforts on what was conducted previously. Extensive additional delineation sampling should be conducted throughout the entire deepwater portion of the site to best understand precisely where these contiguous or concentrated zones exist and to allow accurate definition of the mass of PCB in each zone.

RESPONSE 60: The previous sampling provided sufficient information to allow the selection of remedy, but the remedy calls for additional sediment sampling in the deepwater areas to further delineate the areas to be dredged to meet the cleanup goals for PCBs. Post-ROD delineation sampling is routinely conducted at remediation sites to more precisely determine removal limits. The Department also agrees that additional sampling is needed to identify whether, and where, contiguous or concentrated zones may exist to allow accurate definition of the sediment to be dredged.

COMMENT 61: Because of the ambiguity surrounding the additional delineation sampling, Riverkeeper requests that an Additional Delineation Sampling Workplan be developed to describe with specificity the locations, actions, and timing of the additional delineation sampling to be conducted. In light of the lack of detail in the PRAP concerning additional in-river sampling to be conducted, we believe this Workplan should be publicly noticed and made available for public comment.

RESPONSE 61: The Department will require the development of a Sediment Delineation Sampling Work Plan as an element of the design and it will be publicly noticed and made available for public review.

COMMENT 62: The proposed action level of 50 ppm for the OU-2 deepwater area is premature, and a more stringent action level threshold below 50 ppm is necessary to protect the benthic community. The PRAP indicates that dredging of sediment in the deepwater portion of OU-2 will be conducted in areas defined by PCB concentrations greater than 50 ppm to six feet below the existing bottom. However, the PRAP completely fails to explain the technical rationale for the proposed 50 ppm action level. According to the DER-10, a PRAP must summarize the "alternatives considered and discuss the reasons for proposing the remedy," which has not been done here with respect to this proposed action level. During the Public Meeting on January 26, 2012, DEC Staff stated that a 50 ppm action level "struck the right balance," given the practical concerns and difficulties with dredging in deeper water. While Riverkeeper understands these concerns, this narrative answer can not suffice as a cogent technical basis to support 50 ppm as the appropriate action level. A satisfactory technical explanation must be made so the public can be informed and properly analyze the bases for selecting an action level that is relatively high.

In addition, on choosing a 50 ppm action level, the PRAP only states that "Targeting deepwater areas with PCBs above 50 ppm reduces the time needed to complete dredging activities when compared to deepwater areas above 1 ppm." However, when asked at the Public Meeting about whether NYSDEC calculated or estimated exactly how much longer dredging would take under a more stringent action level, DEC Staff (Mr. William Ports) responded that DEC had not calculated the time. The PRAP should not conclude without technical backup that choosing a higher action level of 50 ppm will reduce the amount of time needed for dredging when the Department has not calculated or estimated any such temporal differences.

The matter of remedial criteria warrants careful elaboration in the ROD for OU-2. Under the NYCRR, the goal of any remedial program for a specific site is to "restore the site to pre-disposal conditions, to the extent feasible. At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles." These words are echoed verbatim in the PRAP as two of its stated goals. The selection of the higher threshold of 50 ppm, without sufficient technical support and explanation supporting that action level, does not appear consistent with this legal mandate and the PRAP's stated goals.

While Riverkeeper understands that this higher threshold selection may be based on concerns that dredging will facilitate dispersion and ultimately increase contaminant bio-availability beyond current levels, such concerns must be based on hard data with particular emphasis on the mass of contaminant to be addressed by dredging. In the presence of a small mass – *i.e.*, a discrete area containing less than several pounds of PCBs where that mass is subject to continuing deposition and minimal erosion – the higher threshold of 50 ppm *may* be justified. However, for larger masses, lower thresholds are recommended with 10 ppm being the highest consistent with values used in other sites in the Hudson River and New England when dealing with significant masses of PCB. Because the data available in the PRAP and Revised Feasibility Study (RFS) do not provide sufficient information to properly assess the mass of PCB concentrations throughout the extent of the Site, the public is unable to determine whether the contamination presents "significant" threats to the public health and environment. As a result, the specification of the threshold is at the very least, premature. The present protocols specified in the PRAP do not appear to be sufficient to provide the necessary level of specificity, and the current approach based on sparse sampling and assumptions of costs should be reconsidered. The ROD for OU-2 must provide the basis for quantitative evaluation of the extent of contamination allowing subsequent evaluation and definition of the threshold criteria.

RESPONSE 62: As discussed in the Basis for Selection section of the ROD, the 50 ppm action level for deepwater sediments balances the potential for construction-related impacts associated with disturbance to the river bottom and migration of suspended sediments with the removal of sediments which have the highest levels of PCBs and the greatest potential to migrate and be an on-going source to the environment. The deepwater sediments present a number of concerns which were factored into the decision to remediate sediments in the site specific deepwater areas. These include environmental consequences of resuspending contaminated sediments without resuspension controls in these areas, the potential for remaining contaminated sediments to be disturbed in the future, the proximity of contamination to the sediment surface, and the concentration of contaminants. The Department evaluated the degree and extent of contamination for different action levels based on currently available information. The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs.

The time to remove the sediments in the deepwater areas was estimated for different action levels and is presented in the table below. These estimates are based on standard production rates and do not account for certain site-specific factors. The estimated volume of deepwater sediments that contain greater than 50 ppm PCBs is approximately 5000 cubic yards. The size of the mechanical dredge was assumed to be 5 cubic yards, with a production rate of 80 cubic yards per hour. Time estimates were prepared for both an 8-hour dredge day, and a 4-hour dredge day. The latter estimate reflects an attempt to limit deepwater dredging to the slack period during each daylight portion of the tidal cycle to minimize the migration of fines from the dredge area.

Deepwater PCB Remedial Goal	Estimated Volume of Sediment yd^3	Estimated Time in hours of Dredging	Estimated Days (8 hrs/day)	Estimated Days (4 hrs/day)
50 ppm	5000	64	8	16
10 ppm	20,000	250	31	62
1 ppm	53,000	662	83	166

The Department notes that comparison to action levels for unspecified sites in the upper Hudson River and New England site (presumably the Housatonic River) may not be valid due to the site-specific conditions encountered at this site. Sediments in the deepwater portion of the Harbor at Hastings site are significantly finer, comprising approximately 90% fines passing the #200 sieve, as compared to around 40% fines for the upper Hudson River project. Combined with the greater water depth and current velocity, the potential for uncontrolled dispersion during dredging is much greater at this site. The Department also notes that the Housatonic River project was performed by diverting the river and dredging in a dewatered condition, which provides a high degree of migration control, but is not a feasible approach at this site. As a result, the site-specific action levels that resulted from the balancing of criteria for those sites are not comparable to the Harbor at Hastings site.

To the extent feasible the site will be restored in a manner that will be protective of both the environment and public health. The remedy described in this ROD acknowledges the added difficulties of attaining pre-disposal conditions in an environment that contains levels of PCBs that are above standards in upstream locations not affected by the site. However, through implementation of engineering and institutional controls selected in the remedy, significant threats to public health and the environment will be mitigated.

COMMENT 63: As the Department is aware, on September 8, 2011, Riverkeeper submitted to NYSDEC a position statement for proposed PCB and removal criteria for the offshore areas of the Hastings site prepared by our technical consultant, Dr. W. Frank Bohlen, PhD. *See* Exhibit 3. In that statement, Riverkeeper suggested that sampling should be conducted at sites with PCB concentrations

of 10 ppm at the surface (0-6 inches) or 50 ppm on the vertical between 0.5 and 3.0 feet below the sediment-water interface, unless the site was surrounded by a minimum of four (4) other cores spaced around the acre surface centered on the high concentration site. Supplementary sampling should consist of four (4) sediment cores each to six (6) feet below the sediment-water interface with each taken at the midpoint (or some reasoned alternative) of the perimeter boundaries of a one acre square centered on the high concentration site. Each core should to be sectioned and analyzed to determine PCB concentrations over the vertical for the 0-6 inches, 0.5-3.0 feet, and 3.0-6.0 feet segments. These data will be compiled with concentrations on the 0-3 feet interval used for computation of the area weighted average (AWA) concentrations. The data detailing concentrations in the 3-6 feet layer would be retained for informational purposes.

RESPONSE 63: This approach will be considered in the development of the Sediment Delineation Sampling Work Plan during the remedial design.

COMMENT 64: Department Staff apparently propose to reject Riverkeeper's position statement as a reasonable way to proceed with additional sampling and PCB remediation in the Deepwater areas. Riverkeeper continues to believe that a more stringent action level below 50 ppm is necessary to protect the benthic community, and in turn, human health and safety. Dr. Bohlen advises that a lower threshold concentration of 10 ppm for the first six inches of sediment would greatly reduce the potential for the bio-accumulation of PCBs by the local marine biological community. *See* Exhibit 3. Dr. Bohlen's specification of the 10 ppm threshold is based on distributions of higher concentrations of PCBs residing below that level as shown in the May 2011 data set in the Revised Feasibility Study. If additional sampling shows that these distributions are very localized or that the deeper sediments contain lower concentrations, then leaving them in place *may* be justified. However, that conclusion cannot be made until a more substantive and robust discussion of the issue supported by data is presented.

RESPONSE 64: The Department has not rejected Riverkeeper's approach to additional sampling and remediation in deepwater areas. The Department will consult with the interested stakeholders after the additional sampling data is obtained.

COMMENT 65: First among the nine factors used in selecting a remedy for a site is the "Overall protectiveness of the public health and the environment." Indeed, the PRAP recognizes that "[t]o be selected, the remedy must be *protective of human health and the* environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable." In order to meet the PRAP's stated goal to "eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site," Riverkeeper believes that DEC

must consider and adequately study the feasibility of dredging in deepwater areas with a 10 ppm action level for the first six inches below surface ground. This includes additional sampling and study required to properly assess the mass of PCB concentrations. In fact, as DEC Staff explained in the January 26, 2012 Public Meeting, one of the key lessons learned from the GE Site remediation is to "fully characterize" the contamination. As per DEC's own guidance and experience, therefore, DEC is obligated to fully investigate the extent of contamination, which requires more than a superficial examination and testing of potentially contaminated areas.

RESPONSE 65: See Response 62 above. The Department and NYSDOH believe the selected remedy is protective of human health and the environment because it is unlikely for recreational users of the river to be exposed to site-related contaminants through the incidental ingestion of contaminated surface water and direct contact with contaminated sediments in the deepwater area, the primary human exposure pathway is through the consumption of contaminated fish tissue. One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. For specific advisories on fish consumption in this area please refer to NYSDOH's annual Health Advise on Eating Sportfish and Game.
http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/docs/advisory_booklet_2011.pdf

COMMENT 66: The ROD for OU-2 should describe the equipment or technology to be used for the in-water dredging activities. In discussing the proposed elements of the cleanup of the OU-2 portion of the site, the PRAP does not describe what types of technology or equipment will be used during the dredging activities. Section 375-1.8(a)(4) of the NYCRR provides that "Remedy selection at a site may consider the use of innovative technologies which are demonstrated to be feasible to meet the remediation requirements." The upriver dredging operations at the GE site provided for several technical advancements in dredging and re-suspension technologies. Even though the PRAP represents the initial stages of the design effort, it would be important to see the use of advanced technologies evaluated in the ROD and implemented at the Hastings site.

RESPONSE 66: In general there are two types of dredging technologies which are applicable to the Harbor at Hastings site. These include mechanical and hydraulic dredging equipment, both types of dredges will be evaluated during the design. Debris removal will be performed before sediment dredging begins.

COMMENT 67: The DEC should consider effects of flooding and sea level rise in its site design. The PRAP makes no mention of potential effects on OU-1 and OU-2 due to flooding of the adjoining upland portions of the site. Although some accommodation has been made in the preliminary OU-1 designs for expected long-term sea-level rise (accepting the Army Corps of Engineers' two-foot fill layer recommendation), there is also the matter of direct rainfall, storm surge and/or high river stage effects on OU-1 to consider. Over the past several years this area of the Hudson River has experienced several extreme storm events resulting in standing water on the site. In fact, as several local Hastings-on-Hudson residents attested to at the January 26, 2012 Public Meeting, the area around the Site has experienced several major flood events over the past several years, indicating a possible change in climate conditions and storm patterns that should be accounted for in DEC's evaluation and design. Depending on source, volume, and velocity, such waters have the potential to overwhelm proposed containment/treatment facilities and destabilize portions of the shoreline and/or groundcover. The displacement of any contaminants from these areas may in turn affect portions of the adjoining offshore. The ROD for OU-1 and OU-2 should include efforts to demonstrate the adequacy of proposed designs to effectively armor the site and minimize sensitivity to storm impacts.

RESPONSE 67: The Department shares the concerns expressed regarding the potential influence of climate change and rising sea level on the long-term effectiveness of the remedy to contain contamination during large storm events. The remedial design will consider future storm events and rising sea level that are likely to result in more intense storms, higher water events, and greater erosive forces on the site than have been documented in the past.

Eric Larson with ARCO submitted a letter dated March 9, 2012 which included the following comments:

COMMENT 68: We anticipate that remediation (both in OU-1 and in OU-2) may need to be coordinated with anticipated site redevelopment. While future uses of the site have not been resolved, we understand that Atlantic Richfield supports the concept of beneficial reuse of this site and anticipates working closely with the Village and other stakeholders in this regard. We would request that the ROD allow for some flexibility in design so that remediation does not unnecessarily impede redevelopment efforts while still maintaining environmental effectiveness.

RESPONSE 68: The Department agrees with this comment and will implement additional discussions to address issues and concerns with the Village and stakeholders while the remedial design proceeds. However, implementation of the remedy will not be delayed due to development-related issues.

COMMENT 69: Targeted Deepwater Dredging: In the October 2003 PRAP for OU-2, consistent with the scope of the RI work and data developed as part of the administrative record, NYSDEC did not propose to conduct any dredging in the deepwater area. Instead, the 2003 PRAP proposed a long term monitoring program for the deepwater area. Since that time, and consistent with the RI scope, there has been only limited additional analysis of the issues surrounding deepwater dredging as proposed in the current OU-2 PRAP. Silt curtains and other resuspension controls are unlikely to be feasible in this environment, nor are they likely to serve as effective barriers to the transport of resuspended sediments at these depths and flows. Therefore, any targeted dredging must balance the negative environmental consequences of resuspending contaminated sediment with the environmental benefits of conducting this dredging. These considerations weigh in favor of conducting limited targeted dredging for shallow (0-2 feet) hot spots (50 ppm or greater) in areas of scour that show a contiguous and concentrated pattern of sediment contamination. Consideration should be given to an alternative deepwater cleanup level at or below the 335 ppm Level of Protection screening criterion included in Table 3 of the PRAP.

We suggest that deepwater dredging of sediments deeper than about 2 feet, particularly in areas that do not appear to be subject to scour, does not provide an environmental benefit that outweighs the potential negative consequences associated with resuspension and transport of contaminated sediments. The deepwater areas identified in the PRAP on Figure 7 are generally consistent with this remediation approach and we do not believe additional dredging in other areas is warranted based on a review of the existing data and the multiple lines of evidence that suggest a consistently depositional environment. The current geometric weighted average concentration of PCBs in surface sediments is approximately 1.3 ppm for all areas outside the proposed deepwater dredge extents.

In this regard, we asked two reviewers, Dr. Michael Palermo and Dr. Victor Magar to review the proposed remedy with respect to the targeted deepwater dredging and we have attached their comments as well.

RESPONSE 69: The areas of targeted dredging in the deepwater areas will be further refined in the remedial design. The Department recognizes that standard silt curtains will not be effective in this environment. However, the Department does not want to predicate the means and methods of minimizing or reducing sediment resuspension in the deepwater areas. The dredging in the deepwater areas must balance the distribution of contaminants and the feasibility of removal. Therefore when additional sediment data is available from the deepwater areas the following factors will be considered: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, and 5) the duration of dredging required and associated potential for migration

of resuspended sediments, and 6) the area weighted surface concentration of PCBs.. The Department rejects using the PCB cleanup level of 335 ppm in the deepwater areas because it would protect the environment based only on acute toxicity to benthic organisms, and it is feasible to achieve a higher level of protection. The Department believes that the 50 ppm cleanup in targeted areas provides the best balance of the selection criteria given site specific conditions at the site.

COMMENT 70: Metals: Nearshore, Old Marina, North Boat Slip

The OU-2 PRAP proposes dredging sediments to depths of up to 6 feet below the current sediment surface in the nearshore area, Old Marina, and North Boat Slip. There appear to be several rationales for this dredging including: (a) removal of sediments exceeding the PCB remediation criteria; (b) removal of sediments exceeding the PRAP's selected metals criteria; and (c) the provision of sufficient depth to install backfill or a cap to isolate remaining contamination and/or protect against scour or erosion.

The metals remediation criteria selected in the PRAP do not reflect metals toxicity and are not indicative of ecological risk. Indeed, site related investigations into metals toxicity have demonstrated the absence of toxicity at levels much higher than the criteria established in the PRAP. Thus, this approach is not consistent with EPA policy and guidance regarding the evaluation of sediment toxicity and the selection of sediment remedies. For this reason, we do not support the metals criteria set forth in the PRAP. We asked Dr. Kenneth Jenkins to review the PRAP with respect to metals criteria, ecological risk, and evidence of site-related toxicity. We have attached his comments in that regard.

Although metals concentrations in sediments do not justify nearshore dredging up to 6 feet in depth as a general approach, we recognize that site-specific evidence suggests that there may be some benthic toxicity associated with copper concentrations in excess of 982 ug/l, in nearshore sediments if they were to become exposed to biota through inadequate separation. In these targeted areas, near two outfalls along the southern portion of the site, metals concentrations in sediment may support dredging sufficient to protect against scour and provide physical separation from biota.

In addition, as a practical matter, there may be other reasons why some of the proposed nearshore dredging may be appropriate for the ROD. For example, much of this dredging will also remove sediments contaminated with PCBs. For areas without PCB contamination, considerations of site-specific scour potential and the need to improve site-specific aquatic habitat depth could also support portions of the proposed dredging. For this reason, we would urge that the ROD provide for dredging of up to 6 feet in depth while allowing

some flexibility in remedial design to determine whether certain nearshore areas could be dredged to less than 6 feet in depth.

While returning sediments to pre-existing conditions to the extent feasible is an RAO, there may be little to no ecological benefit from the removal of metals above the remediation criteria set in the PRAP. As a result, short and long term impacts should be the primary consideration for the feasibility of additional dredging, and the ROD should provide some flexibility to reduce nearshore dredging depths during remedial design to minimize short and long term adverse impacts of dredging, particularly in areas where PCB contamination is absent while accounting for aquatic habitat depth, the integration of a sloped shoreline between OU-1 and OU-2, and other localized factors as may be appropriate.

RESPONSE 70: The metals remediation criteria in the PRAP are based on background concentrations of metals in the sediment. The use of a background concentration as a basis for cleanup concentrations is not based on toxicity but on the occurrence and concentration of the metals in the surrounding area. Toxicity testing conducted on the site was not sufficiently robust to develop a site-specific toxicity threshold. The dredging depth was established to allow for the feasible removal of contaminated sediments and the restoration of the river bed following the remediation. Actual dredge depth will be determined during design based on sampling that indicates the actual depth at which the sediments exceed the cleanup criteria. If other feasibility concerns arise during design, consideration will be given to adjusting dredging appropriately.

COMMENT 71: Capping and Backfilling in the Nearshore Area

The PRAP also proposes the use of backfill and/or capping materials in the nearshore area to protect against scour or erosion, to return the area to pre-dredge depths, and to provide isolation from remaining contamination. Regardless of whether the material is backfill or a cap, 6 feet of fill is not necessary to protect human health and the environment from any contamination that may remain. The analysis presented in the RFS indicated that 3 feet was sufficient. The need for anything more than engineered controls that provide physical separation or isolation is unnecessary. A cover of 6 feet far exceeds any cover necessary to provide separation or isolation of remaining contamination. It is also far more than necessary to provide a substrate for biological activity that would be protected from contact with site-related contaminants. We asked Dr. Danny Reible to review this issue, and we have attached his comments.

Further, in some cases, the requirement for up to 6 feet of backfill may impede the coordination of redevelopment and remediation. The ROD should provide flexibility for backfill/capping in the nearshore areas with between 2 and 6 feet of material and should allow both the full extent of the cap/backfill and

the type and nature of soils, sands, or gravels to be used will be determined in remedial design.

RESPONSE 71: Flexibility regarding backfill is provided for in the ROD. Other than the isolation capping layer, the specific substrate for backfill is not specified. Additionally, the remedy allows for a river flow and deposition study to consider allowing natural in-filling following dredging. As noted in the ROD the purpose of the backfill is to "isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer". Depending on dredging depth and location, replacement of riverbed materials with significantly less than what is removed during dredging would not meet all of these goals. See also Response 51.

COMMENT 72: Certain technical challenges have been deferred to design. Perhaps the most significant is whether resuspension/transport controls might be effective in deeper water to allow the expansion of the nearshore dredging area. We have conducted an initial investigation as part of the studies previously submitted to NYSDEC, which shows that the current limits established in the RFS and PRAP for the implementation of resuspension/transport controls are accurate. Our investigation indicates that there is no demonstrated feasible technology that would allow us to significantly expand the proposed dredging limits without creating a substantial risk of contaminant resuspension and transport. In fact, the limits proposed are at the outer edge of silt curtain effectiveness. Thus, consideration of any expansion of the nearshore area in the design phase is unwarranted. There is no compelling reason to treat this technical issue any differently than other technical issues where future improvements during the design process are always possible and are taken into account if and when they are identified.

In this regard, we asked Dr. Palermo to review this issue, and we have attached his comments as well.

RESPONSE 72: The comment is noted.

COMMENT 73: Long Term Monitoring of the Remedy

The RAOs selected in the PRAP are generic and not site-specific. This presents various potential issues including long term monitoring to evaluate the success of the remedy. In particular, the Hudson River (and particularly the lower Hudson) is a highly urbanized watershed that has been home to industry for over 150 years. As a result, the Hudson River has substantial, system-wide contamination that is not related to the Hastings site, including PCB and metals contamination. We note that concentrations of PCBs in Hudson River reference sediments upstream of the Site range from 1 ppm to 2.1 ppm in a background sample within the 0-2 foot interval. As a result, even with successful remediation, site sediments will eventually "equilibrate" with

urbanized background concentrations of PCBs, metals, and other pollutants, making the generic RAOs difficult to achieve. The presence of this background industrial contamination must therefore be taken into account in the design and implementation of a long term monitoring plan. Metrics like PCB concentrations in fish tissue, for example, which are more likely to reflect Hudson River conditions in general rather than site specific conditions, are not suitable for inclusion in a long term monitoring program.

We have attached the comments of Dr. Magar on this issue.

RESPONSE 73: The Department has used monitoring to discern different PCB source conditions in urban watersheds. These include PCB congener analysis; analysis of recently deposited surface sediment concentration; analysis of the source of the metals; and other techniques that have been used on other sediment remediation sites. The Department acknowledges that there are other sources of contamination that are unrelated the Harbor at Hastings site. The long-term monitoring plan described in the PRAP is expected to include the consideration of other industrial inputs in the river mainly through the use of baseline and reference sampling during monitoring. Previous data on the site indicated a local effect of increased PCBs in eels associated with the site. Since PCBs will remain in the river and the remedy will depend on engineering controls to prevent continued release of PCBs long-term monitoring of organisms in the river, including fish, is necessary to demonstrate the effectiveness of the remedy to decrease the site-specific influences on the local fish and therefore, must be retained as a component of the monitoring plan.

COMMENT 74: An expected schedule for the combined remedy in OU-1 and OU-2, exclusive of the regulatory process leading up to initiation of design, is included in the RFS. Note that the PRAP has added investigation and scope to the alternative recommended in the RFS.

RESPONSE 74: The Department understands and recognizes the added investigation and scope to the remedy will take additional time.

COMMENT 75: A transportation study regarding the handling of materials being brought into the site and leaving the site is specifically indicated in the RFS and will be part of the design process. The RFS assumptions provide a basis for comparison but do not limit the outcome of the transportation study.

RESPONSE 75: The comment is noted

COMMENT 76: Current Zoning and Uses. Portions of the site are no longer leased to other parties.

RESPONSE 76: The comment is noted and the ROD has been revised to reflect this.

COMMENT 77: Historical Uses. Wire manufacturing duration was much longer than the duration that manufacturing involving PCBs. PCBs were used in the manufacture of wire and cable only during the World War II period.

RESPONSE 77: The comment is noted and the ROD has been revised to clarify that PCBs were only used during a portion of the operation period.

COMMENT 78: Operable Units. This section describes "the site" as two operable units, however, in other sections OU-1 is described as "on site" while OU-2 is described as "off-site". The use of the word "site" in two different contexts is confusing. Note that there are some references to "on-site" within the document that specifically refer to OU-2. Also note that when the term "off-site" is used to reference OU-2 portions of the project the term should not reflect the status of ownership of said area.

RESPONSE 78: The Department acknowledges this comment.

COMMENT 79: Atlantic Richfield Company has in fact been participating in the site investigation and the remedy evaluation process for many years and voluntarily developed the feasibility study for OU-2.

RESPONSE 79: The comment is noted the ROD was revised to reflect ARCO's voluntary efforts in developing the remedy for the site.

COMMENT 80: Paragraph 6.3. It should be noted that specific fish advisories in the area of the site are primarily due to regional contamination issues and would remain in effect regardless of any remedial actions taken at this site.

RESPONSE 80: The Department acknowledges that certain contaminants in the fish tissue of certain species are attributable to regional contamination issues. However it is not clear whether for certain species, the fish advisory would remain regardless of remedial actions taken at the site.

COMMENT 81: Paragraph 6.4. Paragraph 6.1.2 states the contaminants of concern (COCs) as PCBs, copper, lead and zinc. Paragraph 6.4 re-states theses as the "primary" COCs for the site (previously defined as OU-1) and then describes a different list of COCs related to OU-1. Clarifying the terminology would assist understanding.

RESPONSE 81: As stated in Exhibit A, primary contaminants of concern are those that drive the remedy. The COCs for OU1 and OU2 are slightly different because beryllium was found in OU1 soils but was not found in OU2.

COMMENT 82: Paragraph 6.4. "Metals in sediment pose a toxicity threat to benthic organisms," Multiple investigations previously conducted indicate that

toxicity levels are significantly higher background. We have attached Dr. Jenkins' comments on this issue.

RESPONSE 82: The metals remediation criteria in the PRAP are based on background concentrations of metals in the sediment. The use of a background concentration as a basis for cleanup concentrations is not based on toxicity but on the occurrence and concentration of the metals in the surrounding area. Toxicity testing conducted on the site was determined to be not sufficiently robust to develop a site-specific toxicity threshold.

COMMENT 83: Paragraph 6.5. The RAOs assigned in the PRAP are generic and not Site-Specific. Due to the regional contamination issues, achievement of the specific objectives listed, especially for surface water, are not controlled by the site conditions. We have attached Dr. Magar's comments on this issue.

RESPONSE 83: The comment is noted. However, the surface water contributions from the site will be controlled by the remedy. Baseline and long term monitoring will be implemented to determine the effectiveness of the remedy.

COMMENT 84: Paragraph 1. The reference to the "FS" is presumed to be to the 2011 Revised Feasibility Study (RFS).

RESPONSE 84: The comment is correct.

COMMENT 85: Element 2. The Dense Non-Aqueous Phase Liquid (DNAPL) observed in OU-1 consists of approximately 30-40% PCBs dissolved in a solvent. The DNAPL occupies the void space within the existing fill otherwise occupied by water. The Revised Feasibility Study (2011) used the term "DNAPL" or Liquid PCB Material. Liquid PCBs were not used in the manufacturing process and have not been observed in OU-1 or OU-2. During the World War II era, PCBs were delivered to the site in the form of powder and then mixed with a solvent on site before application in the manufacturing process as a viscous cable coating for certain shipboard cables made for the United States Navy. This war time use of PCBs is the only known manufacturing use of PCBs in cable production at the site.

RESPONSE 85: The comment is noted and the ROD was revised to eliminate references to "liquid PCBs" in favor of "Liquid PCB Material".

COMMENT 86: Element 5. Text variations within the PRAP resulted in inconsistencies with respect to the proposed dredge in the Nearshore and Backwater areas. NYSDEC has prescribed specific areas of potential/anticipated additional dredging in the Old Marina and North Boat Slip that would be in addition to those described in Alternative 6 as shown on the PRAP Figure 7. This additional dredge scope is consistent with the description of the modified Alternative 6 found in exhibit B which states that "This alternative has been

modified from the alternative developed in the FS to include additional dredging in deepwater, old marina, and north boat slip areas, as shown on Figure 7." And goes on to explain that "This approach would dredge sediments in targeted areas which contain the most highly impacted sediment for PCB and metals and therefore presents a greater sediment volume than the original Alternative 6." To be consistent with the Exhibit B description and Figure 7, along with the associated volume and cost estimate presented in the PRAP, the description of the proposed remedy in this section should include a more precise description of the dredging limits required to satisfy the remedial goals. For example: "Removal of Nearshore and targeted Backwater sediment and fill..."
An updated figure titled Plan View Modified Alternative 6 (attached) shows the dredge extents proposed for Alternative 6 along with the additional areas delineated in Figure 7 of the PRAP. This would represent the anticipated dredge extents for the modified alternative 6 that was recommended in the PRAP.

RESPONSE 86: The removal of sediment from the Backwater areas falls under the existing remedy component for sediment removal where silt curtains may be feasibly installed in less than 15 feet of water. The additional dredging scope was explicitly added to the alternative description in Exhibit B to clearly distinguish the PRAP alternative from the similar alternative developed in the FS.

COMMENT 87: Element 6. The requirement for evaluation of alternative resuspension control designs is open ended. In order to maintain a reasonable project schedule, the extent of the evaluation should be limited to the current standard or proven practice for similar settings at the time the evaluation is conducted. As noted in the introduction of these comments, no feasible alternatives or proven technologies that would be appropriate for the existing river conditions were identified in the RFS process based on our contact with a supplier of mobile silt curtains. We have attached Dr. Palermo's comments on this issue.

RESPONSE 87: The Department agrees that a limited evaluation will be performed regarding alternative resuspension control designs in the deepwater areas. This will include current standard or proven applications in similar settings.

COMMENT 88: Element 7. We do not believe that additional sampling is required in the deepwater area because the data collected to date indicates a high degree of heterogeneity with average concentrations near background. The average surface sediment concentration of PCBs is 1.3 ppm outside of the currently proposed deepwater dredge areas which suggests that contamination is neither contiguous nor concentrated and that the distribution of the relatively few exceedances of 50 ppm are not significant or that dredging would be warranted in light of the negative short and long term impacts associated with dredging in these water depths. If additional sampling is included in the ROD,

it should be limited to delineating areas as shown on Figure 7 of the PRAP and where existing data indicates the potential need for targeted dredging. We have attached Dr. Magar's comments on this issue.

RESPONSE 88: The Department will require additional sediment sampling to determine the distribution of PCB sediments in the deepwater areas to delineate areas to be dredged. This comment is also addressed in Responses 24, 58, 60, 61, 62 and 69.

COMMENT 89: Element 9. Not all elements of an "isolation" cap as defined by the PRAP are necessary at all locations where remaining contamination is above background concentrations. The ROD should allow for the selection of backfill material and capping components to accommodate design for factors including erosion protection requirements (i.e. riprap) and residual contamination as well as provide flexibility for equivalent methods for chemical isolation and habitat creation. For example, areas subject to high erosion forces would require riprap or other appropriate erosion protection at the surface and would not allow for the placement and retention of a 24 inch habitat layer of fine grained silt. Additionally, the migration of divalent metals (including copper) from pore water is improbable and would not require a sand isolation layer in addition to the backfill. We have attached Dr. Reible's comments on this issue. Note that: It is known that this reach of the river has levels of total organic carbon (TOC) with a range of 2.2 – 3.2% (Llansó and Southerland, 2006). This range is considerably elevated compared to other sediment samples obtained from the Hudson (Llansó, R.J. and Southerland, M., 2006). In estuarine/marine systems, copper (Seligman and Zirino, 1998; 2002; Rivera-Duarte, 2006) and other metals (Di Toro et al., 2005;) are known to bind strongly to organic carbon and will be retained even under fairly rigorous extraction procedures (Daminouka and Katsiri, 2009). The likelihood of metals, particularly copper, desorbing from organic ligands in OU-2 sediment is therefore negligible. Previous studies that measured the capacity of naturally occurring sulfides (S-2) to bind divalent metals in both sediment grabs and cores showed that the vast majority of samples had concentrations of S-2 that were greatly in excess of the amount of metals that could be simultaneously extracted with acid (and therefore not bioavailable). Based on equilibrium partitioning sediment benchmarks derived for the protection of benthic organisms to metal mixtures, these levels of sulfides will afford considerable excess binding capacity of any freely dissolved divalent metals in pore water. In addition to this, the placement of backfill would inhibit overlying oxygen in the water column from diffusing into the naturally occurring sediment and therefore encourage anaerobic conditions which, in turn, will stimulate the generation of S-2. The latter would bind to divalent metals, rendering them immobile. Remedial design will consider backfill material and composition for factors including erosion protection requirements (i.e. riprap) and residual contamination concentrations. The ROD should provide flexible language similar the language in the OU-1 ROD

Amendment "The habitat/surface substrate layer will be designed to restore …"

RESPONSE 89: The PRAP identified isolation capping material, but did not specify the specific substrate that should be used for the site backfill. The substrates to be used for restoration will be determined during design and the substrates can vary depending on location in the River.

COMMENT 90: Element 11.a. It is presumed that the phrase "remain in place" with respect to the sediment containment system does not include the habitat layer but rather is intended to ensure that the erosion protection and isolation layers remain in place and are effective.

RESPONSE 90: The comment is correct and is intended for the erosion protection and isolation layers to remain in place. In addition, the habitat layer will be designed to remain in place.

COMMENT 91: Element 11.a.i. The term Northwest Area is introduced in this paragraph and is not defined or shown on the figures. For the purposes of OU-2, it is presumed that this restriction applies to the Northwest Extension Area ("NEA") as defined in the PRAP. Restrictions on the currently existing land in OU-1 are addressed in the OU-1 Proposed ROD Modification.

RESPONSE 91: This element was revised in the ROD to read "Northwest Extension Area", which is located in Operable Unit 2.

COMMENT 92: Element 11.b. After remediation is complete, surface sediments and biota will continue to be affected over time by regional Hudson River contamination that is not associated with the Site, including regional PCB contamination. As a result, it is probable that neither (a) future monitoring of the presence and concentrations of contaminants in surficial sediment nor (b) future monitoring of fish and other migratory species tissue concentrations, or other biologic metrics will provide reliable indicators of the performance of the site remedy. Because these types of monitoring metrics cannot reliably distinguish between local site-related issues and regional contamination, any monitoring program should focus on other parameters, such as bathymetric analysis, to provide information about performance of the remedy. The ROD should provide for sufficient flexibility in the design of a long term monitoring program to allow for these issues to be evaluated during remedial design.
For example, one approach to be considered is evaluating restoration of remediated areas by monitoring for re-colonization by native invertebrate communities. Re-colonization should be weighted more heavily as a monitoring metric than biotic tissue concentrations because of known and ongoing PCB flux from upstream sources and ongoing remediation. Similarly, if re-colonization occurs, benthic macroinvertebrate body burdens should be considered as a more reliable line of evidence for potential site-

related contributions of PCB to biota than would tissue concentrations of other aquatic species. However, benthic macroinvertebrate data would need to be evaluated in the context of sediment and porewater vertical profiles and any protocol for such evaluation must take into account the potential for post-remediation contamination of surficial sediments through deposition from regional non-site related sources.
Fish tissue PCB concentrations should not be considered for monitoring remedy effectiveness because of the conditions throughout the river.
Surface water quality compliance is difficult to measure at the SCG (0.001 parts per trillion). Surface water measurements are potentially confounded by inclusion of suspended particles, which may emanate from multiple sources, including sources unrelated to the site. An apparent absence of migration of site contaminants through porewater to surface water should preclude the need for monitoring biotic tissue, recognizing that the potential tissue concentrations to be influenced by other in-river sources. We have attached Dr. Magar's comments on this issue.

RESPONSE 92: The Department disagrees with the comment regarding the ability of the long term monitoring to be able to distinguish between the site specific PCB sources and those unrelated to the site. Fish tissue samples have been analyzed previously in areas adjacent to the site and have shown site specific influences from the site. The results are reported in the Department's report *1999 As A Special Spatial Year For PCBs in Hudson River Fish*, May 2002.

COMMENT 93: Element 11.b.i and 11.b.ii. The specific baseline and long-term sampling requirements should be developed during design and should consider methods that would provide reliable conclusions that consider regional contamination impacts. We have attached Dr. Magar's comments on this issue.

RESPONSE 93: The Department agrees with the comment that baseline and long-term monitoring should consider methods that would provide reliable conclusions that consider regional contamination impacts.

COMMENT 94: Element 11.c.ii. Regarding "maintaining site access controls", there are no site access controls currently in place for OU-2. A perimeter fence exists in OU-1 along the shore but will be removed as part of the OU-1 remedy implementation.

RESPONSE 94: The comment is noted and the ROD has been revised to reflect this understanding.

COMMENT 95: Page 2. Note that OU-2 samples containing PCB Material have only observed Semi-Solid or Trace PCB Material. No DNAPL has been observed in sediment samples.

RESPONSE 95: The Department does not disagree with the comment that no liquid PCB material have been observed in sediment samples, however the investigation of sediments beneath the rip rap slope has been limited by the inability to obtain samples.

COMMENT 96: Page 3. Surface Water data as summarized on page 3 and in Table 1 requires additional analysis since the conclusions presented are not consistent with other data. Specifically: PCBs; We do not agree with the PRAP's conclusion regarding Surface Water that the degree of chlorination "…results suggest that the Site is the source of PCB contamination in the Hudson River." Any conclusions regarding the source of PCBs within a regional water system like the Hudson River, where there are multiple sources, must be carefully analyzed based on the weight of evidence. For example, while PCBs may be present in samples taken from different locations, sampling results may show differing congener patters, differing degrees of chlorination, or different weathering patterns each of which must be accounted for in attempting to correlate any result to a particular "source." Once in the environment the composition of PCBs changes over time due to various physicochemical properties and biological processes: vapor pressure, solubility, octanol-water partitioning, adsorption, and biodegradation. As the number of chlorine atoms increases, both vapor pressure and water solubility decrease, while adsorption and the octanol-water partitioning coefficient increase. Dechlorination of PCBs occurs primarily through aerobic and anaerobic microbial degradation. Aerobic bacteria preferentially dechlorinate less-chlorinated PCBs resulting in an increase in the degree of chlorination residual over time (i.e., within decades a less chlorinated Aroclor will look more like a more chlorinated Aroclor). Anaerobic bacteria preferentially dechlorinate more highly chlorinated PCBs, mainly by replacement of meta and para positioned chlorine atoms with hydrogen atoms, resulting in predominately ortho substituted mono- through tetra-chlorobiphenyls (i.e., a more chlorinated Aroclor will look more like a less chlorinated Aroclor over time). Additionally, less-chlorinated PCB congeners are less persistent in the environment due to volatilization and solubility; more-chlorinated PCBs are more persistent in the environment due to adsorption. Therefore, over time, under common sediment conditions, an initial release of a less chlorinated Aroclor will often subsequently "weather" in the environment such that sediment samples will present as a more chlorinated Aroclor in laboratory analyses. In summary, the composition of an original PCB mixture released to the environment can be expected to change due to a combination of the processes mentioned above. Therefore, any attempt to determine the source of the PCBs or Aroclors identified in an environmental sample must be approached with caution. Furthermore, Hudson River PCB concentrations show that surface water sample concentrations sampled at the Site are consistent with background concentrations based on all sample locations from 1975 through 2007, summarized in the Injury Determination Report Hudson River Surface Water Resources, Hudson River Natural Resource Damage

Assessment. In addition, surface water PCB concentrations show significantly higher PCB concentrations at upstream sampling locations. Site concentrations show Site levels are consistent with sampling locations immediately upstream and immediately downstream. Therefore, Site surface water PCB concentrations are at, and in most cases below, background PCB levels which suggests that the Site is not a significant contributor of PCBs to the Hudson River. Also note that Site PCB data reports the concentrations of PCBs as Aroclors, whereas the recent NYSDEC results reports the concentrations of PCBs as congeners. During performance studies conducted by EPA for the development of EPA Method 8082, the concentrations determined as Aroclors were larger than those obtained using the congener method, which suggests that Site PCB concentrations reported as Aroclors may be biased high. It should also be considered that, based on initial hydraulic calculations, the pore water volume exiting the site is a small fraction of the surface water and would not be capable of significantly changing the surface water concentrations from background or impacting surface water to the levels indicated in the samples presented within the PRAP. It is unclear if adequate precautions were taken to acquire samples at a location where interference from bottom sediments were eliminated to avoid samples results that were biased high.

RESPONSE 96: The comment is noted.

COMMENT 97: Lead; We do not agree with the conclusion that "The primary surface water contaminants are…lead associated with historical manufacturing and disposal at the site." Based on Gibbs (1994), total suspended sediment concentrations 1 meter above the river bottom increased from approximately 10 mg/kg at the ocean (Varrazano Narrows Bridge, ~45-50 km downstream) to 140 mg/kg in the middle of Haverstraw Bay (~25 km upstream). This work also demonstrated that suspended sediments have metal concentrations much higher (2 to 3 orders of magnitude) than bottom sediments. Site, total and dissolved, lead porewater concentrations as shown in Appendix C of the Field Work Summary Report for Fall 2004 Atlantic Richfield Supplemental Offshore Investigation Former Anaconda Plant Site Operable Unit No. 2 report were reviewed. For the 18 samples collected, all dissolved lead concentrations ranged from non-detect (<0.24 ug/L) to 1.9 µg/L, well below the SCG lead value of 8 µg/L. The total pore water lead concentration averaged 4.7 µg/L and ranged from 0.5 µg/L to 13.2 µg/L; only one sample, which measured 13.2 µg/L lead and was collected in one area south of the south boat slip, exceeded the SCG lead value of 8 µg/L. Given the low Site pore water lead concentrations and the study performed by Gibbs, demonstrating an increase in suspended sediments concentration and associated metals concentration further upstream, one can conclude that the Site is not a significant contributor of lead to the Hudson River.

RESPONSE 97: The Department has a different interpretation of the article by Gibbs. The suspended sediment concentrations measured in the water column for lead will be different from the lead concentration measured in the sediment next to the site. The Department maintains that the lead concentrations found in the sediments near the site are primarily from Harbor at Hastings source areas in OU1, which were identified and found to be related to the former manufacturing and direct discharges into the Hudson River.

COMMENT 98: Page 4. Movement of PCB Material as DNAPL through the fill in OU-1 has historically occurred vertically and, to a limited extent, horizontally along the interface with the Marine Silt. It appears that there has been some historical movement of DNAPL along the Marine Silt interface near the boundary between OU-1 and OU-2. However, there are also other transport mechanisms by which PCBs were likely deposited in OU-2. For example, PCB Material was likely associated with the outfalls of pipes associated with Building 52 and other manufacturing operations on OU-1. In addition, historic activities such as the mixing of PCB manufacturing ingredients along the Northwest Corner may have resulted in the overland transport of PCBs to the River, and other historic activities along the old dock and pier structures may also have resulted in PCB deposition in river sediments. Finally, prior to the installation of the IRM in the northwest corner, PCB contaminated soils may have washed or eroded from the upland surface soils.

RESPONSE 98: The comment is noted and the ROD has been revised accordingly.

COMMENT 99: Page 4, "Screening Criteria for Metals". As noted in the RFS, the ER-L and ER-M values do not account for site-specific conditions. These values are typically used to initially identify contaminated sediment. As stated in the 1999 NYSDEC Technical Guidance for Screening Contaminated Sediments, "Once a sediment has been identified as contaminated, a site-specific evaluation procedure must be employed to quantify the level of risk, establish remediation goals, and determine the appropriate risk management actions. The site-specific evaluation might include for example: additional chemical testing; sediment toxicity testing; or sediment bioaccumulation tests". If criteria are exceeded then sediment contamination is quantified, evaluated with respect to exposure to biota and the significance of exceedances are described in terms of the predicted effects. The guidance also states that "If sediment concentrations of a compound are less than all of the sediment criteria for that substance, aquatic resources can be considered to be not at risk (from that compound)." Given this procedure for evaluating sediments, if the sediment is not considered or shown to be a risk, then remedial action is not necessary. A discussion of previous studies and standard practices is provided hereafter as it pertains to toxicity evaluation of metals in sediment.
The biogeochemistry of sediments influences environmental risk for metals contaminants more than for any other category of environmental contaminants. The PRAP includes provisions for remedial goals based on

background, or ambient concentrations of metals in sediments. Based on empirical evidence and relevant site characteristics, metals in OU-2 sediments are expected to pose no risk to human health or the environment at concentrations much greater than background or ambient concentrations. The proper evaluation of environmental risks caused by sediment contamination typically requires the evaluation of three lines-of-evidence: bulk sediment chemistry, sediment toxicity, and the native benthic invertebrate community. These three lines of evidence (LOEs) (often referred to as a Sediment Quality Triad or SQT) are then evaluated relative to a background or 'reference' area(s), to make an overall conclusion (i.e. a 'weight-of-evidence' or WOE) about risks that contaminated sediments pose to ecological receptors.

Accordingly, remedial goals should consider actual risks to human health and the environment associated with sediment, acknowledging that background conditions may constrain the levels to which cleanup can be sustained. Because of the many factors governing the potential toxicity of metals in sediments, sediment quality values (SQVs) are particularly suspect for metals, and therefore inadequate for basing remedial action decisions without supporting lines of evidence. If toxicity and benthic community results were to reflect an absence of chemical affect on the sediment habitat, metals concentrations exceeding SQVs should not be given greater weight than the other biological lines of evidence. Studies within OU-2 (e.g., Llansó and Southerland, 2006; BB&L, 2006) have identified conditions that indicate a reduction in both the surface sediment concentrations and potential risks of divalent metals (and also PCBs) in the biologically active sediment zone, including:

Deposition of sediments at background concentrations: the OU-2 reach adjacent to the site is "depositional," accumulating suspended sediment from upstream sources (~1 inch/year based on the RI). Ongoing deposition has resulted in levels of constituents of potential concern (CPOCs) that are near background conditions.

Elevated TOC: levels of total organic carbon are greater than most Hudson River reaches (recent data suggests an average of 2.96%), which aids in binding contaminants in sediments, reducing bioavailability to invertebrates and fish; and

Strongly reducing conditions in sediment and a marked excess of acid-volatile (AVS): both contribute to limit or eliminate metals bioavailability - no benthic toxicity is predicted for this type of sediment per the USEPA metals mixtures guidance and should be taken into consideration at this site.

It should also be noted that non-chemical stressors at OU-2 likely affect the benthic community more than site-related COPCs. The degraded conditions at 'reference' locations support this conclusion (e.g., at Greystone.) Also note that the native benthic communities are similar at locations upstream and downstream of OU-2.

It is important that metrics that consider the above lines of evidence be included as a component of remedy selection activities. We have attached Dr. Jenkin's comments on this issue.

RESPONSE 99: This statement is not an accurate summary of the sediment criteria. The criteria indicate a need for analysis of potential toxicity is necessary if the criteria are exceeded. A lack of appropriate investigation cannot be used as a basis to assume the lack of risk from exceedance of the criteria. Toxicity and AVS/SEM testing at this site were not sufficiently robust to determine a site-specific toxicity threshold. Therefore, there has been no demonstration that site-specific factors are ameliorating the expected effects associated with metals concentrations above the sediment criteria.

COMMENT 100: Page 4 "Background Contamination" We note that Site Specific Background Values attributed to our site are similar to background values identified in the TAPPAN ZEE HUDSON RIVER CROSSING PROJECT Draft Environmental Impact Statement. The 95th Percentile concentrations for the 313 samples analyzed for the Tappan Zee Bridge were similar to the background samples selected for OU-2. This data shows that the concentrations upriver of OU-2 were much higher than background in some locations:
Copper 1,550 ppm
Lead 604 ppm
Zinc 399 ppm
PCBs 1.2 ppm

RESPONSE 100: The comment is noted. The Department also notes that the cited values are the maximum values of the Tappan Zee DEIS data set, and may have been taken from a distinct source area that does not represent the potential for remediated sediments to be recontaminated.

COMMENT 101: Table 1. The text indicates the maximum detection was 62.4 ppt, the table indicates 57.0 ppt.

RESPONSE 101: The correction was made in the ROD.

COMMENT 102: Table 2 footnotes, last sentence. "If only the ER-L is impacted …" should read " If only the ER-L is exceeded …"

RESPONSE 102: The correction was made in the ROD.

COMMENT 103: Table 3. Note that a site-specific organic carbon content of 2.96% was measured in more recent investigations which would raise the site-specific screening criteria applicable to this project.

RESPONSE 103: The Department used the organic carbon content value of 2.43% which represents all the reported values including the more recent investigations.

COMMENT 104: Northwest Extension Area. The term "sealed sheet pile wall" is presumed to mean a sheet pile wall with sealed joints as described in the RFS.

RESPONSE 104: Yes.

COMMENT 105: Alternative 6. Clarification. The text refers to "site-specific cleanup goals" in Table 2. Based on Figure 2 it appears that the 95th percentile value in the column labeled "Site Derived Value" in Table 2 is the reference. The ROD should explicitly state the Site-specific Cleanup Levels. The values stated by NYSDEC during the Public Meeting were as follows:
Copper 129 ppm
Lead 132 ppm
Zinc 234 ppm

RESPONSE 105: Footnote c of Table 2 indicates that the site-derived cleanup values are the range of the 90^{th} to 95^{th} percentile values of the background data set.

COMMENT 106: The reference in the first paragraph to Section 7.2 is presumed to be a reference to Section 7 of the PRAP.

RESPONSE 106: The correction is noted and incorporated into the ROD.

COMMENT 107: Basis for Selection, 2nd paragraph, 5th line. Regarding the statement that "Dredging to a depth of 6 feet removes sediment that has the potential to be scoured and migrate." The preceding sentence implies this statement is applicable to both nearshore and backwater areas. In the backwater areas, the natural deposition cited in other sections does not indicate that scour is likely to a depth of 6 feet. Preliminary estimates do not indicate that scour in the nearshore would reach 6 feet and wherever dredging and backfill occurs the backfill will be designed for the river conditions, therefore, dredge to 6 feet is not required to eliminate the potential for scour of contaminated sediment. We have attached Dr. Reible's comments on this issue.

RESPONSE 107: The comment is noted and the ROD is modified to include additional language to justify the removal of sediments to 6 feet. The decision to select the 6 feet is based on the removal of sediment to pre-release conditions to the extent feasible, consistent with the remainder of the site.

COMMENT 108: Criteria 1. The correct increased cost for Alternative 9 is $140 million.

RESPONSE 108: The correction was made in the ROD

COMMENT 109: Figure A. The areas identified as Northwest Off-shore and On-shore Area are presumed to be the Northwest Corner Off-shore and On-shore Areas.

RESPONSE 109: The correction was made in the ROD

COMMENT 110: Note that Atlantic Richfield Company has not declined to implement a remedial program as stated.

RESPONSE 110: The OU1 ROD Amendment is modified to reflect that ARCO has agreed to implement the OU1 remedial program. The OU2 ROD was revised to state that the PRPs for the site declined to implement the remedial investigation and feasibility study portion of the remedial program for OU2 when first requested by the Department. Since 2003 the PRPs have voluntarily performed additional investigations and submitted work plans and reports which include a feasibility study to advance the remedial program.

COMMENT 111: Paragraph 6.1.2. The DNAPL is a PCB mixture, not liquid PCBs. Only Semi-Solid and Trace PCB Material has been observed in sediment. The potential presence of DNAPL (i.e. Liquid PCB Material) beneath the rip-rap has been assumed by NYSDEC but has not yet been confirmed.

RESPONSE111: The comment is correct concerning the Department's expectation of the presence of Liquid PCB Material beneath the rip-rap based on the finding of this material in close proximity to the shoreline. Further delineation will be performed in this area to verify this expectation.

COMMENT 112: Paragraph 6.4. It should be noted that beryllium in groundwater was only slightly exceeded in one out of twenty samples and was non-detect in 20 pore water samples collected during the 2005 OU-2 sampling event. Existing conditions do not suggest the need to include beryllium in long term monitoring plans.

RESPONSE 112: The Department believes that beryllium should be included as a baseline monitoring parameter in the long term monitoring plan. If it is not detected, the monitoring plan may be revised to omit it.

COMMENT 113: Paragraph 6.4. It should be noted that PCBs in groundwater are limited by the extremely low solubility of site-specific Aroclors that are associated with the DNAPL and the mobility of local concentrations is restricted by other site factors including organic content of the soil.

RESPONSE 113: The statements in the comment are accurate, however, PCBs have been detected in unfiltered groundwater samples at the site which exceed the Department's ambient groundwater standards. The selected remedy is intended to prevent contaminated groundwater from leaving the site, and monitoring will be performed to identify PCB concentrations in groundwater.

COMMENT 114: Paragraph 7.2. As previously noted, the presence of Liquid PCB Material off-shore has not been confirmed. Semi-Solid PCB Material has been observed but "PCB DNAPL" has not been "found beneath the river".

RESPONSE 114: See Response #111

COMMENT 115: Paragraph 7.3. Since the westward extent of the DNAPL is unconfirmed, we believe that once the area is accessible during construction, delineation should precede installation of recovery wells.

RESPONSE 115: The Department agrees that delineation of PCB/ DNAPL will precede installation of recovery wells.

COMMENT 116: Paragraph 7.3. The sentence "The containment element for the Northwest On-Site Contamination (formerly identified as the Northwest Corner and Northern Shoreline Area)..." uses an undefined Northwest On-site Contamination term. It is presumed that this statement should be as follows "The containment element for the northwest on-site contamination (formerly identified within the Northwest Corner and Northern Shoreline Area)..."

RESPONSE 116: The comment is correct and the change will be incorporated into the ROD Amendment.

COMMENT 117: Element 2. Note that one of the "additional scope" items referred to in Section 8, Paragraph 7 is an expansion of the extent of excavation (and therefore the areas) in the Northwest Corner and Northern Shoreline areas (see Figure 2 comment below).

RESPONSE 117: The Department acknowledges this increased scope based on the additional information gathered during the pre-design investigations. Although the excavation criteria have not changed, the increased extent will be noted in the ROD Amendment.

COMMENT 118: Element 5. The term "sealed sheet pile wall" is presumed to mean a sheet pile wall with sealed joints as described in the RFS.

RESPONSE 118: Agreed.

COMMENT 119: Element 6. We propose the ROD incorporate the flexibility to accommodate constructability limitations, e.g. "eliminate to the extent practicable any additional fill material…"

RESPONSE 119: The Department agrees with the concept of maintaining flexibility to accommodate constructability limitations during remedial design. There will likely be modifications to the remedial design which were not anticipated at

the issuance of the Record of Decision. These will be documented and addressed on a case by case basis and the Department will follow its guidance and policy regarding such modifications.

COMMENT 120: Element 7. Operation of recovery systems should be continued only as long as recoverable DNAPL is observed.

RESPONSE 120: The shutdown criteria for recovery of DNAPL will be identified in the Site Management Plan. Recoverable DNAPL will be defined and provisions will be included which identify periodic monitoring to determine if the shutdown criteria is acceptable or additional recovery is necessary.

COMMENT 121: Element 10.bi. Groundwater quality and elevation monitoring does not provide data regarding the remedy performance and should not be required for such purposes. The compliance monitoring in Paragraph 10.c.i would provide the required data.

RESPONSE 121: The Department disagrees with the comment. Groundwater quality and elevation monitoring will be needed to evaluate the remedy performance and evaluate any corrective measures needed should they arise in the future. The Department is willing to evaluate and reduce the frequency based on the results obtained.

COMMENT 122: Element 10.b. Consideration should be given to regional contamination when establishing long term monitoring and criteria for groundwater discharged from the Northwest Extension Area. Groundwater treatment may not be necessary based on the extremely low solubility of site-specific Aroclors that are associated with the DNAPL and their concentrations relative to background surface water contamination.

RESPONSE 122: The PCB groundwater results will be evaluated and used to determine appropriate treatment of groundwater. The PCB groundwater results from the site indicate that levels exceed New York State Ambient Groundwater Standards.

COMMENT 123: Element 10.b.iv is presumed to be part of the previous bullet.

RESPONSE 123: The correction was made in the ROD

COMMENT 124: Figure 2. An updated version of Figure 2 that has been updated for the new data and uses the nomenclature in the text of the proposed modification is attached.

RESPONSE 124: The revised figure will be included.

APPENDIX B

Administrative Record

Administrative Record

Harbor at Hastings
Operable Unit No. 2
State Superfund Project
Village of Hastings on Hudson, Westchester County, New York
Site No. 360022

1. Proposed Remedial Action Plan for the Harbor at Hastings site, Operable Unit No. 2, dated October 2003, prepared by the Department

2. Proposed Remedial Action Plan for the Harbor at Hastings site, Operable Unit No. 2, dated January 2012, prepared by the Department

3. Referral Memorandum dated August 16, 1999 for Harbor at Hastings site, Operable Unit No. 2.

4. RI/FS Work Plan, Work Assignment No. D003821-15

5. Remedial Investigation Report, Harbor at Hastings (OU#2), Site 3-60-022, Earth Tech, December 2000

6. Mariniello Cove Sediment Sample Results, NYSDEC November 11, 2001

7. Final Feasibility Study Report, Harbor at Hastings (OU#2), Site 3-60-022, March 2003

8. Public Meeting Transcript for Remedial Actions Proposed for the Harbor at Hastings Site, Operable units #1 and #2, November 19, 2003

9. Supplemental Feasibility Study Report for Operable Unit No. 2, Parsons, April 2006

10. Revised Feasibility Study OU2, Former Anaconda Wire and Cable Company Site, NYSDEC Site # 3-60-22, Haley & Aldrich, October 31, 2012

11. Letter dated March 22, 2005 from Dave Kalet of ARCO regarding, Request to Initiate Technical Dialogue and for Additional DEC Information

12. Letter dated May 10, 2005 from Dave Kalet of ARCO regarding Additional AVS/SEM Information

13. Letter dated June 8, 2005 from George Heitzman of NYSDEC to Dave Kalet regarding Equilibrium Partitioning Sediment Benchmarks

14. Letter dated August 4, 2005 from Dave Kalet of ARCO regarding Use of Equilibrium Partitioning Sediment Benchmarks Methodology

15. Letter dated September 26, 2005 from George Heitzman of NYSDEC to Joseph Sontchi regarding Equilibrium Partitioning Sediment Benchmark

16. Letter dated October 14, 2005 from Dave Kalet of ARCO regarding Application of Equilibrium Partitioning Sediment Benchmarks Methodology to OU-2

17. Letter dated March 12, 2009 from William Ports of NYSDEC to Dave Kalet regarding Equilibrium Partitioning Sediment Benchmark

18. Letter dated February 1, 2012 from Jacques Padawer, Ph. D

19. Letter dated February 29, 2012 from Jeremiah Quinlan, Village of Hastings-on-Hudson Trustee

20. Letter dated March 9, 2012 from Eric Larson of Atlantic Richfield Corporation, including attachments

21. Letter dated March 9, 2012 Ms. Eileen Bedell, owner of the Hudson Valley Health & Tennis Club, including attachment

22. Letter dated March 12, 2012 from Daniel E. Estrin and Justin Davidson of the Pace Environmental Litigation Clinic, Inc. representing Riverkeeper, Inc., including Exhibits

APPENDIX D

RFS Appendices (Select Reports)

HALEY ALDRICH

RFS APPENDIX B – SHORELINE PROTECTION

HALEY ALDRICH

This appendix outlines the steps taken to calculate preliminary wind-generated wave heights and to use those wave heights to perform preliminary rip-rap sizing calculations. The Coastal Engineering Manual (CEM) Part II, July 2003 was used as a design guideline for wave prediction and rip-rap sizing. Included in this appendix are the assumptions, methods, and selection of variables for wind data interpretation, wave height calculation, and rip-rap sizing calculations.

Wind Data Interpretation

Wind data was gathered from different sources to develop reasonable wind conditions with which to calculate wave height. Prominent wind directions were established by examining wind rose plots produced by the Natural Resources Conservation Service (NRCS) Station #94728 – New York, NY). NRCS produced monthly wind rose plots which display wind direction and speed as a percentage of each month's time. The plots contain data spanning from 1961 to 1990. Wind speeds were taken from the New York State Building Code: Section 1609 – Wind Loads. See Attachment B.3-1 for the complete set of wind rose plots and Building Code wind data.

Wind Direction

The 12 monthly wind rose plots were analyzed to determine prevailing wind direction. Due to the site's location on the eastern side of the Hudson River (where the Hudson runs within approximately 10 degrees of true north-south orientation), winds from the eastern 180 degree segment of the wind rose (NNE, NE, ENE, E, ESE, SE, and SSE) were not selected as viable design options. As the site is situated on the eastern bank of the Hudson River, winds from these directions would generate waves in directions traveling away from the shore protection, thus not posing a threat to the shore protection. Wind directions from the western 180 degree segment of the wind rose were retained as possibilities for wave generating winds (N, NNW, NW, WNW, W, WSW, SW, SSW, S), as the waves resulting from these wind directions would travel toward the shore protection.

Within the segment of retained wind directions, the wind directions to which each site area was susceptible were determined. For example, the north shore protection alternatives appear to be most susceptible to a wave from the W. However, the north alternatives are also susceptible to waves from the NW or SW, and waves from the NW or SW would be larger considering the longer fetch (length of water across which the wind blows) associated with these directions. Additional analysis of the impact of wave approach angle on wave height should be included in the design phase of the project. Table B.3-1 presents the site areas and general wind/wave directions which were analyzed for each site area. Once the wind directions were chosen for further evaluation, fetch lengths were determined for each wind direction by using the ruler tool in Google Earth (see Attachment B.3-1).

Wind Speed

Wind speed was taken from the 2010 Building Code of New York State Chapter 16; Section 1609 – Wind Loads. The Building Code gives wind speeds used for the purposes of structural design. Speeds are given as 3-second gust values, which can be converted to fastest-mile speeds with a chart presented in Section 1609. For the purposes of wave generation, the fastest-mile speeds were used, as 3-second gusts lack the duration to generate waves that are predictable using the CEM methodology and are not

representative of wave-generating wind conditions. Based on the wind speed map and conversion chart, the fastest-mile wind speed at the site is 80 mph or 35.8 m/s. See Attachment B.3-1 for the wind map and conversion chart used for wind speed selection.

Wave Height Calculation

Wave height calculations were performed according to the CEM Part II Chapter 2, specifically, *Wave Prediction in Simple Situations*. The purpose of this section, as stated in the CEM, is to "estimate wave conditions for preliminary considerations in project designs." The CEM presents a wave prediction method in the form of equations and nomograms. Proceeding with this method, there are several assumptions that form the basis for simplified wave prediction:

1) Simplified wave prediction can be used to accurately estimate 3 situations:
    a. Fetch-limited values: This occurs when a wind blows at constant speed and direction over a given fetch for a long enough duration for waves to achieve steady-state, fetch limited values.
    b. Duration-limited values: A rare condition in nature, this occurs when a wind increases very quickly through time in an area without close boundaries.
    c. Fully developed values: These values, calculated with an equation, represent the upper limit of wave heights for certain design considerations.
2) Wave height grows with increased fetch. (The equations associated with this assumption were used, with the aforementioned wind speeds and directions, to calculate wave height.)
3) Fetch width does not influence the effective fetch length. Straight line fetch is recommended for use in the wave equations.
4) Although studies have suggested water depth affects wave growth, a 1993 study showed that fetch-limited wave growth in shallow water behaved much the same as that in deep water. It was recommended that deepwater wave growth equations be used to predict wave behavior for all depths, but only if the wave period is constrained by a limiting value.

The calculation proceeded assuming that the conditions at the site would produce fetch-limited values (the geometry of the site governs fetch-limited conditions), straight line fetch only would be used in the equations, and deep water equations would be used to model the water wave conditions at the site.

Wave Height Calculation Procedure

The following sections outline the simplified wave prediction process using the method presented in the CEM. Wave height calculations were performed in SI units, as the equations demanded. However, wave height was converted to English units in order to yield a value in English units in the rip-rap sizing calculation.

Equation II-2-35 was used to calculate the time required to develop fetch-limited waves. If the waves do not exist for this minimum duration, the equations cannot be used with confidence.

$$t_{x,u} = 77.23 \frac{x^{0.67}}{u^{0.34} g^{0.33}} \qquad \text{(II-2-35)}$$

Where:
x = fetch
u = wind speed

The wind speed selected from the New York State Building Code is a fastest-mile value of 80 mph or 35.8 m/s. The results from Equation II-2-35 varied from 65 minutes to 229 minutes. These values represent the minimum time required to achieve fetch-limited conditions, or conditions necessary for the accuracy of simplified wave prediction. The wave prediction calculation proceeded using the New York State Building Code's fastest-mile wind speed 80 mph over an acceptable, if not conservative, duration of 12 hours (sustained wind speeds of 80 mph would be accompanied by a major weather system).

Equation II-2-38 is used to convert duration into an equivalent fetch in the event that the wind duration is less than the value calculated in Equation II-2-35 (65 to 229 minutes). The equivalent fetch is meant to be entered as the fetch in Equation II-2-36 to calculate a new wave height. This calculation was not necessary due to the assumption that the wind lasts for a duration of 12 hours.

The wave prediction continued with 35.8 m/s as a value for wind speed assumed to be available for a 12-hour duration. Several relationships are included in Equation II-2-36, which governs wave growth with fetch. They are presented in the order in which they were used.

$$C_D = 0.001(1.1 + 0.035 U_{10}) \qquad \text{(II-2-36-1)}$$

Where:
C_D = drag coefficient
U_{10} = wind speed

$$C_D = \frac{u_*^2}{{U_{10}}^2} \qquad \text{(II-2-36-2)}$$

Where:
u_* = shear velocity

$$\frac{g T_p}{u_*} = 0.751 \left(\frac{gx}{{u_*}^2}\right)^{\frac{1}{3}} \qquad \text{(II-2-36-3)}$$

Where:
T_P = wave period

$$\frac{gH_m}{{u_*}^2} = 4.13 \times 10^{-2} \left(\frac{gx}{{u_*}^2}\right)^{\frac{1}{2}} \qquad \text{(II-2-36-4)}$$

Where:
H_m = wave height

Values for wave height were calculated in Equation(s) II-2-36. Equation II-2-39 was given as a check to ensure the wave periods calculated in Equation II-2-36-3 did not exceed the limiting wave period.

$$T_P = 9.78 \left(\frac{d}{g}\right)^{\frac{1}{2}} \qquad \text{(II-2-39)}$$

Where:
T_P = limiting wave period
d = water depth

Water depth was found in the depth chart titled "12343 Hudson River, New York to Wappinger Creek" included in Attachment B.3-1. The maximum depth along any wave path for any site area (52 ft.) was taken as the water depth. An average or median could have been used instead but would have had minimal effect on the limiting wave period calculation. Limiting wave period was calculated to be 12.43s with a water depth of 52 ft. A depth of 40 ft. yielded a limiting wave period of 10.90s. In comparison, calculated wave periods ranged from 2.21s to 4.14s.

The wave periods did not reach or exceed the limiting wave period. However, if the calculated wave period exceeds the limiting wave period, the limiting wave period should replace the calculated wave period for any subsequent calculations (i.e. number of waves generated).

Sample Wave Height Calculation

This section will provide an outline of the data gathering and equations to calculate wave height for a NNW wind in the Old Marina.

- Wind Direction: NNW; One of three directions analyzed for the Old Marina. A NNW wind is viable according to the wind roses and results in the longest fetch of any wind direction at the Old Marina.

- Wind Speed: 35.8 m/s; Building Code of New York State: Section 1609 – Wind Loads fastest-mile wind speed.

- Wind Duration: 12 hours.

- Fetch Length: 4,110 m; Determined using ruler tool in Google Earth.

- Time required to accomplish fetch-limited conditions:

$$t_{x,u} = 77.23\frac{x^{0.67}}{u^{0.34}g^{0.33}} \quad \text{(II-2-35)}$$

$$t_{x,u} = 77.23\frac{4{,}110^{0.67}}{35.8^{0.34}9.81^{0.33}} = 7{,}953s = \mathbf{133\ min}*$$

*Proceed using duration of 133 minutes.

- Drag Coefficient:

$$C_D = 0.001(1.1 + 0.035U_{10}) \quad \text{(II-2-36-1)}$$

$$C_D = 0.001(1.1 + 0.035 * 35.8) = \mathbf{0.002}$$

- Shear velocity:

$$C_D = \frac{u_*^2}{{U_{10}}^2} \quad \text{(II-2-36-2)}$$

$$0.002 = \frac{u_*^2}{35.8^2} : Solve\ for\ u_*:\ u_* = \mathbf{1.73\ m/s}$$

- Wave Period:

$$\frac{gT_p}{u_*} = 0.751\left(\frac{gx}{{u_*}^2}\right)^{\frac{1}{3}} \quad \text{(II-2-36-3)}$$

$$\frac{9.81 * T_p}{1.734} = 0.751\left(\frac{9.81 * 4{,}110}{1.734^2}\right)^{\frac{1}{3}} : Solve\ for\ T_P: T_P = \mathbf{3.15s}$$

- Limiting Wave Period:

$$T_P = 9.78\left(\frac{d}{g}\right)^{\frac{1}{2}} \quad \text{(II-2-39)}$$

$$T_P = 9.78\left(\frac{15.24}{9.81}\right)^{\frac{1}{2}} = 12.19s*$$

*Wave period does not exceed limiting wave period. Continue with period of **3.15s**.

- Wave Height:

$$\frac{gH_m}{u_*} = 4.13 \times 10^{-2}\left(\frac{gx}{{u_*}^2}\right)^{\frac{1}{2}} \quad \text{(II-2-36-4)}$$

$$\frac{9.81*H_m}{1.734^2} = 4.13 \times 10^{-2}\left(\frac{9.81*4{,}110}{1.734^2}\right)^{\frac{1}{2}} : Solve\ for\ H_m: H_m = \mathbf{1.47m = 4.81ft}$$

Rip-rap Sizing Calculation

The methodology for rip-rap sizing was taken from the Costal Engineering Manual Part VI – Chapter 5. More specifically, Table VI-5-23 (see Attachment B.3-2) presents the equations established by van der Meer in 1988.

Table VI-5-23 offers two equations; one for plunging waves and one for surging waves. The uncertainties of the coefficients of van der Meer's two equations have been estimated at 6.5% (plunging

waves) and 8% (surging waves). The selection of which equation to use is made based on the relationship between ξ_m and ξ_{mc}.

$$\xi_m = {s_m}^{-0.5} tan\alpha < \xi_{mc} = (6.2P^{0.31}(tan\alpha)^{0.5})^{1/(P+0.5)}: \text{ Plunging Waves – Use Eq. VI-5-68}$$
$$\xi_m = {s_m}^{-0.5} tan\alpha > \xi_{mc} = (6.2P^{0.31}(tan\alpha)^{0.5})^{1/(P+0.5)}: \text{ Surging Waves – Use Eq. VI-5-69}$$

Where:
$s_m = \frac{H_m}{L_{om}}$ = wave steepness
H_m = wave height
L_{om} = deepwater wavelength corresponding to mean wave period
$L_{om} = 3.281 \frac{g * {T_P}^2}{2\pi}$
α = slope angle
P = notational permeability

For each wave generation scenario in each site area in this application, the relationship between ξ_m and ξ_{mc} indicated the use of Equation VI-5-68 for plunging waves was appropriate. Furthermore, the "Validity" notes in Table VI-5-23 state:

> For cot$\alpha \geq$ 4.0, only Equation VI-5-68 should be used.

The values for cotα range from 4 to 12.5 in this application, which, confirmed by the relationship between ξ_m and ξ_{mc}, resulted in the use of Equation VI-5-68 only. In the North Boat Slip site area, slopes of 6.5H:1V and 12.5H:1V are in the RFS. However, only 6.5H:1V was retained for use in the calculations, for conservative purposes, as a steeper slope results in a larger calculated rip-rap size.

$$\frac{H_m}{\Delta D_{n50}} = 6.2 * S^{0.2} P^{0.18} {N_Z}^{-0.1} {\xi_m}^{-0.5} \qquad \text{(VI-5-68)}$$

Where:
H_m = wave height
$\Delta = \frac{\rho_s}{\rho_w} - 1$
ρ_s = mass density of rocks
ρ_W = mass density of water
D_{n50} = Equivalent cube length of median rock
S = relative eroded area
P = notational permeability coefficient
N_z = number of waves

Nominal values for S (relative eroded area) were determined in Table VI-5-21 (see Attachment B.3-2).

A value for P (notational permeability coefficient) was determined in Figure VI-5-11 (see Attachment B.3-2). A P-value of 0.4 corresponds to a configuration consisting of an armor layer, a filter layer, and a core layer. For purposes of the feasibility study, this configuration best corresponds to the future

construction of the rip-rap. Figure VI-5-11 was used later in the calculation to determine layer thicknesses and D_{n50} for the filter layer.

Values for N_z were calculated for each wave scenario in each site area by dividing the wind duration (12 hours) by the wave period calculated in Equation II-2-36-3 (values ranging from 2s to 5s). Values for N_z ranged from 10,000 to 20,000 waves. However, the "Validity" notes in Table VI-5-23 state:

> $N_z \leq$ 7,500 after which number equilibrium damage is more or less reached.

Therefore, an N_z-value of 7,500 was adopted for each wave scenario.

Sample Rip-rap Sizing Calculation

This section will provide an outline of the data gathering and equations to calculate rip-rap size in the Old Marina. This calculation will be performed using the wave height calculated in *Sample Wave Height Calculation* (4.81 ft.), which was based on a NNW wind. Table B.3-2 shows the calculated rip-rap sizes for each site area and wind direction combination.

- Calculation to determine plunging (Equation VI-5-68) vs. surging waves (Equation VI-5-69):
  For $\cot\alpha \geq 4.0$, only Equation VI-5-68 should be used.
  $cot\alpha = \frac{4}{1} = \mathbf{4}$
  USE EQUATION VI-5-68. (Check calculation is provided below.)

- Check calculation to determine plunging (Equation VI-5-68) vs. surging waves (Equation VI-5-69):

$$\xi_m = {s_m}^{-0.5} tan\alpha < \xi_{mc} = (6.2P^{0.31}(tan\alpha)^{0.5})^{1/(P+0.5)}$$

$$L_{om} = 3.281\frac{g * {T_P}^2}{2\pi}$$

$$L_{om} = 3.281\frac{9.81 * 3.15^2}{2\pi} = \mathbf{51}\boldsymbol{ft}$$

$$s_m = \frac{H_m}{L_{om}}$$

$$s_m = \frac{4.81}{51} = \mathbf{0.09}$$

$tan\alpha = \frac{1}{4}$ (4H:1V in Old Marina)

$$\xi_m = {s_m}^{-0.5} tan\alpha$$

$$\xi_m = 0.09^{-0.5} * \frac{1}{4} = \mathbf{0.81}$$

P = 0.4 (From Figure VI-5-11)

$$\xi_{mc} = (6.2P^{0.31}(tan\alpha)^{0.5})^{1/(P+0.5)}$$

$$\xi_{mc} = \left(6.2 * 0.4^{0.31} * \left(\frac{1}{4}\right)^{0.5}\right)^{1/(0.4+0.5)} = \mathbf{2.56}$$

0.81 < 2.56. SURGING WAVES – USE EQUATION VI-5-68.

- Calculation of equation variables, and finally D_{n50}:

$$\frac{H_m}{\Delta D_{n50}} = 6.2 * S^{0.2}P^{0.18}{N_Z}^{-0.1}{\xi_m}^{-0.5} \qquad \text{(VI-5-68)}$$

$H_m = 4.81$ ft.

$$\Delta = \frac{\rho_s}{\rho_w} - 1$$

$\rho_s = 145$ pcf (Density of sandstone)
$\rho_w = 63.5$ pcf (Average density of salt/fresh water)

$$\Delta = \frac{145}{63.5} - 1 = \mathbf{1.28}$$

S = **8** (From Table VI-5-21)

P = **0.4** (From Figure VI-5-11)

$$N_z = \frac{Wind\ Duration}{T_P}$$

$$N_z = \frac{43{,}200s}{3.15s} = 13{,}714$$

13,714 > 7,500. USE **7,500**. (From Table VI-5-23 "Validity")

$\xi_m = 0.81$

$$\frac{H_m}{\Delta D_{n50}} = 6.2 * S^{0.2}P^{0.18}{N_Z}^{-0.1}{\xi_m}^{-0.5}$$

$$\frac{4.81}{1.28*D_{n50}} = 6.2 * 8^{0.2}0.4^{0.18}7{,}500^{-0.1}0.81^{-0.5}$$: Solve for D_{n50}

$D_{n50} = 0.99$ ft. = **12.4 in.**

Alternative Methods for Rip-rap Sizing Calculation

As previously mentioned, the CEM presents two methods for sizing calculations: Hudson (1974) and van der Meer (1988). The van der Meer method is considered to be more representative of wave/rip-rap physical interaction than the Hudson method. However, sizing calculations were also performed using the Hudson method (see Attachment B.3-3 for support material) and are presented in Table B.3-3. Two sets of D_{n50} values were calculated for; one using a K_D value for smooth, rounded rock placed

randomly with breaking waves and one using a K_D value of 2.0 for rough, angular rock placed randomly with breaking waves. Also presented in Table B.3-3 is a comparison of the D_{n50} values calculated in both methods. The Hudson method yielded rock sizes in the range of 1.5 to 2.7 times larger than those calculated in the van der Meer method.

Conclusions & Further Analyses

- Wave heights were calculated using the longest fetch lengths for each wind direction. Fetch lengths were determined assuming wave generation could occur unobstructed (by current, physical wind barriers, etc.).
- Angle of wave incidence on shore protection was not analyzed for its impact on equivalent wave height or rock sizing. This analysis will likely result in lesser values for wave height and/or rock sizing in the wave generation scenarios fueled by wind directions that do not perpendicularly impact shore protection (NNW, NW, WNW, WSW, SW, SSW).
- The effect of bathymetric slope on wave scour in the N and S Boat Slips and the Old Marina was not analyzed. The analysis could result in lesser values for wave height and/or rock sizing in these areas due to the dissipation of wave energy along the bathymetric slope.
- S-Values for the van der Meer equations were given as representations of the damage level expected due to waves breaking on shore protection. Values were given for initial damage, intermediate damage, and failure. Values for initial and intermediate were selected for use in the rock sizing calculations. S-Value selection has a significant impact on the calculated rock size, as a change in S from 3 (initial damage for site slope values) to 17 (failure for site slope values) can result in a change in rock size of up to 6 inches, depending on other conditions.
- The configuration of the rip-rap presented in Table VI-5-11 for a P-value of 0.4 was used to determine the armor layer thickness and filter layer thickness which are based on D_{n50}. This P-value accounts for the permeability of the shore protection in the rock sizing calculation.

Enclosures:

Table B.3-1 – Preliminary Wave Height Calculations using CEM Part II – Chapter II
Table B.3-2 – Preliminary Rip-rap Sizing Calculations
Table B.3-3 – Preliminary Rip-rap Sizing Summary
Attachment B.3-1 - Wave Height Calculation Support Material
Attachment B.3-2 - Van der Meer Rip-Rap Sizing Calculation Support Material
Attachment B.3-3 - Hudson Rip-Rap Sizing Calculation Support Material

REFERENCES

1. US Army Corps of Engineers (2003). The Coastal Engineering Manual Part II, July 2003.

2. Natural Resources Conservation Service, National Water and Climate Center (http://www.wcc.nrcs.usda.gov/climate/windrose.html)

3. New York State Department of the State, (2007). Building Code of New York State, August 2007.

4. Google Inc., Google Earth , version 5.2

5. NOAA Office of Coast Survey, Nautical Chart 12343 Hudson River New York to Wappinger Creek, October 2005. (http://www.charts.noaa.gov/OnLineViewer/12343.shtml)

TABLE B.3-1
PRELIMINARY WAVE HEIGHT CALCULATIONS USING CEM PART II - CHAPTER II
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Gravital Accel. (m/s^2)	9.81
Limiting Height, H_L (m)	35.20
Wind Duration (hr)	12.00

Location	Wind/Wave Direction	Wind speed at 10m elevation, U_{10} (m/s)	Wind Duration (s)	Fetch, X (m)	Time required for waves to be fetch limited, $t_{x,u}$ (s)	Time required for waves to be fetch limited, $t_{x,u}$ (min)	Drag Coeff., C_D	Wave Shear Velocity, u_* (m/s)	Wave Period, T_P (s)	No. Waves in 12 Hours	**H_m (m)**	**H_m (ft)**	Limiting Period, T_P (s)	Use T_p?
Old Marina	NNW	35.8	43,200	3,980	7,783	130	0.002	1.734	3.12	13,845	**1.44**	**4.73**	9.44	No
	NW	35.8	43,200	2,040	4,974	83	0.002	1.734	2.50	17,300	**1.03**	**3.39**	9.44	No
	WNW	35.8	43,200	1,600	4,227	70	0.002	1.734	2.30	18,759	**0.91**	**3.00**	9.44	No
Northwest Off-Shore Area	NNW	35.8	43,200	1,570	4,173	70	0.002	1.734	2.29	18,878	**0.91**	**2.97**	9.44	No
	NW	35.8	43,200	1,920	4,776	80	0.002	1.734	2.45	17,653	**1.00**	**3.29**	9.44	No
	WNW	35.8	43,200	1,500	4,048	67	0.002	1.734	2.25	19,167	**0.89**	**2.91**	9.44	No
South Alternatives	NNW	35.8	43,200	3,510	7,155	119	0.002	1.734	2.99	14,437	**1.35**	**4.45**	9.44	No
	NW	35.8	43,200	1,960	4,842	81	0.002	1.734	2.46	17,532	**1.01**	**3.32**	9.44	No
	WNW	35.8	43,200	1,460	3,975	66	0.002	1.734	2.23	19,340	**0.87**	**2.87**	9.44	No
	W	35.8	43,200	1,480	4,012	67	0.002	1.734	2.24	19,253	**0.88**	**2.89**	9.44	No
	WSW	35.8	43,200	1,710	4,419	74	0.002	1.734	2.35	18,348	**0.95**	**3.10**	9.44	No
North Boat Slip	NNW	35.8	43,200	3,520	7,168	119	0.002	1.734	3.00	14,423	**1.36**	**4.45**	9.44	No
	NW	35.8	43,200	2,010	4,925	82	0.002	1.734	2.48	17,385	**1.03**	**3.36**	9.44	No
	WNW	35.8	43,200	1,480	4,012	67	0.002	1.734	2.24	19,253	**0.88**	**2.89**	9.44	No
	W	35.8	43,200	1,410	3,883	65	0.002	1.734	2.21	19,566	**0.86**	**2.82**	9.44	No
	WSW	35.8	43,200	1,680	4,367	73	0.002	1.734	2.34	18,456	**0.94**	**3.08**	9.44	No
	SW	35.8	43,200	2,520	5,730	96	0.002	1.734	2.68	16,123	**1.15**	**3.77**	9.44	No
	SSW	35.8	43,200	8,980	13,425	224	0.002	1.734	4.09	10,556	**2.17**	**7.11**	9.44	No
South Boat Slip	NNW	35.8	43,200	3,610	7,291	122	0.002	1.734	3.02	14,302	**1.37**	**4.51**	9.44	No
	NW	35.8	43,200	2,020	4,941	82	0.002	1.734	2.49	17,357	**1.03**	**3.37**	9.44	No
	WNW	35.8	43,200	1,500	4,048	67	0.002	1.734	2.25	19,167	**0.89**	**2.91**	9.44	No
	W	35.8	43,200	1,520	4,084	68	0.002	1.734	2.26	19,082	**0.89**	**2.93**	9.44	No
	WSW	35.8	43,200	1,700	4,402	73	0.002	1.734	2.35	18,384	**0.94**	**3.09**	9.44	No
	SW	35.8	43,200	2,510	5,715	95	0.002	1.734	2.68	16,144	**1.15**	**3.76**	9.44	No
	SSW	35.8	43,200	9,280	13,724	229	0.002	1.734	4.14	10,441	**2.20**	**7.23**	9.44	No

TABLE B.3-2
PRELIMINARY RIP-RAP SIZING CALCULATIONS
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Reference: Table VI-5-23: Rock, Two-Layer Armored Non-Overtopped Slopes (van der Meer 1988)

Significant wave height	H	ft	Calculated in 'Wave Calcs'
Equivalent cube length of median rock	D_{n50}	ft	Calculated in Table
Medium mass of rocks, $M_{50}=roe_s * D_{n50}\hat{}3$	M_{50}	lb	Calculated in Table
Mass density of rocks	roe_s	lb/cu ft	145
Mass density of water	roe_w	lb/cu ft	63.5
Relative eroded area	S	-	8-12
Notional permeability	P	-	0.4
Number of waves	N_z	-	7,500
TAN Slope angle	tan (α)	-	Calculated in Table
Wave steepness, $s_m=H/L_{om}$	s_m	-	Calculated in Table
Deepwater wavelength corresponding to mean wave period	L_{om}	ft	Calculated in Table
$s_m\hat{}(-0.5)*\tan(alpha)$	ξ_m		Calculated in Table

	Wind Direction	Stone Type	H (ft)	roe_s (lb/cu ft)	roe_w (lb/cu ft)	tan(α)	S	P	(No. waves) N_z	L_{om} (ft)	s_m	ξ_m	$\Delta = (roe_s/row_w)-1$	$D_{n50\text{-armor}}$ (in)	Armor Layer Thickness (in)	$D_{n50\text{-filter}}$ (in)	Filter Layer Thickness (in)
Old Marina	**NNW**	sandstone	4.73	145	63.50	0.25	8	0.40	7,500	50	0.09	0.81	1.28	**12.2**	**24.4**	**6.1**	**18.3**
	NW	sandstone	3.39	145	63.50	0.25	8	0.40	7,500	32	0.11	0.77	1.28	8.5	17.0	4.3	12.8
	WNW	sandstone	3.00	145	63.50	0.25	8	0.40	7,500	27	0.11	0.75	1.28	7.5	14.9	3.7	11.2
Northwest Off-Shore Area	NNW	sandstone	2.97	145	63.50	0.17	10	0.40	7,500	27	0.11	0.50	1.28	5.8	11.5	2.9	8.6
	NW	sandstone	3.29	145	63.50	0.17	10	0.40	7,500	31	0.11	0.51	1.28	**6.4**	**12.8**	**3.2**	**9.6**
	WNW	sandstone	2.91	145	63.50	0.17	10	0.40	7,500	26	0.11	0.50	1.28	5.6	11.2	2.8	8.4
South Alternatives	**NNW**	sandstone	4.45	145	63.50	0.13	12	0.40	7,500	46	0.10	0.40	1.28	**7.4**	**14.9**	**3.7**	**11.2**
	NW	sandstone	3.32	145	63.50	0.13	12	0.40	7,500	31	0.11	0.38	1.28	5.4	10.8	2.7	8.1
	WNW	sandstone	2.87	145	63.50	0.13	12	0.40	7,500	26	0.11	0.37	1.28	4.6	9.2	2.3	6.9
	W	sandstone	2.89	145	63.50	0.13	12	0.40	7,500	26	0.11	0.37	1.28	4.7	9.3	2.3	7.0
	WSW	sandstone	3.10	145	63.50	0.13	12	0.40	7,500	28	0.11	0.38	1.28	5.0	10.1	2.5	7.6
North Boat Slip	NNW	sandstone	4.45	145	63.50	0.15	10	0.40	7,500	46	0.10	0.49	1.28	8.6	17.1	4.3	12.9
	NW	sandstone	3.36	145	63.50	0.15	10	0.40	7,500	32	0.11	0.47	1.28	6.3	12.7	3.2	9.5
	WNW	sandstone	2.89	145	63.50	0.15	10	0.40	7,500	26	0.11	0.46	1.28	5.4	10.7	2.7	8.0
	W	sandstone	2.82	145	63.50	0.15	10	0.40	7,500	25	0.11	0.46	1.28	5.2	10.4	2.6	7.8
	WSW	sandstone	3.08	145	63.50	0.15	10	0.40	7,500	28	0.11	0.46	1.28	5.7	11.5	2.9	8.6
	SW	sandstone	3.77	145	63.50	0.15	10	0.40	7,500	37	0.10	0.48	1.28	7.2	14.3	3.6	10.7
	SSW	sandstone	7.11	145	63.50	0.15	10	0.40	7,500	86	0.08	0.53	1.28	**14.2**	**28.5**	**7.1**	**21.4**
South Boat Slip	NNW	sandstone	4.51	145	63.50	0.14	12	0.40	7,500	47	0.10	0.46	1.28	8.1	16.1	4.0	12.1
	NW	sandstone	3.37	145	63.50	0.14	12	0.40	7,500	32	0.11	0.44	1.28	5.9	11.8	2.9	8.8
	WNW	sandstone	2.91	145	63.50	0.14	12	0.40	7,500	26	0.11	0.43	1.28	5.0	10.0	2.5	7.5
	W	sandstone	2.93	145	63.50	0.14	12	0.40	7,500	26	0.11	0.43	1.28	5.1	10.1	2.5	7.6
	WSW	sandstone	3.09	145	63.50	0.14	12	0.40	7,500	28	0.11	0.43	1.28	5.4	10.7	2.7	8.1
	SW	sandstone	3.76	145	63.50	0.14	12	0.40	7,500	37	0.10	0.45	1.28	6.6	13.3	3.3	9.9
	SSW	sandstone	7.23	145	63.50	0.14	12	0.40	7,500	88	0.08	0.50	1.28	**13.5**	**26.9**	**6.7**	**20.2**
													Minimum	4.6			
													Maximum	14.2			
													Median	5.9			
													Average	7.0			

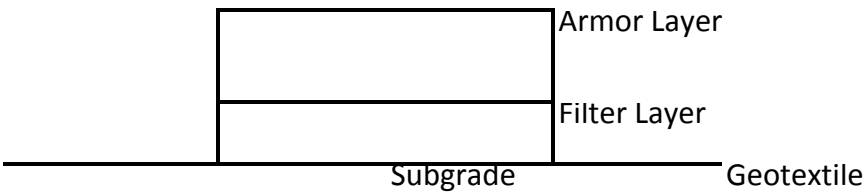
PRELIMINARY Rip-Rap Sizing Summary

LOCATION	SLOPE H:V	Armor D_{50} (in)	Armor Thickness (in)	Filter D_{50} (in)	Filter Thickness (in)	TOTAL Thickness (in)
Old Marina	4:1	12	24	6	18	42
NW Corner	6:1	15	30	8	23	53
S Alternatives	8:1	8	16	4	12	28
N Boatslip	6.5:1	8	16	4	12	28
S Boatslip	7:1	6	12	3	9	21

Existing NW Corner

Note: The existing riprap is on a roughly 2.5H:1V slope. Looking at the stone sizes, the existing D50 may be around 18 inches. This is consistent with design for an 18,000 ft fetch length (a NNW wind, 22.5 degrees west of north). Our proposed slope is 6H:1V, however a much more conservative fetch length would be 30,000 feet (12.5 degrees west of north), yielding a D50 of 15 inches. For Feasibility, adopt 15 inches D50 for the armor stone.

Diagram of Riprap Configuration:

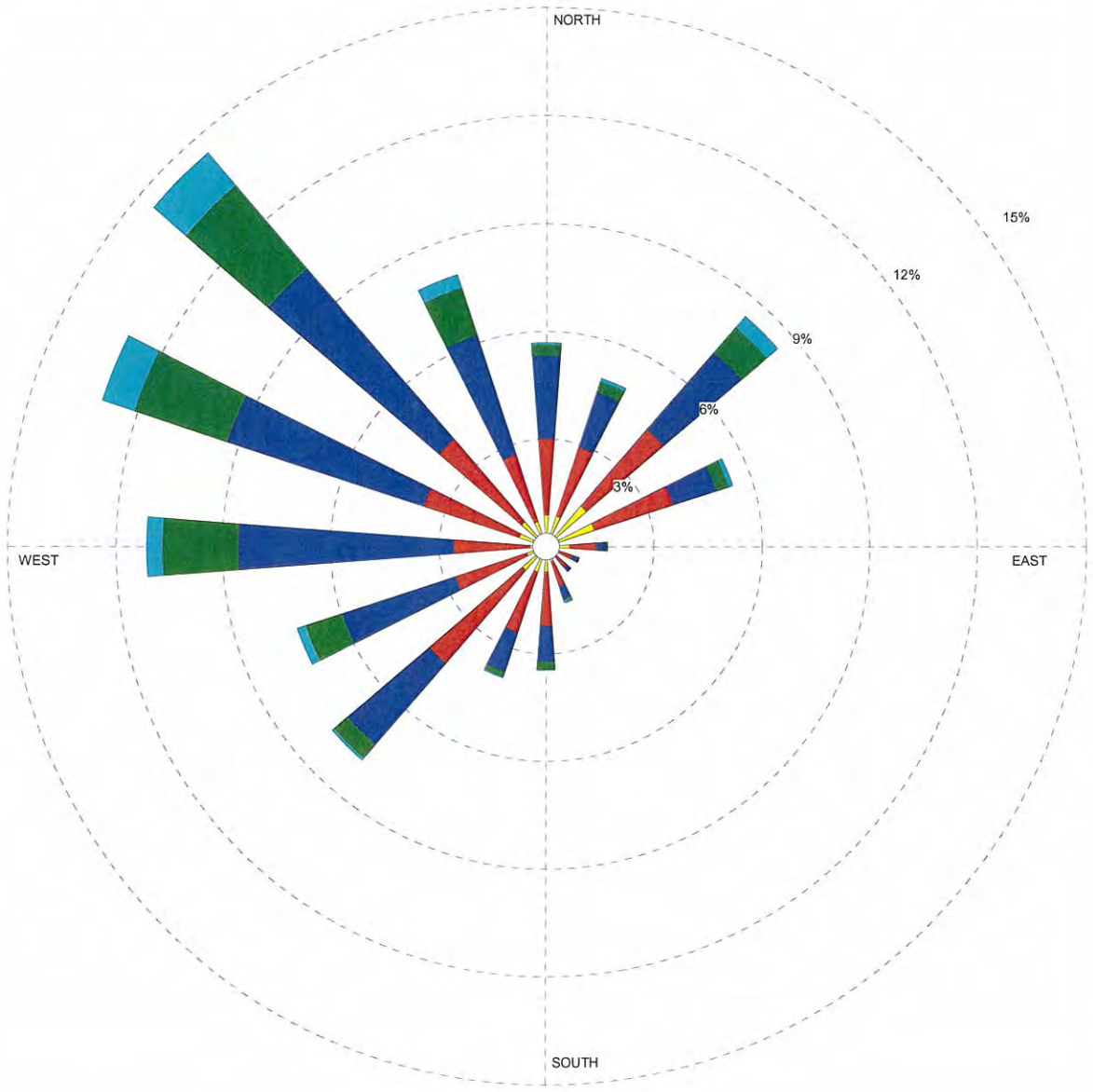


ATTACHMENT B.3-1

Wave Height Calculation Support Material

WIND ROSE PLOT

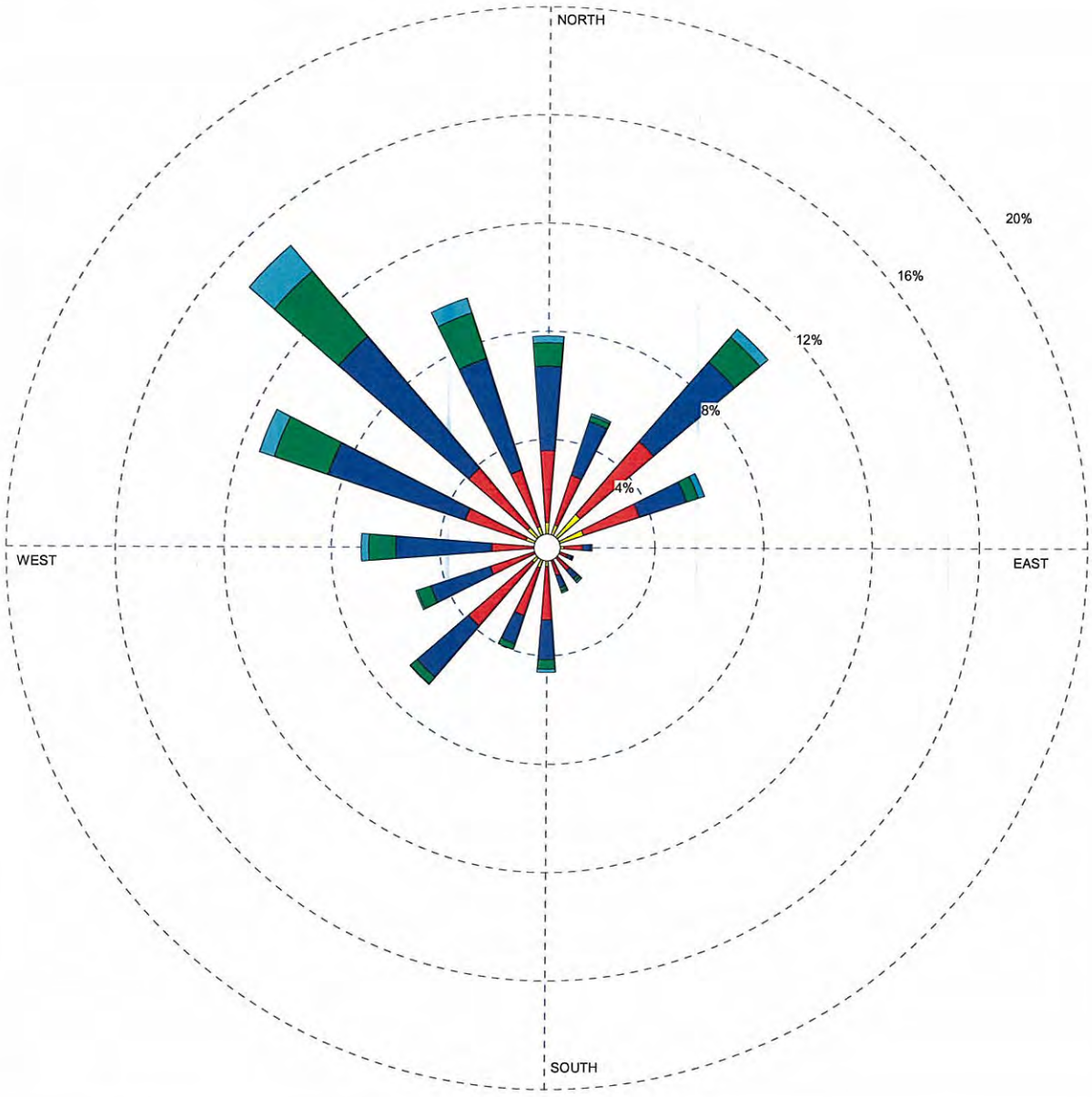
Station #94728 - NEW YORK, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE **11/1/2002**	COMPANY NAME
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **6.17 m/s**	CALM WINDS **1.04%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jan 1 - Jan 31** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



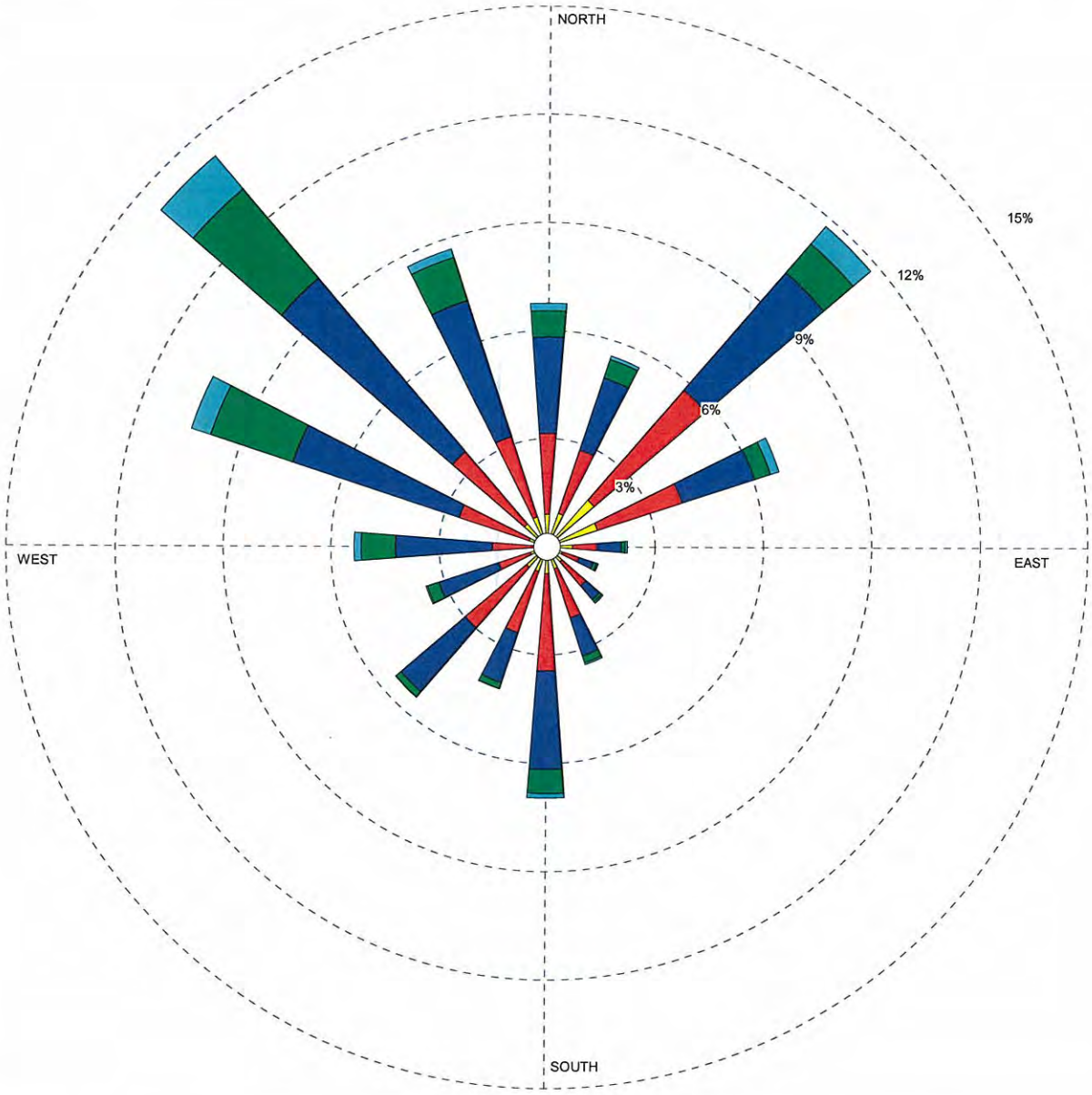
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER		DATE **11/1/2002**	COMPANY NAME
DISPLAY **Wind Speed**		UNIT **m/s**	COMMENTS
AVG. WIND SPEED **6.13 m/s**		CALM WINDS **0.99%**	
ORIENTATION **Direction (blowing from)**		PLOT YEAR-DATE-TIME **1961** **Feb 1 - Feb 29** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



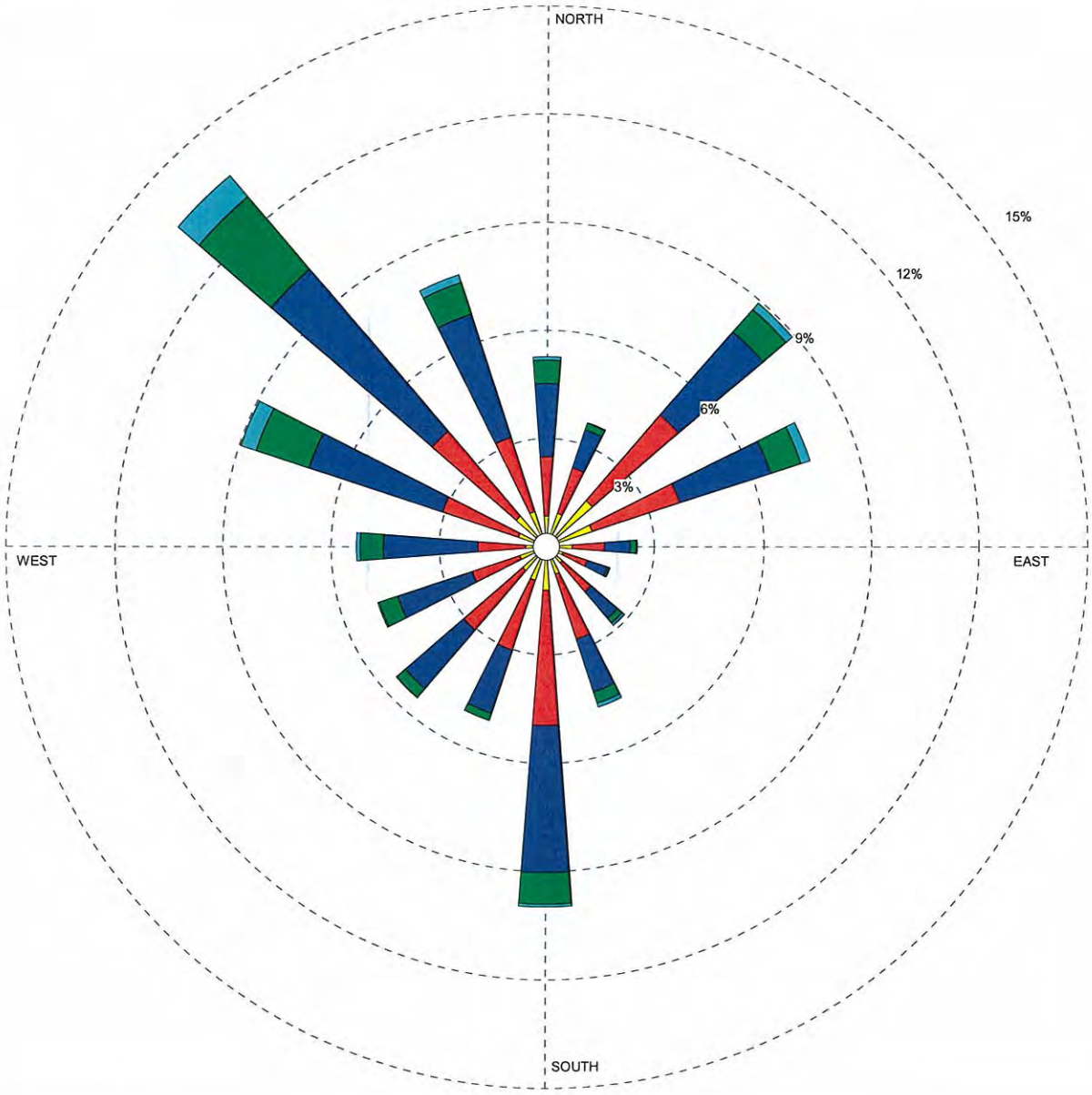
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE **11/1/2002**	COMPANY NAME	
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS	
AVG. WIND SPEED **6.13 m/s**	CALM WINDS **1.05%**		
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Mar 1 - Mar 31** **Midnight - 11 PM**	PROJECT/PLOT NO.	

WIND ROSE PLOT

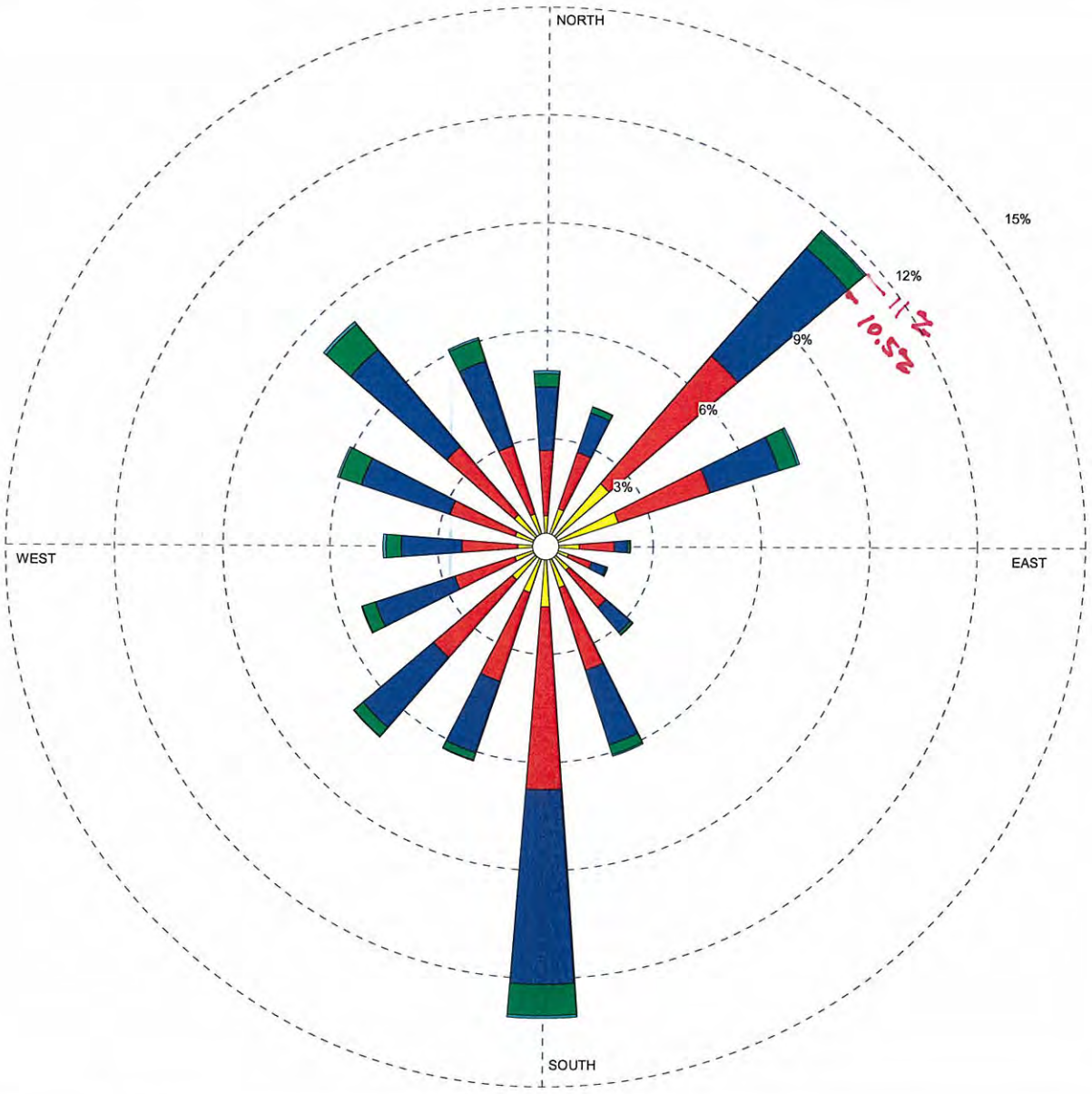
Station #94728 - NEW YORK, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE **11/1/2002**	COMPANY NAME
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.86 m/s**	CALM WINDS **1.26%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Apr 1 - Apr 30** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

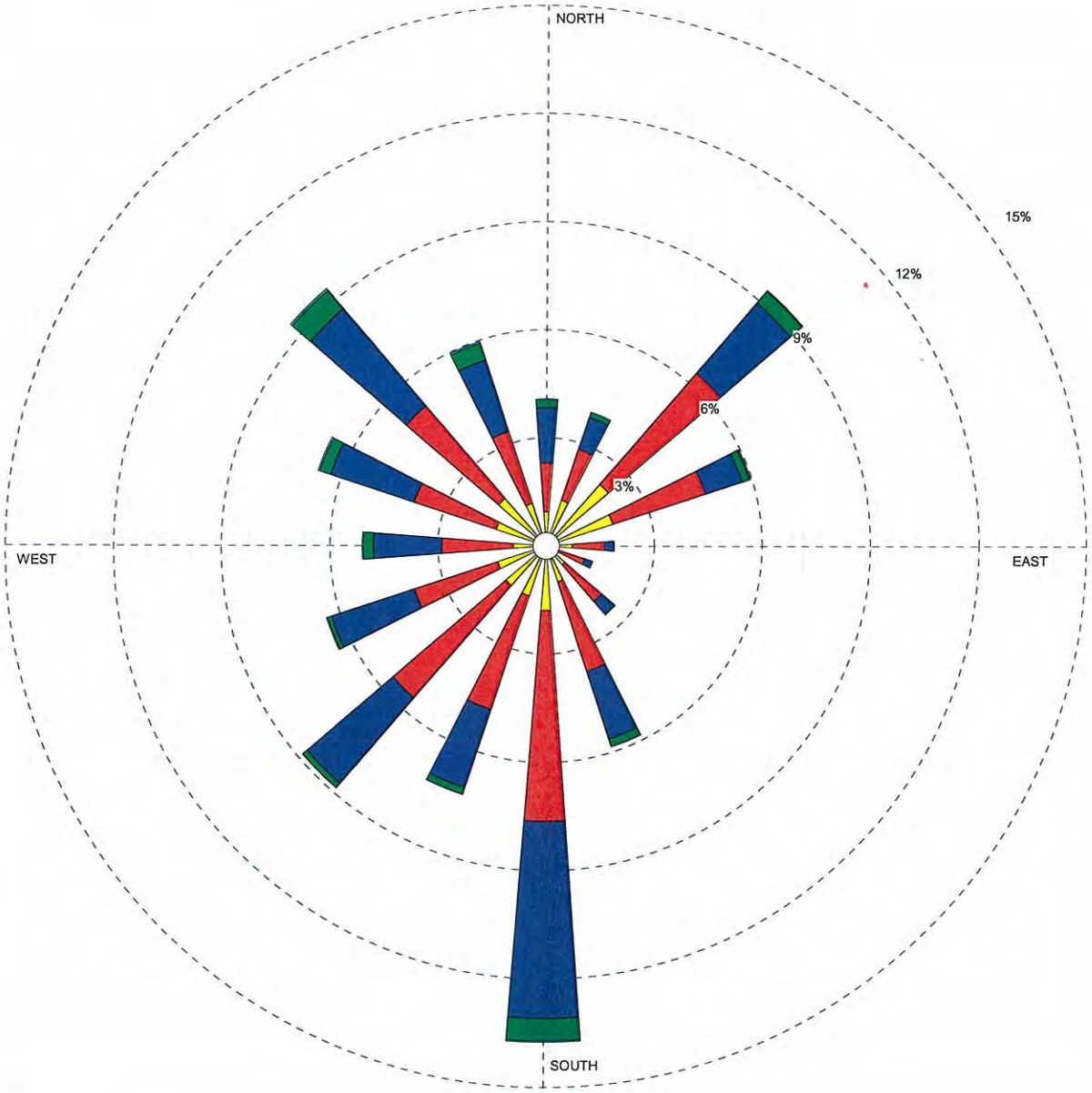
Station #94728 - NEW YORK, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE **11/1/2002**	COMPANY NAME
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.28 m/s**	CALM WINDS **1.69%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **May 1 - May 31** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



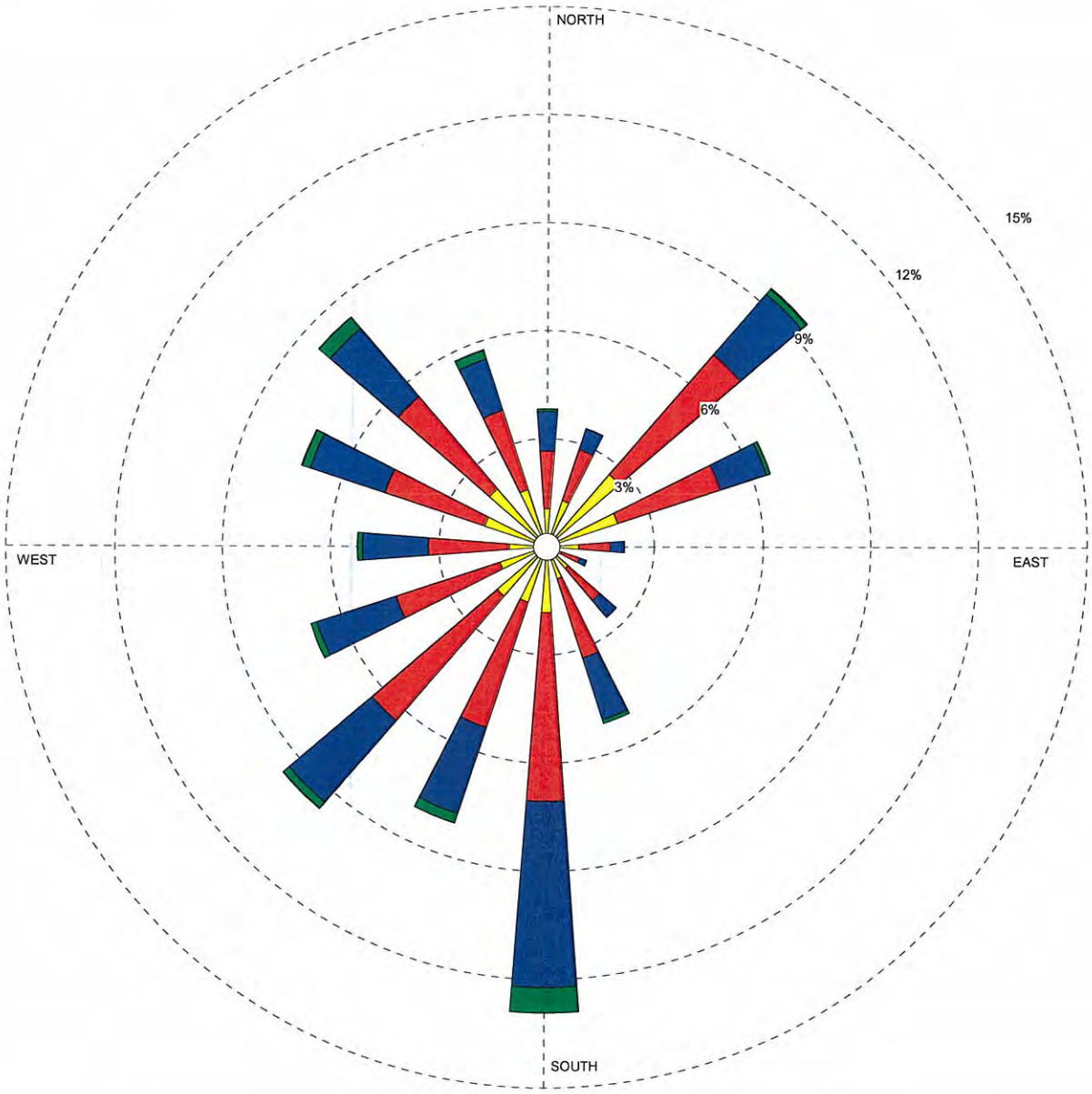
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE **11/1/2002**	COMPANY NAME
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **4.99 m/s**	CALM WINDS **1.69%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jun 1 - Jun 30** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



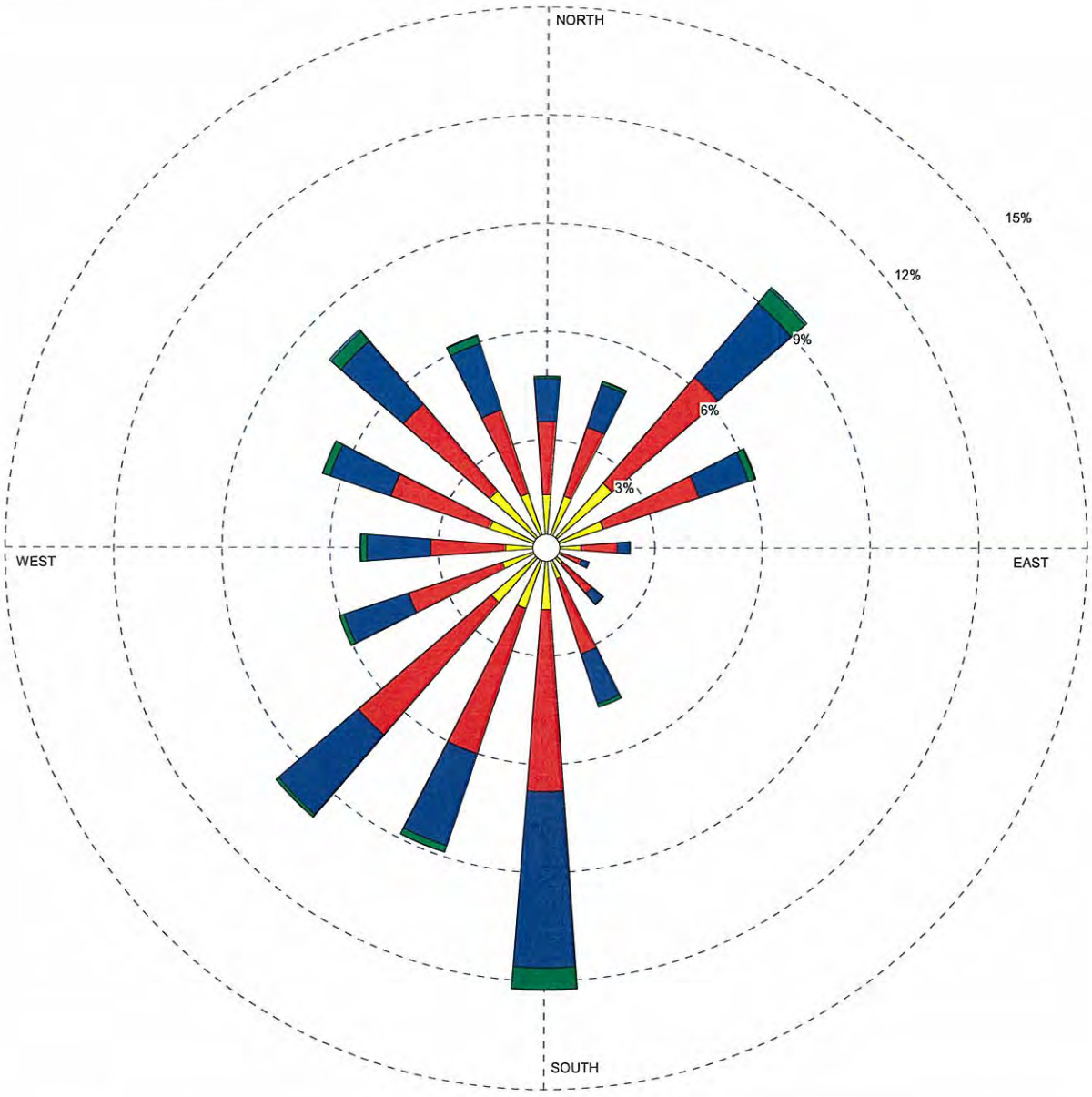
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE **11/1/2002**	COMPANY NAME
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **4.75 m/s**	CALM WINDS **1.53%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jul 1 - Jul 31** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



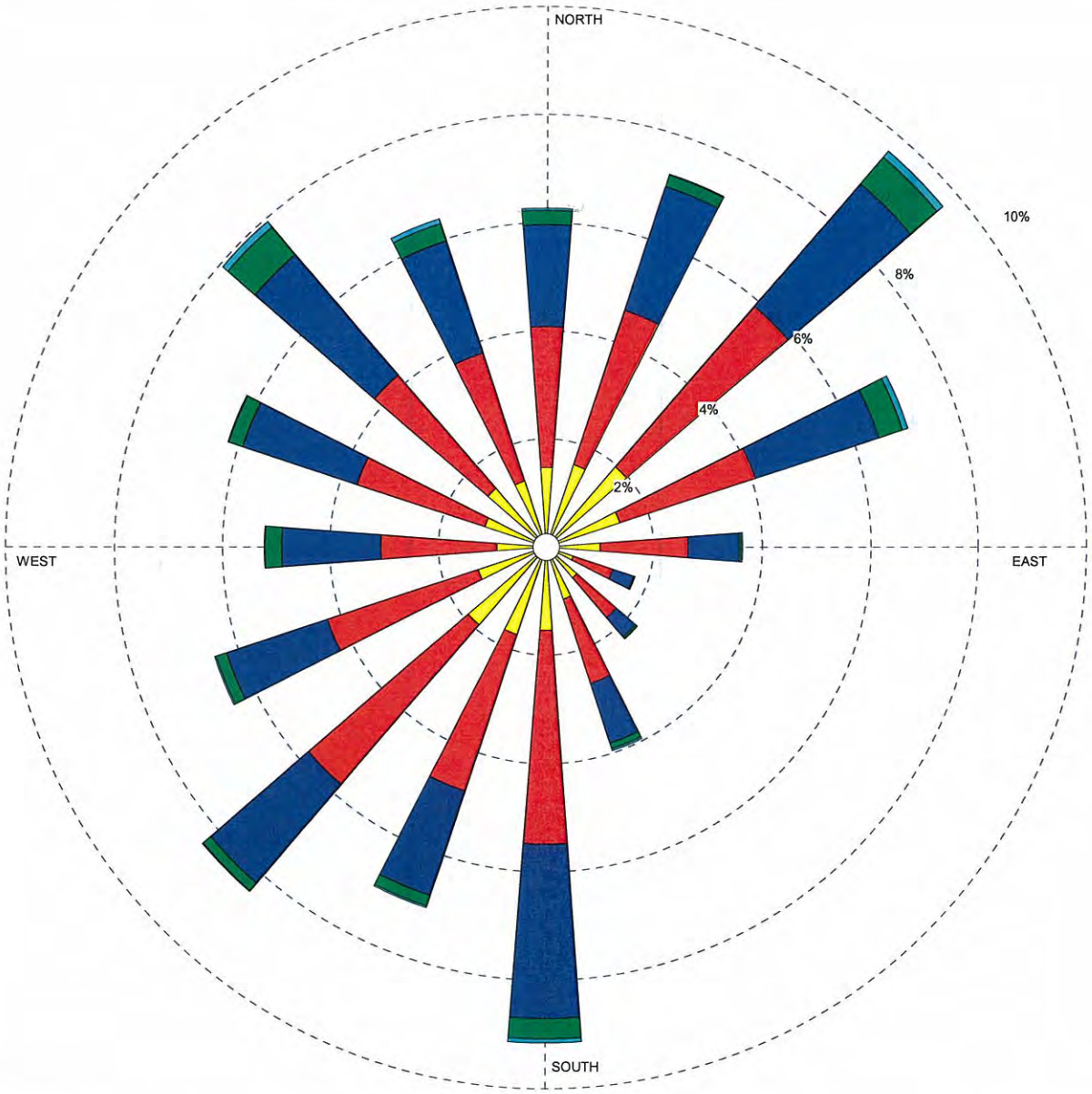
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE	COMPANY NAME
	11/1/2002	
DISPLAY	UNIT	COMMENTS
Wind Speed	**m/s**	
AVG. WIND SPEED	CALM WINDS	
4.79 m/s	**1.45%**	
ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
Direction (blowing from)	**1961 Aug 1 - Aug 31 Midnight - 11 PM**	

WIND ROSE PLOT

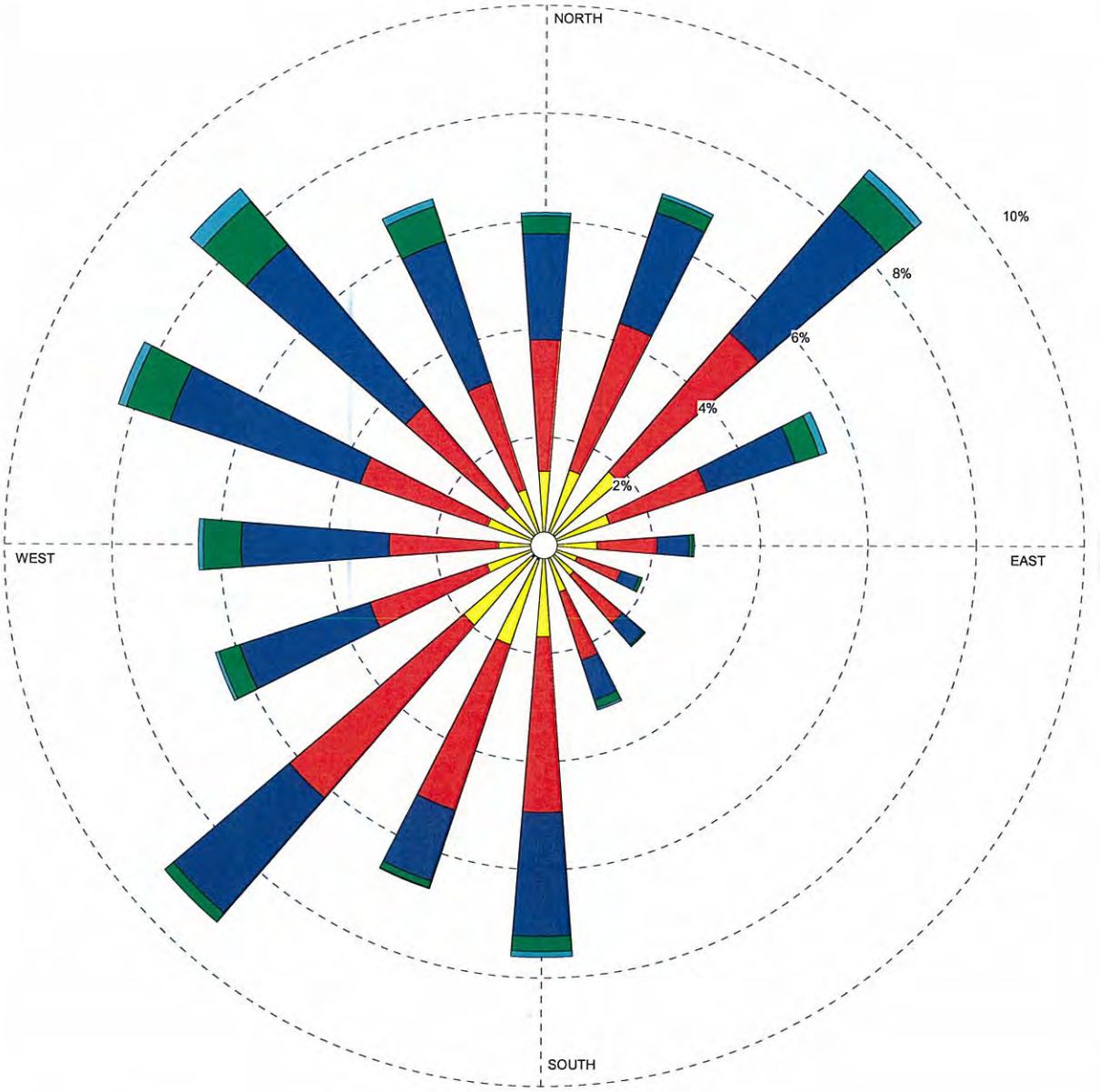
Station #94728 - NEW YORK, NY



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER	DATE **11/1/2002**	COMPANY NAME
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.01 m/s**	CALM WINDS **1.41%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Sep 1 - Sep 30** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



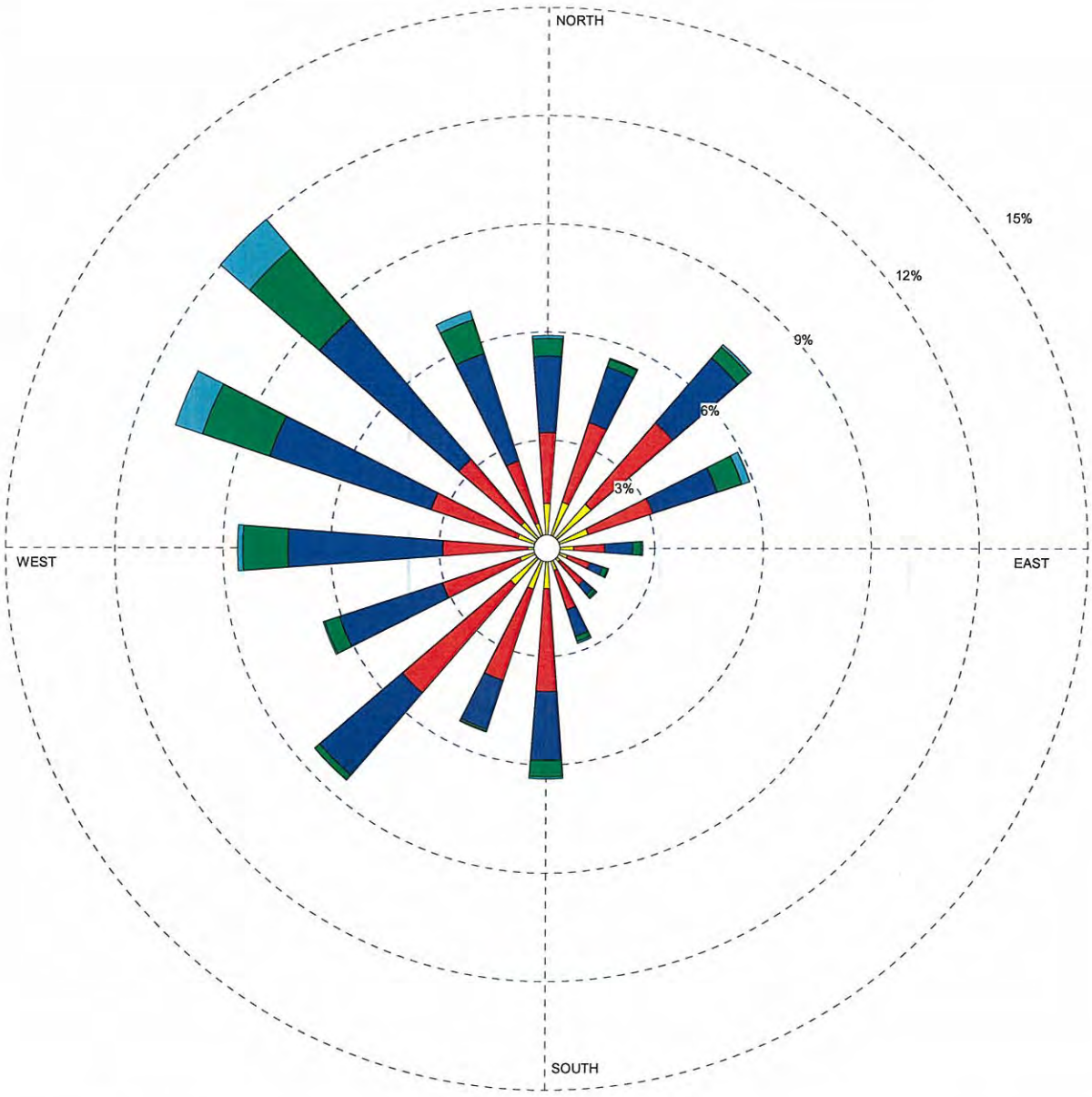
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE **11/1/2002**	COMPANY NAME
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **5.25 m/s**	CALM WINDS **1.87%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Oct 1 - Oct 31** **Midnight - 11 PM**	PROJECT/PLOT NO.

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



Wind Speed (m/s)

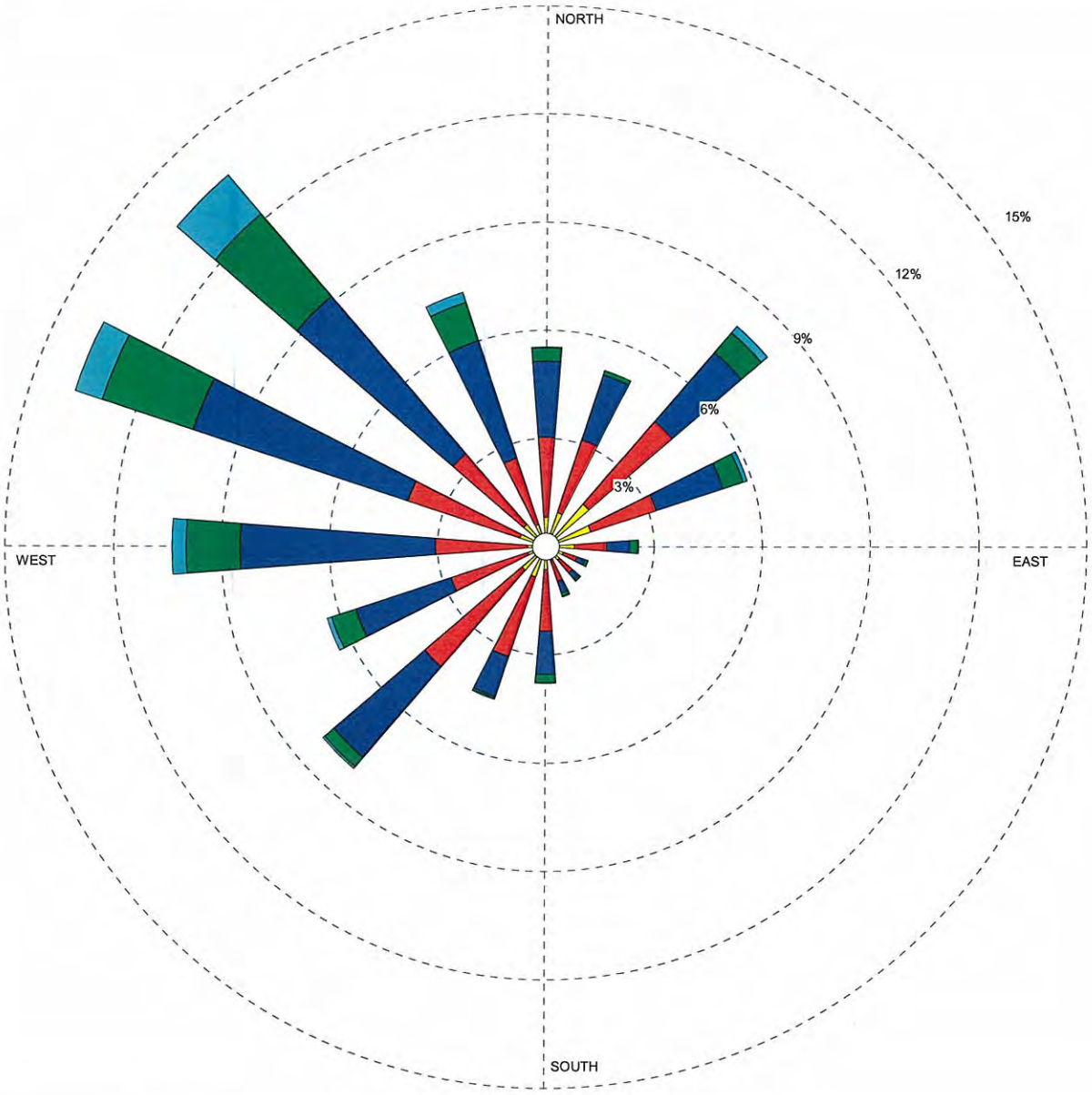
- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE **11/1/2002**	COMPANY NAME
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **5.80 m/s**	CALM WINDS **0.85%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Nov 1 - Nov 30** **Midnight - 11 PM**	PROJECT/PLOT NO.

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #94728 - NEW YORK, NY



Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE	COMPANY NAME
	11/1/2002	
DISPLAY	UNIT	COMMENTS
Wind Speed	**m/s**	
AVG. WIND SPEED	CALM WINDS	
6.04 m/s	**0.92%**	
ORIENTATION	PLOT YEAR-DATE-TIME	PROJECT/PLOT NO.
Direction (blowing from)	**1961 Dec 1 - Dec 31 Midnight - 11 PM**	

SECTION 1609 WIND LOADS

Top Previous Section Next Section To view the next subsection please select the Next Section option.

SECTION 1609 WIND LOADS

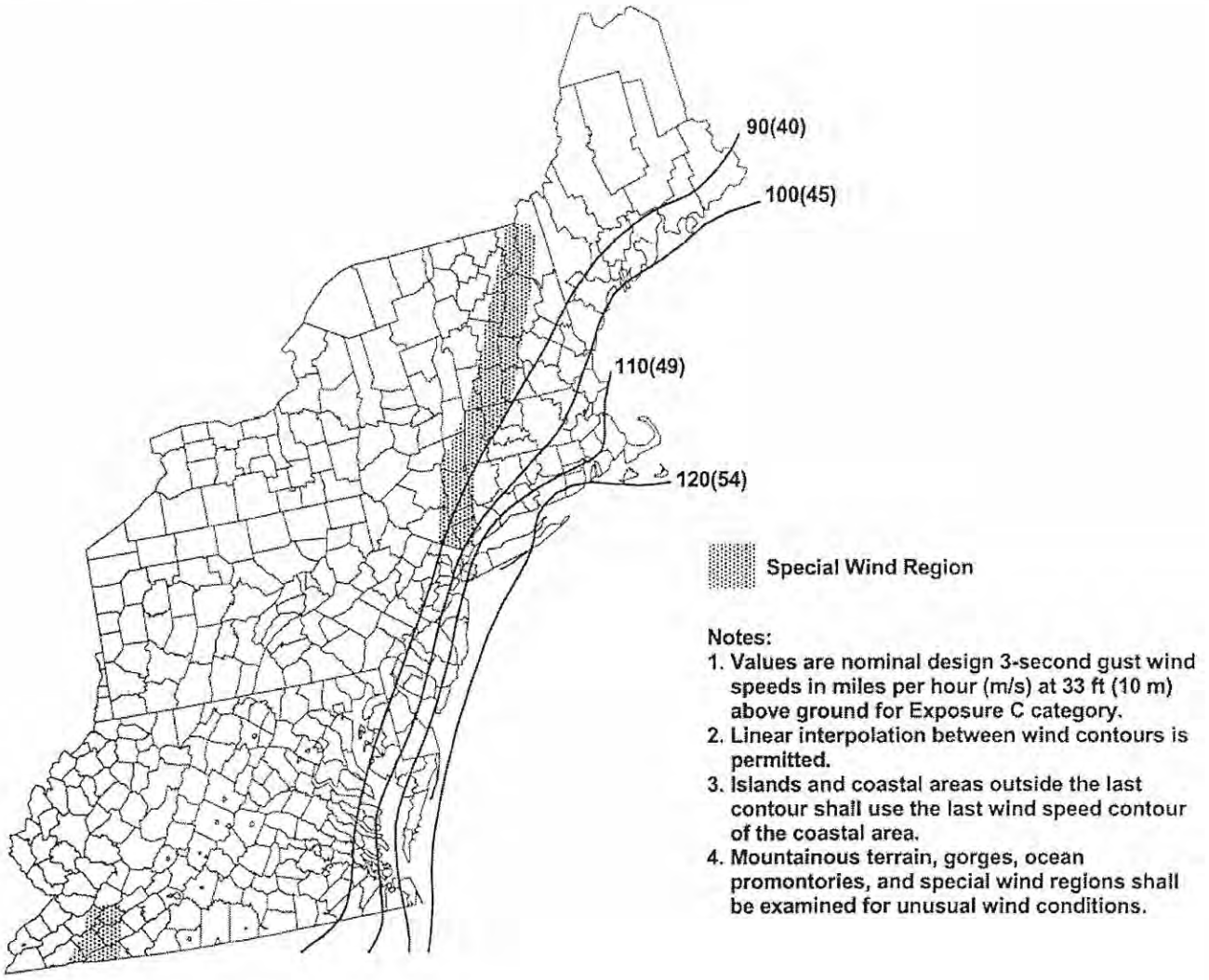


FIGURE 1609 BASIC WIND SPEED (3-SECOND GUST) MID AND NORTHERN ATLANTIC HURRICANE COASTLINE

1609.1 Applications. Buildings, structures and parts thereof shall be designed to withstand the minimum wind loads prescribed herein. Decreases in wind loads shall not be made for the effect of shielding by other structures.

1609.1.1 Determination of wind loads. Wind loads on every building or structure shall be determined in accordance with Section 6 of ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

Exceptions:

1. Wind loads determined by the provisions of Section 1609.6.

2. Subject to the limitations of Section 1609.1.1.1, the provisions of *SBCCI SSTD 10 Standard for Hurricane Resistant Residential Construction* shall be permitted for applicable Group R-2 and R-3 buildings.

3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the *AF&PA Wood Frame Construction Manual for One- and Two-Family Dwellings*.

4. Designs using *NAAMM FP 1001 Guide Specification for Design of Metal Flagpoles*.

5. Designs using TIA/EIA-222 for antenna-supporting structures and antennas.

1609.1.1.1 Applicability. The provisions of SSTD 10 are applicable only to buildings located within Exposure, B or C as defined in Section 1609.4. The provisions of SSTD 10 and the *AF&PA Wood Frame construction Manual for One- and Two-Family Dwellings* shall not apply to buildings sited on the upper half of an isolated hill, ridge or escarpment meeting the following conditions:

1. The hill, ridge or escarpment is 60 feet (18 288 mm) or higher if located in Exposure B or 30 feet (9144 mm) or higher if located in Exposure C;

2. The maximum average slope of the hill exceeds 10 percent; and

3. The hill, ridge or escarpment is unobstructed upwind by other such topographic features for a distance from the high point of 50 times the height of the hill or 1 mile (1.61 km), whichever is greater.

1609.1.2 Minimum wind loads. The wind loads used in the design of the main wind-force-resisting system shall not be less than 10 psf (0.479 kN/m^2) multiplied by the area of the building or structure projected on a vertical plane normal to the wind direction. In the calculation of design wind loads for components and cladding for buildings, the algebraic sum of the pressures acting on opposite faces shall be taken into account. The design pressure for components and cladding of buildings shall not be less than 10 psf (0.479 kN/m^2) acting in either direction normal to the surface. The design force for open buildings and other structures shall not be less than 10 psf (0.479 kN/m^2) multiplied by the area A_f.

1609.1.3 Anchorage against overturning, uplift and sliding. Structural members and systems and components and cladding in a building or structure shall be anchored to resist wind-induced overturning, uplift and sliding and to provide continuous load paths for these forces to the foundation. Where a portion of the resistance to these forces is provided by dead load, the dead load, including the weight of soils and foundations, shall be taken as the minimum dead load likely to be in place during a design wind event. Where the alternate basic load combinations of Section 1605.3.2 are used, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used.

1609.1.4 Protection of openings. In wind-borne debris regions, glazing that receives positive external pressure in the lower 60 feet (18 288 mm) in buildings shall be assumed to be openings unless such glazing is impact resistant or protected with an impact-resistant covering meeting the requirements of an approved impact-resisting standard or ASTM E 1996 and of ASTM E 1886 referenced therein as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade shall meet the requirements of the Large Missile Test of ASTM E 1996.

2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the Small Missile Test of ASTM E 1996.

Exceptions:

1. Wood structural panels with a minimum thickness of $^7/_{16}$ inch (11.1 mm) and maximum panel span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut to cover the glazed openings with attachment hardware provided. Attachments shall be designed to resist the components and cladding loads determined in accordance with the provisions of Section 1609.6.1.2. Attachment in accordance with Table 1609.1.4 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where wind speeds do not exceed 130 mph (57.2 m/s).

2. Buildings in Category I as defined in Table 1604.5, including production greenhouses as defined in Section 1608.3.3.

TABLE 1609.1.4 WIND-BORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS[a,b,c]

FASTENER TYPE	FASTENER SPACING (inches)			
	Panel span £ 2 feet	2 feet < Panel span £ 4 feet	4 feet < Panel span £ 6 feet	6 feet < Panel span £ 8 feet
2 $^1/_2$ No. 6 Wood screws	16	16	12	9
2 $^1/_2$ No. 8 Wood screws	16	16	16	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.4 N, 1 mile per hour = 0.44 m/s.
a. This table is based on a maximum wind speed (3-second gust) of 130 mph and mean roof height of 33 feet or less.
b. Fasteners shall be installed at opposing ends of the wood structural panel.
c. Where screws are attached to masonry or masonry/stucco, they shall be attached utilizing vibration-resistant anchors having a minimum withdrawal capacity of 490 pounds.

1609.1.4.1 Building with openings. Where glazing is assumed to be an opening in accordance with Section 1609.1.4, the building shall be evaluated to determine if the openings are of sufficient area to constitute an open or partially enclosed building as defined in Section 1609.2. Open and partially enclosed buildings shall be designed in accordance with the applicable provisions of ASCE 7.

1609.1.5 Wind and seismic detailing. Lateral-force-resisting systems shall meet seismic detailing requirements and limitations prescribed in this code, even when wind code prescribed load effects are greater than seismic load effects.

1609.2 Definitions. The following words and terms shall, for the purposes of Section 1609.6, have the meanings shown herein.

BUILDINGS AND OTHER STRUCTURES, FLEXIBLE. Slender buildings and other structures that have a fundamental natural frequency less than 1 Hz.

BUILDING, ENCLOSED. A building that does not comply with the requirements for open or partially enclosed buildings.

BUILDING, LOW-RISE. Enclosed or partially enclosed buildings that comply with the following conditions:

1. Mean roof height, h, less than or equal to 60 feet (18 288 mm).

2. Mean roof height, h, does not exceed least horizontal dimension.

BUILDING, OPEN. A building having each wall at least 80 percent open. This condition is expressed for each wall by the equation:

$A_o \geq 0.8\, A_g$ **(Equation 16-31)**

where:

A_o = Total area of openings in a wall that receives positive external pressure, in square feet (m^2).

A_g = The gross area of that wall in which A_o is identified, in square feet (m^2).

BUILDING, PARTIALLY ENCLOSED. A building that complies with both of the following conditions:

1. The total area of openings in a wall that receives positive external pressure exceeds the sum of the areas of openings in the balance of the building envelope (walls and roof) by more than 10 percent; and

2. The total area of openings in a wall that receives positive external pressure exceeds 4 square feet (0.37 m^2) or 1 percent of the area of that wall, whichever is smaller, and the percentage of openings in the balance of the building envelope does not exceed 20 percent.

These conditions are expressed by the following equations:

$A_o > 1.10A_{oi}$ **(Equation 16-32)**

$A_o > 4$ square feet (0.37 m^2) or $> 0.01A_g$, whichever is smaller,

and $A_{oi}/A_{gi} £ 0.20$ **(Equation 16-33)**

where:

A_o, A_g are as defined for an open building.

A_{oi} = The sum of the areas of openings in the building envelope (walls and roof) not including A_o, in square feet (m^2).

A_{gi} = The sum of the gross surface areas of the building envelope (walls and roof) not including A_g, in square feet (m^2).

BUILDING, SIMPLE DIAPHRAGM. A building in which wind loads are transmitted through floor and roof diaphragms to the vertical lateral-force-resisting systems.

COMPONENTS AND CLADDING. Elements of the building envelope that do not qualify as part of the main windforce-resisting system.

EFFECTIVE WIND AREA. The area used to determine GC_p. For component and cladding elements, the effective wind area in Tables 1609.6.2.1(2) and 1609.6.2.1(3) is the span length multiplied by an effective width that need not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes defined as:

1. The U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 mph (39.6 m/s) and

2. Hawaii, Puerto Rico, Guam, Virgin Islands and American Samoa.

IMPORTANCE FACTOR, I_w. A factor that accounts for the degree of hazard to human life and damage to property.

MAIN WINDFORCE-RESISTING SYSTEM. An assemblage of structural elements assigned to provide support and stability for the overall structure. The system generally receives wind loading from more than one surface.

MEAN ROOF HEIGHT. The average of the roof eave height and the height to the highest point on the roof surface, except that eave height shall be used for roof angle of less than or equal to 10 degrees (0.1745 rad).

WIND-BORNE DEBRIS REGION. Areas within hurricane-prone regions within 1 mile (1.61 km) of the coastal mean high water line where the basic wind speed is 110 mph (48.4 m/s) or greater; or where the basic wind speed is 120 mph (52.8 m/s) or greater; or Hawaii.

1609.3 Basic wind speed. The basic wind speed, in mph, for the determination of the wind loads shall be determined by Figure 1609 or by ASCE 7 Figure 6-1 when using the provisions of ASCE 7. Basic wind speed for the special wind regions indicated, near mountainous terrain, and near gorges, shall be in accordance with local jurisdiction requirements. Basic wind speeds determined by the local jurisdiction shall be in accordance with Section 6.5.4 of ASCE 7.

In nonhurricane-prone regions, when the basic wind speed is estimated from regional climatic data, the basic wind speed shall be not less than the wind speed associated with an annual probability of 0.02 (50-year mean recurrence interval), and the estimate shall be adjusted for equivalence to a 3-second gust wind speed at 33 feet (10 m) above ground in exposure Category C. The data analysis shall be performed in accordance with Section 6.5.4 of ASCE 7.

1609.3.1 Wind speed conversion. When required, the 3-second gust wind velocities of Figure 1609 shall be converted to fastest-mile wind velocities using Table 1609.3.1.

TABLE 1609.3.1 EQUIVALENT BASIC WIND SPEEDS[a,b,c]

V_{3S}	85	90	100	105	110	120	125	130	140	145	150	160	170
V_{fm}	70	75	80	85	90	100	105	110	120	125	130	140	150

For SI: 1 mile per hour = 0.44 m/s.
a. Linear interpolation is permitted.
b. V_{3S} is the 3-second gust wind speed (mph).
c. V_{fm} is the fastest mile wind speed (mph).

1609.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories. When applying the simplified wind load method of Section 1609.6, a single exposure category shall be used based upon the most restrictive for any given wind direction.

1. **Exposure A.** This exposure category is no longer used in ASCE 7.

2. **Exposure B.** Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type of exposure.

3. **Exposure C.** Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457.2 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B-type terrain where the building is directly adjacent to open areas of Exposure C-type terrain in any quadrant for a distance of more than 600 feet (182.9 m). This category includes flat open country, grasslands and shorelines in hurricane-prone regions.

4. **Exposure D.** Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane-prone regions) for a distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1,500 feet (460 m) or 10 times the height of the building or structure, whichever is greater.

1609.5 Importance factor. Buildings and other structures shall be assigned a wind load importance factor, I_w, in accordance with Table 1604.5.

1609.6 Simplified wind load method.

1609.6.1 Scope. The procedures in Section 1609.6 shall be permitted to be used for determining and applying wind pressures in the design of enclosed buildings with flat, gabled and hipped roofs and having a mean roof height not exceeding the least horizontal dimension or 60 feet (18 288 mm), whichever is less, subject to the limitations of Sections 1609.6.1.1 and 1609.6.1.2. If a building qualifies only under Section 1609.6.1.2 for design of its components and cladding, then its main windforce-resisting system shall be designed in accordance with Section 1609.1.1.

Exception: The provisions of Section 1609.6 shall not apply to buildings sited on the upper half of an isolated hill or escarpment meeting all of the following conditions:

1. The hill or escarpment is 60 feet (18 288 mm) or higher if located in Exposure B or 30 feet (9144 mm) or higher if located in Exposure C.

2. The maximum average slope of the hill exceeds 10 percent.

3. The hill or escarpment is unobstructed upwind by other such topographic features for a distance from the high point of 50 times the height of the hill or 1 mile (1.61 km), whichever is less.

1609.6.1.1 Main windforce-resisting systems. For the design of main windforce- resisting systems, the building must meet all of the following conditions:

1. The building is a simple diaphragm building as defined in Section 1609.2.

2. The building is not classified as a flexible building as defined in Section 1609.2.

3. The building does not have response characteristics making it subject to across wind loading, vortex shedding, instability due to galloping or flutter; and does not have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.

4. The building structure has no expansion joints or separations.

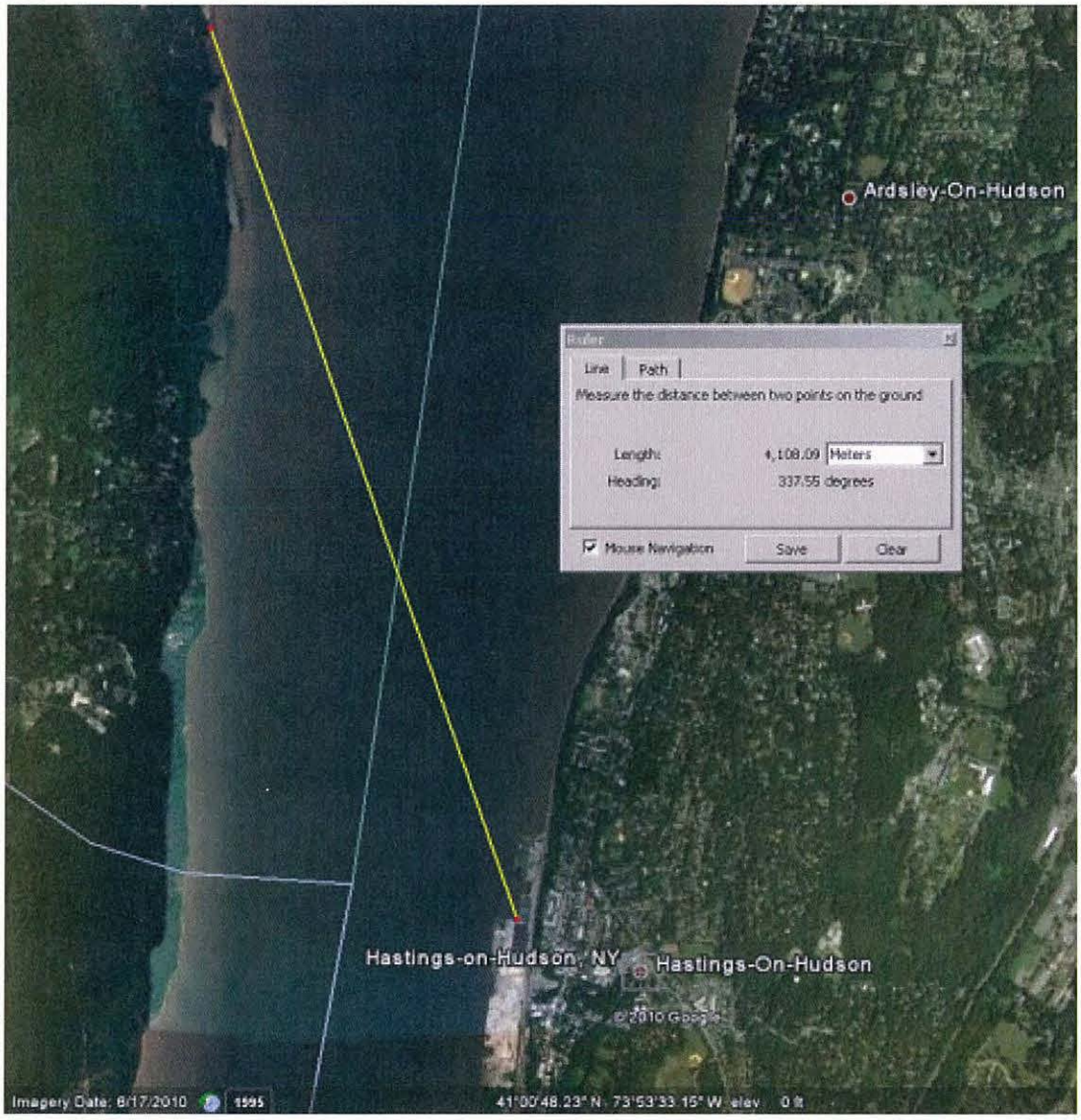
5. The building is regular shaped and has an approximately symmetrical cross section in each direction with roof slopes not exceeding 45 degrees (0.78 rad.).

1609.6.1.2 Components and cladding. For the design of components and cladding, the building must meet all of the following conditions:

1. The building does not have response characteristics making it subject to across wind loading, vortex shedding, instability due to galloping or flutter; and does not have a site location for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.

2. The building is regular shaped with roof slopes not exceeding 45 degrees (0.78 rad.) for gable roofs, or 27 degrees (0.47 rad.) for hip roofs.

1609.6.2 Design procedure.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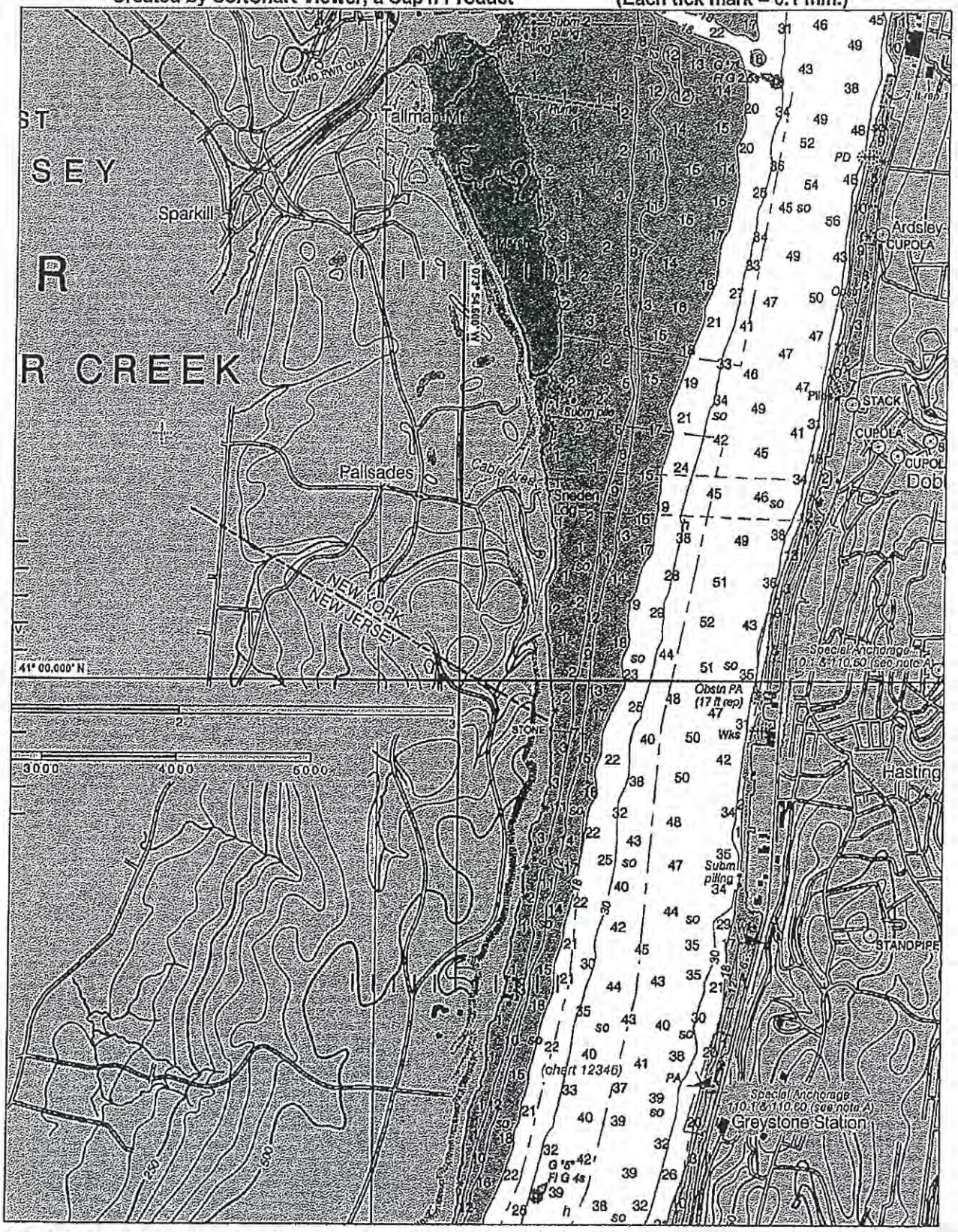

12343 HUDSON RIVER-NEW YORK TO WAPPINGER CREEK (SCALE 1:40000)

(Not For Navigational Use)

ATTACHMENT B.3-2

Van der Meer Rip-Rap Sizing Calculation Support Material

Table VI-5-23
Rock, Two-Layer Armored Non-Overtopped Slopes (van der Meer 1988)

Irregular, head-on waves

$$\frac{H_s}{\Delta D_{n50}} = 6.2 \cdot S^{0.2} P^{0.18} N_z^{-0.1} \xi_m^{-0.5} \qquad \text{Plunging waves : } \xi_m < \xi_{mc} \qquad \text{(VI-5-68)}$$

$$\frac{H_s}{\Delta D_{n50}} = 1.0 \cdot S^{0.2} P^{-0.13} N_z^{-0.1} (\cot\alpha)^{0.5} \xi_m^{P} \qquad \text{Surging waves : } \xi_m > \xi_{mc} \qquad \text{(VI-5-69)}$$

$$\xi_m = s_m^{-0.5} \tan\alpha \qquad \xi_{m\,c} = \left(6.2\, P^{0.31} (\tan\alpha)^{0.5}\right)^{1/(P+0.5)}$$

where

H_s	Significant wave height in front of breakwater
D_{n50}	Equivalent cube length of median rock
ρ_s	Mass density of rocks
ρ_w	Mass density of water
Δ	$(\rho_s/\rho_w) - 1$
S	Relative eroded area (see Table VI-5-21 for nominal values)
P	Notional permeability (see Figure VI-5-11)
N_z	Number of waves
α	Slope angle
s_m	Wave steepness, $s_m = H_s/L_{om}$
L_{om}	Deepwater wavelength corresponding to mean wave period

Validity:

1) Equations VI-5-68 and VI-5-69 are valid for non-depth-limited waves. For depth-limited waves H_s is replaced by $H_{2\%}/1.4$.
2) For $\cot\alpha \geq 4.0$ only Eq VI-5-68 should be used.
3) $N_z \leq 7,500$ after which number equilibrium damage is more or less reached.
4) $0.1 \leq P \leq 0.6$, $0.005 \leq s_m \leq 0.06$, $2.0\ tonne/m^3 \leq \rho \leq 3.1\ tonne/m^3$
5) For the 8 tests run with depth-limited waves, breaking conditions were limited to spilling breakers which are not as damaging as plunging breakers. Therefore, Eqs VI-5-68 and VI-5-69 may not be conservative in some breaking wave conditions.

Uncertainty of the formula: The coefficient of variation on the factor 6.2 in Eq VI-5-68 and on the factor 1.0 in Eq VI-5-69 are estimated to be 6.5% and 8%, respectively.

Test program: See Table VI-5-4.

Table VI-5-21
Damage Classification and Related Values of the Damage Parameters D, N_{od} and S

No damage	No unit displacement. Note that S might not be equal to zero due to settlement
Initial damage	Few units are displaced. This damage level corresponds to the *no-damage* level used in *Shore Protection Manual* 1977 and 1984 in relation to the Hudson formula stability coefficient, where the *no-damage* level is defined as 0-5% displaced units within the zone extending from the middle of the crest height down the seaward face to a depth below SWL equal to a H_s-value which causes the damage 0-5%.
Intermediate damage ranging from moderate to severe damage	Units are displaced but without causing exposure of the under or filter layer to direct wave attack
Failure	The underlayer or filter layer is exposed to direct wave attack

Damage level by D for two-layer armor

Unit	Slope	Initial damage	Intermediate damage	Failure	Reference
Rock[1]	1:2-1:3	0-5%	5-10%	≥20%	Jackson (1968)
Cube[2]	1:1.5-1:2		4%		Brorsen et al. (1974)
Dolosse[2]	1:1.5	0-2%		≥15%	Burcharth and Liu (1992)
Accropode[2,3]	1:1.33	0%	1-5%	≥10%	Burcharth et al. (1998)

[1] D is defined as percentage of eroded volume.
[2] D is defined as percentage of units moved more than D_n within the following level restricted areas: For rock see definition under initial damage, for cube $SWL \pm 6D_n$, for Dolosse $SWL \pm 6D_n$, for Accropodes between levels $SWL + 5D_n$ and $-9D_n$.
[3] One-layer armor cover layer.

Damage level by N_{od} for two-layer armor (van der Meer 1988)

Unit	Slope	Initial damage	Intermediate damage	Failure
Cube	1:1.5	0		2
Tetrapods	1:1.5	0		1.5
Accropode	1:1.33	0		0.5

Damage level by S for two-layer armor (van der Meer 1988)

Unit	Slope	Initial damage	Intermediate damage	Failure
Rock	1 : 1.5	2	3–5	8
Rock	1 : 2	2	4–6	8
Rock	1 : 3	2	6–9	12
Rock	1 : 4 – 1 : 6	3	8–12	17

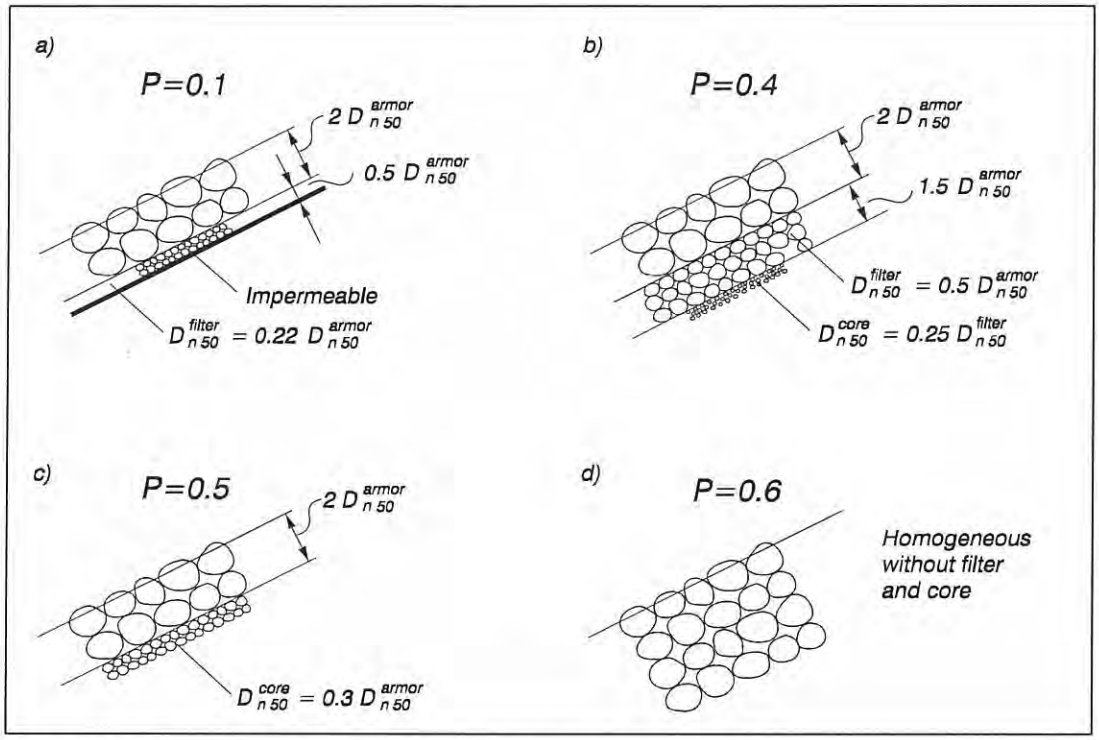

Figure VI-5-11. Notational permeability coefficients (van der Meer 1988)

- The coefficients A, B and C are given in Table VI-5-5. For impermeable slopes the coefficient of variation for A, B and C is 7 percent. Data presented by Ahrens and Heinbaugh (1988a) for maximum runup on impermeable riprap slopes are in agreement with the data represented by Equation VI-5-12.

- Equation VI-5-12 is valid for relatively deep water in front of a structure where the wave height distribution is close to the Rayleigh distribution. Wave breaking on a foreshore results in a truncation in the runup distribution which mainly results in lower runup heights for small exceedence probability levels. However, sometimes higher runup may occur according to observations in the Delft Hydraulics tests and recent tests conducted at Texas A&M University.

(4) Wave runup and rundown on permeable slopes. With respect to runup, permeable structures are defined as structures with core material of such permeability that wave induced porous flow and fluctuations of the internal phreatic line do vary with the frequencies of the waves. The storage capacity of the structure pores results in maximum runup that is smaller than for an equivalent structure with an impermeable core.

(a) Rock armored slopes, irregular long-crested head-on waves. Rock armored permeable slopes with notational permeability $P = 0.5$, as shown in detail c of Figure VI-5-11, were tested in irregular head-on waves by Delft Hydraulics in the program specified in Table VI-5-4. The results are shown in Figure VI-5-12, and the corresponding equation for the central fit to the data is given by

$$R_{ui\,\%}/H_s \quad \begin{cases} = A\,\xi_{om} & \text{for} \quad 1.0 < \xi_{om} \le 1.5 \\ = B\,(\xi_{om})^C & \text{for} \quad 1.5 < \xi_{om} \le (D/B)^{1/C} \\ = D & \text{for} \quad (D/B)^{1/C} \le \xi_{om} < 7.5 \end{cases} \qquad \text{(VI-5-13)}$$

ATTACHMENT B.3-3

Hudson Rip-Rap Sizing Calculation Support Material

Table VI-5-22
Rock, Two-Layer Armored Non-Overtopped Slopes (Hudson 1974)

Irregular, head-on waves

$$\frac{H}{\Delta D_{n50}} = (K_D \cot\alpha)^{1/3} \quad \text{or} \quad M_{50} = \frac{\rho_s H^3}{K_D \left(\frac{\rho_s}{\rho_w} - 1\right)^3 \cot\alpha} \tag{VI-5-67}$$

where H Characteristic wave height (H_s or $H_{1/10}$)
D_{n50} Equivalent cube length of median rock
M_{50} Medium mass of rocks, $M_{50} = \rho_s D_{n50}^3$
ρ_s Mass density of rocks
ρ_w Mass density of water
Δ $(\rho_s/\rho_w) - 1$
α Slope angle
K_D Stability coefficient

K_D-values by SPM 1977, $H = H_s$, for slope angles $1.5 \leq \cot\alpha \leq 3.0$. (Based entirely on regular wave tests.)

Stone shape	Placement	Damage, D [4]			
		0-5%		5-10%	10-15%
		Breaking waves [1]	Nonbreaking waves [2]	Nonbreaking waves	Nonbreaking waves
Smooth, rounded	Random	2.1	2.4	3.0	3.6
Rough angular	Random	3.5	4.0	4.9	6.6
Rough angular	Special [3]	4.8	5.5		

K_D-values by SPM 1984, $H = H_{1/10}$.

Stone shape	Placement	Damage, D [4] = 0-5%	
		Breaking waves [1]	Nonbreaking waves [2]
Smooth rounded	Random	1.2	2.4
Rough angular	Random	2.0	4.0
Rough angular	Special [3]	5.8	7.0

[1] Breaking waves means depth-limited waves, i.e., wave breaking takes place in front of the armor slope. (Critical case for shallow-water structures.)

[2] No depth-limited wave breaking takes place in front of the armor slope.

[3] Special placement with long axis of stone placed perpendicular to the slope face.

[4] D is defined according to SPM 1984 as follows: The percent damage is based on the volume of armor units displaced from the breakwater zone of active armor unit removal for a specific wave height. This zone extends from the middle of the breakwater crest down the seaward face to a depth equivalent to the wave height causing *zero* damage below still-water level.

Shore Protection Manual (1977) versus *Shore Protection Manual* (1984): When considering that $H_{1/10} = 1.27H_s$ for Rayleigh distributed wave heights (non-depth-limited waves) it is seen that the recommendations of *Shore Protection Manual* (1984) introduce a considerable safety factor compared to the practice based on *Shore Protection Manual* (1977).

Uncertainty of the formula: The coefficient of variation of Eq VI-5-67 is estimated to be 18% by van der Meer (1988). Melby and Mlaker (1997) reported a coefficient of variation for K_D of 25% for stone and 20% for Dolosse.

RFS APPENDIX B – SUBAQUEOUS CAP STABILITY

INTRODUCTION

Haley & Aldrich of New York (Haley & Aldrich) is determining the engineering feasibility of installing subaqueous caps in areas of residually contaminated sediment at a former manufacturing plant site located at 1 River Street, Hastings-On-Hudson, New York along the east bank of the Hudson River (the Site). The subaqueous caps will require erosion protection, consisting of granular fill designed to protect the underlying subaqueous cap layers from erosion and scour. This document addresses the engineering characteristics of the erosion protection layer.

APPROACH

Existing information sources were reviewed to obtain the following information for the Site and to develop estimates of the sediment cap grain size:

- Sediment environment (deposition, erosion etc.);
- Sediment type (mud, sand etc.);
- River bottom shear stress and discharge velocity; and
- Tidal influence on shear stress and velocity.

These topics are discussed below.

Sediment Environment and Type

Two sources, the State of New York Department of Environmental Conservation's Online Hudson River Estuary Benthic Mapper (NYSDEC) and the Lamont-Doherty Earth Observatory of Columbia University (Columbia) were utilized to obtain sediment and environmental information for the Site.

The coverage of NYSDEC's Benthic Mapper ends just upstream (north) of the Site and Columbia's coverage includes that of NYSDEC, as well as the Site and areas downstream. These sources were compared for consistency where their coverage overlapped and their depictions of the nature and extent of the sediment environments and sediment types were observed to be identical. Based on the consistency of results between these two sources, and Columbia's collaboration with NYSDEC in the development of the Benthic Mapper, Columbia's coverage of the Site vicinity was considered to be acceptable.

Columbia's classification of the Site sediment environment is "Depositionary Thick" indicating that sediment deposits are greater than 50 centimeters (cm) or approximately 20 inches (in) thick. The sediment type was classified as mud. This characterization is consistent with the findings of previously completed off-shore borings.

River Bottom Shear Stresses and Flow Velocities

A report by Earth Technologies, Inc, (Earth Tech, 2003) and a memorandum by Hydroqual Environmental Engineers and Scientists (Hydroqual, 2005) were utilized to obtain shear stress and flow velocity estimates for the Site.

Earth Tech

The Earth Tech document states that current velocities in excess of 0.6 meters per second (mps) (2 feet per second, fps) were measured within 100 feet of bulk heads at the Site and higher velocities were measured at varying distances in channel further off shore from the bulkheads. The document recommended that a complete analysis of the "velocity field" be conducted and stated "…it is clear from the flow velocity data that flow speeds are lower near shore than further offshore, thereby reducing the problem with high flows."

Hydroqual

Hydroqual calculated the river bottom shear stresses using the Contaminant Assessment and Reduction Project digital model sponsored through the Hudson River Foundation by the Port Authority of New York and New Jersey, the New Jersey Office of Maritime Resources, the NYSDEC and the New Jersey Department of Environmental Protection. Probabilities of channel bottom shear stresses and flow velocities were calculated at 100-second intervals over water years 1988-1989, 1994-1995, 1998-1999, 1999-2000, 2000-2001, and 2001-2002. Attachment B.4-1 presents the calculated shear stresses and flow velocity probability distribution for the model cell closest to the Site. Calculated channel bottom shear stress probability distributions from 0.01 to greater than 99.99 percent, the 1- to greater than the 10,000-year recurrence intervals, range from 0- to 20.5 dynes/ cm^2. Calculated flow velocity probability distributions from 0.01 to 99.99 percent, the 1- to 10,000-year recurrence intervals, range from 0.002 meters per second, (mps) or 0.007 feet per second (fps) to 0.7 mps (2.3 fps). Although the Site is closer to the shoreline than resolved by the model grid, Hydroqual stated that shear stresses (and related flow velocities) "… will be different, (probably lower) closer to the shoreline."

Calculation of Sediment Cap Grain Size

Haley & Aldrich selected the 100-year recurrence interval velocity of 0.57 mps (1.9 fps) in Attachment B.4-1 to evaluate the granular cap particle size using the method of incipient particle motion (USDOT, 2001). The method of incipient particle motion estimates the smallest particle size that is stable at a particular velocity. As used herein, the calculation is formatted to estimate the smallest D_{50} particle size that will remain stable at the 100-year recurrence interval velocity of 0.57 mps (1.9 fps). The calculation assumes no wave action – erosion projection within the zone where wave energy reaches the river bottom is not considered in this report. The results of the calculations are provided in Table B.4-1. As indicated in the Table B.4-1, the particle sizes resistant to motion are smaller in areas having flatter (2 to 9 degrees) river bottom slopes and are larger in areas with steeper (18 to 35 degrees) river

bottom slopes. In other words at the same velocity a particle on a steeper slope would move more easily than a particle on a flatter slope.

As indicated in Table B.4-1, the 100-year recurrence interval for D_{50} size on the 3 degree slope within the silt curtain area would be 1.1 mm (0.044 inches). In the steeper river bottom areas, a particle of D_{50} of 4.0 to 10.0 mm (0.15 to 0.4 inches) would be the smallest size resistant to the 100-year recurrence interval flow velocity. A cap gradation ranging from approximately 0.5 x D_{50} to about 2.0 x D_{50} could be composed of 0.55 mm (0.022 inches) to 2.2 mm (0.088-inches) grain size granular fill. The 0.55 mm (0.011 inches) size material would be stable at the 0.46 mps (1.5 fps) velocity that is near the 10-year (actual estimate 12-year) interval recurrence event. The D_{50} size would be stable at the 100-year recurrence interval velocity of 0.57 mps (1.9 fps) and the 2.2 mm (0.088-inches) size material would be stable at the 0.73 mps (2.4 fps) velocity that exceeds the 10,000-year recurrence interval event (Attachment B.4-1). As is the case with all graded granular caps, it is expected that a small amount of the smaller grain size components near the surface of the cap will be transported during higher recurrence interval events shortly after installation. However, the larger grain sizes will remain as armor on the surface to stabilize the cap.

Tidal Influences in the Site Area

Tidal influences at the Site were evaluated with respect to the velocities and particle sizes discussed above. The following summarizes Earth Tech's and Hydroqual's discussions of this topic.

Earth Tech

Earth Tech (2003) concluded "…peak flow and velocities for extreme riverine flood events at the site will not likely be hydrograph- or tide-dependent. In addition, the report states "…tide dependency will be limited as peak flows from extreme events would occur over a period significantly greater than that of the normal tidal period." Earth Tech concluded that river flood events with return intervals of less than approximately 100 years would likely have limited effect on peak flow velocities at the project site and the magnitude of the river discharges would be much longer duration and greater than the volume and relative magnitude of the daily tidal flux and peak flows. However, Earth Tech did not specifically quantify the potential effect of a tidal storm surge on the hydraulic conditions adjacent to the Site.

Hydroqual

Hydroqual's modeling included the effects of Hurricane Floyd in September of 1999 (water year 1999-2000). Their report states that the hurricane did not have extreme impacts or cause extreme bottom shear stresses compared to the six water years that were evaluated. In addition, the three highest shear stresses evaluated were preceded by high wind conditions that increased current velocities. However, these events and the events of all of the six water years studied also "…did not have extreme impacts on bottom shear stresses in the Hudson River proximal to the Site".

Potential Scour of Existing Sediments

Estimates were made for potential scour of existing sediments under extraordinary conditions, with the understanding that the site is located in a net depositional area, and over time any scoured sediment would be replaced. The CEM Part VI indicates that scour a the toe of a sloping structure is less than that at a vertical structure; based on Equation VI-5-23 for scour at vertical walls, the expected scour for waves generated by a sustained wind of 70 mph would be less than one foot. The CEM in Part VI also states that, for planning purposes, scour at circular piles due to combined current and wave conditions can be estimated to be twice the pile diameter. Piles at the site are generally less than 12 inches diameter, so the scour would be less than two feet. As stated previously, in this depositional area of the Hudson River, any such scour would be replaced after the scouring conditions abated.

SUMMARY AND CONCLUSIONS

The Site is located in a depositional environment of mud deposits as characterized by NYSDEC and Columbia. A sediment cap composed of graded granular fill material will provide erosion and scour protection of underlying sediments.

Hurricane Floyd and three of the water years modeled had high shear stresses and high resulting flow velocities preceded by strong wind conditions at the Site. However, there was very little difference in shear stresses and velocities between these three and all six water years. The flow velocity modeling results of the site for the 1- to greater than 10,000-year recurrence interval events also indicate there is little difference in velocities. As indicated in Attachment B.4-1, the 1,000-year recurrence velocity is only approximately 10% greater that n the 100-year design velocity and the 10,000-year recurrence event is only approximately 20% greater than the 100-year design velocity, thus there is little difference between discharge events without strong winds or discharge events with strong winds or hurricane conditions at the Site.

Sediment cap D_{50} grain sizes were evaluated for the 100-year recurrence interval current velocities. As indicated above, a cap gradation of 0.5 to 2.0 times the D_{50} size would be composed of grain sizes between 0.55mm (0.022 inches) to 2.2mm (0.088 inches) for a 3 degree slope. These sizes are stable between recurrence intervals of 10 years to greater than the 10,000 year recurrence interval events. As is the case with all graded granular caps, it is expected that a small amount of the smaller grained sizes near the surface of the cap will be transported during higher recurrence interval events shortly after installation of the cap. However, the larger grain sizes will remain as armor on the surface to stabilize the cap.

Enclosures:

Table B.4-1 – 100 Year Particle Size Results
Attachment B.4-1 - River Bottom Shear Stress and Flow Velocity and Probability Distributions

REFERENCES

1. Lamont-Doherty Earth Observatory Hudson River Benthic Mapper Web Site,2011.

2. Earth Technologies, Inc., Feasibility Study – Harbor at Hastings Site OU#2, 2003.

3. HydroQual, Environmental Engineers and Scientists, Memorandum, Hudson River Shear Stresses, 2005.

4. State of New York Department of Environmental Conservation's Online Benthic Mapper Web Site, 2011.

5. U.S. Department of Transportation, Federal Highway Administration, Publication No. FHWA NHI 01-003/ Hydraulic Engineering Center Circular No. 23, Bridge Scour and Stream Stability Countermeasures March 2001.

TABLE B.4-1
100-YEAR PARTICLE SIZE RESULTS
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PARTICLE SIZE RESULTS, 100-Year Recurrence Interval V=1.9 ft/sec (1)

LOCATION	EXISITING SLOPES (2) (degrees)	ANGLE OF REPOSE (3) (degrees)	SMALLEST PARTICLE PARTICLE SIZE (D_{50}) (4)	
			(inches)	(millimeters)
Within Silt Curtain	3	14	0.044	1.1
	6	14	0.047	1.2
	9	14	0.063	1.6
	35	36	0.4	10.5
North Boat Slip	2	14	0.043	1.1
	35	36	0.25	6.3
South Boat Slip	4	14	0.045	1.1
	18	20	0.15	3.8

1: 100-year velocity esimate of 1.9 ft/sec (0.57 m/sec) from Hydroqual Corres 29 August 2005
2: Slope angles provided in 7 Jan e-mail
3: 4:1 (14 degrees) assumed except otherwise noted
4: Smallest particle size to resist motion

ATTACHMENT B.4-1

River Bottom Shear Stress and Flow Velocity

Probability Distributions

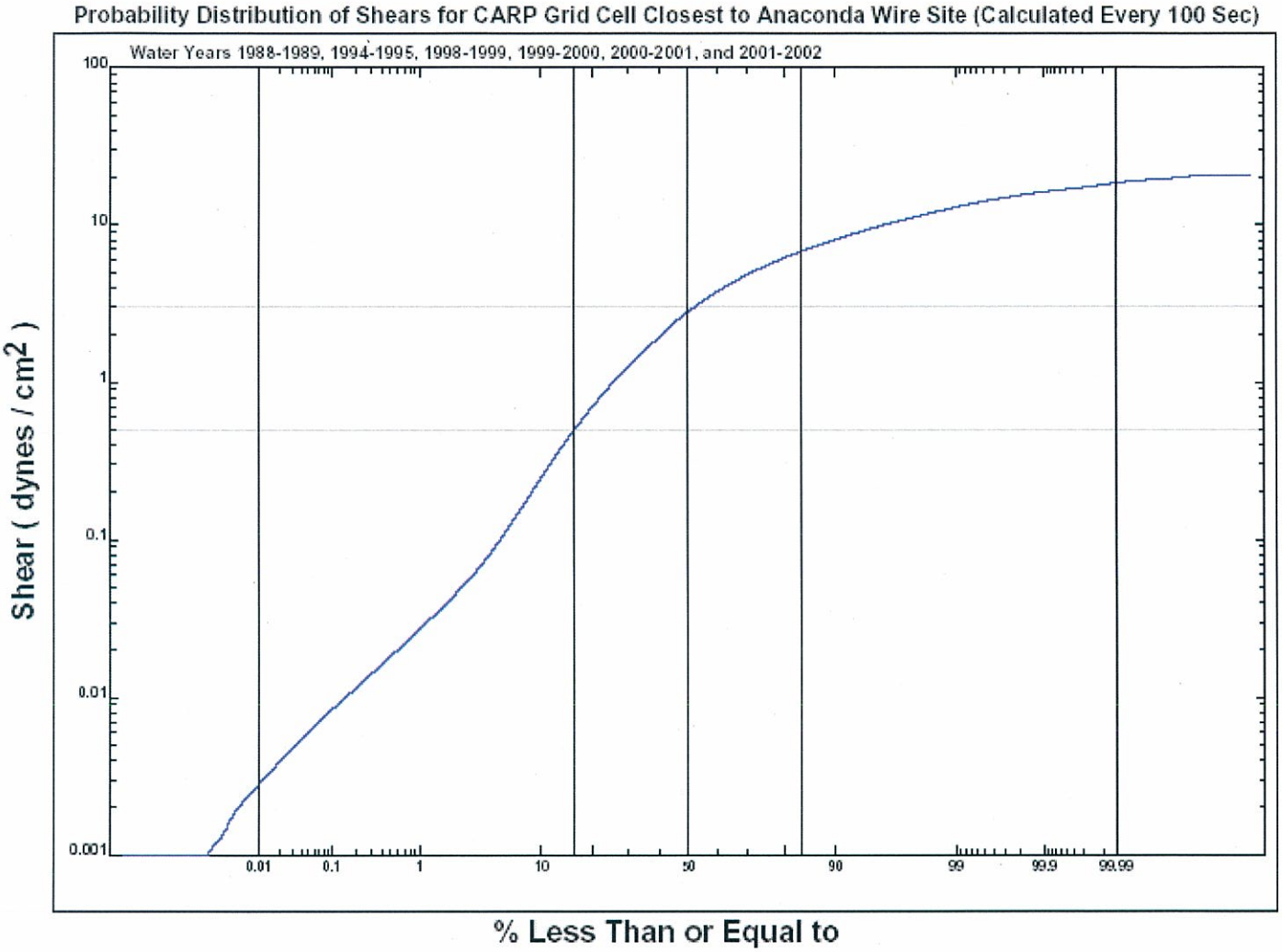

Figure 3. Shear stress calculations across six water years on a logarithmic scale

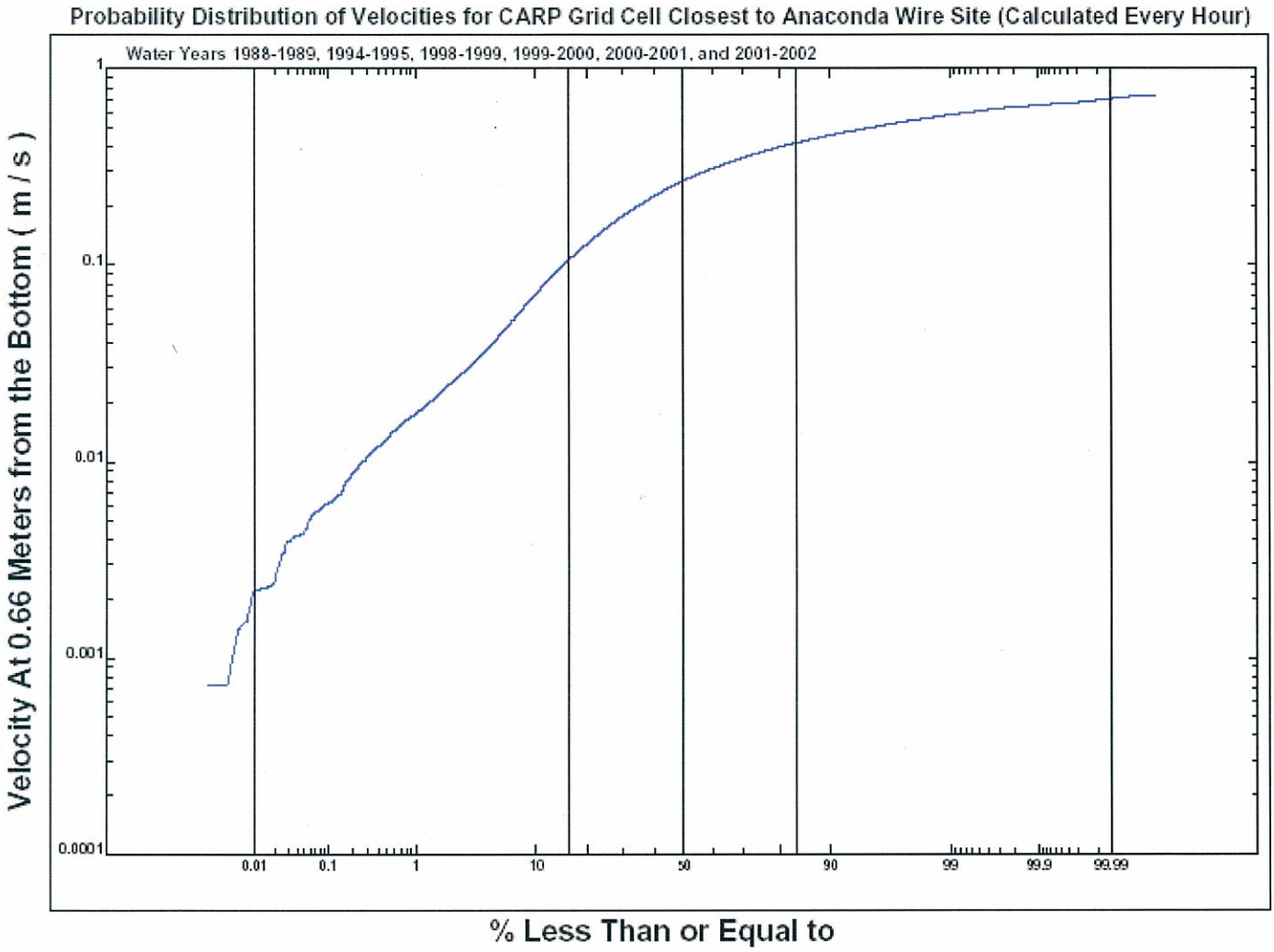

Figure 9. Velocity calculations across six water years on a logarithmic scale

RFS APPENDIX I – SUBAQUEOUS CAP EFFECTIVENESS

HALEY ALDRICH

INTRODUCTION

This appendix describes the engineering basis for Subaqueous Capping (cap) and Backfill that will be included in the Revised Feasibility Study (RFS). Post-dredge Subaqueous Capping and Subaqueous Backfill are both incorporated, to various degrees, within comprehensive OU-2 alternatives.

Subaqueous Cap

For the RFS, a preliminary design of cap construction is necessary for purposes of comparison and evaluation which will serve as a basis for a preliminary design. Refinement of the preliminary design for the selected remedy will be completed during Remedial Design.

Subaqueous Backfill

Dredging in areas that do not require capping will be backfilled to restore bathymetry to the extent practicable. Materials selection may be modified to include additional carbon content as needed to address elevated residual contamination (Modified Backfill).

TERMS

1. "Subaqueous" is defined as river bottom areas below Mean High Water (MHW) and therefore includes inter-tidal areas.

2. "Cap" is defined as the aggregate system of components which function "to prevent direct human and wildlife exposure to contaminated surface sediments" (NYSDEC, 2003). In some areas, the cap may be integrated within the Shore Protection system.

3. "Shore Protection" is defined as the engineered system that mitigates potential erosion. For various alternatives, shoreline protection may include one or more of the following: sheeting, engineered slopes with armor stone (e.g. rip rap) and currently existing materials.

4. "Backfill" is defined as material placed within dredged areas to restore bathymetry.

DESIGN GUIDANCE

Erosion Protection Layer

Design guidance for the erosion protection layer is provided by the Army Corps of Engineers in their 2008 Coastal Engineering Manual, and in Guidance for In-Situ Subaqueous Capping of Contaminated Sediments, Appendix A. Armor Layer Design (Palermo, M., Maynord, S., Miller, J., and Reible, D. 1998).

Chemical Isolation Layer

Design guidance is provided in Appendix B of the "Guidance for In-situ Subaqueous Capping of Contaminated Sediments (Palermo *et al.*, 1998) titled "Model for Chemical Containment by a Cap".

Dr. Reible, the author of "Model for Chemical Containment by a Cap" (Appendix B), provides a tool that assists in calculation for cap design. This tool, Active Cap Design Model Version 3.14 was used to perform a preliminary sensitivity analysis of the variables for a PCB breakthrough calculation.

Calculations use many different criteria to develop the appropriate thickness needed for containment. Significant criteria used in calculating the layer thickness include:

1. Properties of the chemical being contained,
2. Contaminant concentrations in sediment within 1 ft of the bottom of dredge surface,
3. Organic content of the material,
4. Advection and diffusion rates of pore water, and
5. The design life of the cap.

For the RFS, it has been assumed that the habitat and erosion protection layers perform no chemical isolation function although organic carbon content contained in these layers may be present below the bioactive zone and provide additional adsorption capacity which would serve to extend the cap life.

EFFECTIVENESS

Subaqueous Cap effectiveness must consider both erosion protection and chemical isolation. These functions can be provided by one or more individual layers. Material selection and thickness requirements for erosion protection and chemical isolation must consider different factors and will vary dependent upon river conditions and post-dredge residual sediment concentrations as well as the type of contaminants of concern.

Erosion Protection

The purpose of the erosion protection layer is to protect the underlying material (i.e. chemical isolation layer) from being exposed to erosional forces. Therefore, key factors for design of the erosion protection layer are the natural and man-made forces which vary by location and water depth.

An evaluation of erosion protection effectiveness should be separated by the river conditions. There are three primary conditions that exist at the Site: backwater areas, shore areas and those areas not subject to significant wave action forces.

A. Backwater Areas: For the purposes of this analysis, these areas are characterized by shallow water depths, thick natural deposition and are located out of the general flow of river currents. Due to the reduction of wave energy as a result of the shallow depths and reduced river currents, these areas are subject to much lower erosional forces.

B. Shore Areas: For the purposes of this analysis, these areas are characterized by water depths that are subject to the most significant forces of wave energy and river forces.

C. River Bottom Areas: For the purposes of this analysis, these areas are characterized by deeper water depths that are not subject to significant wave energy but are subject to river currents.

Remedial design must consider both ordinary and extraordinary erosional events in the design of erosion protection. For the purposes of the RFS, preliminary calculations were completed to establish a basis for material selection and thickness. These typically vary by area as follows:

A. Backwater Areas: Based on a review of the existing condition (see the RFS Appendix B – Subaqueous Cap Stability), these areas would need a relatively small erosion protection layer to stabilize the existing sediment and would not expose sediments more than 2 feet deep.

B. Shore Areas: Calculations were preformed to consider expected erosional forces in the RFS Appendix B – Shore Protection.

C. River Bottom Areas: Based on a review of the existing condition (see the RFS Appendix B – Subaqueous Cap Stability), scour in this net depositional area would be limited to approximately 12 inches and would require a relatively minor erosion protection layer.

Prop wash, ice forces and marine vessel impacts will also be considered during Remedial Design which may modify the material selection; however these additional considerations are not expected to significantly change the conclusions of the preliminary calculations. The practicable limit for placement of material in the conditions expected to be present at the site are such that a minimum of 6 inches will be assumed for the RFS.

As a basis for the RFS and Remedial Design, the following have been determined to be effective to prevent the exposure of underlying sediment:

A. Backwater Areas: Erosion protection layer consisting of 12 inches of gravel or 18 inches of sediment could be used, assuming that wave energy is dissipated at the steep change in river bottom elevation that exists where these areas meet the river.

B. Shore Areas: Armor stone size and thickness in varying areas of the site are presented in Appendix B – Shore Protection, Table B.3-3.

C. River Bottom: 6 inches of course sand or 12 inches of sediment

Chemical Isolation

The purpose of the chemical isolation layer is to control migration of contaminants beneath the cap into the river or habitat layer. This layer inhibits the potential migration of contaminates by adsorption and/or isolation. Since this layer is placed directly above post-dredge sediments, allowances are incorporated into the design for intermixing with the sediments and consolidation of the placed materials.

An evaluation of chemical isolation effectiveness should address the presence and concentrations of Site-specific contaminates of concern (PCBs and the metals copper, lead, zinc, and nickel).

There is some concern that copper (or possibly other divalent metals) could, over time, migrate from pore water and 'breakthrough' an engineered sand cap. Based on previous investigations, however, this is a very improbable scenario for the following reasons:

USEPA's Equilibrium Partitioning Sediment Benchmark (ESB) provides guidance to evaluate whether endogenous sulfides generated by river sediments are sufficient to bind specific metals. It is now widely accepted that there is good agreement between biological effects and porewater concentrations (DiToro et al., 1991a,b; NRC, 2003), rather than bulk sediment concentrations. "The form of the metal, and thereby the toxicity of a metal, are highly influenced by environmental conditions such as pH, alkalinity, REDOX potential, and the availability of complexing ions or ligands. Very generally, it can be said that the dissolved fraction of metals seems to account for most toxicity…" (NYSDEC 1999, VI.A). The mechanism for reducing the bioavailability of divalent metals, according to the ESB guidance, is strong binding of metals by acid volatile sulfides (AVS) that are formed from sulfates in low oxygen environments (such as below the sediment interface). Studies (Ankley et al., 1996) have shown that if the molar concentration of AVS exceeds the concentration of simultaneously extracted metals (SEM), then toxicity will not be manifested in sediment bioassays. If the molar concentration of SEM exceeds AVS, then toxicity may be observed but other factors must be considered. The ESB guidance also considers the binding capacity of the fraction of total organic carbon in the sediment.

This approach has been used to assess the OU-2 conditions at the Site (BB&L, 2006). Site-specific studies concluded that there is an excess of metal binding capacity in the OU-2 sediments. Subsequently NYSDEC raised questions regarding the target cleanup levels proposed based on BB&L's analysis. In a letter dated 12 March 2009, NYSDEC stated that "If ARCO wishes to pursue ESBs for sediment metals contamination at the Harbor at Hastings site, additional data beyond what was gathered previously would be needed. This may include additional data collection during the pre-design phase to refine the metals clean up goals using an approach that would be specified as part of the remedy." NYSDEC also stated that SEM-AVS is a "valuable tool" and Atlantic Richfield agrees. As suggested by NYSDEC, the RFS proposes to resolve the relationship between bulk sediment concentrations and Site-specific Cleanup Levels as part of the Remedial Design using a toxicity assessment as described in Appendix E.

PCBs have an extremely low solubility and therefore are not expected but may be present in porewater at the Site. Analysis for PCBs in filtered groundwater samples collected from wells in the Northwest Area detected total PCBs at very low or "non detect" concentrations. PCBs were also measured in porewater during the Supplemental FS (Parsons, 2006) and were below the NYSDEC level of protection for acute effects to benthic macroinvertebrates of 10 ug/L and just slightly above the level of protection for chronic effects to benthic macroinvertebrates 0.03 ug/L (NYSDEC, 1999). The high organic carbon content of the sediment and the very low aqueous solubility of the PCB-congener present (Aroclor 1262) inhibit partitioning into the dissolved phase.

A hydrogeologic model was created for the Site in which porewater was modeled as migrating by advection through the marine sediments. This model calculated the upward flux of porewater through the marine sediments at 6×10^{-7} gal/min/ft^2 which is a flow approximately 0.3 gallons per square foot during an entire year (see Section 2.5 in the RFS).

There are three primary materials that are considered at the site for chemical isolation: Sand, Sediment and Modified Backfill.

A. Sand – Material placed post-dredge with a minimum fraction organic carbon (f_{oc}) of 0.7%. Fraction organic carbon was determined based on "Natural Attenuation of Fuels and Chlorinated Solvent in the Subsurface" (Weidemeier, 1999)

B. Sediment – Existing, In-situ, naturally deposited materials with Site-specific contaminates of concern concentrations below Site-specific Cleanup Levels

C. Modified Backfill – Clean fill material placed post-dredge that has been augmented to a fraction organic carbon (f_{oc}) greater than 1%

Calculations were based on Aroclor 1260. This Aroclor was identified as a site-specific PCB Aroclor and is the primary Aroclor found at the site. "The primary PCB mixture found on the Harbor at Hastings property and in site sediments was Aroclor 1260 with lesser amounts of Aroclors 1254 and 1248." (NYSDEC, 2003)

Dr. Reible's Active Cap Design Model Version 3.14 was used to perform a preliminary sensitivity analysis of the variables for a PCB breakthrough calculation. The objective of the analysis was to determine the magnitude of effect each variable had on the time for PCBs to break through the chemical isolation layer. This analysis did not consider the effects of bioturbation on breakthrough time, because for the purposes of the RFS, concentration levels beneath the bioturbation layer are the focus. The result of our analysis was a range of values for breakthrough time calculated based on the range of values we gathered for each variable.

Significant criteria that provide the basis for calculating the required layer thickness include:

- *Properties of the chemical being contained*
  - Chemicals of concern at the site include Aroclor 1260 and dissolved metals.

- *Bulk Sediment concentrations within 1 ft of the bottom of dredge surface*
  - A Bulk sediment concentration of 35 ppm was used for PCBs which are higher than those expected in post-dredge sediments.

- *Organic content of the cap material*
  - Sand with 0.7% fraction organic carbon (f_{oc}) can be acquired. Excess sulfides at the site bind known or predicted sediment concentrations of metals (see discussion above), therefore calculations will focus on PCBs.
  - Sediment with fraction organic carbon of 3.75%.
  - Backfill with minimum of 1% fraction organic carbon.

- *Advection and diffusion rates of pore water*
  - Advection rates of porewater are estimated to be 6×10^{-7} gal/min/ft^2 which is equivalent to a darcy velocity of less than 1 inch per year for areas with a sloped shore

  - Areas with bulkhead installations would have a lower advection rate, depending on the shoreline protection option chosen (e.g. Slopeback or Bulkhead).
  - Diffusion rates are less significant than advection rates.

- *The design life of the cap*
  - 100 years

The practicable limit for placement of material in the conditions expected to be present at the site require a minimum of 6 inches thickness. Calculations were performed assuming 6 inches of material for each of the three primary materials that are considered at the Site for chemical isolation and used in the RFS.

Conclusion

As a basis for the RFS, the following have been determined to be effective for at least 100 years for preventing exposures due to underlying sediment. Calculations will be revised as required during Remedial Design.

A. Sand: 6 inches of sand with a minimum fraction organic carbon (f_{oc}) of 0.7%.

B. Sediment: 6 inches of existing sediment.

C. Modified Backfill: 6 inches of modified backfill.

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APPENDIX E

REMEDIAL DESIGN WORK PLAN EXCERPTS
(SCOPE OF PROGRAM)

APPENDIX 2

OU-1 SUPPLEMENTAL INVESTIGATION PLAN

1. INTRODUCTION

This plan describes supplemental onshore investigation activities for OU-1. This task is part of the overall pre-design investigation (PDI) that will be completed at the Former Anaconda Wire & Cable Company site (Site), NYSDEC Site # 3-60-022, located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York.

2. BACKGROUND

In order to support the remedy design, several data collection tasks will be conducted. Data gaps that have been identified include updating the current groundwater model, identification of subsurface voids along the shoreline, and investigation of subsurface anomalies, which includes subsurface features that may require special consideration during remedial design (e.g. vaults, sumps, etc.). The primary purpose of these tasks include identifying: subsurface structures or voids that my pose a safety risk to operation of heavy equipment during remedy implementation, subsurface features that may contain residual PCBs, and other anomalies that may require additional investigation.

3. SCOPE OF WORK

The goal of this task is to obtain additional information to support the final remedy design. This plan describes the approach to complete the following tasks:

- Install groundwater wells and operation of pressure transducer data loggers
- Complete baseline sampling of site groundwater
- Evaluate voids adjacent to the shoreline
- Investigate other subsurface anomalies
- Investigate Buildings 15 and 52 outfalls
- Confirm and document existing underground utilities that will remain in place, be relocated, be abandoned, or be removed.

3.1 Groundwater Levels

3.1.1 Monitoring Well Installation

The proposed work scope includes the installation of seven monitoring wells: five shallow wells screened in the Fill unit, and two deep wells screened in the Basal Sand unit (Figure 2-1). Well locations were chosen to establish coverage to better understand tidal influences on the groundwater beneath the site and variation of hydraulic gradients with distance east of the Hudson River for updating the groundwater model. Hydraulic gradients and tides are important parameters which will affect groundwater modeling in support of remedial design.

Monitoring wells will be installed using standard drilling techniques. Shallow wells will be installed to the top of the Marine Silt at depths varying from 15 to 30 feet below ground surface (bgs). Deep monitoring wells will be installed to depths varying from 50 feet near the eastern boundary of the site to 90 feet near the Hudson River. Both shallow and deep wells will be constructed using two-inch-

diameter PVC screen (0.010-slot) and riser with appropriately sized sand filter pack. The top of the filter pack will be placed at least two feet above top of screen. A bentonite seal at least two feet in thickness will be placed above the filter pack. Monitoring wells will be grouted to within two feet of ground surface with cement/bentonite grout and will be completed with locking compression caps and flush-mount or stickup well covers. Monitoring wells with flush-mount surface completions will be appropriately marked to facilitate future locating for monitoring activities. Monitoring well construction will be similar to wells installed during previous investigation activities; typical construction logs for shallow and deep wells are shown in Attachment 1. Actual construction specifications may vary based on observed field conditions.

3.1.2 Transducer Deployment

In addition to groundwater level data loggers (pressure transducers) installed during Phase 1 (Appendix 1), additional pressure transducers will be deployed in the newly installed monitoring wells as shown in Figure 2-1.

Pressure transducers will be capable of recording approximately 40,000 data points. Data recording frequency will be calibrated to best support modeling and design objectives. Groundwater levels will be measured manually at each location immediately following deployment of each transducer and during each download event. Barometric pressures will be monitored at an on-site location and will be used to correct water level records for atmospheric variations. Data will be downloaded from the data loggers approximately every two months for a minimum of six months.

3.2 Groundwater Sampling

Baseline groundwater sampling will be completed to monitor shallow groundwater prior to remedial construction to evaluate the long term effectiveness of the remedy.

Baseline groundwater sampling will be completed for three upgradient wells and three Site wells during the PDI (Figure 2-3) and then annually thereafter until the beginning of construction as described below. Groundwater samples will be collected using low flow techniques and analyzed for PCBs, beryllium, copper, lead, and zinc.

The goal of the baseline groundwater sampling program is to sample shallow-screened wells to provide data at both upgradient and down gradient locations across the Site to establish a baseline for groundwater quality; groundwater flow is generally east to west. A description of monitoring wells selected for this program along with a rationale for their selection is provided below.

<u>Upgradient Wells</u>

- PDMW-16S
    - This well is located in the southeast corner of the Site; no known impacted soils are upgradient of this location.
    - Groundwater sampling performed at this location in 2006 showed non-detect (ND) results for PCBs and lead.
    - This location is upgradient of soil contamination in the southwest portion of the Site and upgradient of MW-01A.

- PDMW-20S
    - This well was installed during the 2013 PDI and is located on the eastern portion of the Site; no known impacted soils are upgradient of this location.
    - Groundwater sampling has not been performed at this monitoring well location.
    - This location is upgradient of the water tower area along with other potential sources of contamination and upgradient of MW-05.
- PDMW-19S
    - This well is located in the northeast corner of the Site; no known impacted soils are upgradient of this location.
    - Groundwater sampling performed at this location in 2006 indicated a PCBs result of 0.00061 ppm and a lead result of 0.0043 ppm.
    - This location is upgradient of the Northwest Corner and upgradient of MW-09.

Site Wells

- MW-01A
    - This well is located in the southwestern corner of the Site and adjacent to the Hudson River.
    - Groundwater sampling performed at this location between 1996 and 2000 indicated a range of concentrations for PCBs between ND and 0.0003 ppm and were ND for filtered samples. Lead in groundwater varied from ND to 0.5 ppm and was ND for filtered samples.
    - This location is down gradient of soils containing lead and PCBs that will be removed during implementation of the remedy.
- MW-05
    - This well is located on the western portion of the Site and adjacent to the Hudson River.
    - Groundwater sampling performed at this location between 1997 and 2000 indicated a range of concentrations for PCBs between 0.052 and 0.16 ppm and were ND for filtered samples. Sampling between 1997 and 2005 indicated a range of concentrations for lead between ND and 0.285 ppm and were ND for filtered samples.
    - This location is in an area of onshore and offshore PCB contamination that will be removed during implementation of the remedy as well as down gradient of Building 52.
- MW-09
    - This well is located near the Northwest Corner and northern shoreline.
    - Groundwater sampling performed at this location in 1997 showed a PCB result of 0.0032 ppm and lead sampling in 2005 was ND including an ND for a filtered sample.
    - This location is proximate to the Northwest Corner and associated contamination and adjacent to former Building 55, known as the former Mixing Room.

These well pairs will provide upgradient and down gradient samples in various areas of contamination that will be addressed during implementation of the remedy.

The condition of wells proposed to be included in baseline sampling will be evaluated during the PDI to determine usability for sampling. Groundwater samples will be collected using low flow techniques and analyzed for PCBs, beryllium, copper, lead, and zinc.

3.3 Void Assessment

There are several areas of the Site where evidence of soil erosion or subsidence beneath the concrete slab have been observed. Observations include large holes in the concrete and large void spaces that expose former building foundation structures. These areas are predominantly located between the north and south boat slips. A better understanding of the depth and extent of void spaces beneath the slab is required to:

1. Plan where activities can be safely completed and
2. Provide data to estimate fill quantities.

Void extents will be evaluated through a ground penetrating radar (GPR) program and voids survey. Once the results of the GPR are confirmed (and additional GPR surveys conducted as required), the voids survey will be completed by constructing multiple transects along the shoreline between the north and south boat slips (Figure 2-2). A hammer drill or coring machine will be used to penetrate the concrete so that contact of fill material with the concrete and the concrete thickness can be assessed. The depth from the bottom of the concrete to the top of the fill material will be measured at each location. Once the initial investigation is complete, larger concrete cores will be completed at select locations (approximately 5 - 8) in order to visually confirm measurement results.

3.4 Subsurface Anomalies

There are several areas of the site in which subsurface anomalies (e.g. subsurface features that require special consideration during remedial design such as vaults, sumps, LNAPL, etc.) have been identified during previous investigations and during routine site work that require additional investigation. Locations are shown in Figure 2-4. Investigation of these areas is required to:

1. Assess previously identified significant voids to reduce the potential for safety incidents during construction, if required.
2. Evaluate potential residual material which may be present in the subsurface and/or within features.

The potential presence of other relevant subsurface features will be evaluated using results of previous investigations, evaluation of historical drawings, interviews with site employees, and site reconnaissance. These areas may be investigated using a combination of techniques including coring the surface and using a down hole camera, limited excavation (for the purposes of exposing subsurface structures), lifting manhole and vault lids for inspection, and/or completion of soil borings. Samples may be collected based on field observations. Once subsurface anomalies have been exposed, investigated, and/or evaluated, the area will be surveyed and secured.

3.5 Outfall Investigations

Outfalls that conveyed water from Building 52 to the Hudson River will be further investigated to determine potential PCB impacts to the subsurface resulting from former operations within the building (Figure 2-5).

This will be completed using a multimodal approach as described below.

- Previously test pits were completed at several locations exposing the pipe; samples of the pipe bedding were collected. These documents will be reviewed and the data incorporated into the current investigation program.
- If, based on review of the data from historical evaluations, additional data is required to assess the potential presence of PCBs adjacent to the outfalls, then test pits will be completed. Test pit locations will be determined based on results of document review. Once the pipe is exposed, measurements and materials of construction will be recorded. Additionally, samples of the pipe bedding and adjacent soils may be collected and analyzed to determine the concentration of PCBs. Excavation spoils resulting from test pits will be used as backfill material.
- If, based on test pitting results, the concentration of PCBs are present at concentrations that exceed removal criteria in soil adjacent to the pipe, then existing sampling information will be reviewed and, if necessary, borings may be completed to further evaluate the extents of PCB impacts.

3.6 Evaluate Existing Underground Utilities

The presence, locations, and general conditions of existing utilities will be evaluated for the purposes of determining utilities that enter and exit the site from offsite locations. Additionally, utilities that have been abandoned or are no longer in use will be documented. This information will be incorporated into the design that may determine future easements and discharge permits required. Data collection to support the civil design portion of the remedial design will focus on confirming the locations of existing active utilities that will remain on site after completion of the remedy, be removed or abandoned during completion of the remedy, re-located in support of site redevelopment plans, or protected during construction. Specific civil design components of the remedial design that require special consideration with respect to existing underground utilities may include:

- Grading and drainage: design components may include storm water controls, site ingress/egress, incorporation of existing structures to remain post remedy, and design of grade transitions to adjacent parcels
- Public works utilities, including storm water system, sanitary system, and water supply
- Shore protection and 100 Year Flood Plain; and
- Protection of utilities during construction

The objectives of the activities in this section are to determine the location and condition of existing active utilities on site as follows:

1. The 48-inch Hastings Creek conduit alignment; the location of this alignment identified on surveyed drawings conflicts with field observations. The location of the outfall to the Hudson River is depicted differently on the 2005 Boswell as survey compared to historical drawings. Additionally, the site entrance location from beneath the rail road tracks has not been determined.
2. The 18-inch storm drain/sewer overflow pipe that extends from the existing Westchester County sanitary pump station; the location of this utility has not been verified.
3. The 18-inch storm drain which discharges at a location south of the North Boat Slip; the location of this alignment has not been verified. Additionally, the location at which the storm drain enters the site from the east has not been determined.
4. The alignment of a 30 inch outfall observed in the northern portion of the North Boat Slip.

Additionally, the location of the sanitary sewer will be documented and the abandonment of gas, potable water, and electric utilities which formerly serviced the site will be confirmed.

Methods that will be used to complete the scope may include:

- Requesting data from municipalities to determine the approximate alignment of the utility.
- Locate manholes and document and survey inverts.

Upon completion of this work, storm sewer pipe profiles will be completed based on invert information. Based on this information, additional investigation may be required at a future date to further evaluate the utility including:

- Smoke and/or dye testing to determine the routing and/or outfall locations.
- Video inspection to determine the condition of the interior of the pipe.
- Test pitting to document the materials of construction, location, and condition of the pipe.

Locations of utilities are shown in Figures 2-6 and 2-7. Note that The New York State Department of Environmental Conservation Region 3 Office, Westchester County Health Department and the New York State Department of Health shall be notified prior to dye testing.

3.7 Laboratory Testing

Lab requirements and QA/QC sample frequency are specified in the Quality Assurance Project Plan (QAPP). Sample analysis methods are also specified in the QAPP (e.g. US EPA Method 8082A for PCB Aroclors; US EPA Method 6010C for metals).

3.8 Operating Procedures

The following operating procedures (OP's) are pertinent and are located in Appendix A.

OP3027 – Decontamination Procedure
OP3001 - Preservation and Shipment of Environmental Samples
OP3026 - Chain of Custody
OP3029 – Field Data Recording
OP3030 - Field Instruments: Use and Calibration
OP3012 - Low Stress/Low Flow Groundwater Sample Collection Procedure

4. QUALITY ASSURANCE

Appendix A of the RDWP provides a Quality Assurance Project Plan (QAPP).

5. SUBMITTALS

Applicable data will be included in the PDI Data Summary Report.

6. HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the site or involved in field activities are described in the Site-specific Health Safety Security and Environmental Plan (HSSEP), these documents will be available for use on Site prior to the commencement of work.

7. ATTACHMENTS

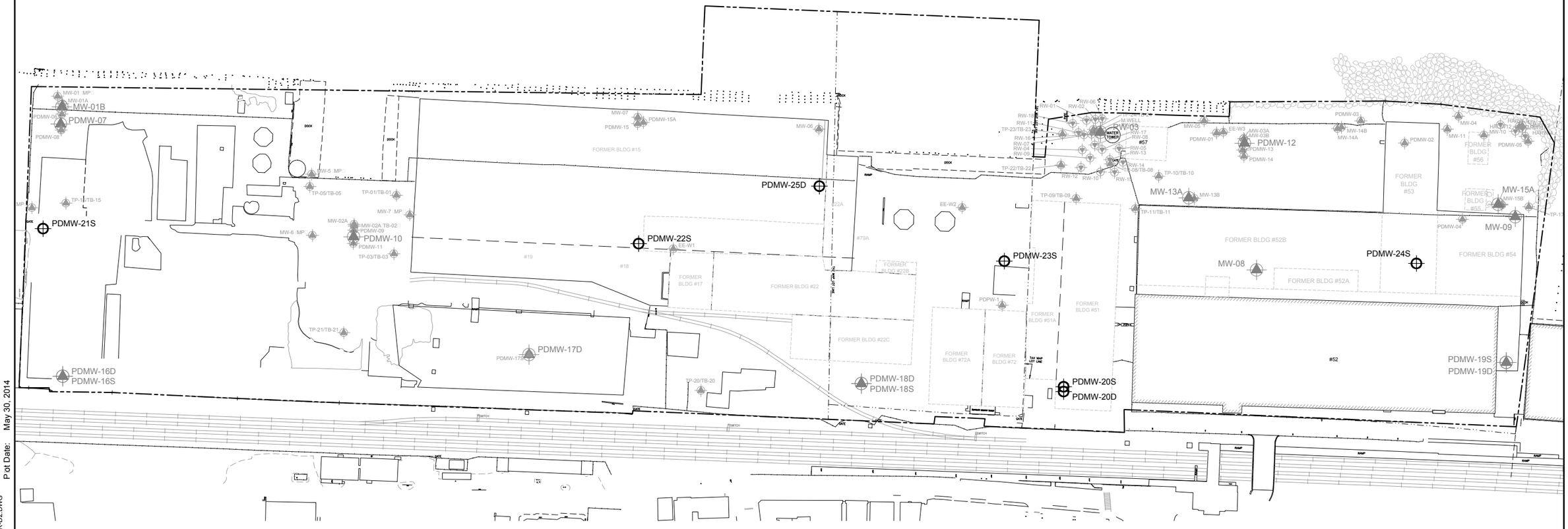
FIGURES

Figure 2-1 Proposed Groundwater Well Installation Plan
Figure 2-2 Proposed Voids Survey
Figure 2-3 2013 PDI Groundwater Well Sampling Locations
Figure 2-4 Subsurface Anomaly Investigation
Figure 2-5 Building 52 Outfall Investigation
Figure 2-6 Site Utilities Investigation (North Area)
Figure 2-7 Site Utilities Investigation (South Area)

ATTACHMENT 1

Example Monitoring Well Construction Logs (2006 PDI)

□□DSON□□□□□□□□E□



P ot Date: May 30, 2014

S:\28612_HASTINGS\293\CAD\28612-293-007 PROP DATA LOGGER-D2.DWG
POSTOLOWSKI, KEVIN Dra in Layout: FIG 2-1

Dra in Na e:
O erator Na e:

LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- MONITORING WELL
- RECOVERY WELL
- PROPOSED WELL □PART OF DATA LOGGER INSTALLATION PLAN□
- MONITORING WELL □PART OF DATA LOGGER INSTALLATION PLAN□

NOTES

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW □01/27/2006□
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. MONITORING WELLS DESIGNATED AS SHALLOW □I.E. PDMW-20S□WILL BE COMPLETED IN THE FILL MATERIAL. MONITORING WELLS DESIGNATED AS DEEP □I.E. PDMW-20D□WILL BE COMPLETED IN THE BASAL SAND.

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SCALE IN FEET

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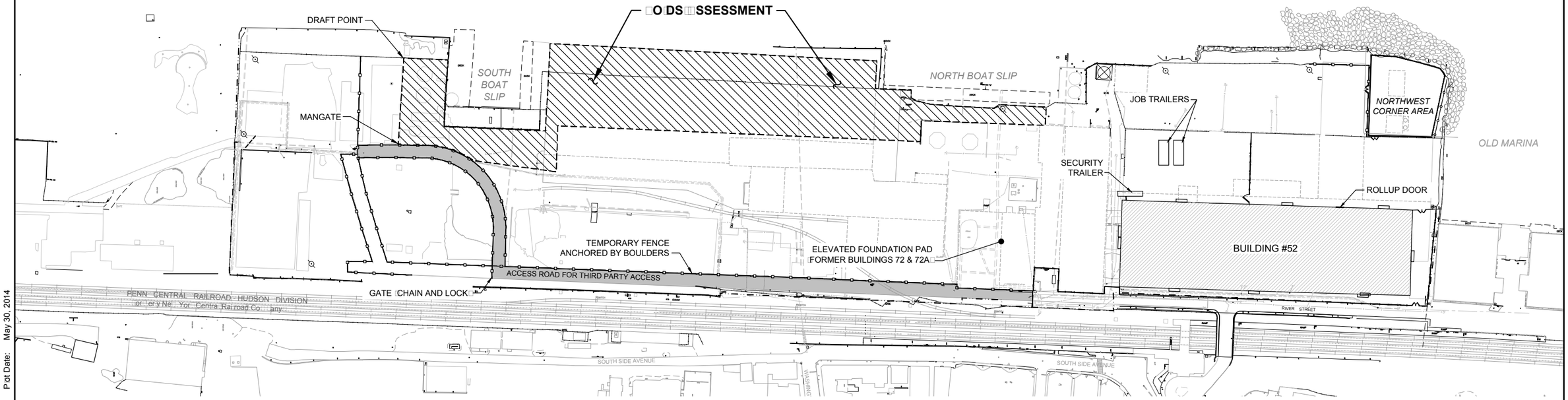
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROPOSED WELLS - DATA LOGGER INSTALLATION PLAN

SCALE: AS SHOWN
MAY 2013

FIGURE 2-1

□□DSON□□□□□□□□□E□



LEGEND

- PROPERTY LINE
- RAIL ROAD
- #52 EXISTING STRUCTURES
- FORMER STRUCTURES
- EXISTING FENCE
- TEMPORARY FENCE
- PERMANENT FENCE
- RIP-RAP
- UG DRAINS / SEWER TO RIVER
- ACCESS ROAD TO ADJACENT PROPERTY
- OVERHEAD ELECTRIC
- ELECTRICAL
- EXISTING UTILITY POLE

NOTES

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW □01/27/2006□
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. ALL PERMANENT FENCE POSTS WERE INSTALLED TO 2 FEET BGS USING HYDRAULIC HAMMER.
4. CONTRACTOR RESPONSIBLE FOR CONFIRMING ALL OBSTRUCTIONS TO COMPLETING WORK SCOPE.

W S N E

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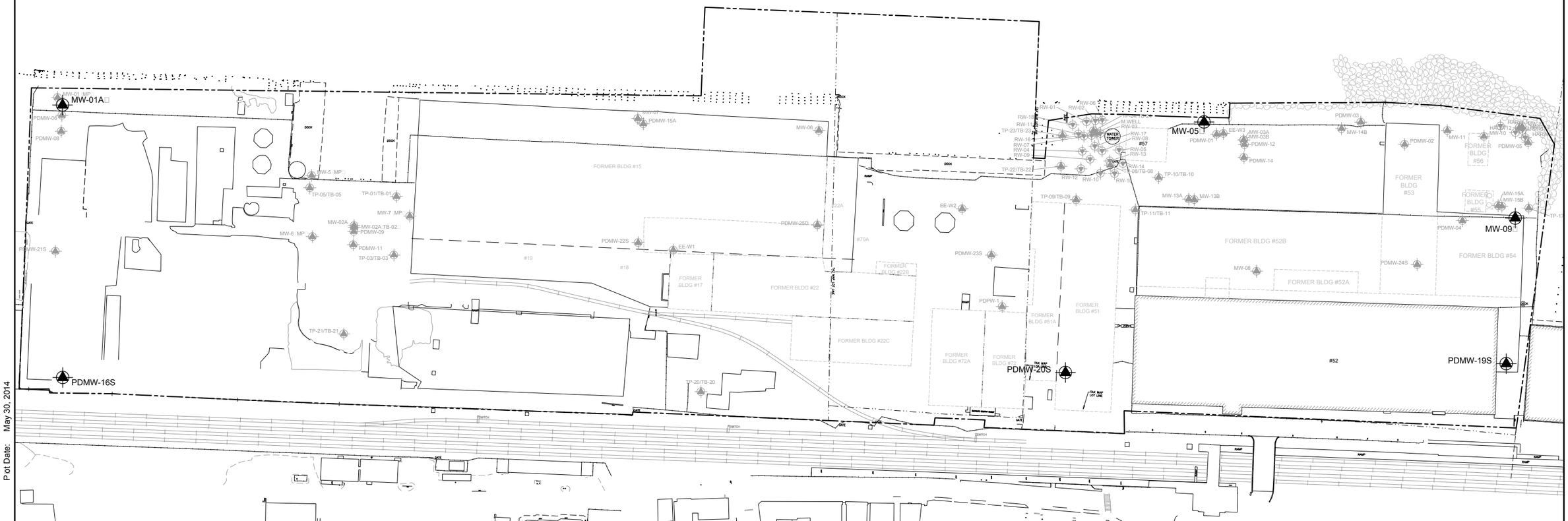
HASTINGS-ON-HUDSON, NEW YORK

VOIDS SURVEY - SUBSURFACE ANOMALY INVESTIGATION

SCALE: AS SHOWN
MAY 2013

FIGURE 2-2

P□t Date: May 30, 2014
S:\28612_HASTINGS\293\CAD\28612-293_006 VOIDS SURVEY.DWG
Dra□in□ Na□e: POSTOLOWSKI, KEVIN
O□erator Na□e:
Dra□in□ Layout: FIG 2-2 5-30-14□



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- PDI SAMPLING WELL LOCATION
- EXISTING MONITORING WELL
- RECOVERY WELL

NOTES

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.

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SCALE IN FEET

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NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

2013 OU1 PDI GROUNDWATER WELL SAMPLING LOCATIONS

SCALE: AS SHOWN
MAY 2014

FIGURE 2-3

Plot Date: May 30, 2014
S:\28612_HASTINGS\293\CAD\2006 OU1 SAMPLING_D2.DWG
Drawing Layout: FIG 2-3 5-30-14
Drawing Name:
Operator Name: POSTOLOWSKI, KEVIN

ANOMALY TYPE 1 – SUBSURFACE STRUCTURES

PURPOSE:
EVALUATE SUBSURFACE STRUCTURES PRESENT IN AREAS OUTSIDE THE LIMITS OF PROPOSED EXCAVATION AREAS.

SCOPE:
- EVALUATE EXTENTS.
- ACCESS THE STRUCTURE INTERIOR USING A SMALL DIAMETER CORE AND OBSERVE PHYSICAL FEATURES SUCH AS POTENTIAL PRESENCE OF NAPL, TAKE PID READING, ETC.
- OBSERVE PHYSICAL CONDITION OF THE STRUCTURE.
- COLLECT SAMPLES IF VISUAL OBSERVATIONS INDICATE PRESENCE OF CONTAMINATION.
- REVIEW EXISTING SOIL DATA IN VICINITY OF STRUCTURE AND IF NECESSARY COMPLETE APPENDIX 3 EXCAVATION PREDELINEATION BORINGS.

ANOMALY TYPE 2 – SUBSURFACE SOIL

PURPOSE:
EVALUATE PRESENCE OF CONTAMINANTS IN POTENTIALLY SUSPECT AREAS BASED ON INFORMATION PROVIDED BY SITE WORKERS.

SCOPE:
- EVALUATE HISTORICAL RECORDS TO DETERMINE WHETHER THIS ANOMALY WAS PART OF A FORMER SITE PROCESS.
- COMPLETE SOIL BORINGS TO DETERMINE THE PRESENCE OF CONTAMINATION.
- IF CONTAMINATION PRESENT, COMPLETE APPENDIX 3 EXCAVATION PREDELINEATION BORINGS.

ANOMALY TYPE 3 – POTENTIAL HISTORIC WELLS

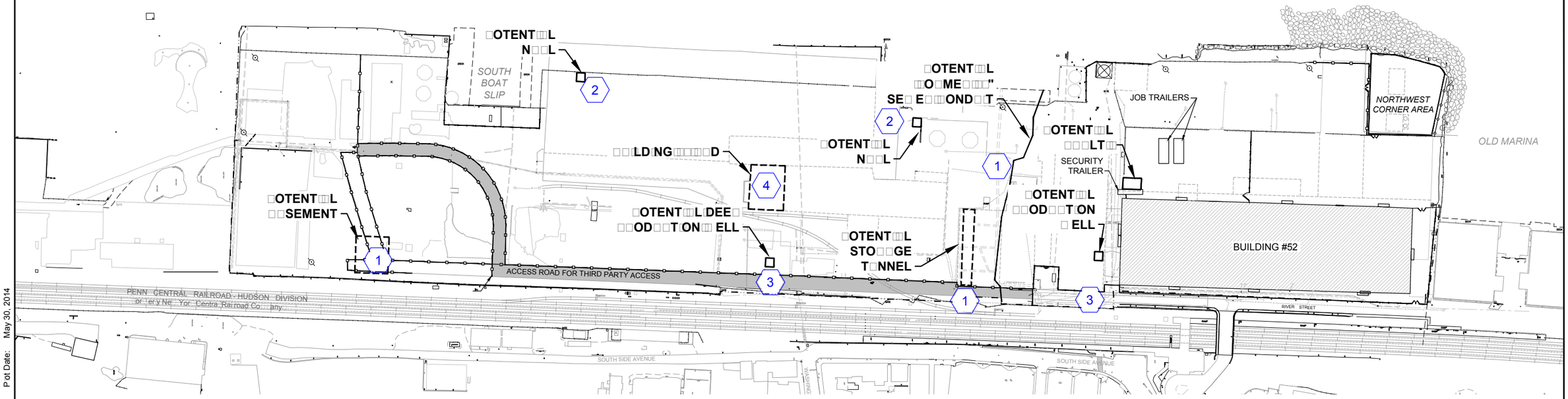
PURPOSE:
EVALUATE ACCESS AND STATUS OF ABANDONMENT OF FORMER PRODUCTION WELLS IDENTIFIED ON HISTORICAL DRAWINGS.

SCOPE:
- IF PRESENT, LOCATE WELLS.
- DETERMINE WHETHER THE WELLS WERE ABANDONED.
- DOCUMENT RESULTS OF SURVEY.

ANOMALY TYPE 4 – BUILDING 17 PAD

PURPOSE:
EVALUATE SOIL BENEATH FORMER SLAB AREAS THAT HISTORICALLY CONTAINED HIGH CONCENTRATIONS OF PCBS WITHIN THE CONCRETE.

SCOPE:
- REVIEW HISTORICAL INFORMATION TO DETERMINE WHETHER PROCESS RELATED FEATURES WERE PRESENT AT THIS ANOMALY.
- IF HISTORICAL DATA SHOWS PROCESS RELATED FEATURES WERE PRESENT, COMPLETE UP TO 2 BORINGS AT DEPTHS BASED ON DOCUMENTED SUBSURFACE FEATURES (0-2 FEET IF FEATURES NOT IDENTIFIED).
- IF CONTAMINATION PRESENT, COMPLETE APPENDIX 3 EXCAVATION PREDELINEATION BORINGS.



UNKNOWN SUBSURFACE ANOMALY INVESTIGATION LOCATIONS

BASED ON RESULTS OF 2013 PDI INVESTIGATION, ADDITIONAL INVESTIGATION NOT REQUIRED

1 ANOMALY TYPE

LEGEND

- PROPERTY LINE
- RAIL ROAD
- #52 EXISTING STRUCTURES
- FORMER STRUCTURES
- EXISTING FENCE
- TEMPORARY FENCE
- PERMANENT FENCE
- RIP-RAP
- UG DRAINS / SEWER TO RIVER
- ACCESS ROAD TO ADJACENT PROPERTY
- OVERHEAD ELECTRIC
- E ELECTRICAL
- EXISTING UTILITY POLE

NOTES

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. ALL PERMANENT FENCE POSTS WERE INSTALLED TO 2 FEET BGS USING HYDRAULIC HAMMER.

W S N E

0 100 200 300 400
SCALE IN FEET

HALEY & ALDRICH

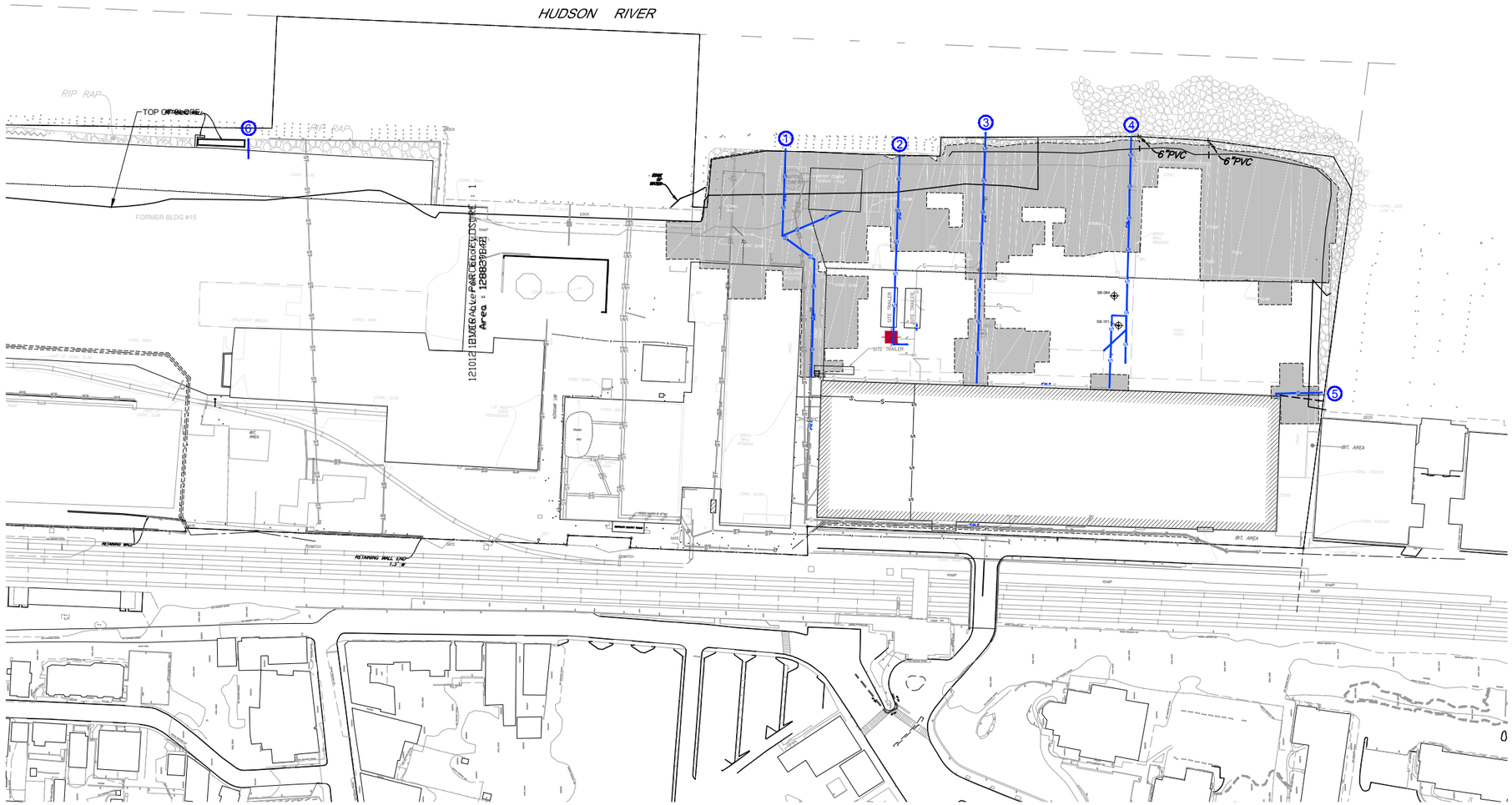
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SUBSURFACE ANOMALY INVESTIGATION

SCALE: AS SHOWN
MAY 2014

FIGURE 2-4

Plot Date: May 30, 2014
S:\28612_HASTINGS\293\CAD\28612-293_006 VOIDS SURVEY_D2.DWG
Drawing Layout: FIG 2-4
POSTOLOWSKI, KEVIN
Drawing Name:
Operator Name:



LEGEND:

- PROPOSED TEST PIT
  NUMBER AND LOCATION OF TEST PITS ARE SUBJECT TO CHANGE BASED ON SITE CONDITION.
- BORING SAMPLES
- BUILDING 52 PROCESS LINES TO OUTFALLS
- BUILDING 15 PROCESS LINE TO OUTFALL
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- PROPOSED EXCAVATION LIMITS

BUILDING 52 OUTFALLS:

1. ENTIRE FOOTPRINT OF OUTFALL CONTAINED WITHIN LIKELY AREA OF EXCAVATION NO APPENDIX 2 INVESTIGATION REQUIRED.
2. INVESTIGATE OUTFALL AS DESCRIBED IN APPENDIX 2
3. ENTIRE FOOTPRINT OF OUTFALL CONTAINED WITHIN LIKELY AREA OF EXCAVATION NO APPENDIX 2 INVESTIGATION REQUIRED.
4. BASED ON RESULTS OF DELINEATION OF SB-084 AND SB-151, ENTIRE FOOTPRINT OF OUTFALL MAY BE CONTAINED WITHIN AREA OF EXCAVATION SEE APPENDIX 3.
5. ENTIRE FOOTPRINT OF OUTFALL CONTAINED WITHIN LIKELY AREA OF EXCAVATION NO APPENDIX 2 INVESTIGATION REQUIRED.

BUILDING15 OUTFALL:

6. ENTIRE FOOTPRINT OF OUTFALL CONTAINED WITHIN LIKELY AREA OF EXCAVATION NO APPENDIX 2 INVESTIGATION REQUIRED.

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW 01/27/2006
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.

N W S E

0 80 160 240 320

SCALE IN FEET

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NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BUILDING 52
OUTFALL INVESTIGATIONS

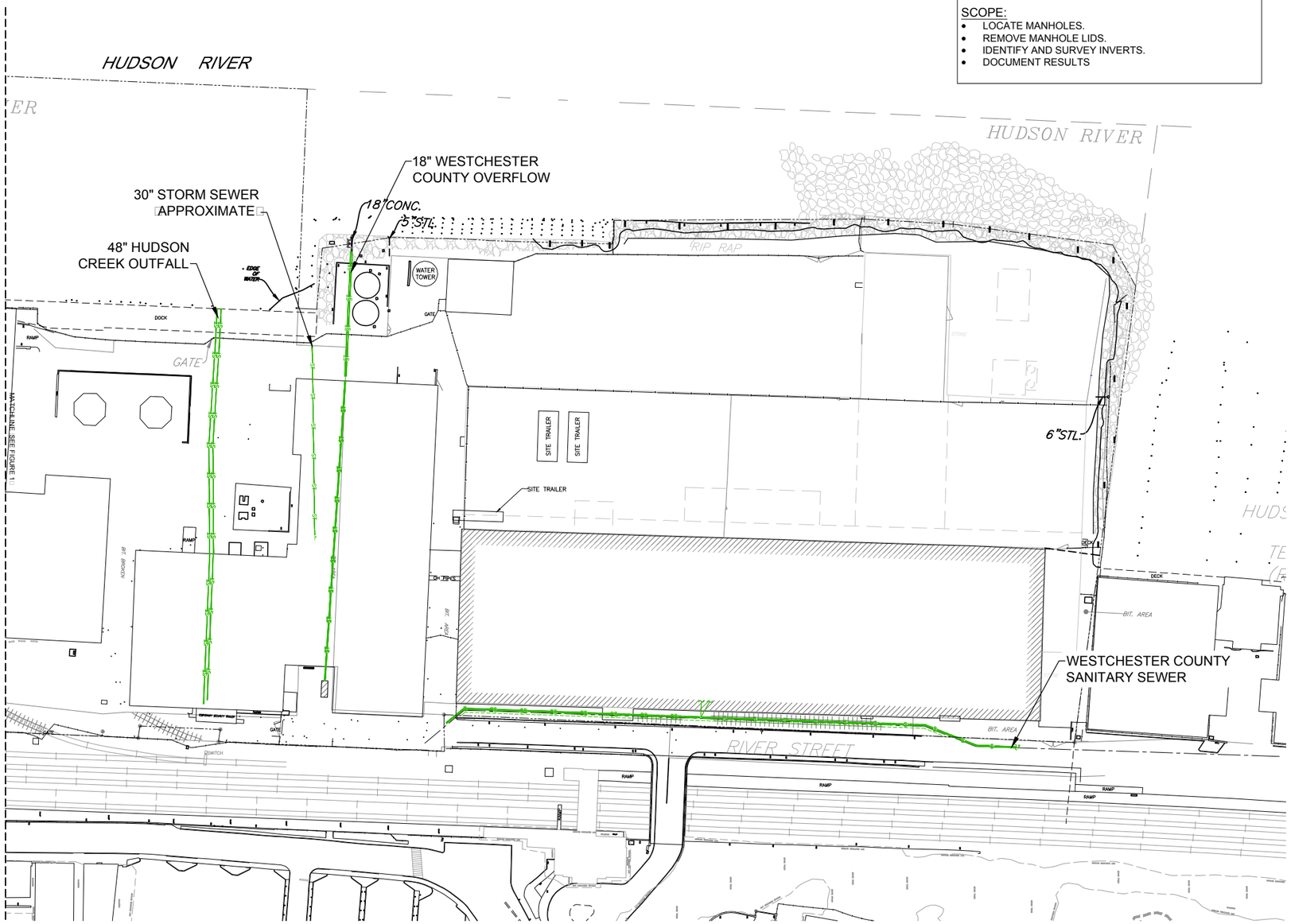
SCALE: AS SHOWN
MAY 2014

FIGURE 2-5

G:\28612\GLOBAL\CAD\28612-250-0012 BUILDING INVESTIGATIONS 2014-REV.DWG

PURPOSE:
EVALUATE PRESENCE AND LOCATION OF ACTIVE UTILITIES THAT ENTER AND LEAVE THE SITE.

SCOPE:
- LOCATE MANHOLES.
- REMOVE MANHOLE LIDS.
- IDENTIFY AND SURVEY INVERTS.
- DOCUMENT RESULTS

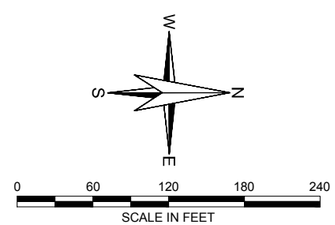


LEGEND:

- SANITARY SEWER LINES TO OUTFALLS
- STORM SEWER LINES TO OUTFALLS
- PROPOSED EXCAVATION LIMITS
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.



HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE UTILITIES INVESTIGATION NORTH AREA

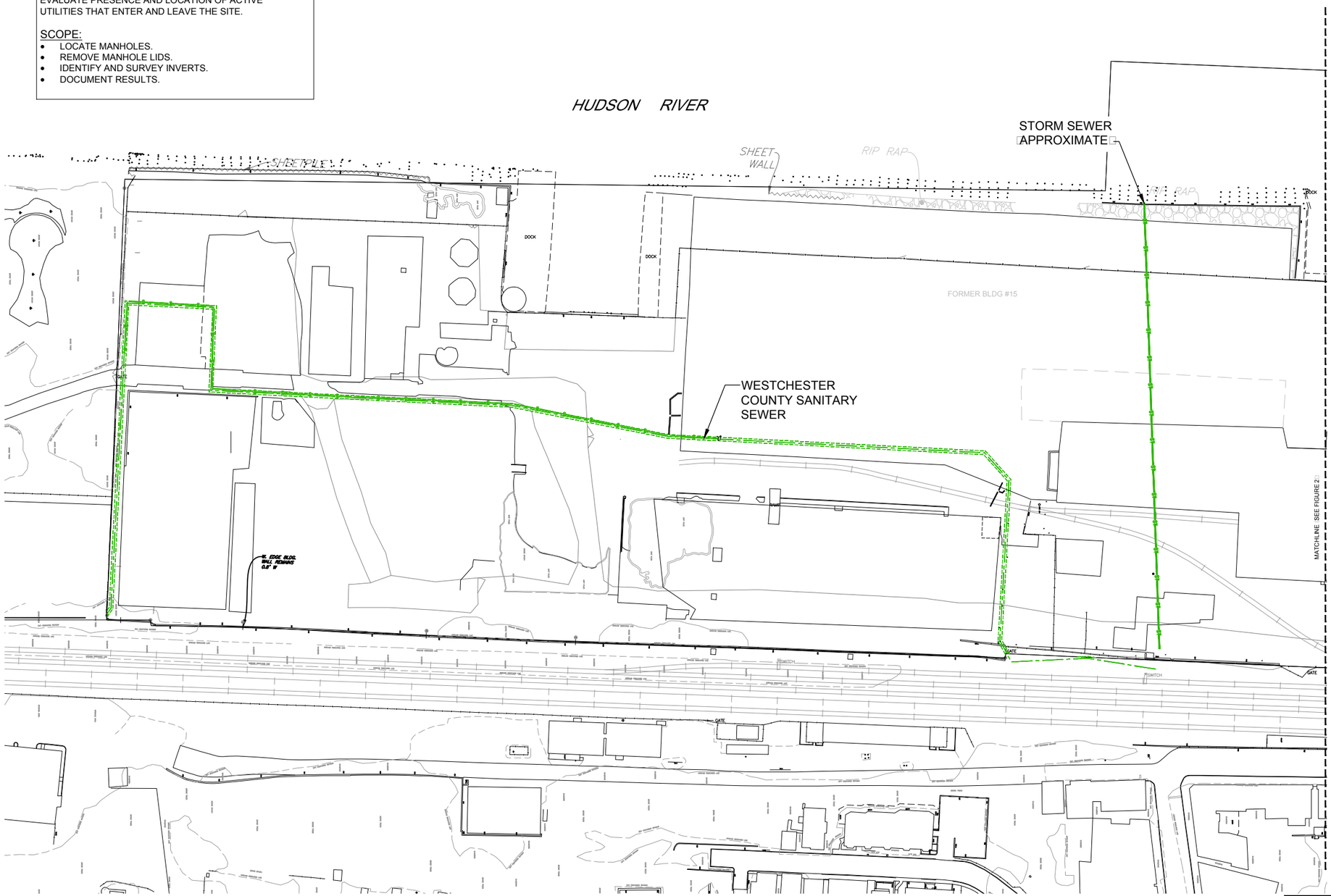
SCALE: AS SHOWN
MAY 2014

FIGURE 2-6

G:\28612\GLOBAL\CAD\28612-250-0012 UTILITY INVESTIGATIONS 2014.DWG

PURPOSE:
EVALUATE PRESENCE AND LOCATION OF ACTIVE UTILITIES THAT ENTER AND LEAVE THE SITE.

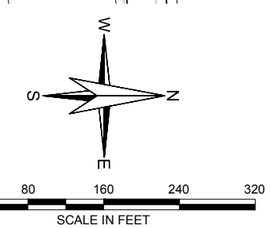
SCOPE:
- LOCATE MANHOLES.
- REMOVE MANHOLE LIDS.
- IDENTIFY AND SURVEY INVERTS.
- DOCUMENT RESULTS.



LEGEND:
- SANITARY SEWER LINES TO OUTFALLS
- STORM SEWER LINES TO OUTFALLS
- PROPOSED EXCAVATION LIMITS
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.



0 80 160 240 320
SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE UTILITIES INVESTIGATION SOUTH AREA

SCALE: AS SHOWN
MAY 2014

FIGURE 2-7

G:\28612\GLOBAL\CAD\28612-250-0012 UTILITY INVESTIGATIONS 2014.DWG

ATTACHMENT 1
Example Monitoring Well Construction Logs (2006 PDI)

HALEY & ALDRICH

OBSERVATION WELL INSTALLATION REPORT

Well No. PDMW-19S

Boring No. PDMW-19

PROJECT	ONE RIVER STREET	H&A FILE NO.	28612-118
LOCATION	HASTINGS ON HUDSON, NY	PROJECT MGR.	W. HARDISON
CLIENT	ATLANTIC RICHFIELD COMPANY	FIELD REP.	J. BODE
CONTRACTOR	WARREN GEORGE, INC.	DATE INSTALLED	4/12/2006
DRILLER	R. BRIDGEPAL	WATER LEVEL	

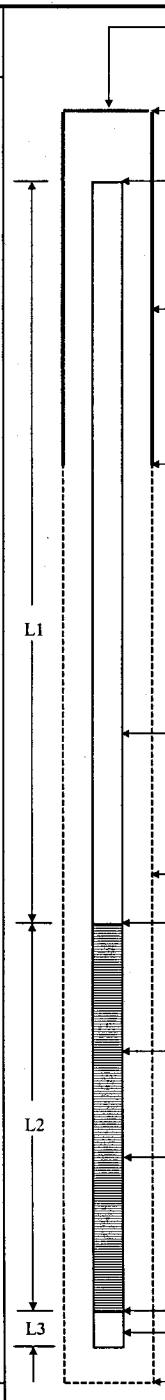
Ground El. _____ ft
El. Datum _____

Location: SEE PLAN

☐ Guard Pipe
☑ Roadway Box

SOIL/ROCK CONDITIONS: FILL

BOREHOLE BACKFILL: CEMENT 0.75; FILTER SAND 1.5; BENTONITE 3.0; FILTER SAND



Type of protective cover	9/16 Bolted Cover
Height/Depth of top of roadway box above/below ground surface	0.0 ft
Depth of top of riser pipe below ground surface	0.3 ft
Type of protective casing:	Roadway Box
Length	1.1 ft
Inside Diameter	5.0 in
Depth of bottom of roadway box	1.1 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.75
Bentonite Seal	1.5	1.5

Type of riser pipe:	Sch 40 PVC Solid
Inside diameter of riser pipe	2.0 in
Type of backfill around riser	Filter Sand / Bentonite
Diameter of borehole	4.5 in
Depth to top of well screen	4.2 ft
Type of screen	Machine Slotted Sch 40 PVC
Screen gauge or size of openings	0.010 in
Diameter of screen	2.0 in
Type of backfill around screen	Filter Sand
Depth of bottom of well screen	12.2 ft
Bottom of Silt trap	- ft
Depth of bottom of borehole	12.5 ft

12.5 (Bottom of Exploration) 12.5

(Numbers refer to depth from ground surface in feet)

(Not to Scale)

4.0 ft	+	8.0 ft	+	- ft	=	12.0 ft
Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length

COMMENTS: Weather: Sun, 60°

G:\28612\118\OW Installation Report 4/26/06

Form 2007

HALEY & ALDRICH

OBSERVATION WELL INSTALLATION REPORT

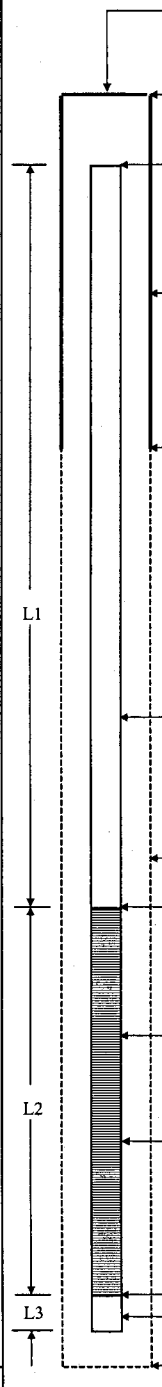
Well No. PDMW-19D
Boring No. PDMW-19

PROJECT	ONE RIVER STREET	H&A FILE NO.	28612-118
LOCATION	HASTINGS ON HUDSON, NY	PROJECT MGR.	W. HARDISON
CLIENT	ATLANTIC RICHFIELD COMPANY	FIELD REP.	J. BODE
CONTRACTOR	WARREN GEORGE, INC.	DATE INSTALLED	4/10/2006 to 4/11/2006
DRILLER	R. BRIDGEPAL	WATER LEVEL	

Ground El. _____ ft
El. Datum _____
Location SEE PLAN
☐ Guard Pipe
☑ Roadway Box

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
	CEMENT
	0.75
FILL	
	CEMENT GROUT
13.0	
MARINE DEPOSITS (Silt)	
	35.0
37.0	
	BENTONITE
MARINE DEPOSITS (Basal Sands)	40.0
	FILTER SAND
48.0 (Bottom of Exploration)	48.0

(Numbers refer to depth from ground surface in feet)



(Not to Scale)

Type of protective cover	9/16 Bolted Cover
Height/Depth of top of roadway box above/below ground surface	0.0 ft
Depth of top of riser pipe below ground surface	0.5 ft
Type of protective casing:	Roadway Box
Length	1.1 ft
Inside Diameter	8.0 in
Depth of bottom of roadway box	1.1 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.75
Cement Grout	0.75	34.25
Bentonite Seal	35.0	4.0

Type of riser pipe:	Sch 40 PVC Solid
Inside diameter of riser pipe	2.0 in
Type of backfill around riser	Bentonite / Cement Grout
Diameter of borehole	5.0 in
Depth to top of well screen	42.7 ft
Type of screen	Machine Slotted Sch 40 PVC
Screen gauge or size of openings	0.010 in
Diameter of screen	2.0 in
Type of backfill around screen	Filter Sand
Depth of bottom of well screen	47.7 ft
Bottom of Silt trap	- ft
Depth of bottom of borehole	48.0 ft

42.7 ft	+	5.0 ft	+	- ft	=	47.7 ft
Riser Pay Length (L1)		Length of screen (L2)		Length of silt trap (L3)		Pay length

COMMENTS: Permanenet 5.0 in. steel casing installed from ground surface to 20.0 ft. Weather: Sun, 50-60°

G:\28612\118\OW Installation Report 4/26/06

Form 2007

APPENDIX 3

OU-1 EXCAVATION PRE-DELINEATION PLAN

1. INTRODUCTION

This plan describes excavation pre-delineation activities for OU-1. This task is part of the overall pre-design investigation (PDI) that will be completed at the Former Anaconda Wire & Cable Company site (Site), NYSDEC Site # 3-60-022, located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York.

2. BACKGROUND

The Record of Decision Amendment (NYSDEC, 2012) (ROD) for Operable Unit No. 1 (OU-1) requires that:

> *"2. At the Northwest Corner of the site and along the Northern Shoreline, excavation of surface soil (0- 12 inches) containing greater than 1ppm PCB and subsurface soil containing greater than 10 ppm PCB to a maximum depth of 9 feet. Outside of the Northwest Corner and the Northern Shoreline areas, excavation of surface soil (0-12 inches) containing greater than 1ppm PCB and subsurface soil containing greater than 10 ppm PCB, to a maximum depth of 12 feet. (modified)*
> *3. Outfalls and associated pipe bedding from Building 52 that are potential PCB source areas will be excavated, sampled and removed, or decommissioned as approved by the Department. (new)*
> *4. Excavation of shallow soils from the southern portion of the site that are identified as "lead hotspots". These correspond to lead levels between 2,160 ppm and 43,200 ppm. (unchanged)* "

This excavation pre-delineation sampling program was designed to comply with sampling requirements set forth in DER-10, Technical Guidance for Site Investigation and Remediation, May 2010 (DER-10). Relevant sections are excerpted below:

From Chapter & Section 5.4(b)

1. *Documentation samples, as defined in paragraph 1.3(b)12, are generally required by a site remedy when the soil cleanup is based on (an) excavation(s) to pre-specified excavation limits described in the remedy decision document and delineated during remedial design. Documentation samples are collected and analyzed to document the soil levels achieved by the remedy.*

2. *"Confirmation samples, as defined in paragraph 1.3(b)3, are required when the limits of soil removal are to be determined by achieving a soil cleanup level in the field. Confirmation samples are to demonstrate that the remedy has achieved the soil cleanup levels identified by the decision document, determined as follows:*
    i. *the use of averages, means or other statistical techniques are generally not allowed, however, recognizing the heterogeneity of contaminated sites and the uncertainty of sampling and analysis of samples, the DER project manager may judge that remediation is complete for sites when:*
        1. *there is a large number of confirmatory samples;*

2. *the vast majority of confirmation samples indicate that the soil cleanup levels for the site have been achieved; and*
3. *those that do not achieve the SCO exceed it only by a small amount; and*

ii. *should the remedial party disagree with the professional judgment of the DER project manager, the remedial party may submit a justification that there is a 95% confidence level that the soil cleanup levels have been achieved using the procedure defined in the EPA guidance document Supplemental Guidance to RAGS: Calculating the Concentration Term. USEPA Publication 9285.7-081 (May 1992). DER will evaluate this information and make a determination whether the sampling adequately documents that the objectives have been achieved."*

5. *"The following are minimum confirmation sampling frequencies for soil excavations of:*
   i. *less than 20 feet in perimeter, include one bottom sample and one sidewall sample biased in the direction of surface runoff;*
   ii. *20 to 300 feet in perimeter, where the remedy is seeking to achieve:*
      1. *surface soil levels, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area; and*
      2. *subsurface soil cleanup levels, one sample from the bottom of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area;*
   iii. *greater than 300 feet in perimeter, should be in accordance with either:*
      4. *subparagraph ii above; or*
      5. *a DER-approved reduced sampling frequency, where the remedial party submits a proposed sampling frequency, with supporting rationale, in accordance with section 1.6;*
   iv. *in an excavation where multiple layers of contamination have been visually or analytically identified, additional side wall samples in the horizon in which contamination was identified are necessary;*
   v. *each excavation within a larger excavation will be considered a separate excavation and should comply with subparagraphs i through iii above; and*
   vi. *for side or bottom samples, for volatile organic compounds in an excavation:*
      1. *within 24 hours of excavation, they should be taken from the zero to six-inch interval at the excavation floor; or*
      2. *after 24 hours, the samples should be taken at six to twelve inches; and*
   vii. *no water should be present in the excavation bottom where bottom samples are collected."*

6. *Confirmation and/or documentation sample locations and depth should be biased toward the:*
   viii. *areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated; and*
   ix. *locations and depths of the highest expected contamination*

3. SCOPE OF WORK

The goal of this task is to pre-delineate onshore excavation limits using pre-excavation sampling. Establishing excavation limits (area and depth) in this manner will streamline design, reduce uncertainty during construction, increase worker safety during construction, and reduce changes in the field which may result from completing excavation confirmation sampling during remedial construction. Examples of potential issues include:

- Lack of specific shoring design and potential re-installation associated with changing excavation limits
- Unknown waste volumes and water treatment needed during dewatering activities
- Unknown thickness and extent of concrete in excavation locations

This plan describes the approach to delineate the extents of excavation at locations where existing data points indicate PCB or lead above the ROD remedial action criteria (criteria). This will be accomplished by collecting supplemental data at select existing data points (resampling) and performing new explorations to delineate the horizontal and vertical extents of impacts above criteria.

The site has been generally divided into three sections in order to facilitate presentation of investigation plans and discussion of data:

1. The southern portion of the site extends from the southern property boundary northward to the south wall of Former Building 51 between the eastern property boundary and the Hudson River shoreline.
2. The northern portion of the site extends from the south wall of Former Building 51 northward to the northern property boundary between the eastern property boundary and the west edge of the Building 52B pad.
3. The northwest portion of the site extends from the northern boundary of the North Boat Slip northward to the northern property boundary between the west edge of the Building 52B pad to the Hudson River shoreline.

3.1 Existing Data

Existing onsite data are the basis for determining the locations of potential remedial excavation areas that require pre-delineation. A summary of existing on site data used as a basis of the excavation pre-delineation program can be found in the 2008 Modified Conceptual Site Model (CSM) for the site, which can be observed in Attachment 1 of this Appendix 3 of the RDWP. These data were used, where available, to establish the vertical extends of PCB soils that exceed criteria and establish the basis for new borings. In many existing boring locations, data can be used to adequately establish additional sampling locations and resampling, as required. Existing data points that do not contain adequate information will be resampled at sampling intervals where data is needed.

3.2 Pre-Delineation Sampling Program Design

The excavation pre-delineation sampling program was designed based on requirements set forth in DER-10 and quoted in Section 2 of this document. In general, excavation limits will be defined by

completing additional borings in locations near existing borings with PCB criteria exceedances. The program proceeds as follows:

1) Evaluate existing locations to 'resample' where needed;
2) Complete sampling around the perimeter of the initials excavation limits which are typically 'offsets' from the existing data at specified depth intervals;
3) Based on the results of the 'offset' locations, the final excavation area will be established or a revised excavation perimeter will be created and 'step out' locations will be sampled;
4) Additional rounds of 'step outs' will be completed until the excavation area confirms no exceedances.

The goal of the offsets is to collect the appropriate number of samples to satisfy the requirement for "confirmation/documentation sampling" described in DER-10 technical guidance. Since the entire Site will receive a minimum of 2 feet of clean cover, all existing materials which remain in place will be defined as subsurface materials whether they consist of soil or other materials (brick, concrete, etc.) and therefore must meet the subsurface exceedance criteria.

3.2.1 Horizontal Distribution of Excavation Pre-delineation Samples

In general, the excavation pre-delineation program investigates an existing criteria exceedance by sampling at a offset borings 15 feet laterally in each direction from the existing data point (See Figures 3-1, 3-2, and 3-3 for proposed resample and offset locations) resulting in a 30 foot by 30 foot gridded "investigation unit". Due to the proximity of other existing data points (above or below criteria), other subsurface features, or concentrations of PCBs relative to the exceedance criteria, many areas will require the use of a non-standard offset. Specific examples of these areas can be observed on the drawings and are described in the table. Evaluation of locations that exceed criteria will generally fall into one of three categories as described below.

1. An "isolated" existing data point describes an existing data point location in which no other data or subsurface features, which exhibits the potential to be a source of PCBs, exist in the vicinity. These areas will generally be investigated as a 30 foot by 30 foot investigation unit unless supplemental site or chemical information indicates that reducing the area is appropriate.
2. A "linear feature" is one or more data points with a criteria exceedance that may be associated with a utility or other liquid conveying site feature (e.g. outfalls and associated pipe bedding from Building 52 that are potential PCB source areas). Criteria exceedances associated with these features may be related to the gravel bedding parallel to the feature and result in horizontal distribution of impacts in the direction parallel to the feature more than in the directions perpendicular to the feature. Therefore, the approach for pre-delineating excavation limits will be to position offsets closer in the direction perpendicular to the feature (e.g. 5 feet) and the standard sampling interval (i.e. 30 feet) in the direction parallel to the feature. Presence of supplemental site or chemical information may indicate that reducing the offset distance is appropriate.
3. A "cluster" location refers to an area where multiple existing data points with criteria exceedances exist within close proximity to one another in an area greater than 900 square feet. For this case, the initial geometry of the investigation units is defined based on the existing data and offset samples are placed around the perimeter. Within a "cluster" one data point may serve as a documentation sample for the side wall of an adjacent area.

Based on a review of the existing data and actual site conditions, there are areas in which modifications to the abovementioned approaches were encountered. Some examples of these areas are described below. Each occurrence of these exceptions is noted in Table 3-1.

1. Existing exceedances located adjacent to property boundaries. Completion of offsets or step outs during this PDI will be limited to within the property boundary. Samples completed in close proximity to property boundaries may be used as documentation samples.
2. Existing exceedances located adjacent to Building 52 or other structures. Offsets adjacent to Building 52 may be used as documentation samples. PCBs are present at concentrations that exceed removal criteria beneath Building 52 as identified in the CSM. No sampling within Building 52 is included in this PDI. If the long term status of Building 52 changes, a separate pre-delineation plan for the building may be completed.
3. Multiple linear features in close proximity to each other. In these instances, offsets may straddle both utilities.
4. Existing data points that exhibit concentrations of PCBs only slightly higher than exceedance criteria. Within areas that do not indicate the presence of widespread impacts above criteria, offsets may be located less than 15 feet from the existing data point.

The initial sampling sequence will be evaluated prior to PDI execution. Explorations will be completed strategically so that sample results can be used to refine offset and step-out locations and depth intervals. Modifications will be discussed with the DEC prior to altering the sampling location plan.

In the event that an exceedance is observed in offset samples, a new perimeter will be established. Step out borings will be determined considering field conditions in the vicinity, concentrations observed, etc. If exceedances occur after multiple step out attempts, alternate methods to delineate PCB criteria exceedances may be reviewed with NYSDEC.

3.2.2 Structure of Table 3-1

Table 3-1 provides important information about each excavation area. Below is a description of each column in the table.

Excavation Area ID	Area Type	Existing Samples in Area	Notes / Exceptions
Each excavation area is provided a unique ID as defined in figures.	Identifies the approach (isolated, linear feature, cluster) selected for pre-delineation.	Lists each existing location with a criteria exceedance within the area.	Describes supplemental information about the excavation area, modifications to the standard approach, etc.

3.2.3 Vertical Distribution of Excavation Pre-delineation Samples

Similar to the horizontal pre-delineation, the vertical (bottom) extents of PCB criteria exceedances within each excavation area will be established through pre-excavation sampling and analysis. Sampling depths intervals will be determined relative to existing grade.

Determination of excavation limits requires sidewall and bottom samples that exhibit concentrations of PCBs below exceedance criteria as follows:

- Bottom sample will be collected as required. Note that the initial excavation depth will be established as the top of the clean sampling interval (e.g. if the existing data point (or resample) indicates the presence of PCBs below criteria at a depth of 8 – 10 feet and above criteria at 6 – 8 feet, then the excavation bottom would be established at 8 feet).
- Bottom of sidewall samples will be collected from borings at the bottom two foot interval of the proposed excavation.
- Horizon samples will be collected, if applicable, at sidewalls (i.e. offsets and step outs) where multiple horizons of exceedances are identified in the existing sample location:

    - At intervals of elevated concentrations which are separated by an interval with significantly lower concentrations.

Vertical sampling intervals will be:

- 0-2 ft for lead hotspots
- Two foot intervals for bottom of excavation samples
- Horizon samples, if applicable, will be collected at the 2 foot interval that corresponds with interval of elevated concentration identified in the existing data point.

Sample interval depths have been identified to define maximum excavation depths as follows:

- 9 feet bgs in the Northern Shoreline Area
- In other areas of the site where PCB impacts above criteria extend below 12 feet, excavation pre-delineation sampling may be proposed to stop at 9 feet. The DEC will be consulted in these specific areas prior to altering the sampling program.

Lead hotspot locations have a pre-determined excavation depth of 2 ft. Therefore, offset borings will only be completed to determine the horizontal distribution of subsurface impacts as specified in the ROD.

If exceedances occur after multiple step out attempts, alternate methods to delineate PCB criteria exceedances may be reviewed with NYSDEC.

3.3 Excavation Pre-delineation Sampling Methods

3.3.1 Survey Control

Existing boring locations will be located via survey and marked for the purposes of resampling, where required, and establishment of perimeter or offset locations.

3.3.2 Concrete and Pavement Coring

Many potential excavation locations are overlain by concrete 6 inches or more in thickness or by asphalt. These areas will be cored using a 6 to 10 inch core barrel to access the subsurface. The diameter of each core will be dependent upon the total anticipated depth of each sample. Each cored sampling location will be surveyed and recorded on field forms.

3.3.3 Surface and Shallow Soils Sampling

A 3-inch diameter by 6-inch long steel hand auger will be used to collect shallow soils (up to approximately 2 feet in depth). Hand auger tools will be decontaminated between borings.

3.3.4 Mid-Depth Soils Sampling

Utilities and other subsurface obstructions at all exploration locations will be hand cleared to a depth of approximately 6 – 7 feet. This will be completed by excavating using an air knife or other clearing technique to each target sampling depth. An air knife consists of using high pressure, compressed air to loosen soils while a vacuum removes the soils from the hole. Once the target depth is reached, a hand auger will be used to collect the sample. The air knife will be used after samples are taken to increase the boring diameter to allow for additional sampling. This process of air knifing/hand augering will continue until a sampling depth of 6-7 feet. The water table in many portions of the site is less than six feet bgs. Attempts will be made to continue hand clearing below the water table. Sampling tools and equipment that comes into contact with potentially contaminated soils will be decontaminated between borings.

3.3.5 Deep Soils Sampling

Standard drilling techniques (e.g. mini-sonic drill rig, direct push) will be used to collect samples at depths greater than 6 – 7 feet or below water table if other techniques are unsuccessful. Borings will be advanced using standard drilling techniques provided by the drilling contractor. Drilling tools will be decontaminated between borings.

3.4 Laboratory Testing

Lab requirements and QA/QC sample frequency are specified in the Quality Assurance Project Plan (QAPP). Sample analysis methods are also specified in the QAPP (e.g. US EPA Method 8082A for PCB Aroclors; US EPA Method 6010C for metals).

The table below summarizes the extent of sample collection based on the initial investigation. These locations and samples are limited to offset sampling but is should be noted that additional samples will be collected, as required, based on initial sampling results. Lead Hotspots will be analyzed for Lead to determine the need for additional step outs with final perimeter location samples being analyzed for additional metals (copper, zinc) for documentation purposes.

PDI Activity	No. of Offsets (Step outs are TBD)	Medium/ Matrix	Sampling Depths (ft.)	Analytical Parameter
South Area (Lead Hotspots)	4 locations 1 sample per location	Soil	0-2	Lead
South Area	59 locations Typically 2-3 samples per location	Soil	Samples will be collected at 2 foot intervals up to 14 as appropriate.	PCBs
North Area	81 locations Typically 2-3 samples per location	Soil	Samples will be collected at 2 foot intervals up to 14 as appropriate.	PCBs

Northwest Area	72 locations Typically 2-3 samples per location	Soil	Samples will be collected at 2 foot intervals up to 9 feet as appropriate.	PCBs

3.5 Operating Procedures

The following operating procedures (OP's) are pertinent and are located in Appendix A.

OP2000 - Monitoring Field Explorations
OP2001 - Identification and Description of Soils Using Visual-Manual Methods
OP3001 - Preservation and Shipment of Environmental Samples
OP3003HOH – Subsurface Soil Sampling
OP3026 - Chain of Custody
OP3027 – Decontamination Procedure
OP3029 – Field Data Recording
OP3030 - Field Instruments: Use and Calibration

4. QUALITY ASSURANCE

Appendix A of the RDWP provides a Quality Assurance Project Plan (QAPP).

5. SUBMITTALS

Applicable data will be included in the PDI Data Summary Report.

6. HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the site or involved in field activities are described in the Site-specific Health Safety Security and Environmental Plan (HSSEP), these documents will be available for use on Site prior to the commencement of work.

7. ATTACHMENTS

Table 3-1 – Excavation Area Sample Location Rationale
Figure 3-1 – Proposed Explorations (South Area)
Figure 3-2 – Proposed Explorations (North Area)
Figure 3-3 – Proposed Explorations (Northwest Area)
Attachment 1 – 2008 Modified CSM Figures

8. REFERENCES

DER-10 Technical Guidance for Site Investigation and Remediation

Modified Conceptual Site Model, Harbor at Hastings Site, Haley & Aldrich of New York 2008

TABLE 3-1
EXAMPLE SAMPLING RATIONALE FOR OU1 PRE-EXCAVATION DELINEATION PROGRAM

Excavation Area ID PD2-EL-XX	Area Type	Existing Samples in Area	Notes/Exceptions (describe non-standard information/condition)
SOUTH			
SA	Linear	HB-01 SB-012 + DUP SB-112 SB-118	The existing data points are located adjacent to the property boundary and a building slab. Existing soil data indicates exceedances adjacent to a property boundary. Completion of offsets or step outs during this PDI will be limited to the property boundary. During the preliminary design, samples completed in close proximity may be used as documentation samples. Existing data point SB-146 (below criteria at the target sampling interval) located 40 feet west of SB-118 indicates a westwardly offset of 15 ft may be sufficient to establish excavation limits. Since data associated with exceedances within SB-112 and SB-012 does not appear to be associated with an underground utility and may be limited by the concrete slab, the northerly offset will be 15 feet and the westardly offset will be placed approximately 3 feet inside the slab.
SB	Linear	SB-152 PDSS-11	This existing data point is located adjacent to the property boundary. Existing soil data indicates exceedances adjacent to a property boundary. Completion of offsets or step outs during this PDI will be limited to the property boundary. During the preliminary design, samples completed in close proximity may be used as documentation samples. Existing data point PDSS-11 (below criteria at the target sampling interval) located adjacent to SB-152 indicates a non standard offset (7.5 feet due to presence of PDSS-11) shown on the drawing may be sufficient to establish excavation limits.
SC	Isolated	SB-111	Due to the low concentration of PCBs (relative to the removal criteria) at the existing data point, 10 ft offsets may be sufficient to establish excavation limits.
SD	Isolated	HB-06 PDSB-36	Existing data indicates exceedances are limited to the upper 2 ft, which lies in the footprint of the shoreline slope back cut area. Since a large area will removed for the slope back construction, pre-delineation is not require at this time.
SE	Linear	PDSB-100/ SB-088	Based on historical data review, PDSB-100 appears to be a resample of the missing interval at SB-088 and therefore additional data refinement is not required. Existing soil data indicates exceedances are located within 4 feet of a property boundary. Completion of offsets or step outs during this PDI will be limited to the property boundary. During the preliminary design, samples completed in close proximity may be used as documentation samples. Due to the low concentration of PCBs (relative to the removal criteria) at the existing data point, 15 ft offsets (to the east and west) and an offset on the north side of the suspected adjacent utility may be sufficient to establish excavation limits.
SF	Isolated	EE-04 + DUP PDSB-102	The field duplicate associated with EE-04 indicates the results in the 5-7 ft interval were 2.9 mg/kg. Based on the sample results of field duplicate collected at EE-04 and the proximity of PDSB-102 to EE-04, removal criteria does not appear to be exceeded and additional investigation is not required.

TABLE 3-1
EXAMPLE SAMPLING RATIONALE FOR OU1 PRE-EXCAVATION DELINEATION PROGRAM

Excavation Area ID PD2-EL-XX	Area Type	Existing Samples in Area	Notes/Exceptions (describe non-standard information/condition)
SG	Cluster	EE-01 EE-02 EE-03 + DUP MW-01A PDSB-36 SB-147 SB-148	Excavation will be evaluated as a cluster of points due to locations of seven existing data points (three exceedances, four non-exceedances). Existing data points indicating non exceedances are being used as excavation boundaries. Some of these locations require additional sampling in order to coincide with target sampling intervals. The field duplicate associated with EE-03 indicates the results in the 5-7 ft interval were 5.6 mg/kg (non-exceedance).
SH	Isolated	SB-058 PDSB-37	Existing data points lie within shoreline slope back area. A non standard 12 foot offset was chosen due to the presence of PDSB-37, which exhibits a known bottom at 2-4 feet.
SI	Isolated	SB-131	Total Lead Exceedance (no PCB exceedances) at 0-2 ft
SJ	Isolated	SB-128	Total Lead Exceedance (no PCB exceedances) at 0-2 ft
SK	Isolated	SB-100	Total Lead Exceedance (no PCB exceedances) at 0-2 ft
SL	Isolated	PDSB-106	Non-standard excavation shape recommended due to possibility of building foundation or utility limiting potential limits of excavation. The utililty is a sanitary sewer and likely is not a source of PCBs.
SM	Isolated	SB-095A	Due to the low concentration of PCBs (relative to the removal criteria) at the existing data point and the proximity of PDSS-14, an offset of 5 ft may be sufficient to establish excavation limits.
SN	Isolated	PDSB-109	Due to the proximity of PDSS-21, PDSB-109 may be in the vicinity of a sump. Therefore, 7.5 ft offsets may be sufficient to establish excavation limits.
SO	Isolated	SB-077 PDSS-06	Existing slab may limit northerly extents of PCBs. Existing data point PDSS-06 indicates west excavation boundary.
SP	Linear	SB-093	Historical data indicates a second concrete slab is located approximately 2-4 ft below surface slab. Offset locations are nonstandard due to location of trench with respect to existing data point SB-093.
SQ	Linear	SB-069	Offset locations are nonstandard due to location of trench with respect to existing data point SB-069.

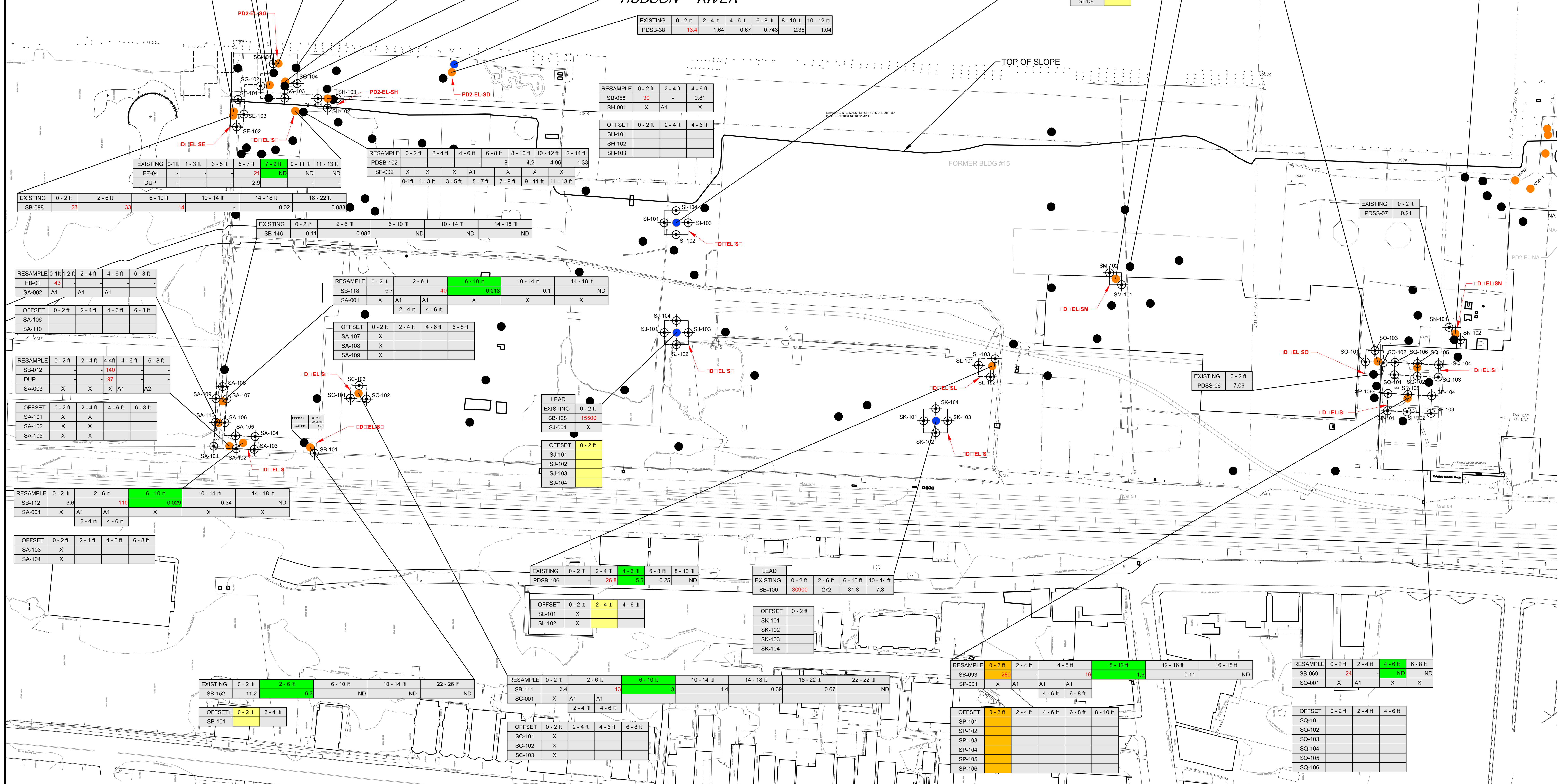
TABLE 3-1
EXAMPLE SAMPLING RATIONALE FOR OU1 PRE-EXCAVATION DELINEATION PROGRAM

Excavation Area ID PD2-EL-XX	Area Type	Existing Samples in Area	Notes/Exceptions (describe non-standard information/condition)
NORTH			
NA	Isolated	SB-085	Due to the low concentration (relative to removal criteria) of PCBs at one interval and significantly lower concentrations at deeper depths, an offset of 7.5 ft may be sufficient to establish excavation limits. Exceedances at 18-22 ft depth indicates that PCBs cannot be removed to below criteria at 12 feet and, therefore, the bottom of excavation may be established at 9 ft.
NB	Isolated	SB-082	Due to the low concentration of PCBs (relative to the removal criteria) at the existing data point, an offset of 7.5 ft may be sufficient to establish excavation limits.
NC	Linear	SB-075 SB-076 SB-153 TB-14	Long Linear feature containing several existing data points exhibiting PCB impacts above removal criteria at multiple depths. A 12 foot offset to the east was chosen due to low concentrations of PCBs (relative to the removal criteria) in existing borings located approximately 20 feet east of SB-153 (EE-10 and PDSB-114).
ND	Isolated	PDSB-14	Standard offsets will be completed for an Isolated point.
NE	Isolated	SB-103	Standard offsets will be completed for an Isolated point.
NF	Isolated	PDSB-16 PDSB-111	High concentration of PCBs deep may indicate the presence of a sump. Additional samples will be collected at the existing location in order to establish a bottom of excavation depth. Due to the presence of a potential sump, a non standard offset was chosen in order to define the limits of excavation. These borings are in the vicinty of an existing construction trailer, which is secured to the slab. Offset locations may vary slightly in order to accomodate this site feature.
NG	Linear	PDSB-31	This area will be investigated as a standard Linear. However, due to the presence of Building 52, NG-101, NG-102, and NG-103 will serve as documentation samples. Excavation is not expected to be completed within 4 feet of Building 52 wall.
NH	Linear / Cluster	PDSB-26 SB-072 SB-073 SB-079 SB-080 SB-081	Cluster area composed of a Linear and Isolated locations extending from the Building 52 wall to the west. Excavation areas evaluated as isolated points are located on the north and south sides of the Linear with impacts present in the existing sample at varying depths. Existing samples and additional samples will be used to evaluate changes in excavation depths within the footprint.
NI	Linear	SB-084 SB-151	Existing data points associated with this area may or may not be associated with subsurface utilities. Offsets from these existing data points will be evaluated once characterization of potential Building 52 outfalls is complete.
NJ	Cluster	PDSB-25 SB-098	Existing data points associated with this area completed as a cluster of existing data points. Due to the low concentration of PCBs (relative to the removal criteria) at the existing data point SB-098, an offset of 10 ft may be sufficient to establish excavation limits at this location. Standard offset will be used for PDSB-25 due to a higher concentration at this point.

TABLE 3-1
EXAMPLE SAMPLING RATIONALE FOR OU1 PRE-EXCAVATION DELINEATION PROGRAM

Excavation Area ID PD2-EL-XX	Area Type	Existing Samples in Area	Notes/Exceptions (describe non-standard information/condition)
NK	Linear	PDSB-33	This area will be investigated as a non-standard Linear. Based on the relatively low concentration of PCBs (relative to the removal criteria) and the apparent end of the utility just south of PDSB-33, a 5 foot offset to the north and 15 feet to the south. Due to the presence of Building 52, NK-102 will serve as a documentation sample. Excavation is not expected to be completed within 4 feet of Building 52 wall.
NL	Isolated	PDSS-02 SB-102	This area known to be in the vicinity of a sump. Therefore, 7.5 ft offsets used for evaluation. Maximum excavation depth is 9 feet as described in the ROD.
NM	Isolated	SB-121	Standard offsets for an Isolated. Maximum excavation depth is 9 feet as described in the ROD.
NN	Cluster	PDSB-34 SB-154	Standard 15 foot offsets for a cluster Maximum excavation depth is 9 feet as described in the ROD.
NO	Isolated	CAM-S0-01	A non standard 7.5 foot offset was chosen due to the presence of low concentration PCBs (relative to the removal criteria).
NP	Isolated	None	Existing data points associated with this area may or may not be associated with subsurface utilities. Offsets from these existing data points will be evaluated once characterization of potential Building 52 outfalls is complete.
NQ	Isolated	None	Investigation borings were not completed in this area. Therefore, the suspected pipe will be located and accessed (if located) to assess the potential for this area being a source area as described in the document.
NR	Isolated	None	Isolated point of a surface exceendance with an existing data point below critieria within 10 feet. Access of drilling equipment may be an obstacle to obtaining a sample every 30 feet. Therefore, the number of samples required to maintain an average of one sample per 30 feet was maintained. Maximum excavation depth is 9 feet as described in the ROD.
WEST			
WA	Cluster	Multiple	Area that includes many existing data points, evaluated for large-scale excavation to 9 ft depth as described in the ROD.
WB	Isolated	SB-123	Standard isolated point offset; maximum excavation depth is 9 feet as described in the ROD.
WC	Isolated(s)	PDSB-22 SB-063	Exceedances for both existing data points are 6 ft or shallower. Maximum excavation depth is 9 feet as described in the ROD Two Isolated excavations combined, share confirmatory sample locations.
WD	Isolated(s)	FL-21	Evaluated using non standard offsets due to the shared boarder of excavation WA and low concentrations in the existing sample point. Maximum excavation depth is 9 feet as described in the ROD.
WE	Cluster	PDSB-30 TB-17	Evaluated using non standard offsets due to the shared boarder of excavation WA and low concentrations in TB-17. WE-105 may serve as a step up sample. Maximum excavation depth is 9 feet as described in the ROD.

NOTES:
TBD - To Be Determined
N/A - Not Applicable



RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	
SB-148	ND	7.3	ND	-	-
SG-003	X	X	X	**	**

RESAMPLE	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
MW-01A	-	-	-	0.95	13	-	-
SG-001	X	X	X	X	X	A1	A2

OFFSET	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
SG-102	X	X	X	X			
SG-103	X	X	X	X			

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-36	0.038	ND	3.43	-	-	-	-
SG-002	X	X	X	A1	A2	**	**

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-100	-	-	-	-	-	12.2	1.23

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
SE-101	X	X	X			
SE-102	X	X	X			
SE-103	X	X	X			

*PDSB-100 WAS PREVIOUSLY PERFORMED AS RESAMPLE OF SB-088

EXISTING	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 13 ft	13 - 15 ft
EE-01	-	-	93	6.1	5.6	4.2

OFFSET	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft
SG-101	X	X		

RESAMPLE	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
EE-02	-	ND	-	ND	ND	ND	-
SG-004	X	X	A1	X	X	X	X

EXISTING	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft
EE-03	-	-	82	29	0.7	ND
DUP	-	-	-	5.6	-	-

OFFSET	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft
SG-104	X	X	A1	A1	

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	
SB-147	2	ND	ND	-	
SG-005	X	X	X	**	**
				10 - 12 ft	12 - 14 ft

**COMPLETION OF ADDITIONAL SAMPLING DEPENDENT UPON RESULTS OF SG-002

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft
SB-077	19	0.228	ND	ND

OFFSET	0 - 2 ft	2 - 4 ft
SO-101		
SO-102		
SO-103		

EXISTING	0 - 2 ft
PDSS-14	0.028

EXISTING	0 - 2 ft	2 - 3.5 ft	3 - 5.4 ft
SB-095A	10.3	1.18	0.005

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-109	-	536	52	-	-	-	-
SN-001	X	X	X	A1	A1		

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
SN-101					
SN-102					

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft
PDSB-37	-	1.99	-
SH-104	A1	X	X

LEAD

EXISTING	0 - 2 ft
SB-131	19600

OFFSET	0 - 2 ft
SI-101	
SI-102	
SI-103	
SI-104	

EXISTING	0 - 1 ft
HB-06	370

LEAD

EXISTING	0 - 2 ft
HB-06	43200

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
PDSB-38	13.4	1.64	0.67	0.743	2.36	1.04

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft
SB-058	30	-	0.81
SH-001	X	A1	X

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft
SH-101			
SH-102			
SH-103			

EXISTING	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
EE-04	-	-	-	21	ND	ND	ND
DUP	-	-	-	2.9	-	-	-

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-102	-	-	-	8	4.2	4.96	1.33
SF-002	X	X	X	A1	X	X	X
	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
SB-088	23	33	14	-	0.02	0.083

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft
SB-146	0.11	0.082	ND	ND	ND

RESAMPLE	0-1ft	1-2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
HB-01	43	-	-	-	-
SA-002	A1		A1	A1	

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
SA-106				
SA-110				

RESAMPLE	0 - 2 ft	2 - 4 ft	4-4ft	4 - 6 ft	6 - 8 ft
SB-012	-	-	140	-	-
DUP	-	-	97	-	-
SA-003	X	X	X	A1	A2

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
SA-101	X	X		
SA-102	X	X		
SA-105	X	X		

RESAMPLE	0 - 2 ft	2 - 6 ft		6 - 10 ft	10 - 14 ft	14 - 18 ft
SB-118	6.7	40		0.018	0.1	ND
SA-001	X	A1	A1	X	X	X
		2 - 4 ft	4 - 6 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
SA-107	X			
SA-108	X			
SA-109	X			

PDSS-11	0 - 2 ft 10/26/2005
Total PCBs	1.49

LEAD

EXISTING	0 - 2 ft
SB-128	15500
SJ-001	X

OFFSET	0 - 2 ft
SJ-101	
SJ-102	
SJ-103	
SJ-104	

RESAMPLE	0 - 2 ft	2 - 6 ft		6 - 10 ft	10 - 14 ft	14 - 18 ft
SB-112	3.6	110		0.029	0.34	ND
SA-004	X	A1	A1	X	X	X
		2 - 4 ft	4 - 6 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
SA-103	X			
SA-104	X			

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
PDSB-106	-	26.8	5.5	0.25	ND

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft
SL-101	X		
SL-102	X		

LEAD

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft
SB-100	30900	272	81.8	7.3

OFFSET	0 - 2 ft
SK-101	
SK-102	
SK-103	
SK-104	

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	22 - 26 ft
SB-152	11.2	6.3	ND	ND	ND

OFFSET	0 - 2 ft	2 - 4 ft
SB-101		

RESAMPLE	0 - 2 ft	2 - 6 ft		6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 22 ft
SB-111	3.4	13		3	1.4	0.39	0.67	ND
SC-001	X	A1	A1					
		2 - 4 ft	4 - 6 ft					

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
SC-101	X			
SC-102	X			
SC-103	X			

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 8 ft		8 - 12 ft	12 - 16 ft	16 - 18 ft
SB-093	280	-	16		1.5	0.11	ND
SP-001	X	A1	A1	A1			
			4 - 6 ft	6 - 8 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
SP-101					
SP-102					
SP-103					
SP-104					
SP-105					
SP-106					

EXISTING	0 - 2 ft
PDSS-06	7.06

EXISTING	0 - 2 ft
PDSS-07	0.21

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
SB-069	24	-	ND	ND
SQ-001	X	A1	X	X

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft
SQ-101			
SQ-102			
SQ-103			
SQ-104			
SQ-105			
SQ-106			

LEGEND:

- PROPOSED INVESTIGATION BORING
- PROPOSED EXCAVATION LIMITS
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT LESS THAN CRITERIA
- RESULT GREATER THAN CRITERIA
- LEAD HOTSPOT
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER

ANALYSIS NOT PERFORMED IN EXISTING SAMPLE
HORIZON SAMPLE
A1 = ANALYZE RESAMPLE FIRST
A2 = ANALYZE RESAMPLE BASED ON RESULTS OF A1, ETC.

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-109	-	536	52	-	-	-	-
SN-001	X	X	X	A1	A1		

EXISTING	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
EE-04	-	-	-	21	ND	ND	ND
DUP	-	-	-	2.9	-	-	-
OFFSET	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft		
SG-104	X	X	A1	A1			

ALL RESAMPLES ARE -0XX
ALL OFFSETS ARE -1XX, STEPOUTS WILL BE -2XX
X = SAMPLE NOT PLANNED AT THIS INTERVAL
EXPECTED BOTTOM OF EXCAVATION DEPTH BASED ON EXISTING DATA
A BLANK CELL INDICATES THAT A SAMPLE MAY BE COLLECTED WITHIN THIS INTERVAL.
EXPECTED SIDEWALL BOTTOM INTERVAL (IF <10PPM IN OFFSET, REPRESENTS COMPLIANT SIDEWALL SAMPLE)

PROGRAM TYPE (PRE-DESIGN INVESTIGATION - PHASE 2)
EXCAVATION IDENTIFICATION (SA=SOUTH EXCAVATION LOCATION "A")
PD2-EL-SA-101
SAMPLE TYPE (ENVIRONMENTAL LAND)
BORING LOCATION NUMBER

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.

0 80 160 240 320
SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROPOSED EXPLORATIONS (SOUTH AREA)

SCALE: AS SHOWN
MAY 2013

FIGURE 3-1

C:\USERS\KMA\DESKTOP\DESKTOP FILES\28612-250-0011 DATABOX PROP BORINGS 2013_R11 052313.DWG

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
SB-085	340	0.76	190	180	0.21	58	0.27	0.2	ND

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 9 ft
NA-101		X	X		
NA-102		X	X		
NA-103		X	X		
NA-104		X	X		

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 21 ft
SB-076	330	10.40	24	0.66	0.669	ND
NC-001	A1	X	A1	A1	X	X	X
			6 - 8 ft	8 - 10 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
NC-101		X	X			
NC-102		X	X			
NC-103		X	X			
NC-104		X	X			

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
PDSB-14	26.5	30.9	31.1	9.1	0.245	0.026

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
ND-101	X	X		
ND-102	X	X		
ND-103	X	X		
ND-104	X	X		

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
TB-14	-	-	64.2	-	-	-	-
NC-002	X	X	X	A1	A2		

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
NC-105	X	X					
NC-106	X	X					

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
PDSB-16	19	1.15	11.5	5.6	2.73	-

IMPACTS AT PDSB-111 DRIVES THE EVALUATION AT THIS LOCATION

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
SB-082	1.9	ND	20.7	-	2.3	0.09	ND
NB-001	X	X	A1	A1	X	X	X
			6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft	

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
NB-101	X	X	X			
NB-102	X	X	X			

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
SB-103	47	1.3	1.5	0.36	0.26	0.026	ND

OFFSET	0 - 2 ft	2 - 4 ft
NE-101		
NE-102		
NE-103		
NE-104		

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
SB-075	11	ND	100	0.478	0.068	0.094	
NC-003	X	X	A2	A1	X	X	X
			6 - 8 ft	8 - 10 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
NC-107	X	X	X			
NC-108	X	X	X			

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-111	-	-	-	-	-	17000	-
NF-002	X	X	X	X	X	X	A1

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
NF-101	X	X	X	X	X		
NF-102	X	X	X	X	X		
NF-103	X	X	X	X	X		
NF-104	X	X	X	X	X		

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14-15.5 ft
SB-153	ND	14	2	1.7	1.7
NC-003	X	A2	A1	X	X	X
		2 - 4 ft	4 - 6 ft		

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NC-109	X			
NC-110	X			
NC-111	X			
NC-112	X			
NC-113	X			

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-31	28	24.2	48.6	95	26.1	-	-
NG-001	X	X	X	X	X	A2	A1

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
NG-101	X	X	X	X	X		
NG-102	X	X	X	X	X		
NG-103	X	X	X	X	X		
NG-104	X	X	X	X	X		

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
SB-081	19	20	ND	ND	ND	ND	0.14	ND	ND
NH-006	X	A2	A1	X	X	X	X	X	X
		2 - 4 ft	4 - 6 ft						

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NH-107	X			
NH-108	X			
NH-109	X			
NH-110	X			
NH-111	X			
NH-112	X			

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
SB-098	0.254	20	0.97	1.7	0.42	0.064	ND	ND
NJ-001	X	A1	A1	X	X	X	X	X	X
		2 - 4 ft	4 - 6 ft					

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NJ-105	X			
NJ-106	X			

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
PDSB-25	0.8	110	9.7	3.63	3	1.32

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NJ-101	X	A1		
NJ-102	X	A1		
NJ-103	X	A1		
NJ-104	X	A1		

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
SB-084	ND	4600	210	180	3.4	0.08	0.078	0.041
NI-001	X	A1	A1	X	A2	A1	X	X	X	X
		2 - 4 ft	4 - 6 ft		10 - 12 ft	12 - 14 ft				

LOCATIONS OF PRE-DELINEATION INVESTIGATION POINTS WILL BE DETERMINED UPON COMPLETION OF BUILDING S2 OUTFALL CHARACTERI ATION

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
SB-151	2.4	110	0.27	7.8	ND	0.047	0.12	-	ND
NI-002	X	A2	A1	X	X	X	X	X	X	X
		2 - 4 ft	4 - 6 ft						

LOCATIONS OF PRE-DELINEATION INVESTIGATION POINTS WILL BE DETERMINED UPON COMPLETION OF BUILDING S2 OUTFALL CHARACTERI ATION

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
SB-102	320	0.023	5.2	0.28	0.03	0.16	0.022	ND	ND

OFFSET	0 - 2 ft	2 - 4 ft
NL-101		
NL-102		

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	6 - 10 ft	10 - 12 ft	12 - 14 ft
PDSS-02	97 / 29.5	-	-	-	-	-	-
NL-001	X	A1	A2				

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft
NL-103			
NL-104			

RESAMPLE	0 - 0.5 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
FL-24	21	-	-	-	-
NR-001	A1	A2			
	0 - 2 ft				

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
NR-101					
NR-102					
NR-109					

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
SB-154	32.4	12	0.31	ND	ND	-	ND
NN-002	X	A2	A1	X	X	X	X	X
		2 - 4 ft	4 - 6 ft				

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NN-101	X			
NN-105	X			

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
PDSB-34	49.8	116.8	279	-	-
NN-001	X	X	X	A1	A2

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
NN-102	X	X			
NN-103	X	X			
NN-104	X	X			

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
SB-121	210	33	7.3	0.042	ND	ND	ND

OFFSET	0 - 2 ft	2 - 4 ft
NM-101		
NM-102		
NM-103		
NM-104		

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
PDSB-33	37.1	12.3/10.6	1.47	1.44	1.12

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NK-101	X			
NK-102	X			
NK-103	X			

RESAMPLE	0 - 2 ft	2 - 3 ft	3 - 4 ft	4 - 5 ft	5 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
CAM-S0-01	-	1	-	-	21	-	-	-	-
NO-001	X	X	X	X	X	A1	A2		

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
NO-101	X	X	X				
NO-102	X	X	X				

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
SB-079	5.54	160	6.6	0.058	0.041	ND
NH-002	X	A2	A1	X	X	X	X
		2 - 4 ft	4 - 6 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
NH-102	X			
NH-103	X			
NH-104	X			

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 21 ft
SB-073	24	0.054	3.5	0.75	ND	ND

OFFSET	0 - 2 ft	2 - 4 ft
NH-101		

PDSB-32	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	9/30/2005	9/30/2005	9/30/2005	9/30/2005	9/30/2005
Total PCBs	7.2	3.98	2.27	3.7	3.78

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft	14 - 16 ft	16 - 18 ft	18 - 20 ft
SB-072	99	-	0.065	-	14	ND	17	0.44	-	15

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
NH-105		X					
NH-106		X					
NH-113		X					
NH-114		X					
NH-115		X					

RESAMPLE	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
SB-080	110	27	11	10	0.039	ND
NH-004	X	X	A2	A1	X	X	X
			6 - 8 ft	8 - 10 ft			

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
NH-116		X	X			
NH-117			X			
NH-118		X	X			

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
PDSB-26	36.5	17.2	1.41	9.8	2.74	0.483

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft
NH-119	X		
NH-120	X		
NH-121	X		

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-111	-	-	-	-	-	17000	-
NF-002	X	X	X	X	X	X	A1

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
NF-101	X	X	X	X	X		
NF-102	X	X	X	X	X		
NF-103	X	X	X	X	X		
NF-104	X	X	X	X	X		

HUDSON RIVER

LEGEND:

- PROPOSED INVESTIGATION BORING
- PROPOSED EXCAVATION LIMITS
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT LESS THAN CRITERIA
- RESULT GREATER THAN CRITERIA
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER

EXCAVATION BOTTOM MAY BE ESTABLISHED AT 9□

ANALYSIS NOT PERFORMED IN EXISTING SAMPLE

HORI□ON SAMPLE

A1 □ANALY□E RESAMPLE FIRST
A2 □ANALY□E RESAMPLE BASED ON RESULTS OF A1, ETC.

RESAMPLE	0 - 0.5 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
PDSB-109	7	526	52	-	-	-	-
SN-001	X	X	X	A1	A1		

EXISTING	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft	9 - 11 ft	11 - 13 ft
EE-04	-	-	-	21	ND	ND	

OFFSET	0-1ft	1 - 3 ft	3 - 5 ft	5 - 7 ft	7 - 9 ft
SG-104	X	X	X		

ALL RESAMPLES ARE -0XX

ALL OFFSETS ARE -1XX, STEPOUTS WILL BE -2XX

X □SAMPLE NOT PLANNED AT THIS INTERVAL

EXPECTED BOTTOM OF EXCAVATION DEPTH BASED ON EXISTING DATA

A BLANK CELL INDICATES THAT A SAMPLE MAY BE COLLECTED WITHIN THIS INTERVAL.

EXPECTED SIDEWALL BOTTOM INTERVAL□ IF □10PPM IN OFFSET, REPRESENTS COMPLIANT SIDEWALL SAMPLE

PROGRAM TYPE □PRE-DESIGN INVESTIGATION - PHASE 2

EXCAVATION IDENTIFICATION □NA□ NORTH EXCAVATION LOCATION "A"□

PD2-EL-NA-101

SAMPLE TYPE □ENVIRON-MENTAL LAND□

BORING LOCATION NUMBER

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW □01/27/2006□
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.

W S N E

0 80 160 240 320

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROPOSED EXPLORATIONS □NORTH AREA□

SCALE: AS SHOWN
MAY 2013

FIGURE 3-2

C:\USERS\KMAI\DESKTOP\DESKTOP FILES\286112-250-0011 DATABOX PROP BORINGS 2013_R11 052313.DWG

OFFSET SAMPLING REGIME FOR EXCAVATION WA

Offset ID	0-2	2-4	4-6	6-8	8-10	Reference Sample for Offset
WA-101	X	X	X	resample existing		SB-059
WA-102	X	X	X	resample existing		
WA-103	X	X	X	X	A1	PDSB-11
WA-104	X	X	X	X	A1	
WA-105	X	X	X	X	A1	TB-09
WA-106	X	X	X	X	A1	
WA-107	X	X	X	X	A1	PDSB-07
WA-108	X	X	X	X	A1	PDSB-08
WA-109	X	X	X	X	A1	PDSB-12
WA-110	X	X	X	X	A1	
WA-111	X	X	X	X	A1	
WA-112	X	X	X	X	A1	
WA-113	A1	X	X	X	A1	SB-116
WA-114	X	X	X	X	A1	TB-10
WA-115	X	X	X	X	A1	
WA-116	X	X	X	X	A1	
WA-117	A1	X	X	X	A1	PDSB-10
WA-118	A1	X	X	X	A1	
WA-119	A1	resample existing		X	X	SB-115
WA-120	A1	X	X	X	A1	PDSB-15,
WA-121	A1	X	X	X	A1	EE-15
WA-122	X	X	X	X	A1	PDSB-17
WA-123	X	A1	X	X	A1	SB-035
WA-124	X	A1	X	X	A1	PDSB-20
WA-125	X	A1	X	X	A1	
WA-126	X	A1	X	X	A1	
WA-127	X	A1	X	X	A1	PDSB-21
WA-128	X	A1	A1	A1	A1	
WA-129	A1	X	X	X	A1	SB-062
WA-130	X	A1	X	X	A1	PDSB-18,
WA-131	X	A1	X	X	A1	SB-064
WA-132	X	A1	X	X	A1	SB-066
WA-133	X	A1	X	X	A1	PDSB-23
WA-134	X	A1	X	X	A1	
WA-135	X	A1	X	X	A1	
WA-136	X	X	X	X	A1	PDSB-24
WA-137	X	X	X	X	A1	SB-067
WA-138	X	X	X	X	A1	
WA-139	X	X	X	X	A1	
WA-140	X	X	X	X	A1	DB-30
WA-141	X	X	X	X	A1	DB-29
WA-142	X	X	X	X	A1	
WA-143	X	X	X	X	A1	DB-28
WA-144	X	X	X	X	A1	
WA-145	X	X	X	X	A1	DB-20
WA-146	X	X	X	X	A1	
WA-147	X	X	X	X	A1	DB-22
WA-148	X	X	X	X	A1	
WA-149	X	X	X	A1	A1	PDSB-28
WA-150	X	X	X	X	A1	HA-116
WA-151	X	X	X	X	A1	
WA-152	X	X	X	A1	A1	PDSB-29,
WA-153	X	X	X	X	A1	TB-17
WA-154	X	X	A1	X	A1	HA-115,
WA-155	X	X	A1	X	A1	PDSB-30

EXISTING SAMPLE DATA REFERENCED FOR OFFSET LOCATIONS CAN BE FOUND IN ATTACHMENT 1 OF APPENDIX 3 OF THE RDWP.

EXISTING	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
SB-123	1300	0.27	0.054	0.036	ND	ND	ND	0.4	ND

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft
WB-101	A1		
WB-102	A1		
WB-103	A1		
WB-104	A1		

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
PDSB-22	-	50	-	5.3	-	-
WC-002	X	X	A1	X	X	X

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
WC-103	X				
WC-104	X				

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
SB-063	100	-	8.5	-	8.9	-
WC-001	X	A1	X	X	X	X

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
WC-101				
WC-102				
WC-105				

RESAMPLE	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft	14 - 16 ft	16 - 18 ft	18 - 20 ft	20 - 22 ft
DB-30	7.3	-	92	-	110	0.31	-	ND	0.049	ND	0.043

RESAMPLE	0 - 0.5 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
FL-21	14	-	-	-	-
WD-001	A1	A2	A3		
	0 - 2 ft				

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
WD-101					
WD-102					
WD-109					

EXISTING	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
PDSB-30	1.4	610	123	2.33	4.12

OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
WE-104	X	X	**		

** COMPLETION OF WG-104 IS DEPENDENT UPON RESULTS OF WG-001 (IF WG-001 HAS CLEAN BOTTOM AT 6-8, NO SAMPLE REQUIRED).

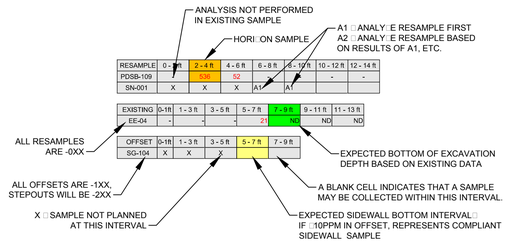
RESAMPLE	0 - 2	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
TB-17	-	4.4	26	-	-
WG-001	X	X	X	A1	A2

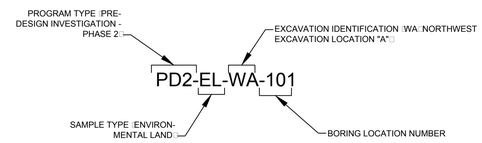
OFFSET	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
WG-101	X	X			
WG-102	X	X			
WG-103	X	X			

RIVER

LEGEND:

- PROPOSED INVESTIGATION BORING
- PROPOSED EXCAVATION LIMITS
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT LESS THAN CRITERIA (PDSB-24)
- RESULT GREATER THAN CRITERIA (PDSB-24)
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- DEADMAN AND EXTENSION ALIGNMENT AND PROBES (SEE APPENDIX 4)





NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.

N W S E

0 60 120 180 240

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROPOSED BORINGS (NORTHWEST AREA)

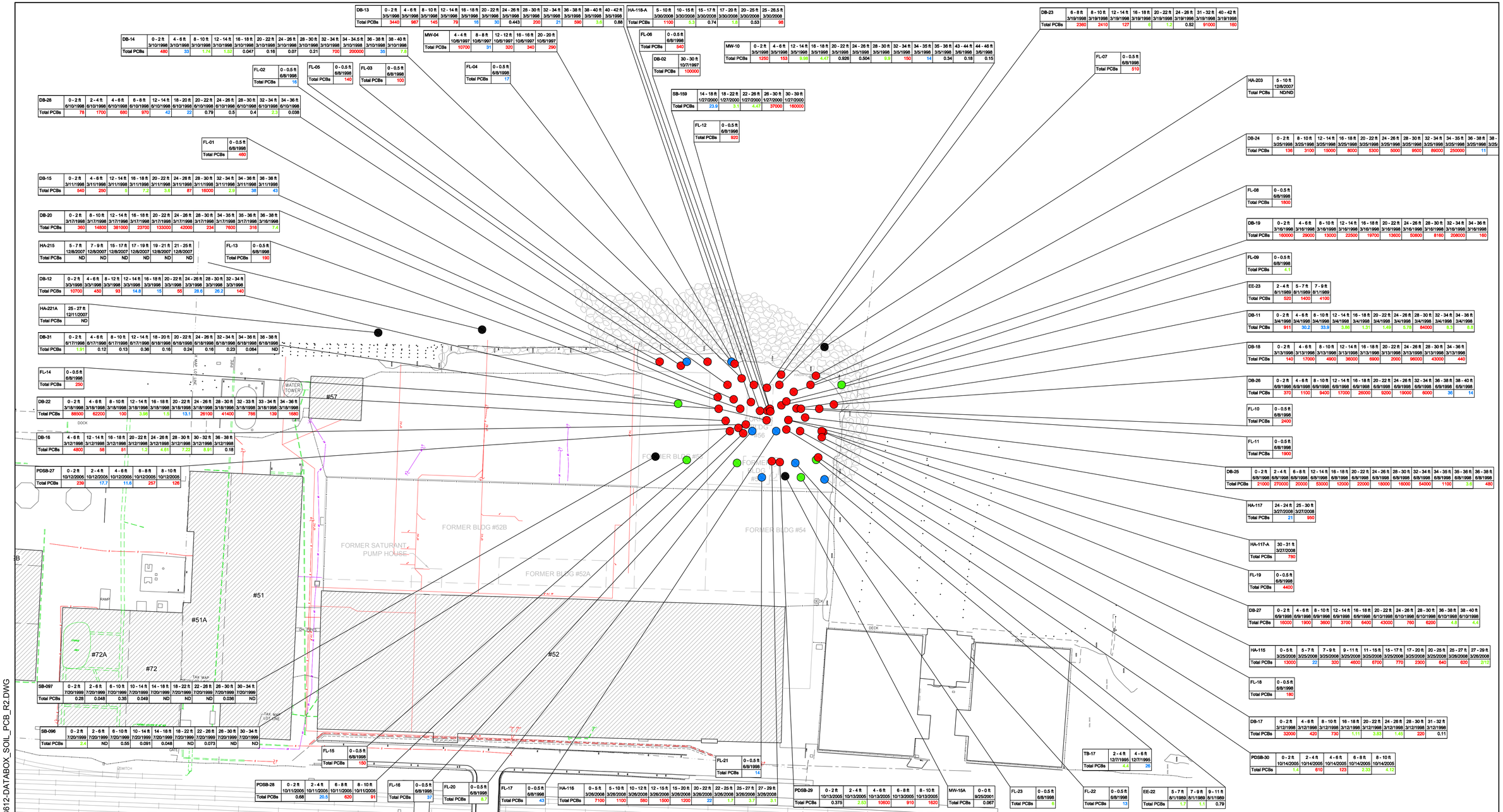
SCALE: AS SHOWN
MAY 2013

FIGURE 3-3

C:\USERS\KMA\DESKTOP\DESKTOP FILES\128612-250-0011 DATABOX PROP BORINGS 2013_R11 052313.DWG

ATTACHMENT 1

2008 Modified CSM Figures



G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_SOIL_PCB_R2.DWG

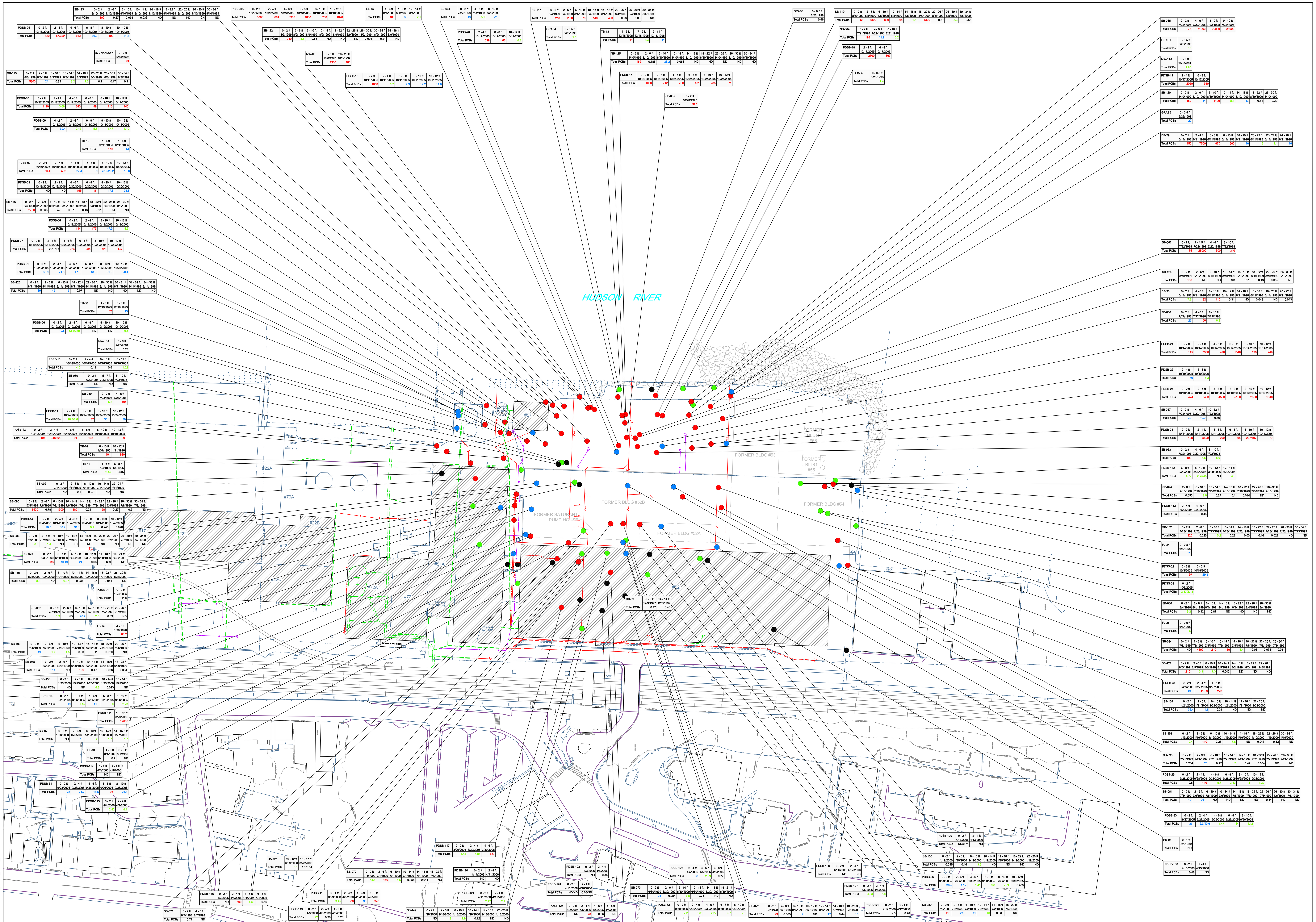
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS IN SOIL (NORTHWEST CORNER)

SCALE: AS SHOWN
AUGUST 2008

FIGURE 7A



SB-123	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999
Total PCBs	1300	0.27	0.054	0.036	ND	ND	ND	0.4	ND

PDSB-05	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005
Total PCBs	8000	601	6300	1680	760	1620

EE-15	4 - 6 ft	7 - 9 ft	12 - 14 ft
	8/1/1989	8/1/1989	8/1/1989
Total PCBs	160	36	2.1

SB-061	0 - 2 ft	4 - 6 ft	8 - 10 ft
	7/22/1998	7/22/1998	7/22/1998
Total PCBs	18	5.1	22.3

SB-117	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999
Total PCBs	210	1100	70	1400	430	0.23	0.83	ND

GRAB3	0 - 0.5 ft
	6/26/1998
Total PCBs	0.66

SB-119	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999
Total PCBs	58	1800	800	64	1.6	1300	0.37	8.3	0.58

PDSB-04	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005
Total PCBs	120	57.3/54	66.6	36.9	100	31.3

SB-122	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft	34 - 38 ft
	8/9/1999	8/9/1999	8/9/1999	8/9/1999	8/9/1999	8/9/1999	8/9/1999	8/9/1999	8/9/1999
Total PCBs	240	5.5	0.68	ND	ND	ND	0.091	0.21	ND

PDSB-20	2 - 4 ft	6 - 8 ft	10 - 12 ft
	10/17/2005	10/17/2005	10/17/2005
Total PCBs	1039	66	6.8

GRAB4	0 - 0.5 ft
	6/26/1998
Total PCBs	5.5

TB-13	4 - 6 ft	7 - 9 ft	9 - 11 ft
	12/15/1995	12/15/1995	12/15/1995
Total PCBs	61	4.3	44

SB-064	0 - 2 ft	4 - 6 ft	8 - 10 ft
	7/21/1998	7/21/1998	7/21/1998
Total PCBs	176	11.9	6.2

PDSB-18	2 - 4 ft	6 - 8 ft
	10/17/2005	10/17/2005
Total PCBs	2700	869

57UNKNOWN	0 - 0 ft
	9/15/1998
Total PCBs	91

MW-05	8 - 8 ft	20 - 20 ft
	10/6/1997	10/6/1997
Total PCBs	1300	100

SB-125	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999
Total PCBs	169	0.186	33.2	0.058	ND	ND	ND	ND	ND

GRAB2	0 - 0.5 ft
	6/26/1998
Total PCBs	1.4

SB-115	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999
Total PCBs	5800	24	0.83	8.2	1.3	0.1	0.17	0.11

PDSB-15	0 - 2 ft	2 - 4 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/11/2005	10/11/2005	10/11/2005	10/11/2005	10/11/2005
Total PCBs	1050	6.7	19.9	19.2	11.8

PDSB-17	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/24/2005	10/24/2005	10/24/2005	10/24/2005	10/24/2005	10/24/2005
Total PCBs	1090	712	760	481	285	71

SB-035	0 - 2 ft
	10/20/1997
Total PCBs	970

PDSB-10	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/17/2005	10/17/2005	10/17/2005	10/17/2005	10/17/2005	10/17/2005
Total PCBs	1120	3.68	640	59	110	140

PDSB-09	0 - 2 ft	2 - 4 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/18/2005	10/18/2005	10/18/2005	10/18/2005	10/18/2005
Total PCBs	39.4	2.47	5.6	1.47	1.19

TB-10	4 - 6 ft	6 - 8 ft
	12/11/1995	12/11/1995
Total PCBs	110	44

PDSB-02	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/19/2005	10/19/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Total PCBs	141	532	27.4	31	23.6/26.2	10.8

PDSB-03	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/19/2005	10/19/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Total PCBs	ND	ND	195	81	17.6	28.8

SB-116	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999	8/3/1999
Total PCBs	2700	0.666	0.42	0.37	0.13	0.11	0.34	ND

PDSB-08	0 - 2 ft	2 - 4 ft	8 - 10 ft	10 - 12 ft
	10/19/2005	10/19/2005	10/19/2005	10/19/2005
Total PCBs	114	177	47.9	4.5

PDSB-07	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/19/2005	10/19/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Total PCBs	304	201/ND	226	284	426	147

PDSB-01	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/20/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005	10/20/2005
Total PCBs	35.8	21.6	47.6	48.3	31.9	28.4

SB-126	0 - 2 ft	2 - 6 ft	6 - 10 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 31 ft	31 - 34 ft	34 - 38 ft
	8/11/1999	8/11/1999	8/11/1999	8/11/1999	8/11/1999	8/11/1999	8/11/1999	8/11/1999	8/11/1999
Total PCBs	19	49	17	0.071	ND	ND	ND	ND	ND

TB-08	4 - 6 ft	6 - 8 ft
	12/19/1995	12/19/1995
Total PCBs	62	13

PDSB-06	0 - 2 ft	2 - 4 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/19/2005	10/19/2005	10/19/2005	10/19/2005	10/19/2005
Total PCBs	10.8	3.84/2.58	ND	ND	9.8

MW-13A	0 - 0 ft
	9/25/2001
Total PCBs	0.23

PDSB-13	0 - 2 ft	2 - 4 ft	8 - 10 ft	10 - 12 ft
	10/18/2005	10/18/2005	10/18/2005	10/18/2005
Total PCBs	4.5	0.14	0.5	1.02

SB-060	0 - 2 ft	5 - 7 ft	8 - 10 ft
	7/22/1998	7/22/1998	7/22/1998
Total PCBs	ND	ND	ND

SB-059	0 - 2 ft	4 - 6 ft
	7/23/1998	7/21/1998
Total PCBs	5.8	104

PDSB-11	2 - 4 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/24/2005	10/24/2005	10/24/2005	10/24/2005
Total PCBs	16.3/8.6	87	30.1	30

PDSB-12	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/19/2005	10/19/2005	10/19/2005	10/19/2005	10/19/2005	10/19/2005
Total PCBs	107	348/220	91	108	92	89

TB-09	8 - 10 ft	10 - 12 ft
	1/31/1996	1/31/1996
Total PCBs	194	920

TB-11	4 - 6 ft	6 - 8 ft
	1/4/1996	1/4/1996
Total PCBs	2.46	0.045

SB-092	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	22 - 24 ft
	7/14/1999	7/14/1999	7/14/1999	7/14/1999	7/14/1999
Total PCBs	ND	0.1	0.079	ND	ND

SB-085	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999
Total PCBs	3400	0.78	1900	180	0.21	58	0.27	0.2	ND

PDSB-14	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/4/2005	10/4/2005	10/4/2005	10/4/2005	10/4/2005	10/4/2005
Total PCBs	26.5	30.9	31.1	9.1	0.245	0.026

SB-083	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999
Total PCBs	8.3	1.4	ND	ND	ND	ND	ND	ND	ND

SB-076	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 21 ft
	6/30/1999	6/30/1999	6/30/1999	6/30/1999	6/30/1999	6/30/1999
Total PCBs	333	10.49	24	0.66	0.669	ND

SB-155	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	26 - 30 ft
	1/24/2000	1/24/2000	1/24/2000	1/24/2000	1/24/2000	1/24/2000	1/24/2000
Total PCBs	8.3	ND	6.07	0.037	0.1	0.041	ND

PDSS-01	0 - 2 ft
	10/4/2005
Total PCBs	0.206

SB-082	0 - 2 ft	2 - 6 ft	6 - 10 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999	7/7/1999
Total PCBs	1.9	ND	20.7	2.3	0.09	ND

TB-14	4 - 6 ft
	1/29/1996
Total PCBs	64.2

SB-103	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	7/26/1999	7/26/1999	7/26/1999	7/26/1999	7/26/1999	7/26/1999	7/26/1999
Total PCBs	49	1.7	1.5	0.36	0.26	0.026	ND

SB-075	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
	6/29/1999	6/29/1999	6/29/1999	6/29/1999	6/29/1999	6/29/1999
Total PCBs	11	ND	100	0.478	0.068	0.094

SB-156	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	18 - 14 ft
	1/25/2000	1/25/2000	1/25/2000	1/25/2000	1/25/2000
Total PCBs	ND	ND	6.6	0.023	ND

PDSB-16	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	9/26/2005	9/26/2005	9/26/2005	9/26/2005	9/26/2005
Total PCBs	19	1.15	11.5	5.6	2.73

PDSB-111	10 - 12 ft
	3/29/2006
Total PCBs	17000

SB-153	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 15.5 ft
	1/26/2000	1/26/2000	1/26/2000	1/26/2000	1/27/2000
Total PCBs	ND	16	2	1.7	1.7

EE-10	4 - 6 ft	6 - 8 ft
	8/1/1989	8/1/1989
Total PCBs	0.4	ND

PDSB-114	0 - 2 ft	2 - 4 ft
	4/4/2006	4/4/2006
Total PCBs	ND	ND

PDSB-31	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	9/23/2005	9/23/2005	9/26/2005	9/26/2005	9/26/2005
Total PCBs	28	24.2	48.6	95	26.1

PDSB-115	0 - 2 ft	2 - 4 ft
	4/4/2006	4/4/2006
Total PCBs	2.82	4.1

HA-121	10 - 12 ft	15 - 17 ft
	3/28/2008	3/28/2008
Total PCBs	8.1	1.1/0.34

SB-071	0 - 2 ft	4 - 6 ft
	8/7/1998	8/7/1998
Total PCBs	0.72	ND

PDSB-116	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
	4/3/2006	4/4/2006	4/4/2006	4/4/2006
Total PCBs	ND	500	1.63	0.56

PDSB-118	0 - 1 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
	3/29/2006	4/5/2006	4/5/2006	4/5/2006
Total PCBs	3.45	86	36	340

PDSB-119	0 - 2 ft	2 - 4 ft	4 - 6 ft
	4/3/2006	4/3/2006	4/3/2006
Total PCBs	1.92	0.38	0.28

SB-079	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
	7/1/1999	7/1/1999	7/1/1999	7/1/1999	7/1/1999	7/1/1999
Total PCBs	5.54	160	6.6	0.058	0.041	ND

PDSB-117	0 - 2 ft	2 - 4 ft	4 - 6 ft
	3/29/2006	3/29/2006	3/30/2006
Total PCBs	1.45	4.86	657

PDSB-120	0 - 2 ft	2 - 4 ft
	4/11/2006	4/11/2006
Total PCBs	ND	ND

PDSB-121	0 - 2 ft	2 - 4 ft
	4/11/2006	4/11/2006
Total PCBs	2.27	2.9

SB-149	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	22 - 26 ft
	1/18/2000	1/18/2000	1/18/2000	1/18/2000	1/18/2000	1/18/2000
Total PCBs	ND	1.3	1.9	0.12	ND	ND

PDSB-123	0 - 2 ft	2 - 4 ft
	4/3/2006	4/6/2006
Total PCBs	ND	0.35

PDSB-124	0 - 2 ft	2 - 4 ft
	4/10/2006	4/10/2006
Total PCBs	ND/ND	0.26/ND

PDSB-125	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft
	4/3/2006	4/5/2006	4/5/2006	4/5/2006
Total PCBs	ND	78	0.26	ND

PDSB-126	2 - 4 ft	4 - 6 ft	6 - 8 ft
	4/5/2006	4/5/2006	4/5/2006
Total PCBs	38	2.99	0.77

SB-073	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 21 ft
	6/30/1999	6/30/1999	6/30/1999	6/30/1999	6/30/1999	6/30/1999
Total PCBs	24	0.054	3.5	0.75	ND	ND

PDSB-32	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	9/30/2005	9/30/2005	9/30/2005	9/30/2005	9/30/2005
Total PCBs	7.2	3.98	2.27	3.7	3.78

SB-072	0 - 2 ft	4 - 6 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft	14 - 16 ft	18 - 20 ft
	8/7/1998	8/7/1998	8/7/1998	8/7/1998	8/7/1998	8/7/1998	8/7/1998
Total PCBs	99	0.065	14	ND	17	0.44	15

DB-09	6 - 6 ft	14 - 14 ft
	12/3/1997	12/3/1997
Total PCBs	0.47	0.46

PDSB-128	0 - 2 ft	2 - 4 ft
	4/11/2006	4/12/2006
Total PCBs	ND	ND

PDSB-127	0 - 2 ft	2 - 4 ft
	4/6/2006	4/6/2006
Total PCBs	4.23	6.8

PDSB-122	0 - 2 ft	2 - 4 ft
	4/12/2006	4/12/2006
Total PCBs	ND	0.28

PDSB-129	0 - 2 ft	2 - 4 ft
	4/13/2006	4/13/2006
Total PCBs	ND/0.71	ND

SB-150	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000
Total PCBs	0.045	0.16	3.6	ND	ND	ND	ND

PDSB-26	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	9/29/2005	9/30/2005	9/30/2005	9/30/2005	9/30/2005	9/30/2005
Total PCBs	36.5	17.2	1.41	9.8	2.74	0.483

SB-080	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft
	7/2/1999	7/2/1999	7/2/1999	7/2/1999	7/2/1999	7/2/1999
Total PCBs	110	27	11	10	0.039	ND

SB-065	0 - 2 ft	4 - 6 ft	8 - 9 ft	9 - 10 ft
	7/22/1998	7/22/1998	7/22/1998	7/22/1998
Total PCBs	78	51000	90000	21000

GRAB1	0 - 0.5 ft
	6/26/1998
Total PCBs	10

MW-14A	0 - 0 ft
	9/25/2001
Total PCBs	1.95

PDSB-19	2 - 4 ft	6 - 8 ft
	10/17/2005	10/17/2005
Total PCBs	2020	910

SB-120	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	26 - 30 ft
	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999
Total PCBs	480	44	1100	8.4	43	0.34	0.22

GRAB5	0 - 0.5 ft
	6/26/1998
Total PCBs	22

DB-29	0 - 2 ft	2 - 4 ft	6 - 8 ft	8 - 10 ft	18 - 20 ft	20 - 22 ft	22 - 24 ft	24 - 26 ft
	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998
Total PCBs	150	7500	970	500	16	5	1.1	16

SB-062	0 - 2 ft	1 - 1.5 ft	4 - 6 ft	8 - 10 ft
	7/22/1998	7/22/1998	7/22/1998	7/22/1998
Total PCBs	175	28000	500	310

SB-124	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999	8/10/1999
Total PCBs	150	ND	ND	ND	0.11	0.13	0.032	ND

DB-30	0 - 2 ft	4 - 6 ft	8 - 10 ft	10 - 12 ft	14 - 16 ft	16 - 18 ft	18 - 20 ft	20 - 22 ft
	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998	6/11/1998
Total PCBs	7.3	92	110	0.31	ND	0.049	ND	0.043

SB-066	0 - 2 ft	4 - 6 ft	8 - 10 ft
	7/22/1998	7/22/1998	7/22/1998
Total PCBs	25	150	8.2

PDSB-21	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/14/2005	10/14/2005	10/14/2005	10/14/2005	10/14/2005	10/14/2005
Total PCBs	145	7300	470	1540	120	249

PDSB-22	2 - 4 ft	6 - 8 ft
	10/10/2005	10/10/2005
Total PCBs	50	5.3

PDSB-24	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/10/2005	10/10/2005	10/10/2005	10/10/2005	10/10/2005	10/10/2005
Total PCBs	474	3400	4500	5100	2390	1940

SB-067	0 - 2 ft	4 - 6 ft	10 - 12 ft
	7/22/1998	7/22/1998	7/22/1998
Total PCBs	30	10.9	0.86

PDSB-23	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	10/11/2005	10/11/2005	10/11/2005	10/11/2005	10/11/2005	10/11/2005
Total PCBs	108	5800	790	68	207/197	79

SB-063	0 - 2 ft	4 - 6 ft	8 - 10 ft
	7/22/1998	7/22/1998	7/22/1998
Total PCBs	100	8.5	8.9

PDSB-112	6 - 8 ft	8 - 10 ft	10 - 12 ft	12 - 14 ft
	3/29/2006	3/29/2006	3/29/2006	3/29/2006
Total PCBs	4.72	3.25/3.45	ND	4.8

SB-094	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999	7/16/1999
Total PCBs	0.055	2.9	0.27	0.1	0.044	ND	ND

PDSB-113	2 - 4 ft	4 - 6 ft
	3/29/2006	3/29/2006
Total PCBs	0.79	0.44

SB-102	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	7/23/1999	7/23/1999	7/23/1999	7/23/1999	7/23/1999	7/23/1999	7/23/1999	7/23/1999	7/23/1999
Total PCBs	320	0.023	5.2	0.28	0.03	0.16	0.022	ND	ND

FL-24	0 - 0.5 ft
	6/8/1998
Total PCBs	21

PDSS-02	0 - 2 ft	0 - 2 ft
	10/3/2005	10/18/2005
Total PCBs	97	29.5

PDSS-03	0 - 2 ft
	10/3/2005
Total PCBs	2.37/2.13

SB-086	0 - 2 ft	2 - 6 ft	6 - 10 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999	8/4/1999
Total PCBs	9.2	0.12	0.87	ND	ND	ND	ND

FL-25	0 - 0.5 ft
	6/8/1998
Total PCBs	6

SB-084	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999	7/8/1999
Total PCBs	ND	4600	210	180	3.4	0.08	0.078	0.041

SB-121	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft
	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999	8/5/1999
Total PCBs	210	3.5	7.3	0.042	ND	ND	ND

PDSB-34	0 - 2 ft	2 - 4 ft	4 - 6 ft
	9/27/2005	9/27/2005	9/27/2005
Total PCBs	49.8	116.8	278

SB-154	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	22 - 26 ft
	1/21/2000	1/21/2000	1/21/2000	1/21/2000	1/21/2000	1/21/2000
Total PCBs	32.4	12	0.31	ND	ND	ND

SB-151	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	30 - 34 ft
	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000	1/19/2000
Total PCBs	2.4	110	0.27	7.8	ND	0.047	0.12	ND

SB-098	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft
	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999	7/21/1999
Total PCBs	0.254	28	0.97	1.7	0.42	0.064	ND	ND

PDSB-25	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft	10 - 12 ft
	9/28/2005	9/28/2005	9/28/2005	9/28/2005	9/28/2005	9/28/2005
Total PCBs	0.8	110	9.7	3.63	3	1.32

SB-081	0 - 2 ft	2 - 6 ft	6 - 10 ft	10 - 14 ft	14 - 18 ft	18 - 22 ft	22 - 26 ft	26 - 30 ft	30 - 34 ft
	7/6/1999	7/6/1999	7/6/1999	7/6/1999	7/6/1999	7/6/1999	7/6/1999	7/6/1999	7/6/1999
Total PCBs	19	26	ND	ND	ND	ND	0.14	ND	ND

PDSB-33	0 - 2 ft	2 - 4 ft	4 - 6 ft	6 - 8 ft	8 - 10 ft
	9/27/2005	9/27/2005	9/29/2005	9/29/2005	9/29/2005
Total PCBs	37.1	12.3/10.6	1.47	1.44	1.12

HB-04	0 - 1 ft
	8/1/1989
Total PCBs	ND

PDSB-130	0 - 2 ft	2 - 4 ft
	4/13/2006	4/13/2006
Total PCBs	0.48	ND

LEGEND:
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT <1 MG/KG
- RESULT >1 AND <=10 MG/KG
- RESULT >10 AND <=50 MG/KG
- RESULT >50 MG/KG
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- UNKNOWN

NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. MAXIMUM RESULT SHOWN IN EACH DEPTH INTERVAL.
7. RESULTS IN DATABOXES SCREENED AGAINST SITE-SPECIFIC CRITERIA: < 1MG/KG, >1 AND <=10 MG/KG, >10 MG/KG AND <=50 MG/KG, AND >50 MG/KG.
8. ALL RESULTS SHOWN IN MG/KG.
9. SAMPLES COLLECTED POST 2005 INCLUDE AROCLOR 1262 AND 1268. SEE SECTION 6.1.1 IN MODIFIED CONCEPTUAL SITE MODEL REPORT FOR MORE INFORMATION.

SITE KEY: NTS

G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_SOIL_PCB_R2.DWG

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS IN SOIL (NORTH REMAINDER AREA)

SCALE: AS SHOWN
AUGUST 2008

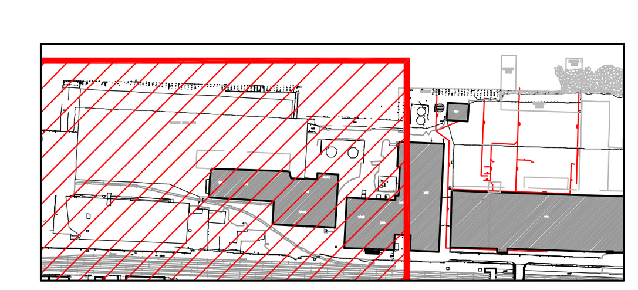
FIGURE 7B

G:\28612_HASTINGS\GLOBAL\CAD\28612-DATABOX_SOIL_PCB_R2.DWG

LEGEND:

- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP-RAP
- RESULT <1 MG/KG
- RESULT >1 AND <=10 MG/KG
- RESULT >10 AND <=50 MG/KG
- RESULT >50 MG/KG
- STORM DRAIN/SANITARY
- EXISTING STORM SEWER
- UNKNOWN

NOTES:
1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
5. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
6. MAXIMUM RESULT SHOWN IN EACH DEPTH INTERVAL.
7. RESULTS IN DATABOXES SCREENED AGAINST SITE-SPECIFIC CRITERIA: < 1MG/KG, >1 AND <=10 MG/KG, >10 MG/KG AND <=50 MG/KG, AND >50 MG/KG.
8. ALL RESULTS SHOWN IN MG/KG.
9. SAMPLES COLLECTED POST 2005 INCLUDE AROCLOR 1262 AND 1268. SEE SECTION 6.1.1 IN MODIFIED CONCEPTUAL SITE MODEL REPORT FOR MORE INFORMATION.



SITE KEY: NTS

W S N E

0 60 120 180 240
SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

TOTAL PCB CONCENTRATIONS
IN SOIL (SOUTH AREA)

SCALE: AS SHOWN
AUGUST 2008

FIGURE 7C

APPENDIX 4

EXTENSION ALIGNMENT INVESTIGATION PLAN

1. INTRODUCTION

This plan describes PCB Material (PCBM) and riprap probes. This task is part of the overall pre-design investigation (PDI) that will be completed at the Former Anaconda Wire & Cable Company site (Site), NYSDEC Site # 3-60-022, located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York.

2. BACKGROUND

Design and construction of the bulkhead extension in the Northwest Corner described in the OU-2 ROD requires confirmation of the absence of PCB Material as DNAPL or Semi-solid material and the absence of major obstructions (e.g. riprap) along the alignment for the new bulkhead extension. Previous investigations have identified the presence of riprap and PCB Material in the area but further delineation is required for design.

3. SCOPE OF WORK

3.1 Purpose and Scope

The purpose of the PCBM and riprap probes is to evaluate the presence of both PCBM and obstructions along the alignments of the proposed bulkhead extension wall and deadman. These factors are important for several reasons:

- To provide the required lateral resistance, the deadman and bulkhead extension wall must be driven to the Basal Sand. It is important to confirm that semi-solid or liquid PCBM do not exist along the alignment, since it could be dragged down to the Basal Sand during construction of the wall.

- To provide sufficient containment, the extension wall must be installed outboard of liquid PCBM.

- To properly install the sheetpile for the wall, it must be located outboard of large or significant thickness of obstructions (such as riprap) that could prevent proper installation.

In the current design concept, the bulkhead extension wall and deadman are anticipated to consist of a king pile wall with 66-in. diameter pipe piles at 10-foot centers, with sheetpiles between.

A phased approach of probes is planned in the vicinity of the planned extension wall and deadman, with the actual number and locations of probes to be determined as the work progresses, depending on conditions encountered. The proposed probe procedure utilizes methods that have been successfully employed at the site during previous investigations, which include the adhesion testing performed in 2008 to observe presence of PCBM, and the riprap probes performed in 2010 to initially evaluate the extent and thickness of riprap.

3.2 PCBM Adhesion Testing

In general, samples will be obtained from the probes and will be evaluated to determine visual evidence of PCBM. A procedure to visually observe PCBM in sediment samples, called adhesion testing, was previously performed at the site in 2008.

Initial physical screening of the PCBM indicated that the material readily adheres to steel. As such, stainless steel laboratory spatulas were used in 2008 to examine each sample for presence and adhesion of PCBM. A similar procedure will be used for this task of the PDI. A steel spatula will be probed into the soil along the length of each sample, and visual observations will be made of whether PCBM is visible in the sample, or visible adhering to the spatula.

If trace PCBM is suspected after the adhesion testing, pull testing will also be performed, in which a small amount of soil from the sample is collected and compacted, and then pulled apart to identify if string-like material can be observed.

Samples will be visually inspected, probed with the stainless steel spatula, and logged for PCBM observations and soil stratigraphy. Samples where PCBM is positively identified will be photographically recorded. After observation, samples will be drummed for disposal. Samples will not be retained.

3.3 Off-shore Probes

3.3.1 Off-shore Probe Procedure

Off-shore probes will be advanced using rotary wash drilling techniques, using a drilling rig mounted on a barge. Casing will be advanced through the sediment by pushing using the weight of the rig. Split spoon samples will also be advanced in front of the casing, and samples will be examined for PCBM as discussed in the preceding section. If no recovery is obtained, observations will be made to evaluate whether PCBM is visibly adhered to the split spoon sampler. The split spoons will be advanced either to the top of the Marine Silt, or until hammer blowcounts indicate the potential presence of riprap.

If assumed riprap is encountered, the rollerbit will be inserted into the hole and spun to confirm refusal. Observations will be made of the thickness and likely size of the riprap (as inferred based on drilling action). In the intervals where the roller bit is advanced, no split spoon samples will be obtained (and no PCBM observations of samples will be made) since the materials being drilled (cobbles and boulders) exceed the sampler size. If the roller bit cannot be advanced through the riprap, the location will be terminated due to rollerbit refusal and the barge will be moved to the next probe location.

Split spoon samples will be obtained from mudline to 5 feet below the top of the Marine Silt (except for the obstruction zones or in locations where roller bit refusal is encountered). The top of Marine Silt will be estimated based on contour plans that have been prepared from borings that have previously been drilled in the northwest area.

After each probe, the casing and rollerbit will be examined for any evidence of PCB Material and decontaminated if required. Additionally, residual sediment will be removed from the casing and rollerbit.

3.3.2 Off-shore Probe Sequence

The general sequence of the work is anticipated to be as follows:

Probes will be initiated on the alignment shown as Round 1 on Figure 4-1. Generally, the Round 1 alignment is offset 13 feet from locations where PCBM has been observed in the past. The 13 foot offset amount is chosen based on a desired 10 foot (approximate) buffer between the edge of the wall and a positive PCBM observation, plus the 3 foot (approximate) distance from edge of wall to centerline of wall (based on the currently anticipated 66-in. diameter pipe piles). Some isolated locations of "inferred potential PCB material" (i.e. based on an interpretation of historical observations prior to the adhesion testing program) are located in shallow sediment which would be removed prior to installation of the bulkhead and therefore do not constrain the bulkhead alignment.

- Round 1 - Perform probes generally at 30-foot centers along the line shown as Round 1 on Figure 4-1. At locations adjacent to an existing positive PCBM observation, the probe spacing will be decreased to 15 feet. For each probe, obtain split-spoon samples at 2-foot intervals to a depth corresponding to 5 feet below the estimated top of the Marine Silt. Perform adhesion testing on each split spoon sample. If obstructions are encountered when pushing the split spoon, the roller bit will be advanced through the obstruction to the extent possible, to obtain information on thickness and size of riprap. (Again, note that split spoon samples for PCB observation will not be obtained within the obstruction/rollerbit zones, since the obstructions will exceed the size of the sampler). If no PCBM is observed in any sample taken from Round 1, and if no significant riprap thickness is encountered, the program will be complete. For locations where PCBM is observed in Round 1 samples, and/or if significant riprap thickness is encountered, continue to Round 2 at those locations.

- Round 2 – Perform probes 13 feet outboard from Round 1, in locations where positive Round 1 PCBM observations are identified, and/or riprap is encountered. Spacing of Round 2 probes will be determined based on conditions encountered in Round 1. Adhesion testing and riprap probing will be performed as described above. If no PCBM is observed in any sample taken from Round 2 and if no riprap is encountered, the program will be complete. For locations where PCBM or riprap are observed in Round 2 samples, continue to Round 3 at those locations.

  Note that riprap refusal is not expected on the Round 2 alignment, based on information obtained from the 2010 riprap probes.

- Round 3 – Perform probes 13 feet outboard from Round 2, in locations where positive Round 2 PCBM observations are identified, and/or riprap refusal is encountered. Spacing of Round 3 probes will be determined based on conditions encountered in Round 2. Adhesion testing and riprap probing will be performed as described above.

Up to approximately 27 probes are expected to be completed for Round 1. See Figure 4-1 for approximate Round 1, 2, and 3 alignments and approximate Round 1 probing locations.

Round 2 and Round 3 lines are shown for reference purposes only and probes will not necessarily be performed along these lines. Individual probe locations along Round 2 or Round 3 will be field-determined based on the preceding Round 1 (or 2) results, as described above,

and will be performed only in locations where adjacent Round 1 (or 2) probes encounter PCBM and/or obstructions.

Also, the Round 1 probe number and sequence is subject to change based on initial probe results. Round 1 probes will be initiated in the vicinity of locations where PCBM observations are mostly likely to occur, adjacent to existing positive PCBM observations (such as HA-217, HA-P12, and HA-204). Subsequent Round 1 locations may be adjusted or eliminated based on these results.

For the probes planned in the Old Marina area, some of the existing piles and dock structures may be removed prior to the work, to allow access for the drilling barge. The Round 1 line shown adjacent to the Old Marina is approximate and subject to change based on access restrictions for the drilling barge.

3.4 Probes along North Property Line

The purpose of the probes planned to be drilled adjacent to the north property line ("North Property Line Probes" on Figure 4-1) is to determine presence or absence of PCBM and riprap, as discussed above, with the added objective of determining whether the wall alignment can be moved south to coincide with the property line along the Old Marina. The current alignment shown in the RFS is north of the property line.

Due to the sloped shoreline and tidal conditions, a drill rig cannot physically be positioned to install vertical borings at the property line. Therefore, the drill rig will be positioned on-shore as near as possible to the property line, and an angled boring will be completed to evaluate conditions at the property line. The boring angle will be adjusted to avoid penetrating the Fill / Marine Silt interface at the former wooden bulkhead that may exist along the property line, as identified during previous borings.

Most of the property line probes will be spaced 30 feet apart, similar to the probes described previously, except for the area immediately adjacent to the borings that have encountered liquid PCBM in the past (HA-114, HAOW12, HARW-4). In the four probes nearest these borings, the spacing will be reduced to 15 feet.

The property line probes will be advanced using either mini-sonic or rotary wash drilling techniques, and the riprap procedures described above will also be used (the rollerbit will be spun through intervals of suspected riprap, based on drilling action and/or hammer blows). Samples will be obtained from ground surface to 5 feet below the top of the Marine Silt.

3.5 Additional On-shore Probes

Two more areas of on-shore probes will also be drilled, and are shown on Figure 4-1:

- Deadman: Due to the fact that the deadman will be required to penetrate into the Basal Sand, a line of PCBM probes will also be advanced along the approximate deadman alignment.

- Extension wall continuation: A continuation of the bulkhead extension wall is required at the transition between the higher elevation upland created by filling behind the wall, versus the lower elevation sloped shore just south of the northwest extension area. This continuation of the bulkhead extension wall may also need to be driven to the Basal Sand.

The on-shore probes will be advanced using sonic drilling techniques. Soil samples will be extracted in 5 or 10 foot long sleeves from ground surface to 5 feet below the top of the Marine Silt. As with the off-shore probes, the top of Marine Silt will be estimated based on contour plans that have been prepared based on the borings that have previously been drilled in the northwest area.

After each probe, the drill tooling will be examined for any evidence of PCB Material and decontaminated if required. Additionally, residual soil will be removed from the drill tooling.

A Round 1, 2, and 3 phased approach will be used, and each will be offset by 13 feet, similar to the approach described above for the off-shore probes.

3.6 Laboratory Testing

No laboratory testing is planned for this task. Presence of PCBM will be determined based on visual observation only.

3.7 Relevant Field Operating Procedures

Field investigations will be performed in general accordance with the following Operating Procedures (OPs). Refer to Appendix A.

OP1002 – Drilling Safety
OP1008 – Operations Over, Near, or On Water
OP2000 – Monitoring Field Explorations
OP2001 – Identification and Description of Soils Using Visual-Manual Methods
OP2005 – Test Borings, Sampling, Standard Penetration Testing and Borehole Abandonment

4. QUALITY ASSURANCE

Appendix A of the RDWP provides a Quality Assurance Project Plan (QAPP).

5. SUBMITTALS

Applicable data will be included in the PDI Data Summary Report.

6. HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the site or involved in field activities are described in the Site-specific Health Safety Security and Environmental Plan (HSSEP), these documents will be available for use on Site prior to the commencement of work.

7. ATTACHMENTS

Figure 4-1 Proposed Exploration Location Plan, PCBM/Riprap Probes

HUDSON RIVER

POTENTIAL OFFSHORE ROUND 3 (13 FT. OFFSET FROM ROUND 2)

POTENTIAL OFFSHORE ROUND 2 (13 FT. OFFSET FROM ROUND 1)

OFFSHORE ROUND 1

EXTENSION WALL CONTINUATION ALIGNMENT ROUND 1 (ONSHORE)

DEADMAN ALIGNMENT ROUND 1 (ONSHORE)

POTENTIAL ONSHORE ROUND 3

POTENTIAL ONSHORE ROUND 2

POTENTIAL ONSHORE ROUND 3

NORTH PROPERTY LINE PROBES

FORMER PIER

FORMER DOCK

FORMER BLDG #56

FORMER BLDG #53

FORMER BLDG #55

FORMER BLDG #52B

FORMER BLDG #54

LEGEND:

- EXISTING STRUCTURES
- PROPOSED NORTHWEST EXTENSION WALL ALIGNMENT SHOWN IN RFS
- PROPERTY BOUNDARY
- RIP-RAP
- EXPLORATION LOCATION TO MARINE SILT INTERFACE
- LEADER INDICATING ACTUAL EXPLORATION LOCATION
- EXPLORATION LOCATION WHERE MARINE SILT WAS NOT ENCOUNTERED DUE TO REFUSAL
- HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
- HISTORICAL SAMPLE LOCATION (DEPTH VARIES)
- 2010 RIP-RAP INVESTIGATION PROBE
- APPROXIMATE / CONCEPTUAL LOCATION OF PROPOSED PCB / RIPRAP PROBE

SAMPLE LEGEND:

LIQUID PCB MATERIAL

SEMISOLID PCB MATERIAL — TRACE PCB MATERIAL

- LIQUID PCB MATERIAL OBSERVED
- SEMISOLID PCB MATERIAL OBSERVED
- TRACE PCB MATERIAL OBSERVED
- NO PCB MATERIAL OBSERVED
- INFERRED POTENTIAL PCB MATERIAL LOCATION

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.
3. THE ROUND 1 LINE IN THE OLD MARINA IS APPROXIMATE AND SUBJECT TO CHANGE BASED ON ACCESS RESTRICTIONS FOR THE DRILLING BARGE.
4. ROUND 2 AND ROUND 3 LINES ARE SHOWN FOR REFERENCE PURPOSES ONLY AND PROBES WILL NOT NECESSARILY BE PERFORMED ALONG THESE LINES. INDIVIDUAL PROBES ALONG ROUND 2 OR ROUND 3 WILL BE PERFORMED ONLY IN LOCATIONS WHERE ADJACENT ROUND 1 PROBES ENCOUNTER PCBM AND/OR OBSTRUCTIONS.
5. THE ROUND 1 PROBE LOCATIONS ARE CONCEPTUAL AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS AND OBSERVATIONS MADE IN ADJACENT ROUND 1 PROBES AS THE WORK PROGRESSES.

0 60 120

SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROPOSED LOCATION PLAN PCBM / RIPRAP PROBES

AS SHOWN
MAY 2013

FIGURE 4-1

G:\PROJECTS\286122\50 - RFS\CAD\PLAN VIEWS & SECTIONS\286612-PCB MATERIAL EXTENTS R2.DWG

APPENDIX 5

DEEPWATER INVESTIGATION PLAN

1. INTRODUCTION

This plan describes the Deepwater Investigation. This investigation is part of the overall pre-design investigation that will be completed at the Former Anaconda Wire & Cable Company site (Site), NYSDEC Site # 3-60-022, located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York.

2. BACKGROUND

The Record of Decision (NYSDEC, 2012) (ROD) for Operable Unit No. 2 (OU-2) requires removing sediment in portions of OU-2 including deepwater areas defined as areas beyond feasible deployment of silt curtain and within the extents defined by OU-2. For the deepwater areas where dredging activities cannot be fully contained, the ROD states:

"Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging."

3. SCOPE OF WORK

The goal of this investigation is to examine deepwater areas where PCBs in excess of 50 mg/kg (ppm) (elevated PCB concentrations) are known or suspected to be present, but where insufficient data exists to confirm the presence of PCB deposits with concentrations greater than 50 mg/kg that may require remediation. This investigation will gather data for making decisions regarding remedial action, and will provide information to delineate dredge areas.

This investigation addresses areas in the proximity of existing exceedances and areas between EB-10 and EB-14. Areas previously identified in the ROD to be dredged are pre-delineated in a separate investigation (see RDWP Appendix 6). The deepwater investigation sediment sampling, which will be conducted within an area located approximately 300 feet off-shore of the Site (approximately 4 acres), will be used to further understand lateral and vertical PCB contamination, within specific deepwater areas.

This investigation is comprised of four tasks as described below. Additional details are provided in Section 3.1.

- **Task 1: Resampling - Resample specific locations with elevated PCB concentrations**
  This task investigates areas in the proximity of specific existing exceedances. Specifically, this task will re-sample areas proximate to three previously sampled deepwater locations where elevated PCB concentrations were detected (EB-10, EB-14, CS-19). Sampling at these locations will be used to 1) confirm the presence of elevated PCB concentrations at each location, 2)

confirm the depths of elevated PCB concentration previously detected, and 3) observe physical characteristics at each location. Refer to Figure 5-1 for proposed sampling locations (VC-101 through VC-103).

- **Task 2: Investigation Unit Sampling - Sample the area between EB-10 and EB-14**
  This task samples areas between EB-10 and EB-14. Sampling at these locations will be used to 1) identify the presence of elevated PCB concentrations at each location, 2) to identify the depths of elevated PCB concentration if present, 3) determine whether additional sampling (i.e. step-out sampling) is necessary, and 4) observe physical characteristics at each location. Sediment samples will be collected in a 160-foot triangulation grid pattern to divide the investigation area into hexagonal Investigation Units. Refer to Figure 5-1 for proposed sampling locations and Investigation Units (VC-104 through VC-108).

- **Task 3: Decision Unit Sampling - Including Step-out Investigation (as needed)**
  Investigation Unit(s) will be divided into smaller hexagonal Decision Units. This investigation task will further assess the nature and extent of elevated PCB concentrations emerging from Task 2 and will support decisions regarding the need for remedial action. Refer to Figure 5-1 for proposed sampling locations (VC-109 through VC-132) and Decision Units including other additional potential step-out Decision Units.

- **Task 4: Variability of Sediment Concentrations**
  Additional sampling will be completed at VC-101, VC-102 and VC-103 to assess the variability of the sediment concentrations to better understand if the concentrations are uniform or if exceedances are sporadic. Based on the results from the initial sampling, additional locations may be selected to help assess the contaminant mass distribution in relevant areas. Three additional cores will be added in close proximity to each location being evaluated.

3.1 Sampling Program Design

The sampling program employs a 160-foot triangulation grid for investigation areas and an 80-foot triangulation grid for refinement of extents of contamination. All tasks will be performed during a single field event to the extent feasible. As currently planned, the sampling vessel will remain on site until all locations are completed. At a minimum, sampling described in Task 1, Task 2, Task 4, Task 3 locations associated with historical locations (EB-10, EB-14, CS-19) and other Task 3 locations (VC-109 thru VC-132) will all be completed during the first sampling round (32 locations). After analysis and review with the NYSDEC, additional Task 3 samples may be completed (up to 16 or more locations).

This program selected vibracore technology to collect sediment cores for sampling based on previous successful sampling programs at the site and other factors (See Section 3.4). Vibracore, along with ponar grabs for surface samples, will be collected from barge or boat-mounted equipment. The vibracore diameter is anticipated to be 4 inches and may change in the field based on sediment conditions and recovery.

Sediment samples will be collected and submitted for PCB analysis according to requirements and procedures described herein and the pertinent operating procedures. Sample locations will be documented using a survey grade differential GPS with a sub-meter accuracy along with a depth sounder as necessary.

3.1.1 Vertical Distribution of Samples

Considering that previous samples indicated PCB exceedances are predominantly within the top 3 feet of sediment. The following approach will be used to establish vertical sample intervals to delineate PCB concentrations in targeted sediment deposits:

Below is a list of depth intervals and rationale for sampling:

- 0.0-0.5 foot:
  - Consistent with previous sampling programs as the surface sediment sampling interval
  - Represents the zone with highest bioactivity
  - Collected using petit ponar sampler or equivalent
  - Represents the most recently deposited sediments
- 0.5-1 and 1-2 foot:
  - Consistent with the ROD which stated that "The majority of targeted PCB dredging areas identified in the deepwater are within the top two feet. Therefore, the targeted dredging will remove sediments which have the highest levels of PCBs and the greatest potential to migrate and be an ongoing source to the environment."
- 2-3 foot:
  - Depth intervals to better define vertical thickness of impacted sediment, to help provide appropriate dredge limits and to prevent unnecessary over-dredging
- 3-4 foot:
  - Provides information on underlying sediments
- 4-6 and 6-8 foot:
  - Provides additional information (as necessary) to document weather the maximum dredge depth of 6 ft is needed and, if so, what residual concentrations would exist

Note that if the preceding shallower interval is < 50 mg/kg then the deeper interval(s) (>4 foot) would not be analyzed. Concentration levels associated with the deepest analyzed interval will be discussed with the DEC prior to discarding archived deeper samples to determine whether further analysis is warranted.

3.1.2 Spatial Distribution of Samples

As discussed above the sampling program employs a 160-foot triangulation grid for investigation areas and an 80-foot triangulation grid for refinement of extents of contamination. This grid system creates hexagonal areas referred to as Investigation and Decision Units, respectively. Additionally, step-out sampling will be implemented where required to adequately delineate locations where spatial extents are not fully bounded.

This grid system was applied uniformly because the investigation area is not directly adjacent to suspected onshore point sources and the sediment material is uniform across this site. Previous grain size analysis data indicate that sediments are predominantly fine grained material of similar properties and direct observations of surface sediments also support this conclusion.

3.1.3 Task 1: Re-Sampling

This investigation task will consist of re-sampling at the three previously sampled deepwater locations where PCB concentrations were detected above 50 mg/kg within the top 3 feet of sediment (EB-10, EB-14, and CS-19) shown on Figure 5-1. These locations will comprise the three initial Investigation Units.

The table below presents the previous PCB concentration data and associated sample depths:

Previous Sediment Sample Locations and Dates Sampled	Sample Depth Interval (feet)	PCB Concentration (mg/kg)
EB-10 (May 2001)	0-0.5	2.1
	1-2	**97**
	2.3-4	ND
	4-6	ND
EB-14 (May 2001)	0-0.5	ND
	1-2	**260**
	2-4	2.4
	4.5-6.5	ND
	7.5-8.5	ND
	8.5-10.5	0.94
	11-12.5	ND
CS-19 (October 1999)	0-0	ND
	0.5-2	ND
	2-2.7	**380**
	2.7-3.2	**140**

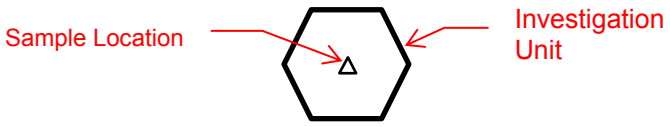
Each of the three sample locations (VC-101 thru VC-103) corresponding to the former EB-10, EB-14, and CS-19 locations will be used to construct an Investigation Unit. Investigation Units are shown and discussed in Section 3.1.4.

In an effort to confirm historic sampling results and evaluate the area proximate to each location, sediment samples will be collected at all depth intervals up to 8 feet (consistent with section 3.1.1). This task will allow comparison of the newly collected data to both the historic data and additional data collected in Task 2. Sediment sampling depths and sediment thickness inconsistencies are anticipated between the historic sample locations and newly proposed confirmatory sampling locations due to sediment deposition since the 1999 and 2001 sampling. This sampling task will provide a more accurate representation of current conditions that will be considered during remedy selection and design.

3.1.4 Task 2: Investigation Unit Sampling

This investigation task will be conducted to further evaluate the potential presence of PCB exceedances as described previously.

The figure below shows how an investigation unit and the corresponding sampling location within that investigation unit are associated. The Investigation Unit size and locations are based on a triangular spacing of approximately 160 feet, each representing approximately 0.5 acres, starting from the former EB-10 Investigation Unit and extending north toward the EB-14 Investigation Unit. A total of 5 locations (VC-104 through VC-108) were identified for consideration and will be located at the center of each additional Investigation Unit (Figure 5-1).



Evaluation of Investigation Unit Data

Results for each new location (VC-104 through VC-108) will be used to characterize each Investigation Unit and to determine whether additional sampling for that Investigation Unit is required beyond locations identified in Task 3 below.

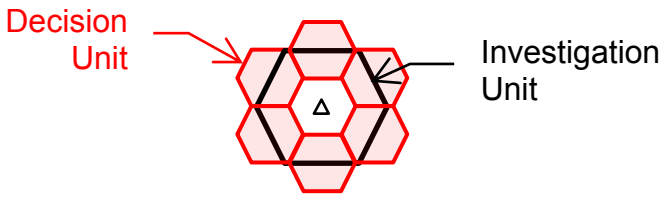
- If Investigation Unit location data indicates all samples are significantly < 50 mg/kg then no further investigation is required (i.e. perimeter decision unit samples are not required).
- If the data does not indicate that all samples are significantly < 50 mg/kg, then additional investigation requirements will be based on consultation with the NYSDEC and will consider:
    - Depth and thickness of PCB exceedances
    - Variability of concentrations
    - Type of environment (erosion or deposition)
    - Concentration levels and thickness of sediments above the PCB exceedances
- Locations that require additional investigation will proceed to Task 3 and will be added to the sampling locations identified in Task 3 below.

3.1.5 Task 3: Decision Unit Sampling

Decision Units are defined by sampling locations placed on an 80-foot triangulation grid. Each decision unit will be representative of approximately 0.13 acres. Decision Units that will be sampled include:

- Locations around the perimeter of EB-10, EB-14 and CS-19 (VC-109 thru VC-126)
- Locations VC-127 thru VC-132
- Supplemental locations determined to require additional investigation from Task 2
- Supplemental locations determined to require additional investigation from Task 3 (step-outs from existing 80-foot grid locations)

The step-out sampling depth intervals and locations will consider Task 1, Task 2 and any previously completed Task 3 sampling results as described previously. The diagram below illustrates Decision Units placed around an Investigation Unit that requires additional investigation. The Sampling location would be at the center of each Decision Unit.



During step-out sampling, Decision Unit samples may be collected and analyzed incrementally.

Evaluation of Decision Unit Data

Results of each decision unit will be evaluated to determine if additional investigation is required.

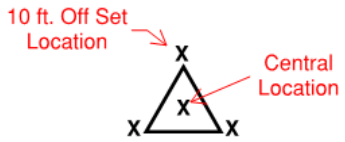
- If Decision Unit location data indicates all samples are significantly < 50 mg/kg then no further investigation is required (i.e. step-out decision unit samples are not required).
- If the data does not indicate that all samples are significantly < 50 mg/kg, then data will be reviewed with the NYSDEC and additional locations may be selected for investigation (additional step-out locations).

An evaluation of the collected data will be performed during the remedial design in order to determine the appropriate remedial action and define any dredging that may be required. The following factors, as specified in the ROD, would be considered during remedial design in determining the appropriate remedial action:

- Depth of PCB exceedances
- Type of environment (erosion or deposition)
- Thickness of clean sediment above the PCB exceedances
- Duration of dredging and associated potential for migration of re-suspended sediments
- Area weighted surface concentrations of PCBs

3.1.6 Task 4: Variability of Sediment Concentrations

Variability sampling will be completed at VC-101, VC-102 and VC-103 to help assess the contaminant mass distribution. These locations target areas of known contamination at different depths including VC-103 in close proximity to EB-15 which was less than 1 ppm at all sampled intervals. The sampling procedure includes conducting three additional sediment cores offset approximately 10 feet from the point being evaluated (see diagram below). Samples would be collected and analyzed for intervals between 0.5 feet and 4 feet with samples up to 8 feet retained for analysis if required. Variability sampling will be conducted during the first sampling round. Results of each cluster of samples will be evaluated and then recorded for use during remedial design.



The variability of the data collected during the initial sampling will be considered to determine if supplemental information could be relevant to determining the appropriate remedial action. Additional samples may be proposed to assess the variability of the sediment concentrations to better understand if the concentrations are uniform or if exceedances are sporadic. For example, the presence of a contiguous area of high contamination could be considered differently than an area with highly variable concentrations with an average concentration much lower than the maximum detection.

3.2 Laboratory Testing

Lab requirements and QA/QC sample frequency are specified in the Quality Assurance Project Plan (QAPP). Sample analysis methods are also specified in the QAPP (e.g. US EPA Method 8082A for PCB Aroclors).

The following table provides a summary of the proposed deepwater sediment sample analyses:

PDI Activity	No. of Samples	Medium/Matrix	Sampling Depths (feet)	Analytical Parameter
Investigation Unit Re-sampling (Task 1)	7 samples per core	Sediment	0-0.5 (ponar) 0.5-1 1–2 2-3 3-4 4-6 6-8	PCBs
Investigation Unit Sampling (Task 2)	7 samples per core	Sediment	0-0.5 (ponar) 0.5-1 1–2 2-3 3-4 4-6 6-8	PCBs
Decision Unit Sampling (Task 3)	7 samples per core	Sediment	0-0.5 (ponar) 0.5-1 1–2 2-3 3-4 4-6 6-8	PCBs
Sediment Variability (Task 4)	6 samples per core 3 additional cores per location	Sediment	0.5-1 1–2 2-3 3-4 4-6 6-8	PCBs

3.3 Relevant Field Operating Procedures

Field investigations will be performed in general accordance with the following Operating Procedures (OPs). Refer to Appendix A.

OP2000 - Monitoring Field Explorations
OP2001 - Identification and Description of Soils Using Visual-Manual Methods
OP3001- Preservation and Shipment of Environmental Samples
OP3004 - Sediment Sampling
OP3026 - Chain of Custody
OP3029 – Field Data Recording
OP3030 - Field Instruments: Use and Calibration

3.4 Vibracoring

Vibracoring sampling techniques will be used to collect sediment core samples at each of the proposed Deepwater Investigation sampling locations (except for the surface ponar grabs). Vibracoring is the process of collecting samples within core liners that provide a continuous, minimally disturbed sediment core sample from unconsolidated sediments.

Various sediment coring techniques were evaluated for use during the proposed Deepwater Investigation. Vibracoring was chosen due to several factors including; sediment properties, prior successful use in the proposed investigation areas, minimal sediment compaction throughout length of core, minimal sediment disturbance throughout length of core, and greater recovery potential of sediment sample. Where allowable according to sediment properties and density, sediment coring may be conducted without introduction of vibrations, to further decrease the potential for disturbance of near surface sediment. Due to potential disturbance of the 0-0.5 foot interval ponar grabs will be collected for this interval.

While some debris may be encountered, requiring adjustment of sample locations, the extent and type of debris in the investigation area is not expected to interfere with sample collection. The depth of the silt and sediment has been previously documented and therefore reducing the potential for issues related to a false indication of “refusal” resulting from debris.

The sediment-related exploration and sampling program discussed herein will be conducted by the coring subcontractor along with a Haley & Aldrich representative on board a sampling vessel, outfitted with sediment sampling equipment for acquisition of data in shallow and deepwater environments, along with typical oceanographic and marine navigation equipment.

The coring subcontractor will maintain at least a two-person crew during the sampling survey to navigate the vessel, perform the sediment coring, and collect sediment samples. A Haley & Aldrich representative will be on board during the program to document field observations and to assist with the sediment sampling. Sediment coring will be collected from the sampling vessel at locations shown on Figure 5-1.

4. QUALITY ASSURANCE

Appendix A of the RDWP provides a Quality Assurance Project Plan (QAPP).

5. SUBMITTALS

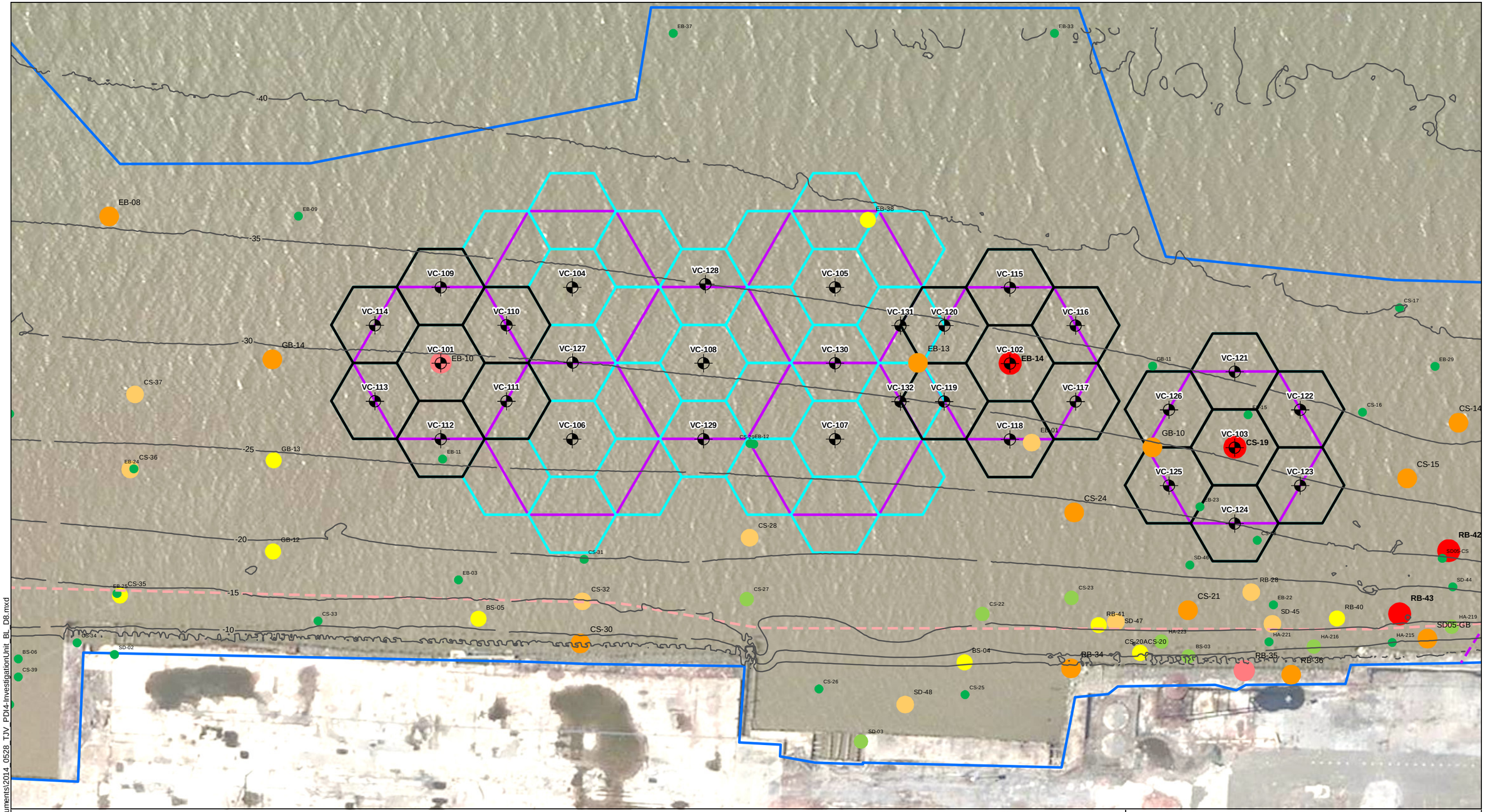
Applicable data will be included in the PDI Data Summary Report.

6. HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the site or involved in field activities are described in the Site-specific Health Safety Security and Environmental Plan (HSSEP), these documents will be available for use on Site prior to the commencement of work.

7. ATTACHMENTS

Figure 5-1 –Deepwater Investigation Locations



BATHYMETRIC CONTOUR
SILT CURTAIN
NORTHWEST EXTENSION
OU-2 BOUNDARY
INVESTIGATION UNIT

POTENTIAL DECISION UNIT (AS REQUIRED BASED ON TASK 2 RESULTS)
DECISION UNIT (BASED ON TASK 1 LOCATIONS)
SAMPLE LOCATION

0-1 mg/kg
1 - 2 mg/kg
2 - 5 mg/kg
5 - 10 mg/kg
10 - 50 mg/kg
50 - 100 mg/kg
>100 mg/kg

NOTES:
1) AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) BATHYMETRY COURTESY OSI, INC., 2013.

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SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

DEEPWATER INVESTIGATION LOCATIONS

SCALE: AS SHOWN
MAY 2014

FIGURE 5-1

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APPENDIX 6

OFFSHORE PRE-DELINEATION PLAN

1. INTRODUCTION

This plan describes pre-delineation for remedial dredging. This investigation is part of the overall pre-design investigation (PDI) that will be completed at the Former Anaconda Wire & Cable Company site (Site), NYSDEC Site # 3-60-022, located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York.

2. BACKGROUND

The Record of Decision (NYSDEC, 2012) for Operable Unit No. 2 (OU-2) calls for removing sediment containing greater than 1 ppm PCB and metals exceeding background from the nearshore and backwater areas, where the potential for public health and environmental exposures are most likely. For the deepwater areas where dredging activities cannot be fully contained, the ROD indicates that the selected remedy removes PCBs in targeted areas at a higher threshold. Specifically, the ROD states:

Removal of sediment and fill that contains PCB concentrations greater than 1 ppm and/or copper, zinc and lead concentrations above the background concentrations listed in Table 2 of Exhibit A, to a maximum excavation depth of 6 feet within the area where sediment resuspension controls, such as a fixed silt curtain, are feasible. This area generally corresponds to a water depth of 15 feet and a distance from the shoreline into the river of approximately 60 to 80 feet and along approximately 2000 feet of shoreline.

Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging.

3. SCOPE OF WORK

The purpose of this investigation is to examine the various offshore areas where PCBs or metals in excess of project-specific criteria (criteria) are known or suspected to be present, in order to gather supplementary data for making decisions regarding remedial action.

This investigation will include delineation activities in three areas shown in Figures 6-1 and 6-2, and described below. The purpose of the delineation work is to further define vertical and lateral remediation boundaries within the targeted OU-2 offshore sediment delineation areas, based on sediment concentrations above PCB and metals criteria.

- **Nearshore Areas**
  The nearshore portion of the Offshore Pre-Delineation program (Figure 6-1) will consist of delineating sediment present in excess of criteria in the areas along the site shoreline defined by the expected silt curtain alignment on the west and the OU-1/OU-2 Boundary on the east (i.e., river area where mudline is shallower than El. -15).

- **Backwater Areas**
  The backwater portion of the Offshore Pre-Delineation program (Figure 6-1) will consist of delineating the sediment present in excess of criteria in the backwater areas of the site located within the nearshore portion of OU-2 boundary, at the area of slower river velocities and increased deposition; namely, the Old Marina, North Boat Slip, and South Boat Slip areas.

- **Deepwater Areas (adjacent to the Northwest Offshore Area)**
  The deepwater portion of the Offshore Pre-Delineation program (Figure 6-2) will consist of delineating the sediment with PCBs in excess of 50 ppm in a localized offshore area west of the bulkhead extension where dredging has been specified by the ROD. Sampling in other deepwater areas (see RDWP Appendix 5) is similar but has a focus on investigation of data gaps rather than refining dredging limits specified by the ROD.

3.1 Sampling Program Design

Existing data collected and evaluated from the nearshore, backwater, and deepwater delineation areas of the OU-2 site have been limited in scope, with varying depth intervals sampled and inconsistencies identified in spatial distribution of sampling locations. The existing data was sufficient for completion of the feasibility study but the following supplemental data is necessary for further delineation of areas for potential remedial action. A gridded sampling program was developed, with consistent sampling intervals and spacing, to be conducted across much of the nearshore and portions of the backwater areas to address these data gaps and to better delineate the presence and concentration of sediment exceeding criteria. A step-out sampling approach was developed in other appropriate areas of OU-2 including portions of the deepwater and backwater.

The OU-2 delineation data set obtained from this sampling program will be evaluated and incorporated, along with existing data, into the design of the dredging program.

Sediment samples will be collected and submitted for analysis for PCBs and metals (copper, lead and zinc) according to the requirements and procedures described in this plan and the pertinent operating procedures (OPs).

This program selected vibracore technology to collect sediment cores for sampling based on successful historical sampling programs at the site, among other reasons (see Section 3.5). Vibracore along with ponar grabs for surface samples will be collected from barge or boat-mounted equipment. The vibracore diameter is anticipated to be 4 inches but may be changed in the field based on sediment conditions and recovery. Up to approximately 8 feet of sediment will be sampled at each of the proposed locations to be consistent with the maximum depth of dredge as specified in the ROD and to document sediment concentrations that will be left in place. Re-sampling will be completed for deepwater locations to confirm depth and concentration data and provide reference for step-out sampling. Additional re-sampling may also be conducted at other previously sampled locations to confirm existing data where elevated PCB and metals concentrations were detected. It should be noted that additional sampling may be required to fully document the sediment concentrations remaining after remedial action.

Sample locations will be documented using a survey grade differential GPS with a sub-meter accuracy along with a depth sounder as necessary.

3.1.1 Vertical Distribution of Samples

The following approach will be used to establish vertical sample intervals to delineate PCB and metal concentrations in targeted sediment deposits:

Below is a list of depth intervals and rationale for sampling:

- 0-0.5 foot:
  - Consistent with previous sampling programs as the surface sediment sampling interval
  - Represents the zone with highest bioactivity
  - Collected using petit ponar sampler or equivalent
  - Represents the most recently deposited sediments
- 0.5-1 foot:
  - Supplement the surface sampling interval to maintain continuous sampling
- One foot sampling intervals from 1 to 6 feet:
  - Define vertical thickness of impacted sediment,
  - Provide appropriate dredge limits and to prevent unnecessary over-dredging
  - Document sediment concentrations that will be left in place after remedial action
- Two foot sampling interval(s) from 6 to 8 or 10 feet:
  - Document sediment concentrations that will be left in place after remedial action

Note that if the preceding shallower interval is less than the criteria then the deeper interval(s) (>4 foot) would not be analyzed. Concentration levels associated with the deepest analyzed interval will be discussed with the DEC prior to discarding archived deeper samples to determine whether further analysis is warranted.

3.1.2 Spatial Distribution of Samples

Sampling locations were selected based on the following spatial (horizontal) distributions and considered the presence of existing data. The sampling program employs a sampling grid in order to fill data gaps or address uneven distribution of existing data. Grid spacing is approximately 80 feet and will provide a consistent basis for understanding the distribution of contaminants in the sediment to refine dredge extents and provide a basis for remedial design. Additionally, step-out sampling will be implemented where required to adequately delineate locations where spatial extents are not fully bounded.

It is anticipated that the dredging program will be defined by grid areas to a corresponding depth interval unless additional data is available to refine dredge extents.

3.1.3 Nearshore Areas

The nearshore portion of this delineation program will be conducted to further assess and delineate sediment exhibiting concentrations in excess of criteria within the top 6 feet of sediment column in OU-2. This area is generally within approximately 15 feet of water depth, corresponding to approximately 60 to 80 feet west of the OU-1 shoreline boundary. Refer to Figure 6-1 for proposed nearshore sampling locations.

A grid based sampling program (as discussed above) will be utilized to provide a current and consistent data set over the nearshore area. Sampling and analysis for PCBs and metals

(copper, lead, zinc) will be conducted in sediments up to 8 feet deep in the sediment column. Up to eight samples (dependent upon core recovery) will be collected from each sediment core.

Since this is a grid based sampling program, step-out sampling is not part of this task. Results will be evaluated to determine if additional action is required (e.g. higher density sampling) and then recorded for use during remedial design.

3.1.4 Backwater Areas

Similar to the nearshore delineation program, the backwater portion of the delineation program will be conducted to further delineate sediment exhibiting criteria exceedances in OU-2. Refer to Figure 6-1 for proposed backwater sampling locations.

The Backwater Area is divided into the three following delineation areas; Old Marina Area located at the northern limit of the site, North Boat Slip Area located in the central portion of the offshore site, and the South Boat Slip Area located at the southern end of the site. Refer to

- **North Boat Slip Area**
  A grid based sampling program (as discussed above) will be utilized where existing data gaps have been identified in this area. Sampling and analysis for PCBs and metals (copper, lead, zinc) will be conducted in sediments up to 10 feet deep in the sediment column. Up to nine samples (dependent on core recovery) will be collected from each sediment core advanced at the North Boat Slip sampling locations, representative of the target depth intervals.

- **South Boat Slip Area**
  A step-out sampling program will be used to sample four locations around the previously sampled CS-38 location which identified a significant lead exceedance within the 0-2 foot interval. This location will be resampled and 4 surrounding sample will be place at a 20 foot offset. Sampling and analysis for lead will be conducted in sediments up to 8 feet deep in the sediment column. Eight lead samples will be collected from each sediment core advanced at the South Boat Slip sampling locations, representative of the target depth intervals. Additional step-out locations will be added if exceedances of criteria are identified in the initial samples.

- **Old Marina Area**
  A grid based sampling program (as discussed above) will be utilized where existing data gaps have been identified in this area. Sampling and analysis for PCBs and metals (copper, lead, zinc) will be conducted in sediments up to 10 feet deep in the sediment column. Eleven Old Marina delineation sampling locations were chosen based on; existing sampling locations and data; the potential source of criteria exceedance located in the southeastern portion of the Old Marina area near a potential building 52 outfall and where data gaps have been identified within this backwater area.

  The delineation sampling will be focused in the southeastern portion of the Old Marina area adjacent to the existing RB-37 sampling location where PCBs were detected at 22 mg/kg (0.0-0.5 foot depth below sediment surface), and where data gaps are present. The proposed grid will be extended north if additional delineation is required with supplementary locations added based on the results of the previous sampling.

Additional sampling is not currently proposed at the western portion of the Old Marina since existing data is sufficient for delineation, and the area is bound to the south by the shoreline.

Sampling locations may be adjusted in the field according to access due to the numerous existing wooden piles and the shallow water depths currently present in the Old Marina backwater area.

As in Section 3.1.3; results will be evaluated to determine if additional action is required (e.g. higher density sampling) and then recorded for use during remedial design.

3.1.5 Deepwater Areas (adjacent to the Northwest Offshore Area)

The deepwater portion of the offshore delineation program will consist of further assessing and delineating the presence of sediments that exceed the PCB criteria. Evaluation of sampling results will be consistent with areas addressed as part of the Deepwater Investigation Plan (Appendix 5). Previous samples indicated PCB exceedances of criteria are within the top 3 or 6 feet of the sediment column, but there is insufficient data to evaluate whether they are isolated. Re-sampling will be completed for these locations to confirm depth and concentration data, to provide reference for additional sampling and to provide a more accurate representation of current conditions. Sediment sampling depths and sediment thickness inconsistencies are anticipated between the historic sample locations and proposed confirmatory sampling locations due to sediment deposition since the previous sampling. Proposed new sample locations were established on a step-out system where three to four locations will be sampled within approximately 25 feet of the original impacted sampling locations. This additional sampling will provide data to assess whether additional investigation is required and support determination of deepwater dredge limits during design. Refer to Figure 6-2 for proposed deepwater delineation sampling locations.

The Deepwater delineation area is located offshore immediately west and southwest of the Northwest Off-shore area portion of OU-2 up to approximately 225 feet from the shoreline, as shown in the ROD, and can be further divided into the two following areas:

- **Shallow Contamination Area (up to 2 feet)** – Where dredging up to 2 feet, areas will initially evaluate a 3 foot depth and further delineated for PCB concentrations greater than 50 mg/kg.

- **Deep Contamination Area (up to 6 feet)** – Where dredging up to 6 feet, areas will evaluate a 8 foot depth and further delineated for PCB concentrations greater than 50 mg/kg.

Approximately eight (8) samples will be collected from each sediment core advanced at the deep water locations, representative of the target depth intervals. Within the Shallow Contamination Area, samples collected to 3 foot depths will be analyzed with remaining samples analyzed if the preceding shallower interval is greater than the criteria. Within the Deep Contamination Area, all sample depths will be analyzed. Note that concentration levels associated with the deepest analyzed interval will be discussed with the DEC prior to discarding archived deeper samples to determine whether further analysis is warranted.

If required, additional step-out sampling locations will be based on consideration of the previous sample results in consultation with the NYSDEC.

Sampling Goals for Each Existing Location

Each location is discussed below to establish the special conditions considered for constructing step-out sampling locations. Values below are mg/kg (ppm) for PCBs. (See Figure 6-2)

Existing Shallow PCB Criteria Exceedance Sample Locations:

- RB-43: Proposed step-out north, south and west. East bounded by silt curtain.

Location	0-0.5 ft	0.5-2 ft	2-4 ft	4-6 ft	6-8 ft
RB-43	1.41	490	5.2	--	ND

- RB-12: Proposed step-out north, south and west. East bounded by Northwest Extension Bulkhead. Surface grabs in the vicinity include RB-22 (17 mg/kg).

Location	0-2	2-4 ft	4-6 ft	6-8 ft
RB-12	69	2.2	ND	--

- SD-53, RB-11 and SD-52: Potential contiguous area with step-outs surrounding these points. The existing location CS-11 provides sufficient data for the step-out in the direction of this sample. East bounded by Northwest Extension Bulkhead and associated sampling. Surface grabs in the vicinity include RB-23 (0.7 mg/kg) and BS-02 (1.0 mg/kg).

Location	0-2	2-4 ft	4-6 ft	6-8 ft
SD-53	1960	24.7	9.5	4.5
RB-11	5200	--	--	170
SD-52	153	31.1	290	34.3

Step-out	0-0.5 ft	0.5-2 ft	2-3.8 ft	3.8-4.3 ft	4.3-8 ft
CS-11	ND	ND	ND	ND	--

- RB-14 and CS-12: Potential contiguous area with step-outs surrounding these points. The existing location SD02-CS provides sufficient data for the step-out in the direction of this sample. Surface grabs in the vicinity include SD02-CS (1.0 mg/kg) as shown below.

Location	0-0.5 ft	0.5-3 ft	3-6 ft	6-8 ft
RB-14	120	0.058	ND	0.085

	0-0.5 ft	0.5-2.4 ft	2.4-2.9 ft	3-6 ft	6-8 ft
CS-12	170	ND	ND	--	--

Step-out	0-0.5 ft	0.5-8 ft
SD02-CS	0.99	--

Existing Deep PCB Criteria Exceedance Sample Locations:

- RB-42 and RB-21: Step-out locations to evaluation/delineation and/or to confirm concentration levels and thickness of sediments above the PCB exceedances. Surface grabs in the vicinity include SD05-CS (0.4 mg/kg) and SD02-GB (0.4 mg/kg) respectively.

Location	0-0.5 ft	0.5-2 ft	2-3 ft	4 ft	6-8 ft
RB-42	0.417	0.235	7.9	420	0.074
	0-0.5 ft	0.5-2 ft	2-3 ft	4-5ft	5-6 ft
RB-21	13	30	15	1400	6.9

Evaluation of Data

Results from each interval for each location will be used to characterize each location and will be used to determine if additional investigation for that location is required.

- If perimeter step-out data indicates all samples are $<$ 50 mg/kg then no further investigation is required (i.e. additional step-out samples are not required).
- Additional investigation requirements will be based on consultation with the NYSDEC and will consider:
    - Depth and thickness of PCB exceedances
    - Variability of concentrations
    - Type of environment (erosion or deposition)
    - Concentration levels and thickness of sediments above the PCB exceedances

3.2 Tidal Schedule

Sampling scheduling and sequencing of sampling efforts will be affected by and adjusted to tidal ranges present in the Hudson River due to shallow water depths present in several of the nearshore and backwater sampling locations.

3.3 Laboratory Testing

Lab requirements and QA/QC sample frequency are specified in the Quality Assurance Project Plan (QAPP). Sample analysis methods are also specified in the QAPP (e.g. US EPA Method 8082A for PCB Aroclors; US EPA Method 6010C for metals).

The following table provides a summary of the proposed deepwater sediment sample analyses:

PDI Activity	No. of Samples	Medium/Matrix	Sampling Depths (ft.)	Analytical Parameter
Nearshore	22 sampling locations 8 samples per location	Sediment	0-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-8	PCBs, Metals (Cu, Pb, Zn)
Backwater	**Old Marina**: 11 sampling locations 8 samples per location	Sediment	0-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-8 (8-10 in South Slip & Old Marina)	PCBs, Metals (Cu, Pb, Zn) (*South Slip, Pb only)
	North Slip: 3 sampling locations 8 samples per location			
	South Slip: 5 sampling locations 8 samples per location			
Deepwater	**2 foot**: 25 sampling locations 8 samples per location	Sediment	0-0.5, 0.5-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-8	PCBs
	6 foot: 8 sampling location 8 samples per location			

3.4 Relevant Field Operating Procedures

Field investigations will be performed in general accordance with the following Operating Procedures (OPs). Refer to Appendix A.

OP2000 - Monitoring Field Explorations
OP2001 - Identification and Description of Soils Using Visual-Manual Methods
OP3001- Preservation and Shipment of Environmental Samples
OP3004 - Sediment Sampling
OP3026 - Chain of Custody
OP3029 – Field Data Recording
OP3030 - Field Instruments: Use and Calibration

3.5 Vibracoring

Vibracoring sampling techniques will be used to collect sediment core samples at each of the proposed Offshore Pre-Delineation sampling locations (except for the surface ponar grabs). Vibracoring is the process of collecting samples within core liners that provide a continuous, minimally disturbed sediment core sample from unconsolidated sediments.

Various sediment coring techniques were evaluated for use during the proposed Offshore Pre-Delineation. Vibracoring was chosen due to several factors including: sediment properties, prior successful use in the proposed delineation areas, minimal sediment compaction throughout length of core, minimal sediment disturbance throughout length of core, and greater recovery potential of sediment sample. Where allowable according to sediment properties and density, sediment coring may be conducted without introduction of vibrations, to further decrease the potential for disturbance of near

surface sediment (0-0.5 foot). Due to potential disturbance of the 0-0.5 foot interval ponar grabs will be collected for this interval in deepwater areas with shallow contamination.

While some debris may be encountered, requiring adjustment of sample locations, the extent and type of debris in the delineation area is not expected to interfere with sample collection. The depth of the silt and sediment has been previously documented and therefore reduces the potential for issues related to a false indication of "refusal" resulting from debris.

The sediment-related exploration and sampling program discussed herein will be conducted by the coring subcontractor along with a Haley & Aldrich representative on board a sampling vessel, outfitted with sediment sampling equipment for acquisition of data in shallow and deepwater environments, along with typical oceanographic and marine navigation equipment.

The coring subcontractor will maintain at least a two-person crew during the sampling survey to navigate the vessel, perform the sediment coring, and collect sediment samples. A Haley & Aldrich representative will be on board during the program to document field observations and to assist with the sediment sampling. Sediment coring will be collected from the sampling vessel at locations shown on Figures 6-1 and 6-2.

4. QUALITY ASSURANCE

Appendix A of the RDWP provides a Quality Assurance Project Plan (QAPP).

5. SUBMITTALS

Applicable data will be included in the PDI Data Summary Report.

6. HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the site or involved in field activities are described in the Site-specific Health Safety Security and Environmental Plan (HSSEP), these documents will be available for use on Site prior to the commencement of work.

7. ATTACHMENTS

Figure 6-1 – Nearshore and Backwater Pre-Delineation Sampling Locations
Figure 6-2 – Offshore Pre-Delineation Sampling Locations

INDICATES PROPOSED PCB AND METALS DELINEATION SAMPLING LOCATION.

INDICATES PROPOSED LEAD DELINEATION SAMPLING LOCATION.

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

0-1 mg/kg

1 - 2 mg/kg

2 - 5 mg/kg

5 - 10 mg/kg

10 - 50 mg/kg

50 - 100 mg/kg

>100 mg/kg

OU-2 BOUNDARY

BACKWATER PCB DREDGE AREA (UP TO 6 FT)

NOTES:
1) AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

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SCALE IN FEET

HALEY & ALDRICH

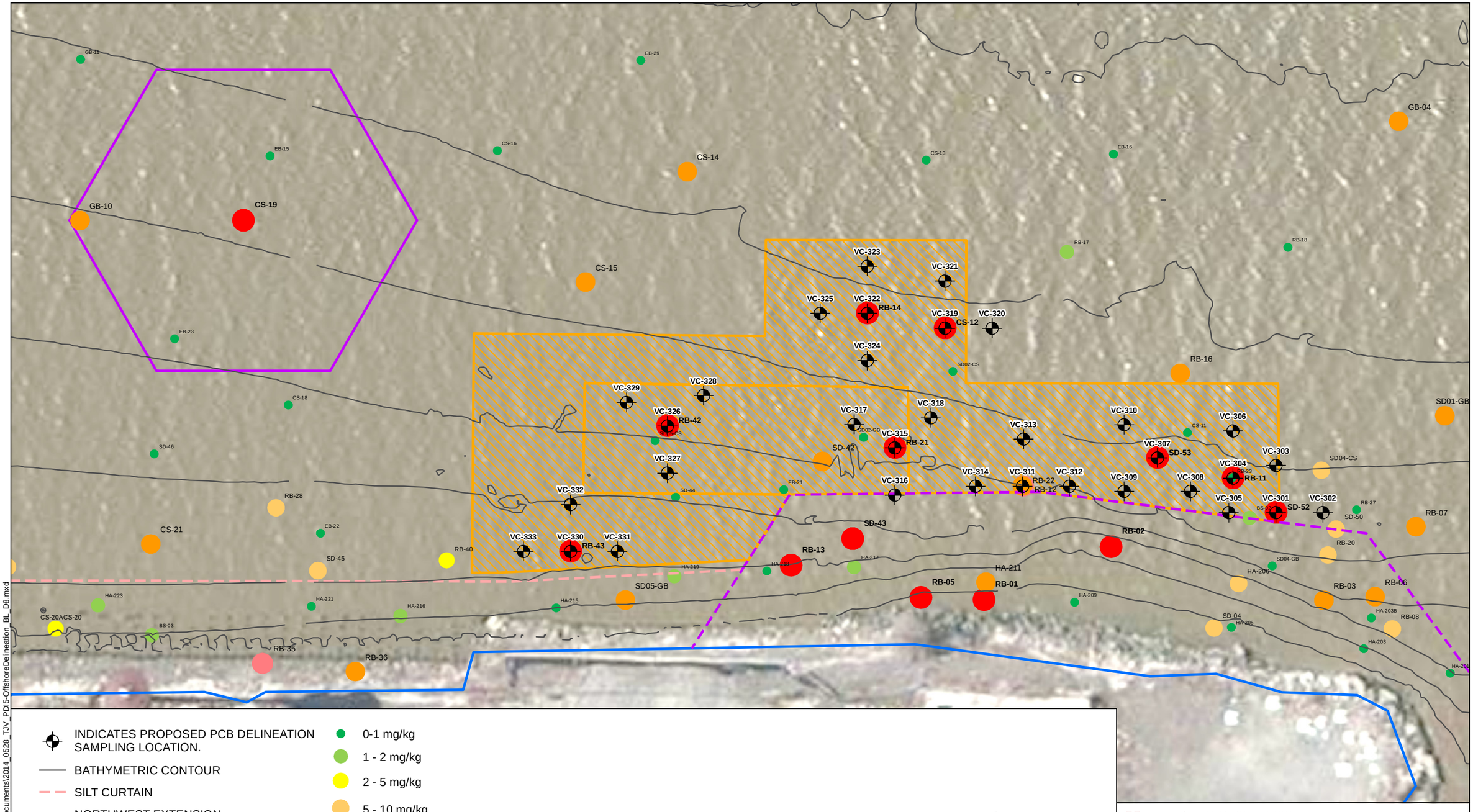
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE AND BACKWATER PRE-DELINEATION SAMPLING LOCATIONS

SCALE: AS SHOWN
MAY 2014

FIGURE 6-1

G:\Projects\28612\Global\GIS\Map Documents\2014_0528_TJV_PDI5-NearshoreDelineation_BL_D7.mxd



INDICATES PROPOSED PCB DELINEATION SAMPLING LOCATION.

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

INVESTIGATION UNIT

OU-2 BOUNDARY

DEEPWATER DREDGE AREA (UP TO 6 FT)

0-1 mg/kg

1 - 2 mg/kg

2 - 5 mg/kg

5 - 10 mg/kg

10 - 50 mg/kg

50 - 100 mg/kg

>100 mg/kg

NOTES:
1) AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) BATHYMETRY COURTESY OSI, INC., 2013.

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SCALE IN FEET

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OFFSHORE PRE-DELINEATION SAMPLING LOCATIONS

SCALE: AS SHOWN
MAY 2014

FIGURE 6-2

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APPENDIX F

BASELINE SAMPLING AND ANALYSIS PLAN
(SCOPE OF PROGRAM)

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MEMORANDUM

23 August 2013
File No. 28612-290

TO: Atlantic Richfield Company
Paul G. Johnson, P.G.

C: Haley & Aldrich of New York
Wayne C. Hardison, P.E.

FROM: Haley & Aldrich of New York
Dr. Stephen R. Clough, Ryan J. Scott, P.E.

SUBJECT: OU-2 Baseline Sampling and Analysis Plan

1. INTRODUCTION

The OU-2 Baseline Sampling and Analysis Plan (BSAP) details preconstruction monitoring activities at the Former Anaconda Wire & Cable Company site (Site), NYSDEC Site # 3-60-022, located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York (Figure 1). This Plan has been prepared on behalf of Atlantic Richfield (AR).

The overarching goal of the OU-2 Baseline Sampling and Analysis Plan is to provide a benchmark against which post-construction performance monitoring can be compared in order to assess the performance and effectiveness of the remedy.

This Baseline and Sampling Analysis Plan is focused on benchmarking off-shore elements of the remedy. A separate OU-1 BSAP will be developed to address benchmarking on-shore elements of the remedy and will consider groundwater monitoring, air monitoring and other applicable media.

Atlantic Richfield intends to involve the Department in evaluating sample locations, determining sufficiency of data collection and in considering alternative sampling techniques throughout the sampling program.

2. BACKGROUND

This Baseline Sampling and Analysis Plan has been prepared in accordance with DER-10, applicable USEPA guidance and the Record of Decision (NYSDEC, 2012) for Operable Unit No. 2 (OU-2) which states that a Site Management Plan is required and shall include:

> *"…a monitoring plan to assess the performance and effectiveness of the remedy. The plan will be designed to measure PCB and metals concentrations and evaluate the long-term contaminant trends in the affected media (biota, sediment, water). One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota. This program will monitor the performance and effectiveness of the remedy in achieving the remedial goals established for the project and will be a component of the monitoring and maintenance of the site. The plan includes, but may not be limited to:*
>
> *i. baseline sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and habitat characterization;*
>
> *ii. long-term sampling of biota; surficial sediment sampling; biota sampling in the vicinity of the site and at reference locations; porewater and surface water sampling in the vicinity of the site and at reference locations; shoreline and nearshore bathymetry; and restoration success to assess the performance and effectiveness of the remedy; and*
>
> *iii. a schedule of monitoring and frequency of submittals to the Department."*

The data and information collected during implementation of the BSAP will serve as the initial point of reference (or benchmark) for data and information obtained during the post-construction long-term monitoring. Therefore, the BSAP is designed to reflect the anticipated requirements of the post-construction long-term monitoring plan and thus allow the assessment of the performance and effectiveness of the remedy.

In March 2012, the NYSDEC issued a Record of Decision (ROD) that calls for removing sediment containing greater than 1 ppm (mg/kg) PCBs and metals exceeding background from the nearshore and backwater areas where the potential for public health and environmental exposures are most likely. The ROD indicates that in deepwater areas, where dredging activities cannot be fully contained, the selected remedy removes PCBs in targeted areas at a higher threshold. The ROD stipulates an evaluation of the long-term trends of PCBs and metals in all affected media which requires determination of baseline conditions to establish an empirical benchmark for the evaluation of spatial or temporal trends. In accordance with the DER-10 Technical Guidance (NYSDEC, 2010), baseline monitoring of the site and reference locations must be completed prior to the start of all construction activities.

Data presented in the 2000 RI may be perceived as describing a 'baseline' because the RI, in addition to the Supplemental Feasibility Report (Parsons, 2006), sampled surface water, sediment and biota (the latter targeting striped bass, American eel, Atlantic silversides and blue crab). That data, however, are more than a decade old and, since much of the impacted area within OU-2 is demarcated as a depositional area, concentrations of PCBs and metals near the surface have likely changed due to annual accretion of sediment. For example, in a study by Llansó and Southerland (2006) levels of both PCBs and metals in surface sediments obtained within the depositional area were markedly below levels

observed in the 2000 RI. In addition, various IRMs in OU-1 may have affected near-shore conditions. Thus it is necessary to update these reports to document the current 'baseline' conditions prior to construction.

More detailed historical information on the 2000 RI, the Supplemental Feasibility Study, and the Revised Feasibility Study for OU2 (e.g. site description and setting, land use, geology, hydrology, nature and extent of contamination, human and environmental risk assessments, etc.) can be found in these key historical documents (Earth Tech, 2000; Parsons, 2006; Haley & Aldrich, 2009).

3. SCOPE OF WORK

The BSAP will collect information for bathymetry and four (4) different types of media: surface water, biota (including habitat characterization), surface sediment and porewater. The various parameters measured for these media are not mutually exclusive so the sampling design may include tasks that overlap (e.g. sampling of bulk sediment locations will also include separate sampling for benthic macroinvertebrates). The schedule for the major tasks within this scope of work considers availability of open water vendors as well as optimal sampling times (e.g. yield of fish and shellfish is markedly improved with warmer river water temperatures in the fall). The daily sampling sequence is arranged, whenever possible, to reduce the potential for cross-contamination between sample locations. Data from the first year of the BSAP will be evaluated to determine if additional information should be collected to meet the Data Quality Objectives (DQOs). This workplan includes a limited evaluation of deeper water areas (>30 feet of water depths). The need for additional deeper water sampling will consider the results of the deeper water investigation (as described in the Remedial Design Work Plan). For example, additional sampling may be needed after the data from the Pre-Design Investigation (PDI) in deeper water is evaluated by the NYSDEC.

3.1 Sample Locations

Approximate sample locations are shown on the attached figures (Figure 2 – 6). The locations for each media to be sampled are grouped into three river sections: north of the site (reference locations), adjacent to the site and south of the site (downstream of the site based on predominant flow direction). Discrete sampling will occur at 20 locations (see table below) and will include five reference locations north of the site, eleven locations adjacent to the site, and four locations south of the site. The north locations should be sufficient to establish reference information and will be reviewed after the first year of sampling. Sample locations consider both the bathymetry survey results and vessel restrictions (e.g. water depth, obstructions) and will be confirmed or modified in the field following review of the SPI screening information as described hereafter.

Location Description:	**Surface Water** (Fig. 2)	**Fish & Shellfish** (Fig. 3)	**Surface Sediment** (Fig. 4)	**Macro-Invert.** (Fig. 4)	**SPI** (Fig. 5)	**Pore-water** (Fig. 6)	Approx. Water Depth (ft)
Number of Locations:	7	17	16	16	>200	7	--
North River Section (Reference):							
Ardsley-on-Hudson	SW-001	BT-01A	SS-001	Yes	Yes	PW-001	<15
Ardsley-on-Hudson (DW)		BT-01D			Yes		30-40
Beach area near Wickers Creek		BT-01B	SS-002	Yes	Yes		<15
Beach area near Wickers Creek (DW)		BT-01E			Yes		30-40
South of Dobbs Ferry	SW-002	BT-01C	SS-003	Yes	Yes	PW-002	5-15
Adjacent River Section (Site):							
Between Old Marina & MacEchron Park			SS-004	Yes	Yes		<15
Old Marina		BT-02A	SS-005	Yes	Yes	PW-003	<5
Near Extension Alignment	SW-007		SS-006	Yes	Yes	PW-004	30
Near Extension Alignment (DW)		BT-02F			Yes		40
Near Water Tower	SW-003	BT-02B	SS-007	Yes	Yes	PW-005	<15
North Boat Slip		BT-02C	SS-008	Yes	Yes		<5
West of North Boat Slip near EB-14 (DW)		BT-02G	SS-101	Yes	Yes		35
Between Boat Slips	SW-004	BT-02D	SS-009	Yes	Yes	PW-006	<15
Between Boat Slips near EB-10 (DW)		BT-02H	SS-102	Yes	Yes		30
South Boat Slip		BT-02E	SS-010	Yes	Yes		<5
Near Old Sluice Area	SW-005		SS-011	Yes	Yes	PW-007	<15
South River Section (Reference):							
500 ft South of Site (Near Dolphins)		BT-03A	SS-012	Yes	Yes		<15
1,300 ft South of Site		BT-03B	SS-013	Yes	Yes		<15
2,000 ft South of Site	SW-006	BT-03C	SS-014	Yes	Yes		<15
2,000 ft South of Site (DW)		BT-03D			Yes		30-40

(DW) = Deeper Water (>15 feet)

Sample locations will be documented using GPS with a horizontal accuracy of 1 meter or better and sample depths will use an echo sounder, or equivalent, with accuracy of 0.3 meters or better. GPS sample coordinates are automatically recorded by the open water vessel and the SPI device. Sample elevations can also be established using the Bathymetry work completed previously.

3.2 Bathymetry

The ROD requires the following plan element(s):

- shoreline and nearshore bathymetry

The identified data quality objective(s) (DQO):

- update the shoreline and nearshore bathymetry and provide additional resolution
- provide supplementary information to support selecting sampling locations for the remaining elements of this BSAP

Methodology overview:

- Single event
- Approx. 51 acres
- Bathymetry Survey (multibeam echosounder)
- Upland Survey along the Shoreline (laser scanner)
- Mudline Elevation Survey (dual frequency echosounder & CHIRP sub-bottom profiler)

This activity was completed in 2012 under a separate work plan (Attachment A) in order to make that information available for the planning of this BSAP among other purposes. Subsequent bathymetry surveys will not be performed during baseline sampling.

3.3 Surface Water

The ROD requires the following plan element(s):

- surface water sampling in the vicinity of the site and at reference locations

The pertinent Remedial Action Objective(s) (RAO):

- "prevent surface water contamination which may result in fish advisories"
- "restore surface water to ambient water quality criteria for the contaminant of concern"
- "prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain"

The identified data quality objective(s) (DQO):

- establish baseline PCB, dissolved metals (copper, lead, zinc), TSS concentrations and other potentially useful parameters in surface water at the site and reference locations for comparison to conditions during the dredging operation

- establish baseline PCB and dissolved metals (copper, lead, zinc) concentrations in surface water at the site and reference locations to assess post-construction remedy effectiveness

Methodology overview:

- Multi-event Monitoring (minimum of 1 year)
- 7 locations (2 north, 3 adjacent, 2 south)

- Record GPS location and water depth
- 1 composite sample collected per location (up to 3 grabs/composite; less for shallow depths)
- Conventional water quality parameters (D.O., pH, temperature, specific conductivity, turbidity)
- Total PCBs as Aroclors, PCB congener analysis of selected samples
- Dissolved metals (copper, lead and zinc)
- TSS, TOC, DOC

A healthy fish population (discussed in Section 3.4.1) is a reflection of the quality of the surface waters in which they live. The quality can be quantified by the measurement of physical and chemical water quality parameters. This data will be obtained through the analysis of chemical constituents (metals, PCBs) and routine monitoring of conventional water quality parameters.

3.3.1 Water Quality Parameters (Analytical and Conventional)

A solid phase extraction (SPE) method, similar to that used for the *Upper Hudson River PCBs Site*, will be used to extract total PCBs from individual surface water samples. Briefly, the analytes and respective site-specific detection limits will be established for this Site as follows (see QAPP for details):

- total PCBs as Aroclor (USEPA Method 3535/8082a) and PCB congeners (Method 3535/8082 modified for congeners) to 0.005 ug/L. This MDL was selected to be below historical site and background levels, which ranged from 0.018 to 0.062 ug/L, since the current laboratory feasible detection limit is greater than the surface water quality criteria of 0.000001 ug/L.
- dissolved copper (Cu), lead (Pb) and zinc (Zn) to less than 2 ug/L (USEPA Method 6010b) which is below NYSDEC surface water quality criteria of 5.6, 8.0 and 66 ug/L, respectively.

After the first round of sampling, the method detection limit will be reevaluated and sampling volumes may be adjusted as necessary. Congener analysis will be performed during the second sampling round once the laboratory is confident it can routinely meet the method detection limit given a known volume of surface water. The types of Aroclors and/or congener profiles will help identify patterns of PCBs that may be indicative of site-related contamination.

A total of seven (7) surface water samples will be collected at locations in the three river sections (2 north, 3 adjacent, 2 south) described above that will be representative of surface water quality (see Table 1 and Figure 2). Samples requiring laboratory analysis will be collected using a Niskin water sampler. Each sample will be a composite of three grab samples collected at 25%, 50% and 75% of the sample location depth (the latter was the maximum depth allocated for the *Upper Hudson River PCBs Site*). Note that if water depth at the time of sampling is less than 8 feet there may be some overlap between the three grabs. Surface water samples (for dissolved metals) will be filtered using a 0.45 micron membrane filter and then preserved.

The *Upper Hudson River PCBs Site* was reviewed to provide guidance in determining the frequency of sampling because of the extensiveness of the data available. While this sampling provided valuable

information; it should be noted that this project represents a different set of conditions in terms of environmental setting, nature and extent of PCB contamination, and the respective source conditions. An evaluation of the 2006 findings indicated that monthly sampling would be sufficient to discern PCB concentration trends over both time and space (QEA, 2006) because both monthly and weekly stations presented a seasonal trend and the weekly sampling would have still shown variability in PCB concentrations if fewer samples had been collected. For example, based on that report, a comparison of the PCB water concentrations from weekly sampling (e.g. Thompson Island, Figure 4-3) versus monthly sampling (Thompson Island Dam, Figure 6-1) showed the same general trend (an increase in concentrations during the summer months). This observation, with regard to frequency, is generally true for most of the surface water stations sampled for the *Upper Hudson River PCBs Site*.

Considering the conclusions above and other factors, collection of one monthly composite sample at each location was chosen as the initial sampling frequency. Sampling less frequently than monthly would not be sufficient to meet the DQOs and weekly sampling is likely to produce redundant data. The sampling frequency may be adjusted to increase or decrease the frequency depending on the magnitude and variability seen in the data collected subsequent to each quarter of data collected or as necessary. The order of sampling will be upstream locations, followed by downstream locations, and then finally adjacent to the Site, with the latter sampled as close to low tide as feasible. Note that the background concentrations within the water column are expected to be relatively uniform within each sampling event. The proposed surface water sampling schedule is as follows:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Congener	x			x			x			x		
Aroclor			x	x	x	x	x	x	x	x	x	x

Only one sampling event will be collected between December and March due to the low variability in surface water concentrations as indicated by the *Upper Hudson River PCBs Site* baseline and for health and safety reasons related to work on the river during winter. Sample location SW-007 will be collected once during spring and once during fall as part of the first year of collection. Both Aroclor and individual congener analysis will be performed quarterly beginning with the second sampling round. An evaluation of the congener profiles will assist in identifying site-related PCBs. The surface water PCB results from Year 1 will be used periodically during the first 12 months to determine if sampling in the subsequent year is necessary and may modify the frequency and/or location of surface water samples during Year 1 and/or in subsequent years.

Given the characteristics of this river system, seven locations are deemed sufficient to effectively characterize the nearshore site-related constituents and conventional water quality parameters. Samples will be collected within the 3 hour interval prior to low tide (or as close to low tide as feasible. This approach will ensure that the river is moving uniformly downstream and will minimize the potential for the Site to impact the north reference samples during the collection event. Additionally, this will allow the remaining samples to reflect the contribution of the Site to surface waters at multiple points. Total suspended solids as well as total and dissolved organic carbon (which affect the partitioning of PCBs to fish and therefore bioavailability) will also be measured.

Once the sample(s) are obtained, surface water will be containerized in clean bottles, labeled and stored in a cooler at 4°C. Following proper chain-of-custody documentation, the samples will be shipped to a NYSDOH-certified analytical laboratory.

Conventional water quality parameters that support aquatic life (dissolved oxygen, temperature, specific conductivity, turbidity and pH) will be measured at each surface water sample location. Conventional water quality parameters will be determined from a grab sample and digital measurements will be recorded once the field instrument has equilibrated.

3.4 Biota

The ROD requires the following plan element(s):

- biota sampling in the vicinity of the site and at reference locations
- "One goal of the monitoring program will be to determine if the remedy is successful in reducing the local contribution to PCB tissue concentrations in biota."

The pertinent Remedial Action Objective(s) (RAO):

- "prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain"

Biota sampling is discussed in two parts based on sampling methodology. Fish and shellfish will be discussed first, followed by macro-invertebrates.

3.4.1 Fish and Shellfish

The identified data quality objective(s) (DQO):

- establish baseline PCB concentrations in local fish and local forage fish at the site and reference locations for comparison to conditions after remedial action

Methodology overview:

- Multi-year Monitoring
- Record GPS location and water depth
- 3 river sections (north, adjacent, south)
- 5 samples per species per river section (nearshore areas)
- 5 samples per species per river section (deeper water areas)
- Total PCBs as Aroclors, PCB congener analysis of selected samples; lipids
- Metals (lead)

Measurement of total PCBs and lead in fish and shellfish will be performed to establish a benchmark against which post-construction long-term monitoring in fish (both dry weight and lipid normalized) can be compared. Additional analysis on the two striped bass fillets (recreational species of high importance) with the highest level of total PCBs (as Aroclors) in each section of the river will also be

analyzed for PCB congeners. The types of Aroclors and/or congener profiles will help identify patterns of PCBs that may be indicative of site-related contamination and may be bioconcentrating within local biota. Lead will be measured in fish tissue but is not anticipated, based on past studies, to be elevated due to site-related conditions (this analysis may be discontinued if results show no difference from fish caught at upstream reference locations after the first annual event). Fish and shellfish will be collected in the three river sections described above (Table 1 and Figure 3).

Identifying the signature of site-related PCBs within the adjacent samples and comparing them to reference locations is fundamental to assessing the disposition of site-related PCBs in fish. PCB congener profiles and the measurement of individual Aroclors will allow the evaluation of the site-specific contribution to the PCB levels in biota tissue relative to the reference locations. Total PCBs (as Aroclors) will allow a comparison to current fish tissue advisory levels. It is also important to note that the upstream *Upper Hudson River PCBs Site*, as well as other upstream locations, will likely contribute to reference concentrations and are expected to have a different distribution of Aroclors and congeners when compared to site related PCBs. Some of the elements of the BSAP were derived from elements of past studies which collected fish adjacent to the Site. These elements will provide some continuity in terms of what to expect when interpreting the data.

The capture methods employed will include various passive technologies including: gill nets, Fyke or Box traps, crab pots, eel traps and modified minnow traps. Electroshocking was considered but is not conducive to this portion of the river due to the levels of salinity and the amount of debris in the area would preclude trawling. The target species for the nearshore collection and analytical measurement of PCBs will be organisms that could be ingested by recreational or sustenance fisherman (striped bass, white perch, American eel and blue crab) as well as forage fish (e.g. mummichog). The target species for the deeper water collection and analytical measurement of PCBs will be organisms that reside near the sediment surface and more likely to be local to the deeper water sediments: American eel, hogchoker and blue crab. Non-target species (e.g. banded killifish, catfish) will be collected in appropriate quantities and frozen for archiving for potential use should the quota for target species not be fulfilled at the end of the field program. A scientific collection permit will be submitted to the NYSDEC prior to initiation of field sampling. The permit will address contingencies such as the proper procedures to follow should a sensitive species (e.g. Atlantic sturgeon) be inadvertently caught in a net. Collection methods that inadvertently capture Endangered/Threatened species will be discontinued until the Department is further consulted. The size ranges for the targeted species will be limited to ensure the species home range is within acceptable parameters (e.g. smaller size fish that would be anticipated to be local to this river section) but large enough to meet a minimum mass for analysis of PCBs (e.g. >10 grams). The targeted number of biota samples will be five per species per river section with preliminary locations shown on Figure 3. Sampling will be conducted until the targeted number of organisms are acquired or at the end of two work weeks, whichever comes first. AR will work with the Department throughout the execution of this plan to assess whether the types and number of organisms collected are sufficient to establish a baseline or if alternative collection methods should be employed. If the target quotas are not met by the end of two work weeks, the Department will be contacted (before the subcontractor demobilizes) for further discussions with regard to the duration of sampling.

Figure 3 shows the configurations for the location of sampling stations with regard to the deployment of gill nets and/or traps based on the results of the bathymetric survey. Actual locations will be adjusted in the field based on obstructions and professional judgment of the field biologist. Capture efficiencies will be calculated by the yield of organisms divided by the elapsed time of sampling (or number of traps).

At the time of collection, samples will be assigned identification numbers, tagged, placed in plastic bags, labeled and, if necessary, frozen on dry ice. Species, date collected, collector names, sample location, total body lengths and weights will be recorded on field collection record forms. Chain of custody sheets will be completed and organized separately for each collection date. Samples from each collection station will later be grouped for PCB analysis by species and size (e.g. if compositing is necessary based on collection of underweight individuals). Fish that are too small to be fileted will be analyzed whole. Larger fish will be dissected in the laboratory into fillet and offal (latter is the remainder of the whole fish) and each will be analyzed separately so that, if necessary, whole fish concentrations can be recalculated on the results of the analyses of both tissues. Blue crab will be analyzed as whole organisms. Mollusks may not be viable in this reach of the river due to the nature of the river (based on previous data reviewed in the RI) and riverbed conditions. If bivalves or blue crab of sufficient mass are obtained in any grab sampling (see section 3.4.2), they will be retained (along with other non-target species) for whole body analysis of PCBs and not be discarded until the Department has been consulted.

3.4.2 Benthic Macroinvertebrates

The identified data quality objective(s) (DQO):

- characterize baseline condition of the benthic community at the site and reference locations for comparison to conditions after remedial action by analyzing both the numbers and types of organisms

Methodology overview:

- Single Event (results will be evaluated and reviewed with DEC to determine whether this provides sufficient data)
- Record GPS location and water depth (nearshore samples typically 5 – 15 foot water depth)
- 16 locations (3 north, 10 adjacent, 3 south)
- Taxonomy: Infaunal abundance (total number of individuals per sample); Infaunal density (total number of individuals per square meter); Percent dominance; Species richness (total number of taxa per sample); Taxa evenness (Pielou's Index J'); Taxa diversity (Shannon-Weiner Index); Taxa richness (Margalef's D); Taxa diversity (Pielou's Index H')
- Grain size and TOC will be measured as part of the sediment investigation

Metrics identified from these samples can be reexamined during long-term monitoring to identify any improvement in the rate of recolonization and status of the benthic community by scoring of successional stages. The macroinvertebrate assemblage documented in the 2000 RI indicated a community that was primarily dominated by relatively pollution tolerant organisms such as polychaetes,

amphipods, crustaceans, and bivalves. In that survey, sample locations were generally limited to the shallower water (<15') which is typically more productive than deeper zones. There was no apparent difference in the benthic metrics (e.g. abundance, diversity, biotic indices) between site and background stations. A review of these results indicated that the metrics selected for the BSAP are sufficient to adequately characterize the benthic macroinvertebrate community.

Macroinvertebrates will be obtained for evaluation of abundance and diversity from individual sediment sample grabs collected at each of the 16 locations (Figure 4) deemed as optimal by a qualified benthic ecologist based on real-time images from the Sediment Profile Imaging (SPI) process completed during the habitat characterization as discussed in Section 3.5. An ideal location would be one that is flat, has a soft substrate and has organisms that are active within the visible bioturbation zone. Replicates to ground truth observations from the SPI images (e.g. to discern 'patchiness') will be added, using professional judgment, for at least one nearshore location per section of the river (i.e. a total of 3 discrete grabs/samples for one location).

Macroinvertebrate samples will be obtained using a Ponar dredge sampler. The sampler would be deployed and retrieved using a mechanical winch. Once on board, the sampler will be examined to determine if the grab was successful by observing full closure of the jaws and ensuring the sediment/water interface was level and undisturbed. The entire volume of the grab samples will then be screened through a 0.5 mm sieve. Gross debris will be discarded, while the debris remaining on the sieve will be containerized and preserved in a solution of 4% buffered formalin. These samples will be labeled both internally and externally and sent to a benthic taxonomy laboratory. Following proper chain-of-custody documentation, the samples would be shipped to the laboratory for analysis. If bivalves or blue crab of sufficient mass are obtained in any Ponar dredge samples, they will be logged, removed from the sample and archived for potential use with the fish and shellfish samples (see Section 3.4.1).

Once received by the taxonomy laboratory, the samples will be sorted by class and identified to the lowest practicable taxon using standard taxonomy keys (Abbott, 1974; Bousfield. 1973; Pettibone, 1963; Weiss, 1995). Quality assurance will be conducted as presented in Vittor & Associates "Standard Operating Procedures (SOP) for Benthic Sample Analysis and Data Interpretation" (included in Appendix C of the QAPP). Following sorting and identification, the metrics used to evaluate the quality of each sample grab will be the same as the endpoints measured in the 2000 RI and therefore include total abundance, total richness, percent dominance and the Shannon-Weiner Diversity Index.

3.5 Habitat Characterization

The ROD requires the following plan element(s):

- habitat characterization

The identified data quality objective(s) (DQO):

- establish baseline habitat conditions at the site and reference locations for comparison to conditions after remedial action

Methodology overview:

- Single Event (results will be evaluated and reviewed with DEC to determine whether this provides sufficient data)
- Record GPS location and water depth
- Approximately 50 transects adjacent to the site in addition to north and south locations.
- Visual characterization (sediment profile images)

Habitat is defined as the natural home or environment of an animal, plant, or other organism; a robust benthic habitat fosters a healthy invertebrate community. Selected locations will be examined to characterize the condition of the sediment bed in-situ, as well as the numbers and types of organisms that comprise the benthic community (Section 3.4.2 above).

The habitat characterization, which will identify discrete zones within the study area that have similar habitat features, will utilize Sediment Profile Imaging (SPI) which will provide direct visual information about sediment grain size, the demarcation between oxic and anoxic sediments (e.g. the apparent 'redox potential discontinuity'), the types of organisms, the presence of debris, the presence of methane gas bubbles, and eventually post-remedy information about dredged or capped material and natural recovery processes. If observed, the SPI will also document where submerged rooted aquatic vegetation is present as well as any vegetation identified by the various surface sediment Ponar grab samples. The technology has been used in dredged material characterization programs for the characterization of the benthic macroinvertebrate populations at numerous contaminated sites, including the Hudson River. The results of the sediment and macroinvertebrate sampling will assist in the validation of observations made during the SPI drops.

SPI is an optical device that works like an upside-down periscope and takes cross-sectional images of the upper 20 cm of the sediment bed. SPI has been used for more than 20 years as a valuable tool for evaluating benthic habitat (the environment that supports the benthic organisms).

A 10 megapixel digital profile camera will be mounted in the center of a frame equipped with a mirror set at a 45 degree angle. The mirror acts as a knife to penetrate the sediment. The camera photographs the upper portion of the sediments typically inhabited by benthic invertebrates. Due to the turbidity of the river, overhead (plan) view images using side mounted digital cameras are not feasible.

The SPI stations will be established on a biased grid system which will primarily focus on the nearshore water depths where the remedial activities are proposed (some adjacent deepwater locations will be imaged). Figure 5 presents the north, south and adjacent areas where SPI work will be conducted. Figures 5a and 5b present each SPI location that will be collected in the area adjacent to the site overlaid on a relief map generated from the recent bathymetry survey. SPI stations adjacent to the site and at reference locations include deepwater and backwater habitats in addition to the nearshore area where applicable. It is anticipated that at least 200 individual locations will be imaged with only a limited number of locations that will be obstructed by the presence of debris/refusal. Each grab sample location for the taxonomic identification of macroinvertebrates will be chosen using the results of the SPI. The location of each station will be recorded using a global positioning system. Station positions

will be recorded in latitude and longitude to the nearest 0.01 second using the World Geodetic System 84 coordinate system. The accuracy of the horizontal coordinates will be within 10 feet.

Because SPI is a rapid, real-time technology, it will be deployed as an initial screening method to locate areas of the sediment bed that are soft and therefore conducive to colonization by benthic macroinvertebrates and to confirm subsequent sampling locations for bulk sediment and benthic macroinvertebrates. Interpretation of the plan view and subsurface SPI photograph will confirm that the location is amenable to grab sampling (e.g. not laden with debris or on a slope) and allow visual observation of the benthic habitat (e.g. anoxic conditions, texture, types of organisms).

3.6 Surface Sediment

The ROD requires the following plan element(s):

- surficial sediment sampling

The pertinent Remedial Action Objective(s) (RAO):

- "prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain"

The identified data quality objective(s) (DQO):

- establish baseline PCB, metals (copper, zinc, lead) and TOC concentrations in surface sediment at the site and reference locations to assess post-construction remedy effectiveness

- establish baseline grain size in surface sediment at the site and reference locations for comparison to conditions after remedial action

Methodology overview:

- Single Event (results will be evaluated and reviewed with DEC to determine whether this provides sufficient data)
- 16 locations (3 north, 10 adjacent, 3 south);
- Record GPS location and water depth
- Physical parameters made on grab samples (grain size, TOC)
- Total PCBs as Aroclors, PCB congener analysis of selected samples
- Metals: copper, lead and zinc

Since the literature indicates that biota primarily inhabit the top 0 – 6" of the sediment bed, the BSAP will address this depth interval. Parameters of analysis will include grain size (sieve analysis), total organic carbon (mg/kg) and site-related constituents: PCBs and bulk concentrations of copper (Cu), lead (Pb) and zinc (Zn). Aluminum (Al), beryllium and iron (Fe) will be included as matrix metals to normalize site-related metals (copper, lead and zinc) which may aide in discerning hot spots and the understanding of geochemical relationships with upstream or off-site metals.

Sample locations are presented in Figure 4. Three upstream reference sample locations were selected with two locations (B1-SS-001 and B1-SS-002) selected based on previous locations sampled as reference areas by the NYSDEC (1999). The other location, B1-SS003, is downstream of Dobbs Ferry Waterfront Park, slightly southwest of a long rip-rapped shoreline, similar to Site conditions. Because it is anticipated that sediment will be obtained from the same grab samples as porewater, each location may be a composite sample consisting of up to three grabs within a 20 foot radius of the boat location in order to collect sufficient volume.

Bulk samples of sediment will be obtained using a clam shell type sampling device such as a Ponar sampler. The sampler would be deployed and retrieved using a mechanical winch. Once on board, the sampler will be examined to determine if the grab was successful by observing full closure of the jaws and ensuring the sediment/water interface was level and undisturbed. Samples will be composited, when necessary, by gently homogenizing using a stainless steel paint mixer in a clean five gallon bucket to a consistent color and texture.

Analytical samples would be containerized, labeled and stored in a cooler at 4°C. Following proper chain-of-custody documentation, the samples would be shipped to a NYSDOH-certified analytical laboratory for analysis of grain size, total organic carbon (TOC), Total PCBs as Aroclors and bulk metals (copper, lead, zinc and aluminum, beryllium, iron). Additional analysis on the two sediment samples with the highest level of total PCBs (as Aroclors) in each section of the river will also be analyzed for PCB congeners. The types of Aroclors and/or congener profiles will help identify patterns of PCBs that may be indicative of site-related contamination.

3.7 Porewater

The ROD requires the following plan element(s):

- porewater sampling in the vicinity of the site and at reference locations

The pertinent Remedial Action Objective (RAO):

- "prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain"

The identified data quality objective(s) (DQO):

- establish baseline PCB and dissolved metals (copper, zinc, lead) concentrations in porewater at the site and reference locations

Methodology overview:

- Single Event (results will be evaluated and reviewed with DEC to determine whether this provides sufficient data)
- 7 locations (2 north, 5 adjacent)
- Record GPS location and water depth
- Total PCBs as Aroclors
- Dissolved Metals: copper, lead and zinc

Porewater data will be collected to document the existing concentrations of PCBs and dissolved metals (copper, lead, zinc) within interstitial water. Knowing both the bulk sediment and porewater PCB concentrations will help identify the partitioning behavior of PCBs in the biotic zone of the surface sediment. Different congeners are anticipated to partition according to the degree of chlorination which, in turn, will affect how different types of PCBs may move up the food chain.

Sediment samples will be collected at two reference locations in the north and five locations adjacent to the site shoreline. Samples will be obtained as described above from the 0-6" depth interval and transported to a temperature-controlled laboratory (Table 1 and Figure 6). Porewater will be extracted via centrifugation. In-situ methods (e.g. SPME) were considered but not selected as the results only yield a qualitative metric and are difficult to deploy and retrieved in these river conditions. Consideration will be given to passive sampling technology in limited areas of lower river energy (e.g. boat slips) for porewater during future events, especially if the current program does not return the desired baseline information. Total PCBs will be measured using USEPA Method 8082a (the detection limit may vary depending on the yield of the supernatant). Total PCBs and total organic carbon (TOC) will also be measured in the bulk sediment as part of the surface sediment analysis. Sediment-porewater partition coefficients for total PCBs (Kd and Koc) will be estimated based on the ratio of the bulk concentration in sediment to the total concentration in porewater.

3.8 Field OPs

The following Operating Procedures (OPs) are relevant to the sediment sampling described above. Health and safety related OPs will be provided in the Site-specific Health Safety Security and Environmental Plan (HSSEP) and laboratory analysis OPs are provided in Attachment B.

OP2000 - Monitoring Field Explorations
OP2001 - Identification and Description of Soils Using Visual-Manual Methods
OP3001- Preservation and Shipment of Environmental Samples
OP3004 - Sediment Sampling
OP3007 – Surface Water Sampling
OP3026 - Chain of Custody
OP3027 – Decontamination Procedure
OP3028 – Investigation Derived Wastes
OP3029 – Field Data Recording
OP3030 - Field Instruments: Use and Calibration

Subcontractors selected for individual BSAP work tasks (i.e. habitat characterization, benthic macroinvertebrates, sampling of biota) will submit proprietary Standard Operating Procedures that will be reviewed and inserted into Attachment B prior to the commencement of work. Applicable subcontractor field equipment specifications will also be included to ensure that the methods used to evaluate environmental media in OU2 meet the respective DQOs.

3.9 Data Interpretation

Tabulation, statistical analysis and data reduction will be required for many of the parameters and endpoints measured in the field or laboratory. Examples include descriptive statistics (e.g. minimum, maximum, mean) for site-related constituents in surface water and sediment (PCBs, copper, lead, zinc) for parameters that affect environmental fate (TSS, TOC, grain size) and relationships on allometric measurements (e.g. graphs depicting fish weight vs. length). Although the 2000 RI data would be considered outdated, tissue levels of Aroclors (both bulk and lipid normalized) will be graphically compared (within species) whenever possible.

Porewater data interpretation will include documenting the strength of the partitioning of the PCBs between the sediment and the porewater. This will be measured by calculating a site-specific organic carbon partitioning coefficient (Koc) for each sample collected. These data can be compared to Koc's estimated for PCBs cited in the literature. These values are important in evaluating how tightly PCBs are bound to the sediment particles and therefore the propensity to migrate into porewater and subsequently into benthic organisms and fish.

Once PCBs have been analyzed in sediment and fish tissue, the former will be normalized to TOC and the latter will be normalized to fish lipid. The ratio of the normalized fish tissue PCB concentration to the normalized sediment PCB concentration, known as the "biota-sediment accumulation factor" (BSAF), will be calculated for the Site in addition to direct comparison of tissue concentrations. If the BSAF falls below unity, that may be an indication that PCBs, as a whole, may not be very mobile with regard to being transferred from the source (sediment) to the upper trophic levels (fish) of the food chain (Wong et al., 2001). The OU-2 BSAF can be compared to values calculated from reference locations and post-construction long-term monitoring events.

To assess whether the DQO can be met, specifically, to quantify the site-specific contribution to the media, the data interpretation will include an evaluation of the patterns of PCB congeners to identify if site-related PCBs are present. If the analysis reveals unique signature(s) of site-related PCBs in any particular media, then the Aroclor data will be reviewed to determine if Aroclor analysis alone is sufficient to meet the DQO in future sampling events.

4. QUALITY ASSURANCE PROJECT PLAN

The quality assurance project plan (QAPP) is provided in Attachment B and describes the policy, organization, functional activities, and the quality assurance and quality control (QA/QC) protocols necessary to achieve the DQOs for the intended use of the data as described above. The analytical laboratory will provide a full laboratory package for each sample.

5. SUBMITTALS

Chemical laboratory data will be submitted to the NYSDEC in EQuIS format. Data interpretation for each individual media will not proceed until all laboratory data is received for all of the respective samples. Data will be tabulated according to media type and, if applicable, descriptive statistics will be

developed to identify spatial relationships. Surface water data will be submitted in draft form to the Department on a monthly basis (before it is validated) during the first year of sampling. The data submittal for biota data will include a tabular summary of biometric data (e.g. weight, length, % lipid) for each sample. For fish, a graphical depiction of weight versus length will be provided where appropriate, as well as length versus percent lipid.

Once the data has been tabulated and analyzed, a draft report will be prepared and submitted for review. It will include, if necessary, any recommended changes to the Year 2 BSAP. Following receipt of comments, the report will be revised as appropriate and resubmitted for Department approval.

The results of these sampling events will be reported so that they can be used to establish a range of values against which post-construction long-term monitoring will be evaluated (e.g. a tolerance interval for baseline conditions).

6. HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the Site or involved in field activities will be described in the Site-specific Health Safety Security and Environmental Plan (HSSEP), which will be prepared in accordance with OSHA 1910.120 and specific AR requirements. These documents will be available for use on site and will be developed prior to the commencement of work.

7. SCHEDULE

Monitoring Frequency

It is currently anticipated that the initiation of the BSAP will commence in the fall of 2013 (Year 1). Fish and Shellfish collection is anticipated to be completed in the late summer or fall time frame. The schedule for initiation of the BSAP is subject to change based on the date of approval of this BSAP, equipment availability and weather conditions. The time required for the completion of all sampling activity is anticipated to be approximately six weeks. Subsequent sampling events, as necessary, are anticipated to occur in 2014 (Year 2) and 2015 (Year 3). The scope and schedule for subsequent years would be dependent upon site conditions, results of the prior year(s) data and the date of commencement of construction activities. The purpose of additional annual sampling events is to better define temporal changes associated with preconstruction conditions. The baseline conditions measured for the surface sediment, benthic macroinvertebrates and porewater are anticipated to remain relatively static prior to remedial action so a single baseline monitoring event was selected for these media. Surface water and fish/shellfish are more dynamic and therefore monitoring for these media over a period of time would better discern the range of natural variability in the data.

The anticipated frequency/schedule of field activities is summarized below but is subject to change based on results from the first event which will be evaluated to determine whether additional sampling should be performed:

- bathymetry (completed)
- surface water (Monthly in Year 1, adjust frequency if necessary)
- biota - fish & shellfish (annually)
- biota - macroinvertebrates (Year 1 only)
- habitat characterization (Year 1 only)
- surficial sediment (Year 1 only)
- porewater (Year 1 only)

7.1 ATTACHMENTS

Table 1 – Baseline Sampling & Analysis Plan: Sampling Locations, Methods, Endpoints and Rationale
Table 2 – Baseline Sampling & Analysis Plan: Sample Summary

Figure 1 - Project Locus
Figure 2 - Baseline Sampling & Analysis Plan – Surface Water
Figure 3 - Baseline Sampling & Analysis Plan – Fish and Shellfish
Figure 4 - Baseline Sampling & Analysis Plan – Surface Sediment and Macroinvertebrates
Figure 5 - Baseline Sampling & Analysis Plan – Habitat Characterization (SPI)
Figure 5a - Baseline Sampling & Analysis Plan – SPI Locations Sheet 1 of 2
Figure 5b – Baseline Sampling & Analysis Plan – SPI Locations Sheet 2 of 2
Figure 6 - Baseline Sampling & Analysis Plan – Porewater

Attachment A – Hastings Hydrographic Survey Work Plan Memorandum & Submittal
Attachment B – Quality Assurance Project Plan

7.2 REFERENCES

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Table 1
Baseline Sampling and Analysis Plan: Sampling Locations, Methods, Endpoints and Rationale
Former Anaconda Wire and Cable Company Site
Hastings-on-Hudson, NY

Sampling Location	Medium/Matrix	Sample Location ID Number	Sampling Method	Depth (units)	Measurement[1] Endpoints	Location Rationale
OU-2: North of Site (Reference)	Surface water	B1-SW-001, B1-SW-002	Grab (e.g. Niskin)	Composite of 25%, 50% and 75 % of total depth	PCBs; Dissolved Cu, Pb, Zn; TSS; TOC, DOC, DO, pH, temp., conductivity, turbidity	Characterize baseline levels of analytes in reference surface water upstream of OU-2.
	Biota (fish & shellfish)	B1-BT-01A thru B1-BT-01E	Passive Nets; Traps	2 - 40'	Pb, PCBs (Aroclors & Congeners); %lipid	Characterize baseline levels of analytes in reference fish upstream of OU-2.
	Habitat	B1-SP-001 thru B1-SP-003	Sediment Profile Imaging	0 - 8"	Substrate type, RPD, gas & feeding voids, macroinvertebrates, SAV	Characterize condition of habitat upstream of OU-2.
	Surficial Sediment	B1-SS-001 thru B1-SS-004	Grab (e.g. Ponar)	0 - 6"	PCBs, Al, Be, Fe, Cu, Pb, Zn; TOC; grain size	Characterize baseline levels of analytes in reference sediment upstream of OU-2.
	Biota (macroinvertebrates)	B1-MC-001 thru B1-MC-004 (Coincident with B1-SS samples)	Grab & Sieve (e.g. Ponar)	0 - 6"	Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Characterize baseline condition of reference benthic macroinvertebrate community upstream of OU-2.
	Porewater	B1-PW-001 thru B1-PW-002	Grab & Centrifuge	0 - 6"	Total PCBs; TOC, DOC; Cu, Pb, Zn	Characterize PCBs in reference porewater upstream of OU-2.
OU-2: Adjacent to Site (Vicinity)	Surface water	B1-SW-003, B1-SW-004 and B1-SW-007	Grab (e.g. Niskin)	Composite of 25%, 50% and 75 % of total depth	PCBs; Dissolved Cu, Pb, Zn; TSS; TOC, DOC, DO, pH, temp., conductivity, turbidity	Characterize baseline levels of analytes within OU-2.
	Biota (fish & shellfish)	B1-BT-02A thru B1-BT-02H	Passive Nets; Traps	2 - 40'	Pb, PCBs (Aroclors & Congeners); %lipid	Characterize baseline levels of analytes in fish caught within OU-2.
	Habitat	All locations sampled and numbered sequentially B1-SP-XXX (including B1-SS-005 thru B1-SS-011; B1-SS-101; B1-SS-102)	Sediment Profile Imaging	0 - 8"	Substrate type, RPD, gas & feeding voids, macroinvertebrates, SAV	Characterize baseline condition of habitat within OU-2.
	Surficial Sediment	B1-SS-005 thru B1-SS-011; B1-SS-101 & 102	Grab (e.g. Ponar)	0 - 6"	PCBs, Al, Be, Fe, Cu, Pb, Zn; TOC; grain size	Characterize baseline levels of analytes in sediment within OU-2.
	Biota (macroinvertebrates)	B1-MC-005 thru B1-MC-011; B1-MC-101 & 102 (Coincident with B1-SS samples)	Grab & Sieve (e.g. Ponar)	0 - 6"	Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Characterize baseline condition of benthic macroinvertebrate community within OU-2.
	Porewater	B1-PW-003 thru B1-PW-007	Grab & Centrifuge	0 - 6"	Total PCBs; TOC, DOC; Cu, Pb, Zn	Characterize baseline levels of PCBs in porewater within OU-2.
OU-2: South of Site	Surface water	B1-SW-005, B1-SW-006	Grab (e.g. Niskin)	Composite of 25%, 50% and 75 % of total depth	PCBs; Dissolved Cu, Pb, Zn; TSS; TOC, DOC, DO, pH, temp., conductivity, turbidity	Characterize baseline levels of analytes downstream of OU-2.
	Biota (fish & shellfish)	B1-BT-03A thru B1-BT-03D	Passive Nets; Traps	2 - 40'	Pb, PCBs (Aroclors & Congeners); %lipid	Characterize baseline levels of analytes in fish caught downstream of OU-2.
	Habitat	B1-SP-012 thru B1-SP-014	Sediment Profile Imaging	0 - 8"	Substrate type, RPD, gas & feeding voids, macroinvertebrates; SAV	Characterize baseline condition of habitat downstream of OU-2.
	Surficial Sediment	B1-SS-012 thru B1-SS-014	Grab (e.g. Ponar)	0 - 6"	PCBs, Al, Be, Fe, Cu, Pb, Zn; TOC; grain size	Characterize baseline levels of analytes in sediment downstream of OU-2.
	Biota (macroinvertebrates)	B1-MC-012 thru B1-MC-014 (Coincident with B1-SS samples)	Grab & Sieve (e.g. Ponar)	0 - 6"	Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Characterize baseline condition of benthic macroinvertebrate community downstream of OU-2.

Notes: TOC = total organic carbon; DOC = dissolved organic carbon; RPD = redox potential discontinuity; DO = Disolved Oxygen; SAV = submerged aquatic vegetation

[1]PCBs as Aroclors; see BSAP text for description of selected samples used to identify site-related congeners

Table 2
Baseline Sampling and Analysis Plan: Sample Summary
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY

Sample Type	Number of Sample Locations	Analytical Requirements	Lab	Container[3] Type	QA/QC Procedures	Notes
Surface Water	7	Dissolved copper, lead and zinc using USEPA Method 6010B	PACE	Varies[3] according to analyte	Field Blank, laboratory duplicate, lab MS/MSD	Samples obtained during ebb tide period. Field measurements for dissolved oxygen, pH, temperature, specific conductivity and turbidity. Samples will be extracted using solid phase extraction disks.
		Aroclor & Congener PCBs - USEPA Method 3545/8082A				
		Total and Dissolved Organic Carbon (TOC) SM 5310				
		TSS using USEPA Method SM 2540D				
		Conventional Parameters using Multiprobe WQ Sonde	Field			
Biota[2] (fish)	17 (5 samples per species per river section: nearshore & deepwater)	Lead using USEPA Method 6010B	PACE	Aluminum foil wrap	Lab MS/MSD	Analysis of filet and offal if the minimum sample mass has been achieved. Congener analysis on selected samples of striped bass w/ elevated PCBs.
		Aroclor & Congener PCBs - USEPA Method 3545/8082A				
		Lipids Analysis using Method 3540C (Soxhlet extraction)				
Biota[2] (shellfish)	17 (5 blue crab per river section: nearshore & deepwater)	Lead using USEPA Method 6010B	PACE	Aluminum foil wrap	Lab MS/MSD	Analysis of whole body if the minimum sample mass has been achieved; composite if minimum mass not reached.
		Aroclor PCBs - USEPA Method 3545/8082A				
		Lipids Analysis using Method 3540C (Soxhlet extraction)				
Habitat Characterization	Approx. 240 (1 image per location)	- Color/Texture of sediment - Depth to Redox Potential Discontinuity - Presence/Absence of Gas and Feeding Voids - Types of Macroinvertebrates; Successional Stage - Report SAV if present	Germano & Associates, Inc.	N/A	Provided in Germano & Associates SOP	Will fulfill DQO of "habitat characterization", which includes substrate type/texture, depth to redox potential, presence of voids, numbers/types of organisms, stage of succession, presence of SAV.
Surficial Sediment	16	Al, Be, Fe, Cu, Pb, Zn - USEPA Method 6010B Total Organic Carbon (TOC) - Lloyd Kahn Method Grain size (sieve analysis) Aroclor & Congener PCBs - USEPA Method 3545/8082A	PACE	4 oz glass jars w/ Teflon septa; PE bags for grain size	Field Blank, laboratory duplicate, lab MS/MSD	Individual grab samples to obtain bulk chemistry; individual grab samples for porewater; individual grab samples for benthic macroinvertebrates.
Biota (macroinvertebrates)	16	Taxonomic Identification: Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Vittor & Associates, Inc.	1-L HDPE wide mouth container	<5% Taxonomic Disagreement	Macroinvertebrates will be sieved in the field. In the laboratory, they will be visually sorted and identified to the lowest practicable taxon (LPT). Collect nearshore replicates for at least 1 location per river section.
Porewater	7	Aroclor PCBs - USEPA Method 3535/8082A Dissolved copper, lead and zinc - USEPA Method 6010B Total and Dissolved Organic Carbon (TOC) SM 5310	PACE	Varies[3] according to analyte	Laboratory duplicate, lab MS/MSD	Obtained via laboratory centrifugation

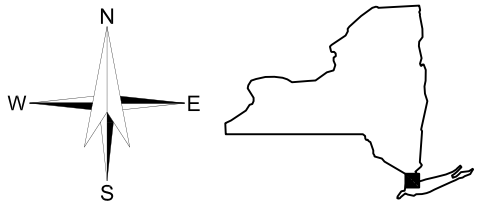
Notes:

1. N/A: Not Applicable

2. All fish will be identified, measured (length and weight), and observed for gross abnormalities (log and photograph all external lesions). Each fish will be wrapped in foil and placed in a plastic bag with internal label (pencilled filter paper); do not eviscerate. Bags from one location can be placed in one larger bag provided it is labeled with the contents and location IDs. When sorting, small specimens such as young-of-year fish and invertebrates should be kept alive in water of appropriate temperature (use ice if needed) until each individual sampling event is completed at a given location. Wrap young fish in hexane-rinsed foil and bag. Keep jars on ice in a cooler until placement in a freezer.

3. See QAPP Table 4.2.1

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

SCALE: 1:24000
MAY 2011

FIGURE 1

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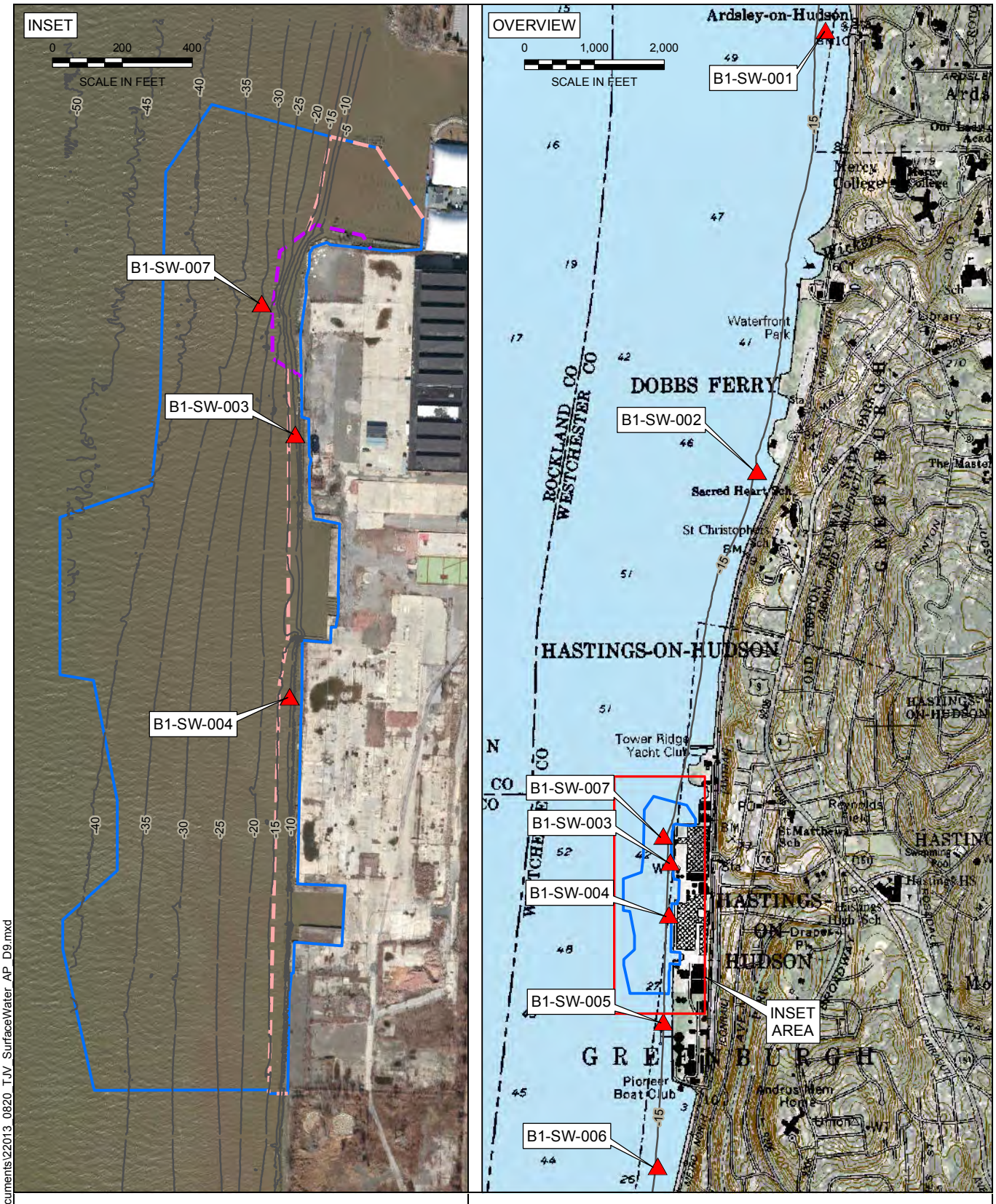

SURFACE WATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE WATER

SCALE: AS SHOWN
AUGUST 2013

FIGURE 2

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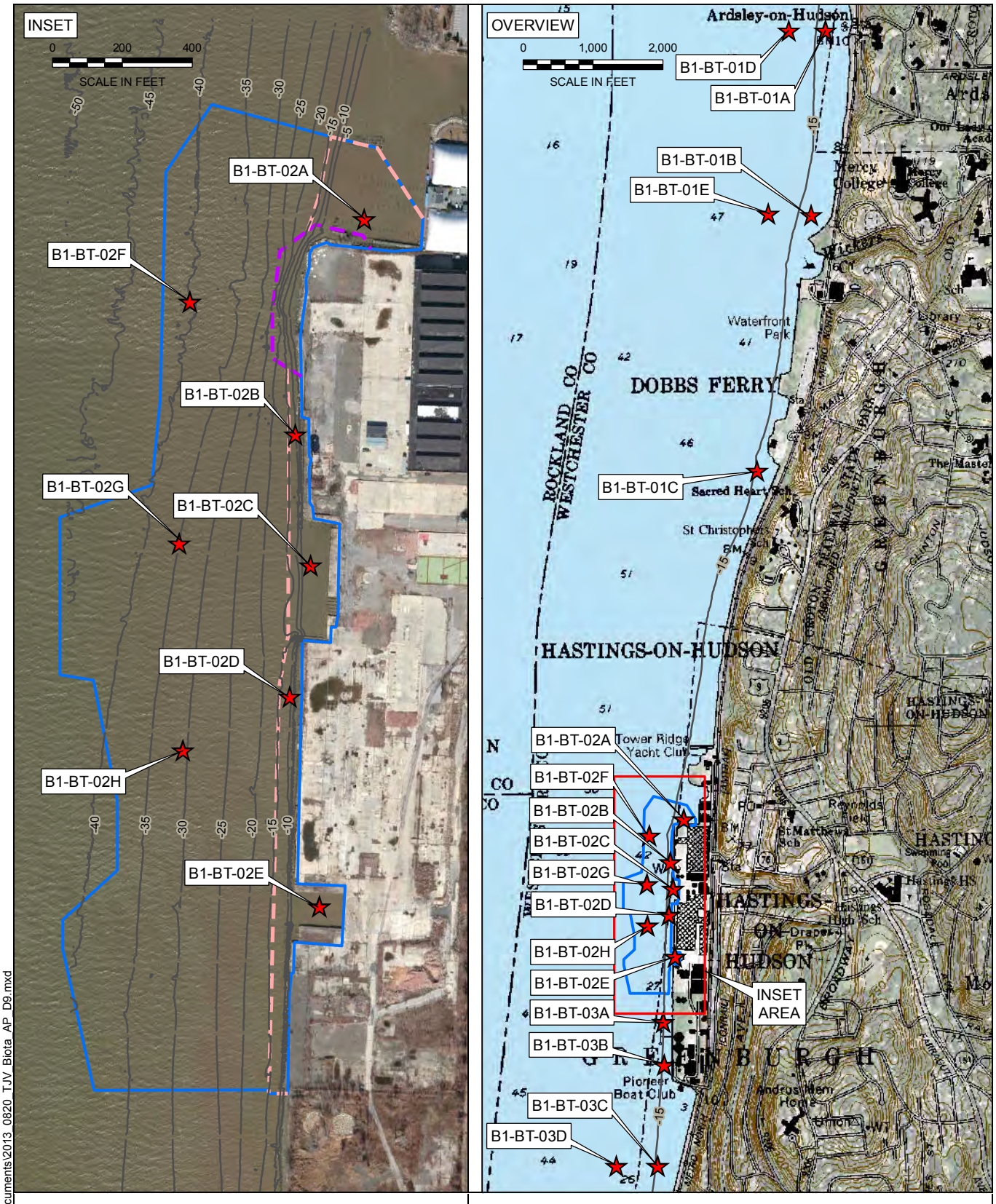


FISH AND SHELLFISH SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

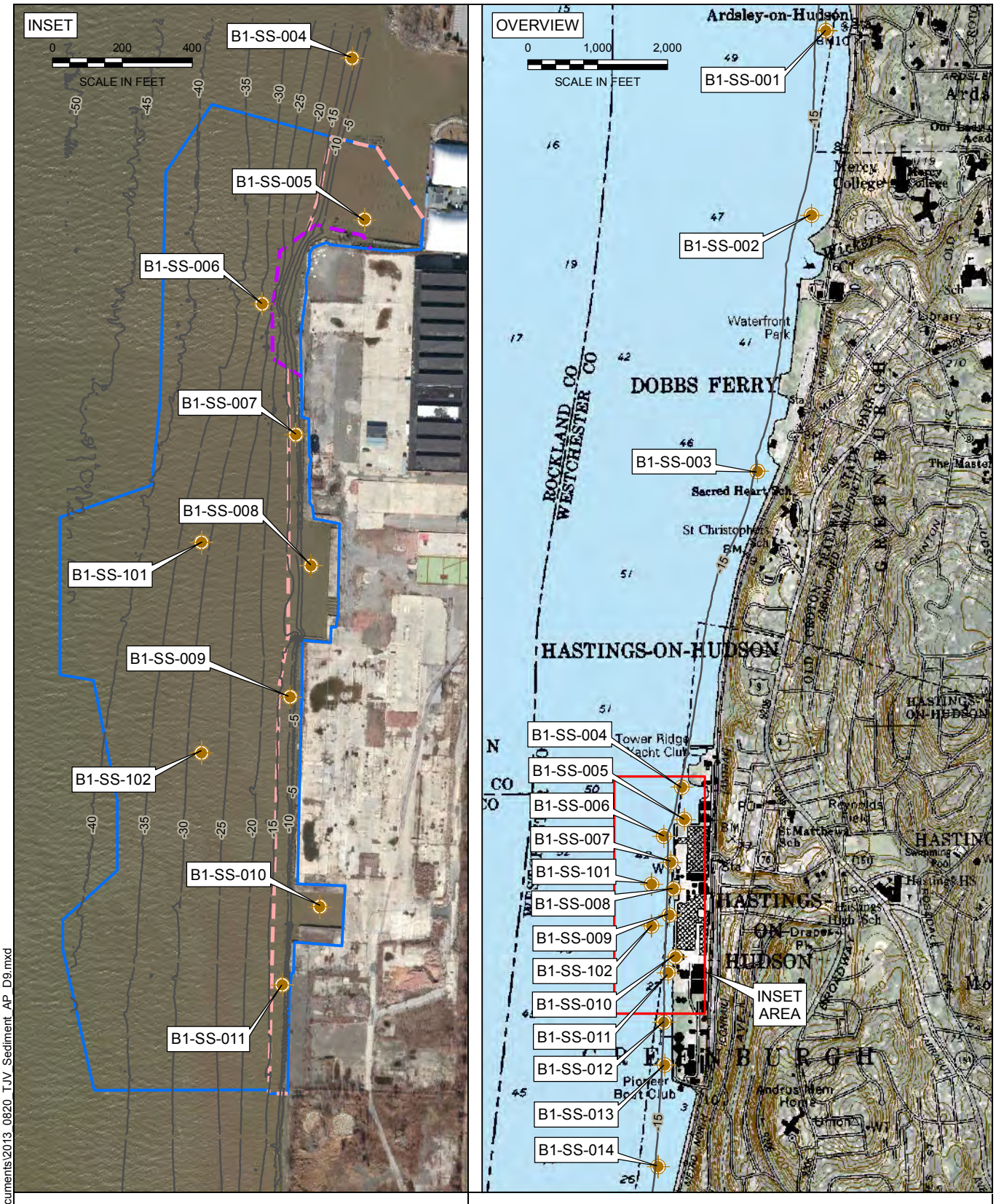
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINESAMPLING AND ANALYSIS PLAN - FISH AND SHELLFISH

SCALE: AS SHOWN
AUGUST 2013

FIGURE 3

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Biota_AP_D9.mxd



SURFACE SEDIMENT AND MACRO-INVERTEBRATE SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

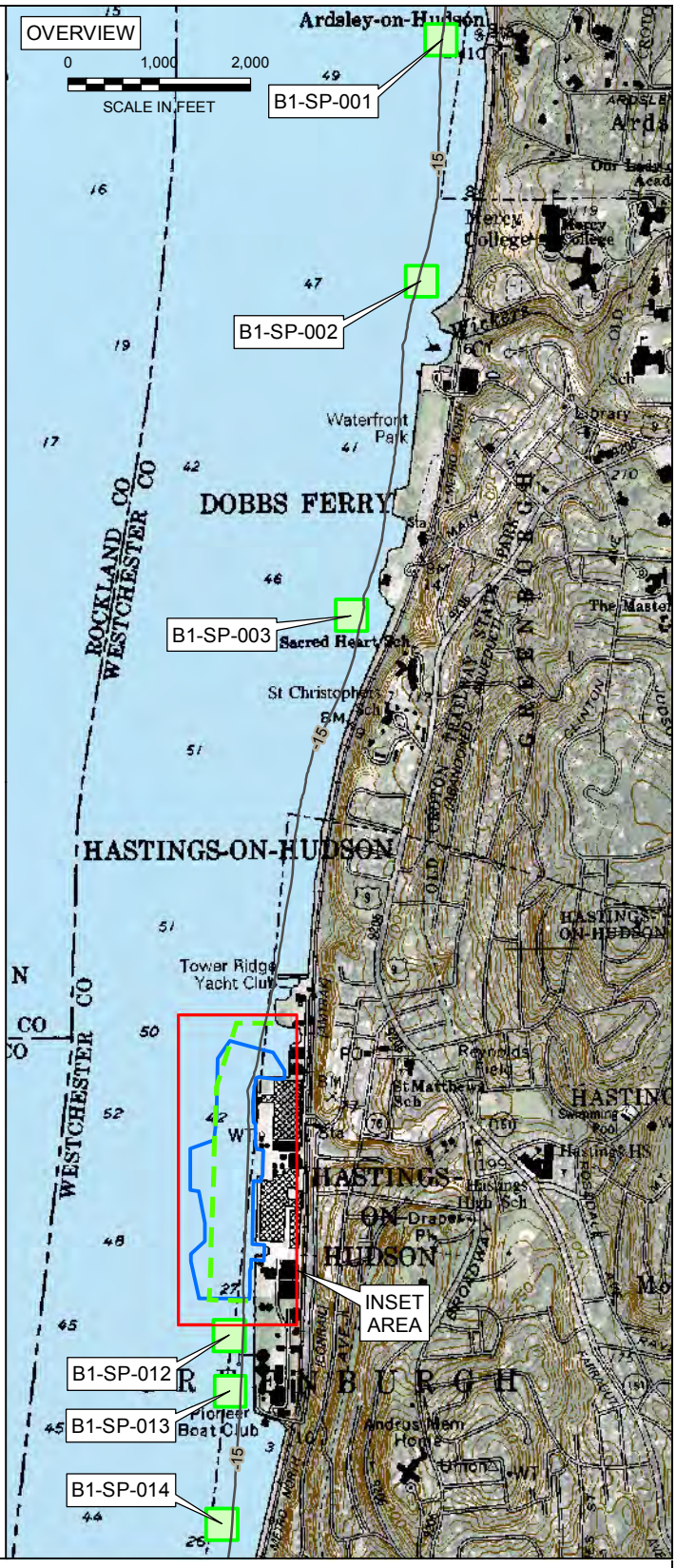
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE SEDIMENT AND MACRO-INVERTEBRATES

SCALE: AS SHOWN
AUGUST 2013

FIGURE 4

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Sediment_AP_D9.mxd



- HABITAT CHARACTERIZATION (SPI)
- LIMITS OF SPI GRID
- BATHYMETRIC CONTOUR
- SILT CURTAIN
- NORTHWEST EXTENSION
- OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

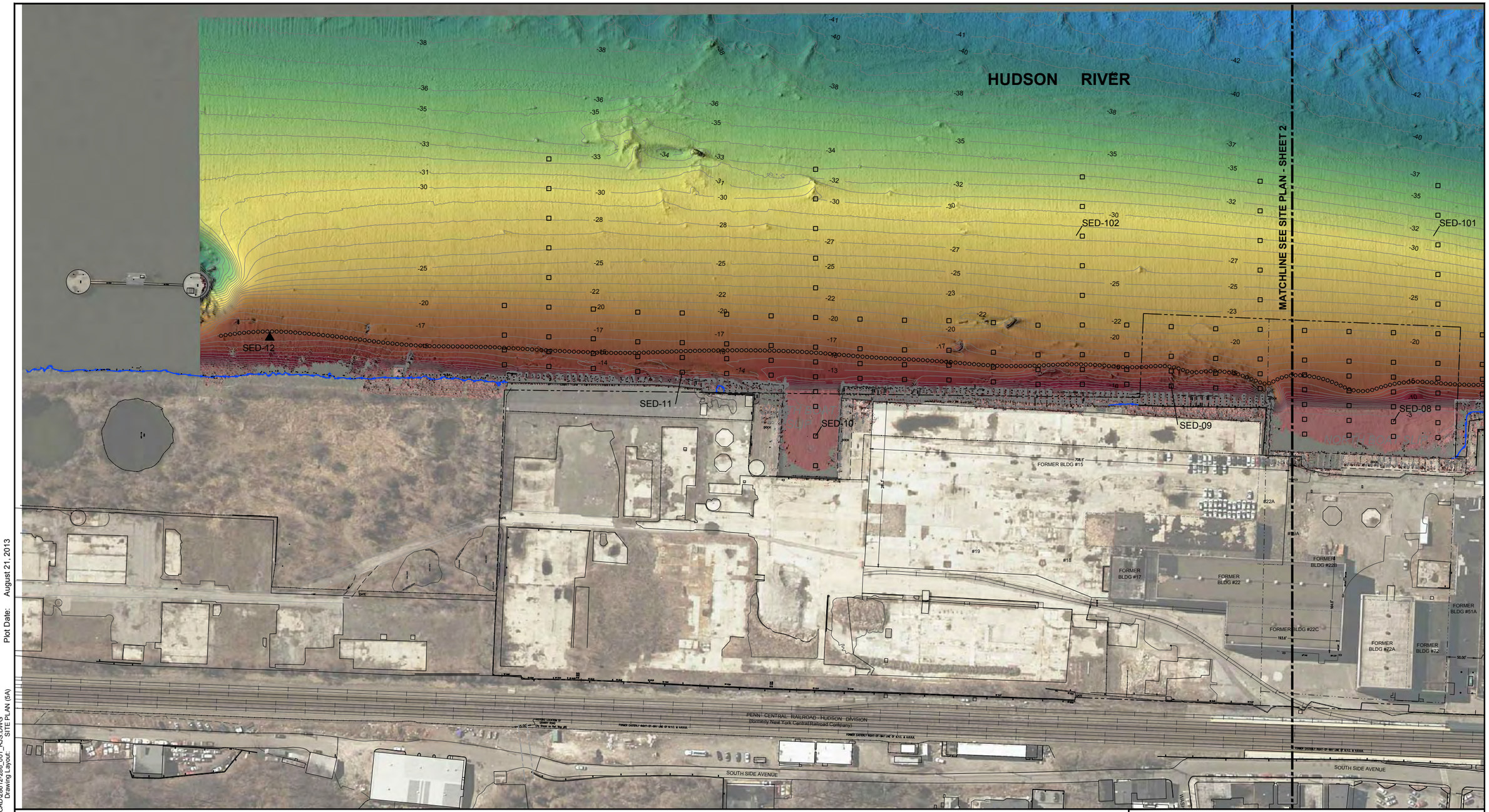
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - HABITAT CHARACTERIZATION (SPI)

SCALE: AS SHOWN
AUGUST 2013

FIGURE 5

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_SPI_AP_D9.mxd



Plot Date: August 21, 2013
Drawing Layout: SITE PLAN (5A)
G:\28612_HASTINGS\286\CAD\28612-286_001_RJS.DWG
Drawing Name: LUCIDO, SAM
Operator Name:

LEGEND

- PROPERTY LINE
- RAIL ROAD
- APPROXIMATE SPI LOCATION
- EL. - 15 FT. DEPTH CONTOUR
- NORTHWEST EXTENSION
- SED-12 ▲ SEDIMENT SAMPLE LOCATION AND NUMBER (SPI LOCATIONS INCLUDED AT THESE LOCATIONS)

NOTES

1. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
2. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
3. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
4. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

W S N E

0 80 160

SCALE IN FEET

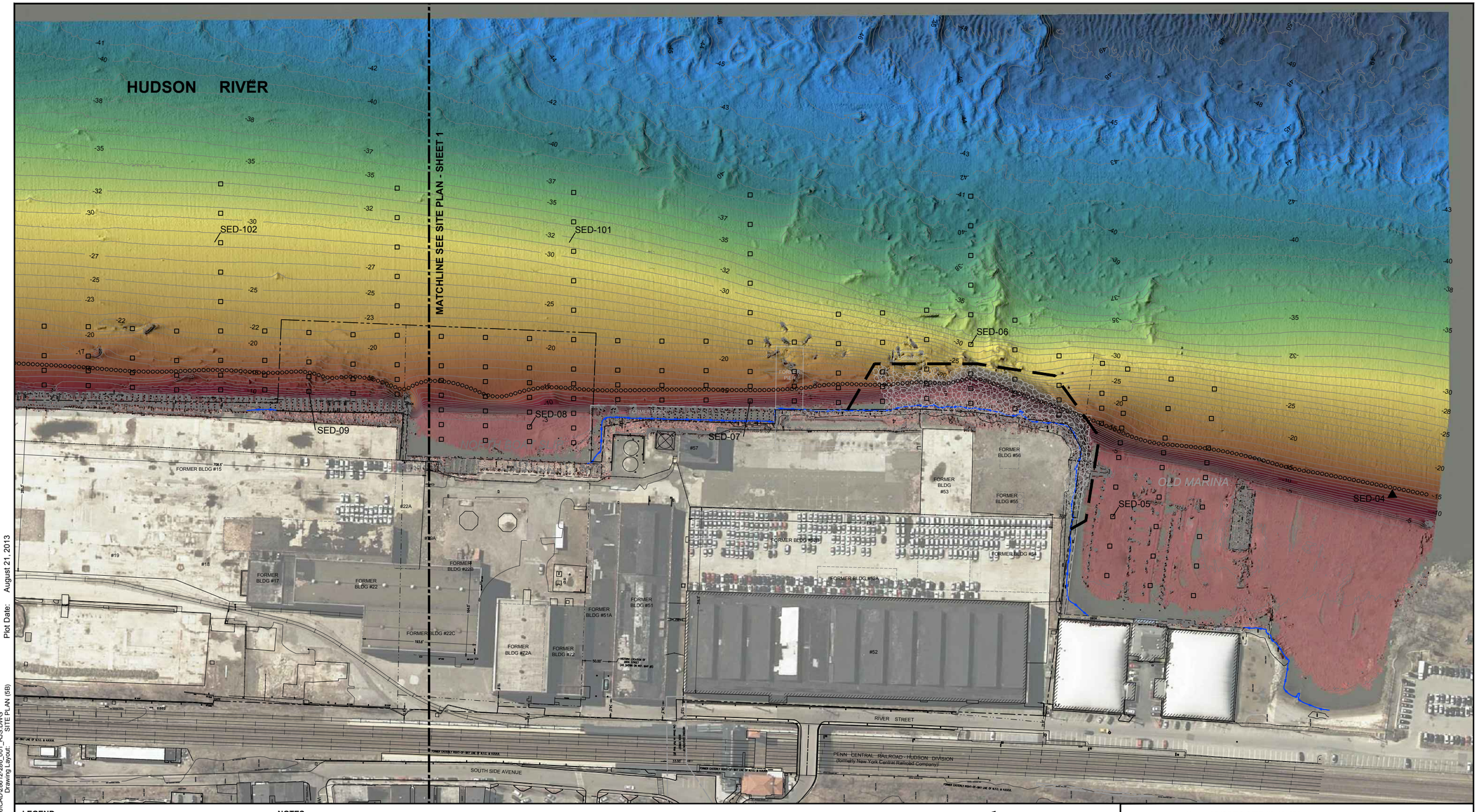
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SPI LOCATIONS SHEET 1 of 2

SCALE: AS SHOWN
APRIL 2013

FIGURE 5A



LEGEND

- PROPERTY LINE
- RAIL ROAD
- APPROXIMATE SPI LOCATION
- EL. - 15 FT. DEPTH CONTOUR
- NORTHWEST EXTENSION
- SED-04 ▲ SEDIMENT SAMPLE LOCATION AND NUMBER (SPI LOCATIONS INCLUDED AT THESE LOCATIONS)

NOTES

1. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
2. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
3. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
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W S N E

0 80 160

SCALE IN FEET

HALEY & ALDRICH

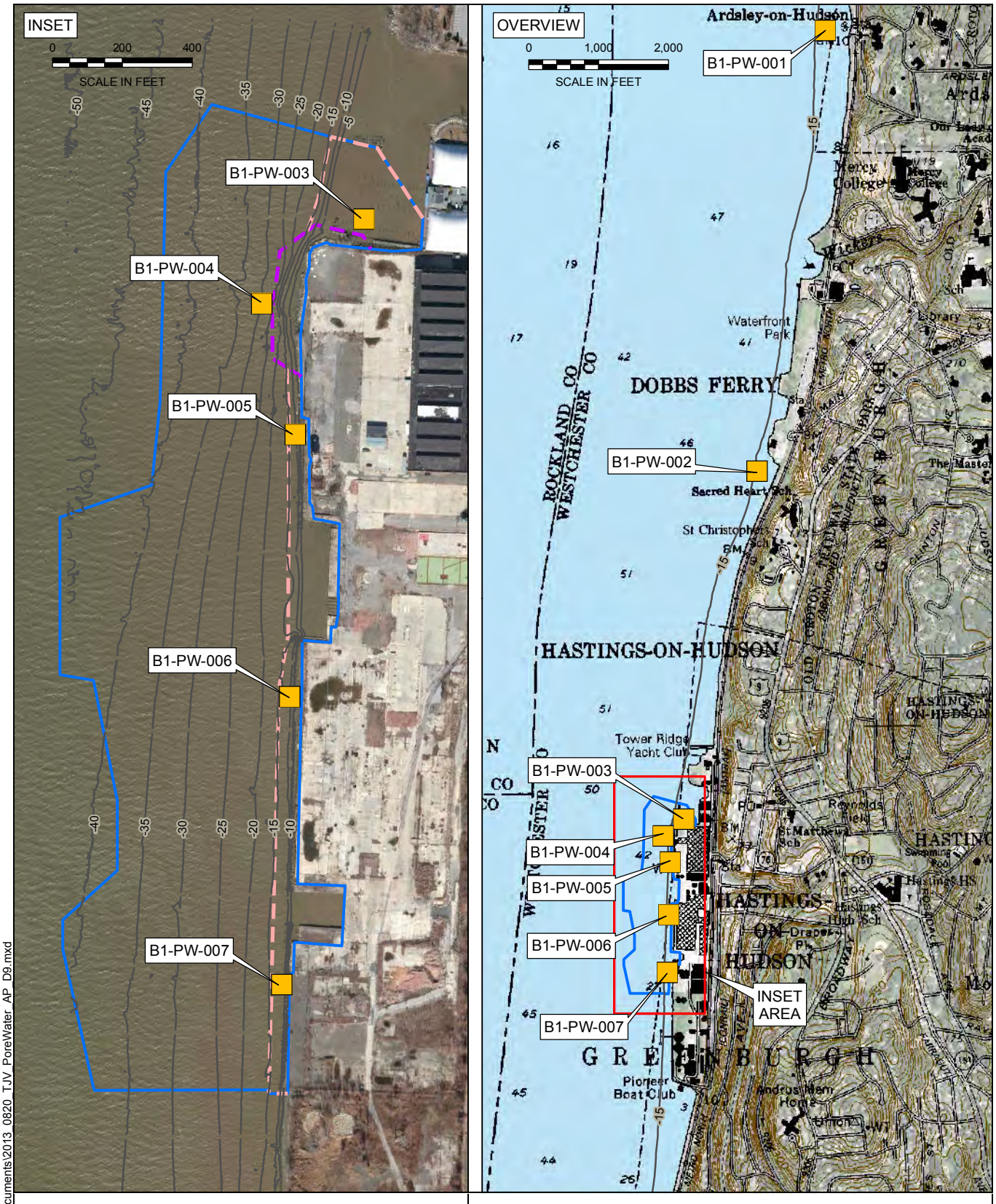
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SPI LOCATIONS SHEET 2 of 2

SCALE: AS SHOWN
APRIL 2013

FIGURE 5B

Plot Date: August 21, 2013
Drawing Layout: SITE PLAN (5B)
G:\28612_HASTINGS\286\CAD\28612-286_001_PJS.DWG
Drawing Name: LUCIDO, SAM
Operator Name:



POREWATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - POREWATER

SCALE: AS SHOWN
AUGUST 2013

FIGURE 6

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_PoreWater_AP_D9.mxd

APPENDIX G

PDI DATA SUMMARY REPORT

HALEY ALDRICH

HALEY ALDRICH

www.haleyaldrich.com

REPORT ON

PRE- DESIGN INVESTIGATION DATA SUMMARY REPORT
FORMER ANACONDA WIRE & CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

BY **Haley & Aldrich of New York**
Rochester, New York

FOR: **Atlantic Richfield Company**
Naperville, Illinois

File No. 28612
10 August 2015

10 August 2015
File No. 28612

Mr. Rick Mustico
New York State Department Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7014

Subject: Pre-Design Investigation Data Summary Report
Former Anaconda Wire and Cable Company
Hastings on Hudson, New York

Dear Mr. Mustico:

Haley & Aldrich of New York (Haley & Aldrich) is pleased to submit this Pre-Design Investigation Data Summary Report, prepared for the Former Anaconda Wire and Cable Company site located at 1 River Street, Hastings on Hudson, New York.

I, Wayne Hardison certify that I am currently a NYS registered professional engineer and that this Pre-Design Investigation Data Summary Report was prepared in accordance with the applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

PROFESSIONAL ENGINEER CERTIFICATION

Signature: Wayne Hardison

Name: Wayne C. Hardison, P.E.

Title: Vice President

Lic. State/#: NY #067080

Date: 10 August 2015

Engineer's Stamp

Please contact us if you have questions.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Wayne C. Hardison, P.E.
Vice President

c: Atlantic Richfield; Attn.: Paul Johnson

C:\Users\rjs\Desktop\2015-0810-wch-PDI DSR Cover.docx

Haley & Aldrich of New York
200 Town Centre Drive
Suite 2
Rochester, NY 14623
585.359.9000

10 August 2015
File No. 28612

Atlantic Richfield Company
150 West Warrenville Road
Naperville, IL 60563

Attention: Paul Johnson, P.G.

Subject: Pre-Design Investigation Data Summary Report
Former Anaconda Wire & Cable Plant Site
Hastings-on-Hudson, New York
Site No. #3-60-022

Paul:

The attached Pre-Design Investigation Data Summary Report has been prepared for submittal to the New York State Department of Environmental Conservation in accordance with the requirements of the Record of Decision dated March 2012 and the Remedial Design Work Plan dated July 2014.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Wayne Hardison

Wayne C. Hardison, P.E.
Program Manager

Enclosures

https://hank.haleyaldrich.com/sites/projects/28612/Shared Documents/324_PDI Completion/PDI Data Report/Text/2015_0727_PDI Data Report_Final.docx

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TABLE OF CONTENTS

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1. Introduction and Description of Activities

This report summarizes field investigations performed during the Pre-Design Investigation (PDI) for Operable Unit No. 1 (OU-1) and Operable Unit No. 2 (OU-2) State Superfund Site #360022 at 1 River Street, Hastings-on-Hudson, New York (Site), which was conducted between September 2013 and April 2015, and presents data collected during the PDI.

The PDI was performed in general accordance with the Remedial Design Work Plan (work plan), Former Anaconda Wire & Cable Plant Site, prepared by Haley & Aldrich of New York (Haley & Aldrich) for Atlantic Richfield Company (AR), dated July 2014. The work plan was prepared in accordance with the OU-1 ROD Amendment, and OU-2 ROD as well as the Amended Order on Consent dated November 6, 2013. Specifically, the on-shore (OU-1) subsurface delineation program was designed in accordance with the OU-1 ROD Amendment, and NYSDEC DER-10. The offshore (OU-2) sediment delineation program was designed in accordance with the OU-2 ROD. Other aspects of the PDI (i.e. geotechnical investigations, utility surveys, etc.) were completed in accordance with the work plan.

1.1 SITE LOCATION AND DESCRIPTION

The Site is located on the eastern bank of the Hudson River within the confines of the Hudson River Valley (Figure 1). The ground surface at the Site is relatively flat with ground surface predominantly ranging from approximately El. 3 to El. 11.

The Site consists of two Operable Units, OU-1 and OU-2. OU-1 is an upland area approximately 2,400 feet long by 500 feet wide. OU-2 is the area that extends westward into the Hudson River approximately 400 feet from the western OU-1 boundary, north into the Old Marina (approximately 300 feet north of the northwestern corner of OU-1), and approximately parallel to the southern property boundary (Figure 1). OU-1 and OU-2 boundaries are described in the Records of Decision (ROD) (NYSDEC, 2012). Site features as discussed in this report are depicted on Figure 2 for reference.

The Hudson River is considered a drowned-river estuary. The river is approximately 4,800 feet wide at the Site with a maximum depth of about 50 feet at midstream. There is no navigation channel specified at the Site's location along the river. Based on historical studies, the currents vary from about 2.2 feet per second (fps) on the flood tide (flowing upstream) to about 2.9 fps on the ebb tide (flowing downstream). Depending on wind direction and velocity, wave heights of 3 feet to 5 feet and wakes of passing vessels of 2.5 feet have been observed. During the winter, ice floes may accumulate along the eastern shore of the Hudson River when there is a strong west wind.

1.2 PDI DATA SUMMARY REPORT ORGANIZATION

Organization of the PDI Data Summary Report is described below.

Section 1 provides background information pertaining to regulatory framework, schedule of milestones, purpose of the work, and requested approvals from NYSDEC.
Section 2 summarizes activities completed as described in the work plan.
Section 3 summarizes results of the PDI.
Section 4 provides interpretation of extents of on-shore excavation and off-shore dredging based on data collected
Section 5 discusses data validation.

Section 6 describes health and safety, air monitoring, and waste management
Section 7 summarizes the work and conclusions

1.3 SCHEDULE

As described in the work plan, schedule milestones include:

- Complete Pre-Design Investigation 270 days following approval of the work plan (approved on 14 July 2014, field work completed on 9 April 2015).
- Submit an initial PDI Data Summary Report 120 days following completion of the PDI (10 August 2015).
- Submit the Preliminary Design 180 days following submittal of the approved Final PDI Data Summary Report (TBD).

Based on discussions with NYSDEC, approval of the Final PDI Data Summary Report is considered to mean incorporation of all NYSDEC comments on report content, and NYSDEC final approval of data completeness and the interpretation therein including dredge and excavation delineation. Preliminary Design would commence after this approval is completed since the data will be the basis of the design. It should also be noted that the completeness of the Preliminary Design may be contingent on potential comments from the EPA on the TSCA application or that Building 52 cannot be demolished and investigation of PCBs beneath the slab completed.

The schedule for Final Design, procurement of contractors and construction will depend on the timing and results of the review process. The schedule will be updated as necessary.

1.4 EXCEPTIONS

Additional PDI that is required within or adjacent to Building 52 post demolition and other data gaps identified herein or identified during design may impact the duration of the design or design review.

1.5 PURPOSE OF THE PDI FIELD WORK

Environmental and geotechnical data is required to form the basis for and complete the design of the remedy. Historic data has been generated and documented in the following documents.

- Conceptual Site Model (CSM) (Haley & Aldrich, 2008)
- 50% Design Report for Operable Unit No. 1, Haley & Aldrich (2006)
- Supplemental Northwest Corner Investigation Findings Report", Haley & Aldrich (2008)
- DNAPL IRM Recovery Well Installation", Haley & Aldrich (2010)
- Data Report on Riprap Field Investigation, Haley & Aldrich (2010)
- Geotechnical Data Report, Haley & Aldrich (2011)

This existing data was not sufficient to complete a detailed design of the remedy. Specifically, results of historical investigations did not provide adequate data to

- define excavation or dredge extents,
- design the Northwest Extension bulkhead wall or select its final alignment,

- design the sloped shoreline, or
- evaluate site features that will impact design and constructability (e.g. obstructions, outfalls, former sumps, etc.).

Therefore, based on historic site investigations and the remedy described in the RODs, a PDI was completed to collect detailed site data to support completion of the design. The scope of the PDI was developed based environmental and geotechnical data generated and reported in the documents referenced above, documented in the work plan, and documents listed in Table 1.
Activities required to complete the design are described in the work plan and are summarized in Section 2 of this document. During completion of the PDI, some modifications were made and were primarily due to field conditions (i.e. thick foundations or other obstructions at proposed investigation locations requiring offsets), and are documented herein.

1.6 PURPOSE OF THE PDI DATA SUMMARY REPORT

Completion of the PDI Data Summary Report is required to comply with the RODs and to begin the design phase. Interpretation of on-shore and off-shore delineation of Site related contaminants of concern present at concentrations that exceed removal requirements is required for design and is included herein. By submitting this PDI Data Summary Report, AR is seeking approval of this report in its entirety including recommended remedial actions described in Section 4 and conclusions described in Section 7.

2. Description of Activities

The approved scope of the PDI is contained within the Remedial Design Work Plan (work plan). Work plan elements were attached as eight appendices and include the detailed tasks of proposed work. Summaries of the PDI tasks, as found in the work plan appendices, are provided in this section of the report. Proposed locations and activities were adjusted based on field conditions or added per the work plan requirements. Where changes to the scope were significant, modifications are discussed in Section 3 along with the results.

The PDI is a supplemental investigation that builds upon previous work. A summary of historical site investigations completed prior to the current work plan is provided in Table 1.

2.1 PHASE 1 PDI INVESTIGATION

2.1.1 Ground Penetrating Radar Survey

The intent of this survey was to use Ground Penetrating Radar (GPR) as a screening tool in OU-1 to identify subsurface features (such as basements, sumps, and large voids) that might require further delineation during other PDI activities. The first step in the field program was a pilot-test survey which evaluated GPR in several areas prior to finalizing the site-wide program. The pilot-test GPR results were evaluated for their ability to assess concrete slab thickness, the potential presence of shoreline voids, and other subsurface features and structures. Results of the pilot-test survey were inconclusive or did not agree with known information, likely due to field conditions and limitations in the technology, and as a result the full scale test was removed from the scope. More details are discussed in Section 3.2 of this document.

2.1.2 Surveys

Topographic Survey

Documentation of topography is required to complete the design, therefore, the existing topography map of the Site was updated. Additionally, subsurface features identified by the GPR survey and historical references were also surveyed. Results are discussed in Section 3.1. Figures in this report have been updated to include the new survey, where appropriate.

Bathymetric Survey

In addition to the upland survey completed as part of the PDI, an updated bathymetry survey was completed as part of the baseline sampling for the development of a Site Management Plan. The purpose of the off-shore bathymetry survey was to document bathymetric and shoreline elevations. This was completed in accordance with a separate work plan approved by NYSDEC (letter dated 10 October 2012). Results are included in Section 3.1 for reference.

2.1.3 Groundwater Level Data

The existing groundwater model will be updated as part of the design. The model will be used to evaluate the interaction of remedial components with site groundwater and the Hudson River. To update the groundwater model, groundwater elevation data at the Site was collected to depict groundwater fluctuations inland and near the Hudson River. These data were obtained by deploying

data loggers in existing and newly installed monitoring wells (new monitoring wells are discussed in Section 2.2 of this report). Data logger deployment locations were chosen to monitor hydraulic gradient and tidal influence in the Fill and Basal Sand hydrostratigraphic units. Sixteen data loggers were planned to be installed in existing wells and in seven (7) newly installed groundwater monitoring wells (discussed in Section 2.2 of this document). Newly installed monitoring wells and associated data logger deployment were completed as part of the OU-1 Supplemental Investigation. Results and any work plan adjustments are discussed in Section 3.2

2.2 OU-1 SUPPLEMENTAL INVESTIGATION

Data collected in this section includes various topics or planning for OU-1 related information required for design of the remedy that will supplement the contamination investigation.

2.2.1 Groundwater Levels

Monitoring Well Installation

Seven monitoring wells - five shallow wells screened in the Fill unit and two deep wells screened in the Basal Sand unit - were installed as part of the investigation. Well locations were chosen to better understand tidal influences on the groundwater beneath the site, variation of hydraulic gradients east of the Hudson River, and for the purpose of updating the groundwater model. Hydraulic gradients and tides are important parameters which will affect groundwater modeling in support of the design. Results and any work plan adjustments are discussed in Section 3.2.

Transducer Deployment

As described in Section 2.1.3, additional monitoring wells were installed and pressure transducers deployed to supplement the existing groundwater monitoring network. Results and any work plan adjustments are discussed in Section 3.2.

2.2.2 Groundwater Sampling

One round of baseline groundwater sampling has been completed to monitor shallow groundwater prior to remedial construction, and allow for evaluating the long term effectiveness of the remedy. The approach for the baseline groundwater sampling program is to sample shallow-screened wells both upgradient of areas without known PCB and/or site specific metal impacted soils greater than remedial criteria and at locations down gradient or proximate to PCB, lead or other suspected sources of soil contamination, to establish a baseline for groundwater quality.

Baseline groundwater sampling was completed for three upgradient wells (PDMW-16S, PDMW-20S and PDMW-19S located on the site) and three wells located on the western portion of the site (MW-01A, MW-05 and MW-09). Sampling will be continued annually until the beginning of construction. Initial results and any work plan adjustments for groundwater sampling are discussed in Section 3.2; results for additional yearly sampling events will be included in future submittals.

2.2.3 Void Assessment

There are several areas of the Site, especially in areas adjacent to the Hudson River, where evidence of soil erosion or subsidence beneath concrete slabs, including voids, have been observed. An understanding of the depth and extent of void spaces beneath the slabs is required to provide data to

estimate fill quantities for support of the design and to better define conditions which will affect the future construction. These potential void areas were assessed using a hammer drill to access the subsurface, and the soil horizon with respect to the slab was observed. Results and any work plan adjustments are discussed in Section 3.2.

2.2.4 Subsurface Anomalies

There are several areas of the Site in which subsurface anomalies (e.g. subsurface features that require special consideration during design such as vaults, sumps, NAPL, etc.) were identified during previous investigations and during routine site work. Investigation of these areas was required to assess existing subsurface voids, evaluate potential residual impacted material which may be present in the subsurface or within the features, and to better define conditions which will affect the future construction. The following subsurface anomalies were identified and investigated as part of the OU-1 Supplemental Investigation:

- Potential basements
- Potential NAPL
- Potential production wells
- Building 17 concrete slab

Additionally, during completion of subsurface investigations or monitoring well installations, evidence of LNAPL was observed at or near the water table at on-shore locations of the Site where observations had not been previously identified. These additional potential NAPL areas were further evaluated to determine the presence of PCBs. Results and any work plan adjustments are discussed in Section 3.2.

2.2.5 Outfall Investigations

Outfalls that conveyed water from Building 52 to the Hudson River were further investigated to determine potential PCB impacts to the subsurface resulting from former operations within the building. Previously, test pits were completed at several locations to expose some of the suspected Building 52 outfall pipes. Previous data and OU-1 pre-delineation excavation data were incorporated into the current Building 52 outfall investigation program. Based on review of the data from historical evaluations and analytical data one potential Building 52 outfall was investigated via test pit to assess the potential presence of PCBs source material. Results and any work plan adjustments are discussed in Section 3.2.

2.2.6 Existing Underground Utilities

During prior site investigation activities, presence of storm sewers and other utilities were identified but not well defined with respect to alignments and outfall locations. During the PDI, the presence, location, and general condition of existing utilities were evaluated with a focus on active utilities that originate offsite and pass through the site. This information will be incorporated into the design and may impact future easements and potential discharge permits. Data collection to support the civil portion of the design focused on confirming the locations of existing active utilities that will either remain on site after completion of the remedy, be removed or abandoned during completion of the remedy, be re-located in support of an approved site redevelopment plan, or be protected during construction.

The investigation used a combination of historical document review, direct visual observation (e.g. opening manholes), invert surveying, and utility tracer equipment to refine locations of utilities. Results and any work plan adjustments are discussed in Section 3.2.

2.3 OU-1 EXCAVATION PRE-DELINEATION

Excavation has been selected as the preferred remedy to address on-shore soils that exhibit concentrations of PCBs greater than removal criteria. Locations where excavation is required is based on historic data collected during the RI, previous OU-1 50% Design, and other Site activities, which are described in the Conceptual Site Model (CSM) (Haley & Aldrich, 2008). However, these data were not sufficient to delineate the extents of excavation required to meet the remedial action goals in the OU-1 ROD. A pre-excavation delineation sampling program was described in the work plan to fully define the required horizontal and vertical limits of removal prior to construction. This is of particular importance since many of the excavations may extend below the water table and will require shoring or other methods to support the excavation. Lead hotspot locations have an excavation depth limit of 2 feet, so offset borings were only completed to determine the horizontal distribution of subsurface impacts as specified in the ROD.

The approach to delineate the extents of excavation on shore was to first identify existing data points with PCBs or lead at concentrations that exceed removal requirements and then delineate. At select locations, new borings were completed to resample existing locations if existing data was incomplete (i.e. total boring depth was not sufficiently deep) or the historical sample intervals needed to be refined. In order to establish excavation limits to bound lateral and vertical extents of PCBs or lead present greater than removal criteria), additional borings were completed. Borings were completed sequentially as follows; 'offset' borings were completed adjacent to existing data points and, where required, 'step-out' borings adjacent to 'offsets', and additional 'step-outs' adjacent to initial 'step-outs' (and so on). Samples were collected and analyzed at specific depth intervals based on existing and new analytical data as well as "horizons" (as described in DER-10) based on spikes in contamination levels. Results and any work plan adjustments are discussed in Section 3.3.

The excavation pre-delineation program investigated PCB and Lead exceedances through sampling that satisfies the minimum requirements set forth in DER-10 guidance (i.e. one sample per 30 linear feet of sidewall, one sample per 900 square feet of excavation bottom, and horizon samples where applicable). The investigation used information known about each point and generally fell into one of three categories as described below:

- An "isolated" existing data point is an existing data point location in which no other data or subsurface features existed in the vicinity which exhibited the potential to be a source of PCBs.
- A "linear feature" is one or more data points with a criteria exceedance that may be associated with a utility or other liquid-conveying site feature (e.g. outfalls and associated pipe bedding from Building 52 that are potential PCB source areas).
- A "cluster" location is an area where multiple existing data points with criteria exceedances exist within close proximity to one another in an area greater than 900 square feet.

Sampling was completed at 2 foot intervals. In order to determine excavation limits, samples were analyzed that correspond with the bottom of excavation, bottom of sidewalls, and, where applicable,

horizons. Sampling depths corresponded to the maximum excavation depth as defined in the OU-1 ROD:

- Up to 9 feet below ground surface (bgs) in the Northern Shoreline Area
- Up to 12 feet bgs in other areas
- Up to 2 feet bgs in Lead hotspot locations

Results and any work plan adjustments are discussed in Section 3.3.

2.4 EXTENSION ALIGNMENT INVESTIGATION

The selected remedy includes a bulkhead that extends into the Hudson River in the Northwest Off-shore Area. Probes were completed to evaluate the presence or absence of PCB Material (PCBM) and obstructions along the alignments of the proposed bulkhead extension wall and deadman. PCBM has been classified in three different physical states. The variation in the physical state of the material represents weathering changes since the material was released. As defined in the OU-2 ROD:

- Liquid PCBM or Dense Non-aqueous Phase Liquid was observed to be amber in color, is less viscous than the Semi-Solid or Trace PCB Material and is highly to moderately mobile, readily flowing into monitoring wells when it is encountered.
- Semi-Solid PCBM was generally observed to be more viscous than Liquid PCB Material and appeared grayish-brown in color. Based on visual observations, Semi-Solid PCBM has a sticky, string-like consistency and not as fluid or capable of migration.
- Trace PCBM, when observed, consists of small quantities of PCB Material intermingled with the soil and was more difficult to visually observe. Like the Semi-Solid PCBM, the Trace PCBM had a string-like consistency (small strings and hair-like filaments) and appeared grayer in color.

Confirmation that semi-solid or liquid PCBM does not exist along the alignment is important since this material could be dragged down to the Basal Sand aquifer during construction of the wall. Confirmation that obstructions do not exist along the alignment is important since they could impede the ability to construct the wall.

Results and any work plan adjustments are discussed in Section 3.4.

2.4.1 Off-shore Probes

The off-shore probes were drilled using a barge mounted drilling rig. Casing was advanced through the sediment and split spoon samples were advanced ahead of the casing. Samples and sampling equipment were examined for PCBM. The split spoons were advanced either to the top of the Marine Silt, or until drilling action indicated the potential presence of riprap.

A phased approach of probing was used in the vicinity of the planned extension wall with probe locations drilled at approximately 30-foot centers. Probe locations were moved outboard where semi-solid PCBM or significant obstructions were identified.

Results and any work plan adjustments are discussed in Section 3.4.

2.4.2 On-shore Probes

The purpose of the probes drilled adjacent to the north property line was to determine presence or absence of PCBM and obstructions, as discussed above, with the added objective of determining whether the wall alignment can potentially be moved south to coincide with the property line along the Old Marina. Due to the sloped shoreline and tidal conditions, it was not possible to position a drill rig directly at property line. Therefore, the approach for PDI was to position the drill rig on-shore as near as possible to the property line, and complete angled borings to evaluate conditions at the property line. The property line probes were spaced about 15 to 30 feet apart.

Two more areas of on-shore probes were also completed:

- Deadman: Due to the fact that the deadman to anchor the sheet pile bulkhead will be required to penetrate into the Basal Sand, a line of PCBM probes was also advanced along the approximate deadman alignment.
- Extension wall continuation: A continuation of the bulkhead extension wall is required at the transition between the higher elevation upland created by filling behind the wall, versus the lower elevation sloped shore just south of the Northwest Extension area. This continuation of the bulkhead extension wall may also need to be driven to the Basal Sand.

Results and any work plan adjustments are discussed in Section 3.4.

2.5 DEEPWATER INVESTIGATION

The goal of this investigation is to examine a targeted portion of the Deepwater Area where PCBs in excess of 50 milligrams per kilogram (mg/kg) are known or suspected to be present in order to gather data for making decisions regarding design of the remedy. The Deepwater Area of the site is shown in Figure 2. This investigation addressed areas in the proximity of existing exceedances and areas between historical borings EB-10 and EB-14, as shown in the work plan. The sediment sampling area was comprised of approximately 4 acres located about 300 feet off-shore of the Site. Results will be used to further understand lateral and vertical PCB contamination, within specific Deepwater Areas.

The sampling program employed a 160-foot triangulation grid for investigation areas and an 80-foot triangulation grid for refinement of extents of contamination. The tasks are outlined below:

- Resampling - Resample Specific Locations (PCBs > 50 mg/kg)
- Investigation Unit Sampling - Area Between EB-10 and EB-14
- Decision Unit Sampling - Including Step-out Investigation (as needed)
- Variability of Sediment Concentrations

Results and any work plan adjustments are discussed in Section 3.5.

2.6 OFF-SHORE PRE-DELINEATION

The purpose of the Off-shore Pre-delineation program is to provide supplementary data for making decisions regarding design of the remedy, relative to extent of sediment that will be required to be dredged. The existing sediment data collected during the RI and other Site activities was sufficient for

completion of the feasibility study. However, additional data is necessary to further delineate areas for potential remedial action, including the extent of dredging, especially in the areas referred to as backwater areas consisting of the South Boat Slip, North Boat Slip and the Old Marina. Investigations were completed in Nearshore Area, Backwater Areas, and Northwest Area within the Deepwater Area adjacent to the Northwest Off-shore Area. This area of the site is shown in Figure 2.

As described in the work plan, vibracore samples along with ponar grabs for surface samples were collected from barge or boat-mounted equipment. Resampling was also conducted at some previously sampled locations to confirm existing data where PCB and metals concentrations greater than remedial criteria were detected.

Sampling intervals were used to delineate PCB and metal concentrations in targeted sediment deposits which may require dredging and to document the sediment concentrations that will be left in place after remedial action. An initial 0 to 0.5 ft depth interval (below mudline, or bml) was sampled to correspond to historical sampling depths and analyses along with a 0.5 to 1 ft interval. One-foot incremental sampling intervals were conducted up to 6 ft bml to refine the PCB and metals contaminant distribution data and residual concentrations as applicable. One two-foot interval sample (i.e. 6-8 ft bml) was analyzed as needed to document sediment concentrations that will be left in place after remedial action (i.e. documentation samples).

Results and any work plan adjustments are discussed in Section 3.6.

2.7 GEOTECHNICAL EXPLORATION

Several phases of geotechnical investigations have been performed at the Site in the past and some data gaps were identified. New geotechnical explorations were included in the work plan to address the data gaps and provide additional stratigraphy and laboratory testing data in several areas: in the general vicinity of the planned deadman anchor, in the general vicinity of the planned Northwest Extension bulkhead wall, and in the off-shore area between the North Boat Slip and the South Boat Slip. The information collected will be used for bulkhead and deadman design, excavation support design, design of the sloped shore, and general site geotechnical analysis (e.g., settlement).

Additionally, some test pits were performed at various locations around the Site where support of excavation (SOE) may be used during remedial construction (i.e., excavation locations that are 6 feet bgs or greater). The purpose of the test pits was to gather information on soil conditions, excavation effort, existing foundations and potential obstructions that could affect the design or construction of the SOE walls.

Results and any work plan adjustments are discussed in Section 3.7.

2.8 BENCH TESTING

The design will include management of saturated soils and sediment, treatment of water during construction and long-term treatment of groundwater as part of a groundwater management system. To support these design tasks, a series of bench-scale treatability tests have been performed to allow identification of effective treatment technologies and design parameters for the potential full scale system. These technologies include:

- Solids Dewatering: Methods and basic design parameters for the dewatering of water-laden excavated soils and dredged sediments;
- Stabilization: Methods and basic design parameters for the stabilization of onsite excavated soils / sediment to be re-used on-site for various purposes;
- Construction Water Treatment: Methods and basic design parameters for the potential treatment of various metals and PCBs in water generated during construction activities (e.g., solids dewatering supernatant and on-shore excavation dewatering); and
- Long-Term Groundwater Treatment: Initial testing of treatment methods for residual groundwater to support screening technologies and provide basic design parameters for further testing, if needed.

Results and any work plan adjustments are discussed in Section 3.8.

3. Investigation Results

3.1 PHASE 1 PDI INVESTIGATION

The objective of the Phase 1 PDI was to:

- Locate subsurface features using GPR
- Locate site surface features and update topographic survey
- Install groundwater level data loggers in select monitoring wells.

The collected data will be used to:

- Design subsequent subsurface structure investigations
- Document current site topographic conditions
- Support the groundwater model.

3.1.1 Ground Penetrating Radar Survey

As indicated in the work plan, a pilot test GPR survey was conducted during April and May 2013 by Naeva Geophysics, Inc. and observed by Antea Group (Antea). The results of the GPR survey indicated that significant voids were present throughout the site. Based on these results, a subsequent voids survey was completed at select locations as recommended by the GPR contractor to calibrate the GPR data interpretation with actual measured data. The results of the voids surveys (which are described in Section 3.2.1) did not corroborate the conclusions of the GPR. Therefore, the site-wide GPR survey was removed from the scope. The GPR report is provided in Attachment A.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.1.2 Surveys

Topographic Survey

Upland survey activities were performed by Wendel Architecture, Engineering, Surveying & Landscape Architecture, PC (Wendel). The survey was completed by a licensed New York State surveyor in May 2013 and June 2014 in general accordance with the work plan. The updated survey is provided in Figure 3.1A.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

Bathymetric Survey

Bathymetric survey activities were completed by Ocean Surveys, Inc. (OSI) in December of 2012 as part of the baseline sampling for the development of a Site Management Plan. The bathymetric survey data was recorded using an interferometric swath bathymetry system utilizing a multibeam echosounder and generated a bathymetric surface with a contour resolution of 1-foot. The updated bathymetry contours are shown on Figure 3.1B.

3.1.3 Groundwater Level Data

Groundwater level data discussed in Section 3.2.1 of this report.

3.2 OU-1 SUPPLEMENTAL INVESTIGATION

The objective of the OU-1 Supplemental Investigation was to obtain additional information to support the final remedy design. The following tasks were performed:

- Install groundwater wells and deploy pressure transducer data loggers;
- Sample site groundwater for the purpose of establishing a baseline;
- Evaluate voids adjacent to the shoreline;
- Investigate subsurface anomalies;
- Investigate Buildings 15 and 52 outfalls; and
- Confirm and/or document significant existing underground utilities.

3.2.1 Groundwater Levels

Monitoring Well Installation

Shallow monitoring wells were installed in the Fill stratigraphic unit and deep monitoring wells were installed in the Basal Sand stratigraphic unit. Monitoring well locations installed for transducer deployment are shown on Figure 3.2A and logs are provided in Attachment B. Monitoring wells were installed during November 2013 by Cascade Drilling, L.P. of Schofield, Wisconsin (Cascade Drilling) using minisonic drilling techniques as generally described in the work plan.

The results of the water level monitoring will be incorporated into the site groundwater model during design of the remedy. This will lead to a better understanding of tidal influences on the groundwater beneath the Site and variations of hydraulic gradients east of the river.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities, as described below.

Modifications

Actual monitoring well installation locations for the purpose of transducer deployment deviated from the approved work plan due to field conditions as described below.

- PDMW-20D: this well was proposed to be installed and screened within the Basal Sand. During completion of the well, the Marine Silt confining layer was not apparently encountered. Based on the description of the 10 to 15 ft interval, the Marine Silt at this location may have been located in the 5 to 10 ft interval which was documented as no recovery. Because of the potential absence of the Marine Silt in this location, a well was not installed. Even without installation of this well, the number and locations of deep groundwater monitoring wells is sufficient to complete the groundwater model. Therefore a well was not installed at this location.

- PDMW-23S: during installation of this well in the proposed location, a four foot void (which appeared to be a subsurface structure) containing black liquid was encountered. The hole in the

structure was plugged, the borehole abandoned, and the well was relocated. The void was added to the subsurface anomalies investigation. This is further discussed in Section 3.2.4 of this report.

Transducer Deployment

Groundwater level loggers were deployed for up to 18 months, starting in May 2013 (as described in Table 3.2A) with final removal in November 2014. Flush mount wells in the groundwater elevation monitoring network were retrofitted with protective stick-up casings to eliminate potential influences on data due to surface water leaking into the well. Modifications to the proposed transducer deployment locations within the existing monitoring well network were made due to field conditions (eight locations were removed from the network because they could not be located or had unsatisfactory ground conditions as described below). Based on discussions with NYSDEC, three wells were added to the network to provide coverage sufficient to meet the objectives of the work plan. Locations of monitoring wells in which transducers were installed are shown on Figure 3.2A, and a summary of data logger results is provided in Table 3.2B. Hourly groundwater level measurements are not included in this report but will be incorporated in an updated groundwater model for the Site.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities, as described below.

Modifications

Actual monitoring wells used for transducer deployment were modified as described below.

Network locations	**Removed from network**	**Added to network**	**Reason removed/added from network**
PDMW-17S	X		Unable to locate
PDMW-15	X		Well underwater due to settling concrete slab adjacent to shore line
MW-07	X		Well underwater due to settling concrete slab adjacent to shore line
PDMW-13	X		Unable to locate
MW-14A	X		Unable to locate
MW-04	X		Well no longer exists
PDMW-19S/D	X		Well located in high traffic area, stick up riser could not be installed
MW-08	X		Well located in high traffic area, stick up riser could not be installed
PDMW-13A		X	Added to provide adequate coverage
PDMW-15A		X	Added to provide adequate coverage
MW-09		X	Added to provide adequate coverage

3.2.3 Groundwater Sampling

As indicated in the work plan, the first yearly groundwater sampling was conducted by Antea in August 2014. Results from PDMW-19S (upgradient well) indicated concentrations of PCBs that exceeded drinking water standards. Based on the upgradient exceedance, approval was given by NYSDEC for the 8 October 2014 request to install an additional monitoring well (PDMW-27S) in the northeast corner of the site, which was sampled in December 2014. Sample results from PDMW-27S also indicated an exceedance of drinking water standards for PCBs. Evaluation of the need for additional well installation is deferred to the future so that additional yearly sampling can be considered in identifying the appropriate action. Refer to Attachment B for boring log and well construction details. Refer to Table 3.2C and Figure 3.2B for groundwater sampling results and locations of the wells.

As indicated in the work plan, baseline groundwater sampling will continue after the PDI annually until the beginning of construction. Results for future events in 2015 and beyond will be included in future submittals.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities, as described above.

3.2.4 Voids Assessment

As indicated in the work plan, an assessment of potential voids was conducted to obtain a better understanding of the depth and extent of void spaces beneath the various surface cover concrete slabs. The investigation was completed during September, November and December of 2013 by American Environmental Assessment Corp. (AEAC) and overseen by the Antea Group (Antea) under the direction of Haley & Aldrich. Void extents were evaluated at approximately 127 locations along portions of the western shoreline including concrete slab areas that contained existing holes that exhibited voids and in concrete slab areas that were recommended by Naeva Geophysics, Inc. based on the initial GPR pilot test.

Refer to Table 3.2D and Figure 3.2C for details of the void survey results and probe locations. Results of the voids survey are described briefly below.

- Expansive voids do not appear to be present in areas where existing holes are present in the surface concrete slab.
- Initial GPR survey results that indicated large areas containing significant voids were generally not corroborated by the confirmation probes completed during the voids assessment.
- Based on the GPR survey, large voids do not appear to be present in areas along the shore line.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.2.5 Subsurface Anomalies

As described in the work plan, the potential presence of other relevant subsurface features (such as sumps and pits, potential NAPL locations) were investigated using a combination of techniques. Field work included coring the surface slab and using a down hole camera, lifting subsurface covers and lids

for visual and photo-ionization detector (PID) inspection, and/or completion of soil borings. Results of the investigation and any modifications to the work plan are described below. Refer to boring logs in Attachment B and Figures 3.2D and 3.2E for additional details and locations of the investigations.

Potential Basements

During past site investigations, three subsurface structures (possible vaults or basements) have been identified. During the PDI, these areas were investigated from the ground surface by removing large cover plates to make observations or by using a downhole camera lowered into a smaller existing hole in the concrete. The below grade spaces were not physically entered because of the risks associated with entering a confined space with unknown hazards. In all locations, subsurface structures appeared visually to be in good condition (i.e. cracks in the walls were not observed) and environmental impacts were not observed by visual, olfactory or PID data.

Potential NAPL

During past site investigations and based on information from onsite personnel, two areas of "Potential NAPL" were identified (adjacent to the South Boat Slip and east of the North Boat Slip). These locations were investigated during the PDI and are shown on Figure 3.2D. Minisonic drilling techniques were used to evaluate the potential presence of NAPL at these two locations. Oily material was observed at the investigation location adjacent to the South Boat Slip. NAPL was not observed at the location east of the North Boat Slip. Soil samples that coincided with oily material were submitted for analysis of PCBs. Results indicate PCB results in these areas are less than 10 mg/kg and further subsurface investigation is not required. Refer to Table 3.2E and Figure 3.2D for details.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities, as described below.

Modifications

Based on clarified information from site personnel, the boring to investigate the "Potential NAPL" location which was previously identified in the work plan to exist north of the South Boat Slip was moved south of the South Boat Slip as shown on Figure 3.2D.

Additionally, in other borings completed as part of the PDI (OU-1 Supplemental Investigation and Extension Alignment Investigation; Sections 3.3 and 3.4), evidence of separate phase product was identified at depths that generally coincided with the water table in several areas of the site. Soil samples were collected from select borings at intervals coinciding with material generally described in boring logs as an oily material, oil-like material, or separate phase product to evaluate whether observed LNAPL is a PCB source (e.g. greater than 500 mg/kg). LNAPL was generally reported as being present in the form of oily droplets on the soil, water, or on the sampling bag.

Locations that exhibited evidence of LNAPL are shown on Figure 3.2E, data resulting from field observations is shown in Table 3.2E, and boring logs are located in Attachment B.

With the exception of one location (WB-301), PCB concentrations within or adjacent to borings containing evidence of LNAPL indicated that the material observed is not a source of high concentration PCBs. WB-301 indicated a concentration of PCBs in the soil matrix of 890 mg/kg. This boring was

collected during the OU-1 Supplemental Investigation and is included in Section 3.3 of this report. Interpretation of results and evaluations of data are discussed in Section 4.1.

Potential Production Wells

As indicated in the work plan and based on review of historical site drawings, two production wells were identified as being potentially present at the Site at the locations shown in Figure 3.2D. A public records search was performed to identify the locations of potential production wells and to determine whether additional production wells may be present on the site. The results of a public records search confirmed two production wells were potentially located on the site but these records did not provide enough information to locate the two identified site wells. The records also did not indicate the presence of additional wells. Site reconnaissance was completed to locate the wells based on locations shown on historical documents. One of the two potential production wells was located by AEAC and a determination was made that, while the well was disconnected from service, it had not been abandoned. The Westchester County Health Department and NYSDEC were notified and the well was properly abandoned. The well research documentation and well abandonment report are located in Attachment C. The second well could not be located. Further investigation is not required in this area.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

Building 17 Pad

As described in the work plan, a historic concrete core sample (completed in 2009) exhibited concentrations of PCBs greater than 10 mg/kg, at the location shown on Figure 3.2D. Historic drawings indicated the presence of former wastewater conveyances (trenches) in this former building; however historic soil borings had not been completed in this area. During the PDI, two soil borings were completed adjacent to these former trenches. Analytical results from both soil sampling locations indicated the presence of PCBs greater than 10 mg/kg. Based on these results, the area was added to the OU-1 Excavation Pre-delineation investigation, and offsets and step outs were completed to delineate PCBs in this area. This pre-delineation program and its results are described in Sections 2.3 and 3.3, respectively.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.2.6 Outfall Investigation

During the PDI, five potential Building 52 outfalls and one outfall from Building 15 were evaluated through historical document review and field investigations. The Building 52 outfall investigation was performed in July 2014 by AEAC and Haley & Aldrich. Results of the outfall investigation are described below (from north to south) and shown on Figure 3.2F.

- Outfall 5 – Based on results of the OU-1 Excavation Pre-delineation Investigation (Section 3.3 of this report), the entire outfall alignment will be removed during remedial construction; therefore further investigation via test pitting of this outfall was not completed.
- Outfall 4 - Investigation of this outfall included a document review to confirm the location of the outfall alignment. Previous document reviews indicted a single discharge pipe from Building 52, which was the basis of the work described in the work plan. However, subsequent additional

historical document review, completed as part of this investigation, indicated the presence of two pipes in close proximity in the vicinity of Outfall 4. Based on this review, one outfall appears to be sewerage from the Former Building 53 wash house and extends from the east edge of Building 53 west to the Hudson River (labeled Outfall 4 on Figure 3.2F). This does not appear to be an outfall associated with process waste from Building 52 and a test pit was not completed. A second outfall appears to extend from the former locker rooms within Former Building 52A, west to the edge of the Building 52 pad, then south to connect with Outfall 3, which may have been a historical source of PCBs. This outfall has been labeled Outfall 3A as shown in Figure 3.2F and is further described below.

- Outfall 3A – As described above, Outfall 3A was identified based on a historical drawing review. The sufficiency of OU-1 Excavation Pre-Delineation investigation data to characterize this pipe will be evaluated during the design. Therefore a test pit was not completed at this newly identified outfall.
- Outfall 3– Based on results of the OU-1 Excavation Pre-Delineation investigation (Section 3.3 of this report), the entire outfall alignment will be removed during remedial construction; therefore an investigation via test pitting of this outfall was not completed.
- Outfall 2 – A test pit (TP-6) was completed on 1 July 2014 by AEAC and Haley & Aldrich, to locate the potential Building 52 Outfall 2. Three pipes were identified in the test pit depths ranging from 14 inches bgs to 4.5 feet bgs. During completion of the test pit, the bedding associated with the pipe identified as being the most likely Building 52 outfall was sampled; results indicated the presence of PCBs at 56 mg/kg. This area was subsequently added to the OU-1 Excavation Delineation investigation program, which is discussed in Section 3.3 of this document. Refer to the test pit log in Attachment B for details. The location of TP-6 is shown on Figure 3.2F.

  Further historical document evaluation indicated that two of the pipes encountered in TP-6 (the southernmost 6-inch cast iron pipe and northern 4-inch cast iron pipe identified on the log) appear to be associated with the abandoned cooling water system from equipment located in Building 52B. This system was installed in 1956 (after cessation of PCB manufacturing operations at the site) and therefore these outfalls are not associated with process wastewater. Additional historical document evaluation indicated the following regarding the third pipe (identified at the time the test pit as the potential Building 52 outfall):

  - This pipe appeared in historical documents in 1918 and appears to be connected to a building labeled as “water closet”.
  - The location of the Former Saturant House is north of the former “water closet” which was identified in the 1918 drawing.
  - Design drawings associated with Building 59 (Saturant Pump House) did not indicate discharge lines.

  Based on these observations and historical document review, the piping designated as Outfall 2 identified in OU-1 Supplemental Investigation is likely not a Building 52 outfall.
- Outfall 1– Based on results of the OU-1 Excavation Pre-Delineation investigation (Section 3.3 of this document), the entire outfall alignment will be removed during remedial construction; therefore an investigation via test pitting of this outfall was not completed.

- Outfall 6 – The footprint of this outfall is likely within the excavation that will be required during remedial construction to establish the sloped shore in this location; therefore OU-1 Supplemental Investigation was not completed.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. The sufficiency of OU-1 Excavation Pre-delineation data to characterize Outfalls 3 and 3A will be evaluated during design of the remedy.

3.2.7 Existing Underground Utilities

The presence, locations, and general condition of select existing utilities were evaluated for the purposes of determining utilities that pass through the site from offsite origins. Additionally, abandoned public utilities or public utility connections no longer in service were also documented, if observed. The focus of this investigation was to confirm the locations of existing, active utilities that will remain on site after completion of the remedy. These utilities will be evaluated during the design of the remedy to determine which existing utilities will be removed or abandoned during completion of the remedy, be re-located in support of site redevelopment plans, or be protected during construction. Collected data will be incorporated into the design and may form the basis for future easements and storm discharge permits.

Investigation activities were completed in July and October of 2014 by Haley & Aldrich personnel with support from Antea, AEAC and Wendel. The investigation used a combination of historical document review, direct visual observation (e.g. opening manholes), invert surveying, and utility tracer equipment to refine utility locations. The locations of the utilities that were investigated are shown on Figure 3.2G.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities, as described below.

Modification:

According to historical site plans, there is a storm water pipe which originates from Washington Street, extends east-west across the Site below Former Buildings 22 and 15, and outfalls to the Hudson River. During the PDI, attempts that were made to locate this pipe were unsuccessful. Because it is well documented on historical plans, there is enough data regarding the existence of this storm water utility to move forward with the design.

3.3 OU-1 EXCAVATION PRE-DELINEATION

The purpose of the OU-1 soil sampling was to pre-delineate on-shore excavation areas which will be completed during remedial construction. Excavation limits were delineated in both lateral and vertical directions, to determine where PCBs and/or lead exceeded removal criteria. Establishing excavation limits (area and depth) in this manner will allow for a focused design, reduce uncertainty and increase worker safety during construction, as well as reduce changes in the field which may result from completing excavation confirmation sampling during remedial construction.

For the ease of identifying delineation areas, the site was divided into three sections: north, northwest, and south as described below. Boring locations are found on Figures 3.3A and 3.3B.

1. The southern portion of the site extends from the southern property boundary northward to the south wall of Former Building 51 between the eastern property boundary and the Hudson River. Investigation areas in this portion of the site are denoted with an "S" in the boring naming convention and are generally to be excavated per the removal criteria up to a maximum depth of 12 ft. except in the Northern Shoreline Area. The Northern Shoreline Area is depicted on Figure 2 of the OU-1 ROD Amendment.
2. The northern portion of the site extends from the south wall of Former Building 51 northward to the northern property boundary between the eastern property boundary and the west edge of the Building 52B pad. Investigation areas in this portion of the site are denoted with an "N" in the boring naming convention and are to be excavated per the removal criteria up to a maximum depth of 12 ft except in the Northern Shoreline Area.
3. The northwest portion of the site is entirely within the Northern Shoreline Area extending from the water tower north to the north boundary of the northwest corner between the western property boundary (Hudson River) and the west edge of the Building 52B pad. Investigation areas in this portion of the site are denoted with a "W" in the boring naming convention and are to be excavated per the removal criteria up to a maximum depth of 9 feet.

The first round of soil sampling associated with the excavation pre-delineation program was conducted between September and November 2013. Based on the results, subsequent sampling events (May through July 2014 and October through November 2014) were conducted to further define vertical and lateral extents of PCBs present greater than removal criteria. Based on the suspected presence of utilities, some exploration locations were pre-cleared to 6.5 feet bgs using an air knife or hand auger to avoid encountering utilities with drilling equipment. Samples that were required to be collected within intervals that were pre-cleared were obtained using a hand auger. Pre-clearing and associated sample collection was completed by AEAC and Antea. Drilling was completed by Cascade Drilling, using a mini-sonic drilling rig model BL 100C. Continuous sampling was generally performed in 2 foot segments using a 4-inch diameter core sampler.

Soil samples were collected at two foot intervals to a maximum depth of 14 feet bgs. Sampling locations were modified as required due to field conditions (i.e. thick foundations, obstructions, utilities, etc.) as was provided for in the work plan. Soil borings were visually examined for evidence of impacts (i.e. visual, olfactory or PID observations) and physically described on the boring logs immediately after extraction. Collected samples were then placed in laboratory grade glassware, packed on ice, and typically transported to the laboratory via courier, with accompanying chain of custody forms. Sampling equipment was decontaminated between samples and drilling equipment was decontaminated between borings. Borings were backfilled to the ground surface with sand upon completion of drilling. Details are provided on the individual boring logs in Attachment B.

Approximately 500 borings were completed and over 2,500 samples were collected and analyzed to determine PCB and/or lead concentrations including quality control samples analyzed to comply with the QAPP. Results of the PCB soil analyses are summarized in Table 3.3A and maximum PCB concentration results are shown on Figure 3.3A. Historical PCB soil results are provided for reference in Table 3.3B. Results of lead soil analyses are included in Table 3.3B and shown on Figure 3.3C. With respect to lead, as required in the ROD, additional samples were collected for copper and zinc analysis from borings that established the final excavation limits and are summarized in Table 3.3D. Interpretation of the on-shore PCB and lead OU-1 Excavation Pre-Delineation Program results are discussed in Section 4.2.

As described in the work plan, select existing historical data points were resampled due to insufficiency of data. These locations are summarized in the following table and results replaced the historical data for the purposes of pre-delineation.

Historic Location	Resample Location	Resampled with 2 ft Intervals
PDSB-36 (5-7 ft)	SG-002	4-8 ft
EE-04 (5-7 ft)	SG-006	4-8 ft
HB-01 (0-1 ft)	SA-002	0-2 ft
SB-093 (0-2 ft) (4-8 ft)	SP-001	0-2, 4-8 ft
SB-082 (6-10 ft)	NB-001	6-10 ft
SB-153 (2-6 ft)	NC-004	2-6 ft
SB-079 (2-6 ft)	NH-001	2-6 ft
SB-084 (2-14 ft)	NI-001	2-14 ft
SB-154 (2-6 ft)	NN-002	2-6 ft

In addition to those locations specifically resampled as part of the work plan, two sampling locations were considered to be resamples while conducting fieldwork. These PDI locations were in the immediate vicinity of existing locations and replace previous results for the purposes of delineation and interpretation in Section 4.2.

Existing Location	Resample Location	Resampled (2 ft Intervals)
PDSB-16 (4-6)	NF-101	4-6 ft
SP-102 (0-2)	SP-201	0-2 ft

The work was performed in compliance with procedures described in the work plan except as detailed below. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities and were generally the result of field conditions. Modifications are detailed below.

Modifications:

Based on borings completed as part of the OU-1 Supplemental Investigation (Section 3.2), two additional investigation areas were added to the Excavation Pre-Delineation program as described below.

- Results of the pipe bedding samples at Outfall 2 indicated the presence of PCBs greater than removal criteria (as discussed in Section 3.2).
- Results of soil samples beneath Building 17 indicated the presence of PCBs greater than removal criteria (as discussed in Section 3.2).

Samples collected for other PDI activities were analyzed for some locations and the results were used for excavation pre-delineation.

- PD2-GL-002
- PDMW-22S and PDMW-24S
- PDMW-22S-01, PDMW-22S-03, PDMW-22S-04, PDWM-22S-10

Initial sampling locations were completed on-shore as described in the work plan except for the following:

- Proposed locations not completed where the drill rig could not access the locations (e.g. proximity to property boundary, retaining wall, shoreline, buildings, etc.) Locations with no result as shown on Figure 3.3A and include: SA-101, SA-102, SA-109, SA-110, NR-001, NR-101 to 103, NC-110, NF-101, NF-103, WA-155, and WE-101 to 104.
- Proposed locations not completed because they became obsolete based on results of other sampling. Locations with no result as shown on Figure 3.3A and include: SG-003, SG-005, NB-101, NB-102, NC-106, NC-107, NC-109, NC-111 to 113, NH-102 to 104, WA-109, WA-111, WA-150, WA-151, WD-101 to 103 and intervals of NC-102.
- Proposed locations not completed because they were deferred based on anticipated construction activities associated with an upgraded sanitary force main. Locations with no result as shown on Figure 3.3A and include: NO-001, NO-101, and NO-102.
- Samples not completed or not completed to full depth based on the presence of potentially active utilities that could not be pre-cleared. Some of these samples became obsolete based on sampling locations added to the program. Locations include: SM borings and some NC borings.

Similarly, offset and step-out sampling locations were completed on-shore as described in the work plan except for the following:

- Step-out locations not completed where the drill rig could not access the locations (e.g. proximity to shoreline). Locations include: west of SR and SI locations.
- Inadequate soil recovery due to concrete and sampling could not be completed: NH-102, NH-103, NH-104, NH-303, NH-317, and SQ-302
- Delineation of exceedances remaining incomplete are discussed in Section 4.2 (see Figure 3.3A) and include the following:
    - Area around Job Trailers
    - Areas adjacent to Building 52
    - Vicinity of SS and SM locations

Additional pre-delineation sampling may be completed in these areas after structures are moved (i.e. site job trailers), demolished (i.e. Building 52), or upgraded (i.e. sanitary force main). The design will specify requirements for confirmation or documentation sampling during construction for areas without complete pre-delineation.

PCB sample analysis hold time specified in the QAPP was conservatively specified as six months. However, the analytical method guidance allows holding times of up to approximately one year after collection. Based on the extensive nature of the pre-delineation process and extended timeframe of the sampling events, some hold times were exceeded at some locations. Specifically, some samples were released after the QAPP-specified six month hold time but within one year after collection. Refer to Section 5.2 for further information.

3.4 EXTENSION ALIGNMENT INVESTIGATION

The purpose of the PCBM and obstruction probes was to evaluate the presence of both PCBM and obstructions along the alignments of the proposed bulkhead extension wall and deadman. To

accomplish this, a phased approach of land and water based probes was completed in the vicinity of the proposed bulkhead extension wall and deadman.

The 2013 probes were performed in a phased approach, as described in the work plan. In 2014, additional off-shore probes were performed in select locations to better define areas where 2013 probes encountered obstructions, or where PCBM data gaps remained.

The explorations performed for the extension alignment are described in the following sections.

3.4.1 Off-Shore Probes

2013 Probe Explorations

Thirty water-based probes (locations designated WP) were drilled during October and November 2013 at the locations shown on Figure 3.4A. The probes were drilled by Cascade Drilling using a track mounted drilling rig that was operated from a barge. The barge was owned and operated by Northstar Marine, Inc. (Northstar) of Clermont, New Jersey. Monitoring of the test borings was conducted by Haley & Aldrich personnel.

The drilling barge was positioned over the drill-hole using a GPS unit on the drilling rig. The barge was held in position by two spuds but was free to move vertically with the tide level. Sampling depth control was achieved using tide boards and tape measurements to mudline within the casing. Tide board water level was monitored and corresponding adjustments to the drill string length were made during drilling, to account for the changing tide level. Surveyed tideboard elevations were then used to relate sampling depth to elevation.

The probes were advanced using rotary wash (mud rotary) drilling methods. Soil sampling was performed using a 3-in. diameter split-spoon sampler driven ahead of the casing with an automatic hammer. Sampling was generally performed continuously (i.e., at approximately 2 ft intervals) where possible, except that when obstructions were encountered, a roller bit was used to advance the boring and no samples were obtained within that interval. When PCBM was observed, bag samples were collected, transferred to shore, and stored for future observation by NYSDEC representatives. Otherwise, samples were not retained and were discarded after recording observations on the boring log. In some instances, glass jar samples were collected where petroleum-like odors were detected. Details are provided on the individual boring logs in Attachment B and Figure 3.4A.

The probes were generally terminated at least 5 ft below top of Marine Silt depending on whether obstructions or semi-solid PCBM were encountered. Sampling equipment was decontaminated between samples and drilling equipment was decontaminated between borings. Probes were grouted to the mudline with cement bentonite grout upon completion of drilling. Locations of the water-based probes are shown on Figure 3.4A, and a summary of the probe explorations is provided in Table 3.4A.

Results of the probes are described briefly below. Refer to the individual boring logs, Table 3.4A, and Figure 3.4A for details.

- Five probes encountered semi-solid PCBM;
- Six probes encountered trace PCBM;
- No liquid PCBM was encountered;

- Four probes encountered refusal on wood and/or riprap obstructions; and
- Petroleum-like odor was also observed at some locations, which generally coincided with probes where PCBM was observed.

2014 Probe Explorations

Eleven additional water-based probes (also designated WP) were drilled in August 2014 by Cascade Drilling. The probes were drilled with a track mounted drilling rig that was operated from a jack-up barge owned and operated by Northstar. The probes were completed as a follow up to the 2013 explorations, to further explore the areas where data gaps concerning PCBM presence and/or obstructions existed. The probes were monitored in the field by Haley & Aldrich personnel. Logs of the 2014 water-based probes are provided in Attachment B.

The probes were performed similarly to as described for the 2013 probes, except that because a jack-up barge was used, elevation corrections related to the changing tide were not required.

Seven of the 2014 water-based probes encountered obstructions at various depths. The obstructions encountered consisted of probable concrete, riprap, rubble, and cobbles, as interpreted by the driller based on drilling action. In most cases, the roller bit was able to be advanced through the obstructions. When refusal was encountered, an alternative location was completed to better define the obstruction. No PCBM was observed. Refer to the individual boring logs, Table 3.4A, and Figure 3.4A for details.

2014 Vibracore Explorations

Vibracore sampling consists of a vibrating mechanism called a "vibrahead" attached to a core tube, which is configured with a 4 in OD steel core barrel with 3½-in. ID Lexan (plastic) clear liner material. The core tube is vibrated into sediment and aided by the force of gravity to collect a sediment core to the target depth or refusal. When the core tube is pushed to completion, the vibracorer is turned off, and the core tube is withdrawn with the aid of hoist equipment.

Vibracores were drilled in the Old Marina to obtain PCBM information as close as possible to the property line. Probes using a drilling barge were not possible in this area, due to the access restrictions (such as the low draft, and the presence of the existing piles and dock structures). The vibracores were advanced using a small vessel which was able to gain closer access to the shoreline, compared to a drilling barge.

Eight vibracore explorations, designated VC-1A, VC-2B, and VC-4A to VC-9A, were drilled in the area of the Old Marina during October 2014. Two vibracore explorations, designated VC-311A and VC-311B, were drilled in the west area of the extension alignment as part of the off-shore pre-delineation PDI activities which are described in Section 3.6. The locations of the vibracores are shown on Figure 3.4A and individual logs are provided in Attachment B.

The vibracores were drilled by CR Environmental of East Falmouth, Massachusetts using vibracore equipment mounted on a 26-ft aluminum work boat. The vibracores extended to depths ranging between 9 to 20 ft below mudline. Sampling equipment was decontaminated with alconox soap between samples and a new acrylic liner was used for each sample. Haley & Aldrich personnel observed and documented the samples obtained from the vibracore explorations.

Results of the probes are described briefly below. Refer to the individual boring logs, Table 3.4A, and Figure 3.4A for details.

- Two vibracores along the extension wall alignment encountered semi-solid PCBM;
- None of the vibracores along the Old Marina encountered PCBM; and
- No liquid PCBM was encountered.

Findings

Figure 3.4A shows the currently assumed bulkhead wall and deadman anchor alignment, based on the results of the probe explorations completed in 2013 and 2014. The exploration markers are color-coded depending on the conditions encountered (e.g., blue for trace PCBM, gray for no PCBM or obstructions).

Note that the potential alignment shown on Figure 3.4A passes through VC-311B, where semi-solid PCBM was observed to a depth of 8 ft. It also passes through some locations where obstructions were encountered. The current assumption is that excavation of PCBM and obstructions is feasible in these locations and could be removed prior to construction of the bulkhead. The preference is to avoid further outboard alignment adjustments while avoiding obstructions and PCBM.

The PCBM and riprap probes were performed in general accordance with the procedures described in the work plan, and no significant variances were made. Based on the findings of the extension alignment investigation, a corridor has been identified where no PCB Material (either as DNAPL or semi-solid), or major obstructions exist. Therefore the objective of the work plan has been met, for the western portion of the alignment. Along the Old Marina, explorations were limited by the physical site access restrictions (such as the existing piles and dock structures). The Preliminary Design will identify any additional information that may be required prior to construction or additional data collection that may be planned during construction.

The potential wall and deadman alignments, while sufficiently defined for design (at least along the western edge), are still subject to change during Final Design and construction, based on construction tolerances and actual conditions encountered (such as large obstructions which may exist but were not located during the pre-design explorations).

3.4.2 On-Shore Probe Explorations

Seventeen land-based probes (locations designated LP and PLP) were drilled along the approximate deadman and extension wall continuation alignments, and along the north property line, to detect visual evidence of PCBM.

The property line probes were drilled south of the property line at a 59 degree angle from the horizontal, except for PLP-4 which was drilled at a 25 degree angle from the horizontal. The location and angle of each probe was determined with the objective that the Fill/Marine Silt interface would be encountered about 5 feet inboard from the location of the wooden bulkhead that is suspected to exist along the property line (i.e., the geometry was chosen with the objective to investigate the Fill/Marine Silt interface as close as possible to the property line, without drilling through the existing bulkhead which is thought to exist at the property line and may be acting as a barrier to PCBM migration toward the north.)

The probes were drilled by Cascade Drilling using a mini-sonic drilling rig model BL 100C. Continuous sampling was generally performed in 5 ft segments using a 4-in. diameter core sampler. Samples were examined and logged by Haley & Aldrich personnel immediately after extraction. The probes were drilled during October and November 2013. Logs for the on-shore probes are provided in Attachment B.

Results of the probes are described briefly below. Refer to the individual boring logs, Table 3.4B, and Figure 3.4A for details.

- Six probes encountered semi-solid PCBM;
- Three probes encountered trace PCBM; and
- No liquid PCBM was encountered.
- Petroleum-like odor and/or oily material (two locations) were observed at some locations, which mostly did not coincide with the probes where PCBM was observed.

Drilling equipment was decontaminated between borings. Borings were grouted to the ground surface with cement bentonite grout upon completion of drilling.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.5 DEEPWATER INVESTIGATION

The purpose of the deepwater sediment sampling was to gather additional data where PCBs in excess of 50 mg/kg are known or suspected to be present, for making decisions regarding remedial action and to provide information for delineation of potential dredge areas. This investigation addressed areas in the proximity of existing exceedances and areas between existing borings EB-10 and EB-14, and used a phased approach to refine contamination extents to further understand lateral and vertical PCB contamination, within specific regions of the Deepwater Area, as shown on Figures 3.5A through 3.5F.

Fifty vibracore explorations were advanced during August and September 2014 at the locations shown on Figures 3.5A through 3.5F. The ponar and vibracore explorations were advanced by CR Environmental using an aluminum work boat fitted with winch operated ponar and vibracore equipment and field screening. Sampling and observations were performed by Haley & Aldrich.

The vibracore vessel was positioned over the drill-hole using a DGPS unit on the vessel. The vessel was held in position by a three point anchoring system. Sampling depth control was achieved using tide boards and a depth sounder to mudline (top of sediment surface). Sampling locations were modified as required due to field conditions (i.e. obstructions, current, etc.) as was provided for in the work plan.

Prior to the advancement of borings, where required, a surface sediment sample was collected using a petite ponar sampler. After the sampler was brought to the surface, samples were collected using a sterilized disposable scoop and transferred to the appropriate sampling containers. After grab sampling was completed at each location (excluding variability locations), a boring was advanced using vibracore drilling methods as previously described. The vibracore was advanced to the required depth or until refusal. Vibracore equipment was decontaminated between borings. A portion of each sediment sample was field screened using a PID.

Visual and/or olfactory observations of impacts to the sediment or presence of PCBM was also documented. Sediment samples for laboratory analyses were obtained from specific depths and homogenized. Samples were then placed in laboratory grade glassware, packed on ice, and transported to the laboratory via courier, with accompanying chain of custody form. Surface and subsurface sediments were analyzed for PCB aroclors, following EPA Method 8082A. Details are provided on the individual vibracore logs in Attachment B.

This sediment contamination investigation is comprised of four tasks which are described in the following sections.

3.5.1 Resampling Specific Locations (PCBs >50 mg/kg)

Vibracore borings VC-101 through VC-103 were advanced proximate to historical borings EB-10, EB-14, and CS-19, respectively. The vibracore borings were advanced to a total depth of 8 ft below mudline (bml). Sediment samples were collected for PCB analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, and 3 to 4 ft bml, 4 to 6 ft bml, and 6 to 8 ft bml, then analyzed as necessary, to delineate the extents of PCBs greater than 50 mg/kg.

PCBs were detected at concentrations in excess of 50 mg/kg in only one of the three vibracore locations collected for Task 1 (VC-103 at 3 to 4 ft bml). Sediment sample results are summarized below and presented in Table 3.5A. Sampling locations are illustrated on Figures 3.5A through 3.5F.

Historical Sample Locations and Dates	Sample Depth Interval (feet)	PCB Concentration (mg/kg)	PDI Sample Locations and Dates	Sample Depth Interval (feet)	PCB Concentration (mg/kg)
EB-10 (May 2001)	0-0.5	2.1	**VC-101**	0 - 0.5	0.5
				0.5 - 1	0.2
	1-2	**97**		1-2	0.4
	2.3-4	ND		2-3 3-4	0.6 1.7
	4-6	ND			
EB-14 (May 2001)	0-0.5	ND	**VC-102**	0 - 0.5	0.2
				0.5 - 1	0.3
	1-2	**260**		1-2	0.3
	2-4	2.4		2-3 3-4	2.5 24
	4.5-6.5	ND			
	7.5-8.5	ND			
	8.5-10.5	0.94			
	11-12.5	ND			
CS-19 (October 1999)	0-0	ND	**VC-103**	0 - 0.5	0.8
	0.5-2	ND		0.5 - 1	0.8
				1-2	1.7
	2-2.7 2.7-3.2	**380** **140**		2-3	1.3
				3-4	**71**
				4-6	9.9

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.5.3 Investigation Unit Sampling - Area between EB-10 and EB-14

Vibracore borings VC-104 through VC-108 were advanced on a 160-foot triangulation grid between historical borings EB-10 and EB-14. The vibracore borings were advanced to a total depth of 8 ft bml. Sediment samples were collected for PCB analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, and 3 to 4 ft bml, 4 to 6 ft bml, and 6 to 8 feet bml, then analyzed as necessary, to delineate the extents of PCBs greater than 50 mg/kg.

PCBs were detected at concentrations in excess of 50 mg/kg in only one of the five vibracore locations collected for Task 2 (VC-108 at 2 to 3 ft bml). Sediment sample results are presented in Table 3.5A and are illustrated on Figures 3.5A through 3.5F.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.5.4 Decision Unit Sampling - Including Step-out Investigation

Vibracore borings VC-109 through VC-126 were advanced to assess the nature and extent of PCB concentrations greater than 50 mg/kg at historical borings EB-10, EB-14, CS-10. Vibracore borings VC-127 through VC-132 were advanced and samples initially held and analyzed as necessary to refine adjacent PCB exceedances. Additionally VC-133 through VC-141 were advanced to assess the PCB concentrations at VC-108 (identified during Task 2), VC-110, VC-123, and VC-130. The vibracore borings were advanced to a total depth of 8 ft bml. Sediment samples were collected for PCB analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, and 3 to 4 ft bml, 4 to 6 ft bml, and 6 to 8 feet bml, then released for analysis as necessary, to delineate the extents of PCBs greater than 50 mg/kg.

PCBs were detected at concentrations in excess of 50 mg/kg in four of the thirty three vibracore locations collected for Task 3 (VC-110, VC-123, VC-130, and VC-139) and only at the 3 to 4 ft bml interval. Sediment sample results are presented in Table 3.5A and are illustrated on Figures 3.5A through 3.5F.

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met.

3.5.5 Variability of Sediment Concentrations

Vibracore borings VC-101A through VC-101C, VC-102A through VC-102C, and VC-103A through VC-103C were advanced within close proximity to VC-101, VC-102, and VC-103, respectively, to assess the contaminant mass distribution proximate to the historical locations EB-10, EB-14 and CS-19. The vibracore borings were advanced to a total depth of 8 ft bml. Sediment samples were collected for PCBs from the depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, and 3 to 4 ft bml, 4 to 6 ft bml, and 6 to 8 feet bml.

PCBs were detected at concentrations in excess of 50 mg/kg in the 3 to 4 ft interval at three of the nine vibracore locations collected for Task 4 (VC-101B, VC-102A, and VC-103B) and at the 4 to 6 ft interval in one location (VC-103B). Sediment sample results summarized in the following table and presented in Table 3.5A. Sediment sampling locations are illustrated on Figure 3.5G.

Location	Variability Results (PCBs in mg/kg)					
	0-0.5	0.5-1	1-2	2-3	3-4	4-6
VC-101	0.5	0.2	0.4	0.6	1.7	-
VC-101A	-	*0.3*	*0.5*	*0.8*	*3.7*	*0.7*
VC-101B	-	*0.3*	*0.6*	*0.7*	70	ND
VC-101C	-	*0.3*	*0.4*	*0.6*	4.5	0.1
Avg.	-	0.3	0.5	0.7	20	-
VC-102	0.2	0.3	0.3	2.5	24	-
VC-102A	-	*0.2*	*0.3*	*1.1*	91	ND
VC-102B	-	*0.4*	*0.9*	*5.1*	9.1	ND
VC-102C	-	*0.4*	*0.7*	*0.1*	ND	ND
Avg.	-	0.3	0.6	2.2	31	-
VC-103	0.8	0.8	1.7	1.3	71	9.9
VC-103A	-	*0.4*	*1.2*	*17*	10	21
VC-103B	-	*0.6*	*0.6*	*2.5*	70	95
VC-103C	-	*0.4*	*0.6*	*2.7*	*0.1*	*ND*
Avg.	-	0.6	1.0	5.8	38	32

The work was performed in compliance with procedures described in the work plan. Based on the results of this investigation, the objectives of the program were met. Some adjustments to the work plan were required during implementation of field activities due to strong currents. Locations for VC-103A through VC-103C were greater than 10 ft away from VC-103 but still within the decision unit.

3.6 OFF-SHORE PRE-DELINEATION

The purpose of this Off-shore Pre-Delineation investigation was to examine specific off-shore areas where PCBs or metals in excess of remedial criteria are known or suspected to be present, in order to gather supplementary data for making decisions regarding remedial action and to provide information for delineation of dredge areas. In compliance with the work plan, off-shore sediment sampling was conducted in three separate areas at the Site: Nearshore Area, Backwater Areas, and Northwest Area within the Deepwater Area.

Vibracore explorations were advanced between the end of August 2014 and the beginning of November 2014. The vibracore explorations were advanced by CR Environmental of East Falmouth, MA using an aluminum work boat fitted with winch operated vibracore equipment and observed by Haley & Aldrich.

The vibracore vessel was positioned over the drill-hole using a DGPS unit on vessel. The vessel was held in position by a three point anchoring system. Sampling depth control was achieved using tide boards and a depth sounder to mudline. Sampling locations were modified as required due to field conditions (i.e. obstructions, current, etc.) as was provided for in the work plan.

Prior to the advancement of borings off-shore delineation borings, an undisturbed surface sediment grab sample was collected using a petite ponar sampler. After the sampler was brought to the surface, samples were collected using sterilized disposable scoop and transferred to the appropriate sampling containers. After grab sampling was completed, as necessary, a boring was advanced using vibracore drilling methods as previously described. The vibracore was advanced to the required depth or until refusal. Vibracore equipment was decontaminated between borings. A portion of each sediment sample was field screened using a PID.

Visual and/or olfactory observations of impacts to the sediment or presence of PCBM was also documented. Sediment samples for laboratory analyses were obtained from specific depths and composited for delineation purposes. Samples were then placed in laboratory grade glassware, packed on ice, and transported to the laboratory via courier, with accompanying chain of custody form. Surface and subsurface sediments were analyzed for PCB aroclors, following EPA Method 8082A and/or metals by EPA Method 6010C. Details are provided on the individual vibracore logs in Attachment B.

This sediment investigation performed for the Nearshore Area, Backwater Areas, and Northwest Area are described in the following sections.

3.6.1 Nearshore Area Results

Vibracore borings, VC-401 through VC-423, were advanced along the Site shoreline defined by the expected silt curtain alignment on the west and the OU-1/OU-2 boundary on the east. The vibracore borings were advanced to a total depth of 8 ft below the mudline. Sediment samples were collected for PCB and metals (copper, lead, and zinc) analyzed from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, 3 to 4 ft bml, 4 to 5 bml, 5 to 6 ft bml and 6 to 8 ft bml.

PCB and select metals greater than remedial criteria were varied up to and exceeding 6 ft in depth. Refer to the individual vibracore logs, Tables 3.6B through 3.6D, and Figures 3.6I through 3.6P for PCBs and Figures 3.6Q through 3.6U for metals.

Compliance with procedures described in the work plan was maintained during completion of the work. Based on the results of this investigation, the objectives of the program were met, except as detailed below. PCBs and metals were detected at levels exceeding remedial criteria at multiple intervals at VC-422. Sampling was not collected further south of the property line.

3.6.2 Backwater Areas Results

Old Marina Area

Vibracore borings, VC-501 through VC-511, were advanced in the North Boat Slip area. The vibracore borings were advanced to a total depth of 10 ft below the mudline. Additionally VC-512 through VC-516 were advanced to assess the PCB and metals concentrations at initial northern locations. Sediment samples were collected for PCBs and metals (copper, lead, and zinc) analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, 3 to 4 ft bml, 4 to 5 ft bml, 5 to 6 ft bml, 6 to 8 ft bml, and 8 to 10 feet bml, then analyzed as necessary, to delineate the extents of PCB or metals exceedances.

Refer to the individual vibracore logs, Tables 3.6B through 3.6D, and Figures 3.6I through 3.6P for PCBs and Figures 3.6Q through 3.6U for metals.

Compliance with procedures described in the work plan was maintained through work completion. Based on the results of this investigation, additional data needs to be collected further north of the step out locations VC-512 through VC-516 to support the design of the remedy.

North Boat Slip

Vibracore borings, VC-601 through VC-603, were advanced in the North Boat Slip area. The vibracore borings were advanced to a total depth of 10 ft below the mudline. Additionally VC-604 and VC-605 were advanced to assess the PCB and metals concentrations south of VC-603 greater than remedial criteria. Sediment samples were collected for PCB and metals (copper, lead, and zinc) analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, 3 to 4 ft bml, 4 to 5 ft bml, 5 to 6 ft bml, 6 to 8 ft bml, and 8 to 10 feet bml, then analyzed as necessary, to delineate the extents of PCB or metals exceedances.

Refer to the individual vibracore logs, Tables 3.6B through 3.6D, and Figures 3.6I through 3.6P for PCBs and Figures 3.6Q through 3.6U for metals.

North boat slip area sediment sampling was performed in general accordance with the procedures described in the work plan. Data collected is sufficient for use during the design, and therefore, the objectives of the program were met.

South Boat Slip Area

Vibracore borings VC-701 through VC-705, were advanced in the south boat slip area. The vibracore borings were advanced to a total depth of 8 ft below the mudline. Sediment samples were collected for lead analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, 3 to 4 ft bml, 4 to 5 ft bml, 5 to 6 ft bml, and 6 to 8 ft bml, then analyzed as necessary, to delineate the extents of lead exceedances.

Refer to the individual vibracore logs, Table 3.6C, and Figures 3.6Q through 3.6U.

South boat slip area sediment sampling was performed in general accordance with the procedures described in the work plan with the exception of no offset east of VC-703 due to access issues (i.e. water depth) and presence of the shoreline. Data collected is sufficient for use during the design, and therefore, the objectives of the program were met

3.6.3 Northwest Area Results

Approximately seventy eight vibracore borings were advanced adjacent to the Northwest Off-shore Area. The vibracore borings were advanced to a total depth of 8 ft below the mudline. Sediment samples were collected from sample locations VC-366, VC-369 through VC-371, and VC-376 and VC-379, but were not analyzed because they were determined to be unnecessary for delineation. Sediment samples were collected for PCB analysis from depth intervals of surface to 0.5 ft bml, 0.5 to 1 ft bml, 1 to 2 ft bml, 2 to 3 ft bml, 3 to 4 ft bml, 4 to 5 ft bml, 5 to 6 ft bml, and 6 to 8 ft bml, then analyzed as necessary, to delineate the extents of PCB greater than 50 mg/kg.

Details are provided on the individual boring logs in Attachment B, Table 3.6A and Figures 3.6A through 3.6H.

As described in the work plan, select existing data points were resampled. The locations are summarized below and supplemented or replaced the historic data for the purposes of pre-delineation.

Historical Sample Locations	Sample Depth Interval (feet)	PCB Concentration (mg/kg)	PDI Sample Locations	Sample Depth Interval (feet)	PCB Concentration (mg/kg)
RB-43	0-0.5	1.4	**VC-330**	0 - 0.5	25
	0.5-2	**490**		0.5 - 1	**900**
				1-2	**250**
	2-4	5.2		2-3	**72**
				3-4	**150**
	4-6	-		4-5	31
				5-6	-
	6-8	ND		6-8	-
RB-12/RB-22	0-2	**69**	**VC-311**	0 - 0.5	0.5
				0.5 - 1	2.1
				1-2	15
	2-4	2.2		2-3	20
				3-4	2.2
	4-6	ND		4-5	ND
				5-6	**9,800**
SD-53	0-2	**2,000**	**VC-307**	0 - 0.5	1.3
				0.5 - 1	**900**
				1-2	**61**
	2-4	25		2-3	1.0
				3-4	-
	4-6	9.5		4-5	-
				5-6	-
	6-8	4.5		6-8	-
RB-11	0-2	**5,200**	**VC-304**	0 - 0.5	3.4
				0.5 - 1	4.5
				1-2	12
	2-4	-		2-3	**330**
				3-4	**6400**
	4-6	-		4-5	**250**
				5-6	3.3
	6-8	**170**		6-8	1.1
SD-52	0-2	**150**	**VC-301**	0 - 0.5	8.3
				0.5 - 1	0.2
				1-2	0.6
	2-4	31		2-3	0.7
				3-4	Obstruction
	4-6	**290**		4-6	n/a
	6-8	34		6-8	n/a
RB-14	0-0.5	**120**	**VC-322**	0 - 0.5	0.3
	0.5-3	0.058		0.5 - 1	0.3
				1-2	**57**
				2-3	ND
	3-6	ND		3-4	-
				4-5	-
				5-6	-
	6-8	0.085		6-8	-

Historical Sample Locations	Sample Depth Interval (feet)	PCB Concentration (mg/kg)	PDI Sample Locations	Sample Depth Interval (feet)	PCB Concentration (mg/kg)
CS-12	0-0.5	**170**	**VC-319**	0 - 0.5	0.3
	0.5-2.4	ND		0.5 - 1	0.6
				1-2	0.5
	2.4-2.9	ND		2-3	ND
RB-42	0-0.5	0.42	**VC-326**	0 - 0.5	7.1
	0.5-2	0.24		0.5 - 1	0.6
				1-2	0.5
	2-3	7.9		2-3	0.8
	4	**420**		3-4	16
				4-5	5.6
	-	-		5-6	ND
	6-8	0.074		6-8	0.5
RB-21	0-0.5	13	**VC-315**	0 - 0.5	4.3
	0.5-2	30		0.5 - 1	1.1
				1-2	1.1
	2-3	15		2-3	3.2
	-	-		3-4	**61**
	4-5	**1,400**		4-5	**85**
	5-6	6.9		5-6	0.1
	-	-		6-8	ND

Adjustments to the work plan were required during implementation of field activities and are detailed below. While not all areas were completely delineated, the data collected is sufficient to move forward with the design, and therefore, the objectives of the program were met.

Modifications:

- Due to PCB exceedances greater than remedial criteria at initial vibracore locations, additional locations VC-334 through VC-375 were added to the program.
- Vibracore location VC-301 was only able to be advanced to 4 ft due to obstructions and debris after multiple attempts.
- Vibracore location VC-333 was unable to advance due to obstructions or debris after multiple attempts.
- Additional sample locations, VC-334 through VC-379, were advanced to define lateral and vertical extent of PCB impacts.

3.7 GEOTECHNICAL EXPLORATION

The geotechnical portion of the PDI consisted of soil borings, test pits, and geotechnical laboratory testing to evaluate subsurface conditions. The purpose of the geotechnical explorations is to provide additional stratigraphy information in several areas: in the general vicinity of the planned deadman anchor (which will be located west of Building 52), in the general vicinity of the planned Northwest Extension bulkhead wall, and in the general off-shore area between the North Boat Slip and the South Boat Slip. The information will be used for bulkhead and deadman design, excavation support design, design of the sloped shore, and general site geotechnical analysis (such as settlement). Additionally, test

pits were excavated at select locations around the site where support of excavation (SOE) may be used during construction (i.e. excavation locations that are about 6 ft bgs or deeper). The purpose of the test pits is to gather information on soil conditions, excavation effort, and potential obstructions that could affect the design and/or construction of the SOE walls.

3.7.1 Geotechnical Test Borings

2013 On-Shore Geotechnical Test Borings

Two test borings, designated PD2-GL-001 and PD2-GL-002, were drilled on land between 2 and 10 October 2013 in the general vicinity of the planned deadman and anchor alignment (west of Building 52) shown on Figure 3.7A. The borings were drilled by Cascade Drilling using a truck mounted drill rig. The borings were advanced using a roller bit and 4-in. casing.

The boring locations were pre-excavated with an air knife to 6.5 feet prior to beginning sampling, to clear for utilities. Soil sampling was performed in general accordance with ASTM D1586 using an automatic hammer. Sampling was generally performed continuously through the Fill and at 5 ft intervals thereafter. Undisturbed samples of fine-grained soils were obtained with a 3-in. diameter Shelby tube using direct push methods. In boring PD2-GL-002, rock was cored using an NX size core barrel.

Sampling equipment was decontaminated between samples and drilling equipment was decontaminated between borings. Borings were grouted to the ground surface upon completion with cement bentonite grout.

Monitoring of the test borings was conducted by a representative from Haley & Aldrich. Logs of the borings are presented in Attachment B. The soil descriptions on the boring logs are based on the Unified Soils Classification System (USCS), as described in the first two pages in Attachment B. Test borings locations and ground surface elevations were determined in the field by site survey, which was performed by Wendel.

2014 Off-Shore Geotechnical Test Borings

Ten (10) test borings, designated PD2-GR-001 through PD2-GR-009 (including PD2-GR-002A), were drilled between 3 June and 4 August 2014 at the locations shown on Figure 3.7A. The borings were drilled by Cascade Drilling using a skid mounted drilling rig operated from a jack-up barge. The barge was owned and operated by Northstar Marine.

The drilling barge was positioned over the drill-hole using a GPS unit on the drilling rig. Sampling depth control was achieved using tide boards and tape measurements to mudline within the casing. Surveyed tideboard elevations were then used to relate sampling depth to elevation.

The borings were advanced using rotary wash drilling methods, with 4-in. and 3-in. casing. Soil sampling was performed in general accordance with ASTM D1586 using an automatic hammer. Sampling was generally performed at 5 to 10-ft intervals. Undisturbed samples of fine-grained soils were obtained with a 3-in. diameter Shelby tube using direct push methods; however, once low/no sample recovery was experienced with this method, a hydraulic piston assembly was used to push most of the remainder of the tubes. Rock was cored at 4 of the boring locations using an NQ size core barrel.

Sampling equipment was decontaminated between samples and drilling equipment was decontaminated between borings. Borings were grouted to mudline upon completion with cement bentonite grout.

Boring PD2-GR-002 was terminated shallower than planned, because semi-solid PCBM was observed in samples taken at 11 feet and 27 feet below mudline. The boring was offset and re-drilled approximately 13 ft outboard from the original location, at PD2-GR-002A.

Monitoring of the test borings was conducted by a representative from Haley & Aldrich. Logs of the borings are presented in Attachment B.

3.7.2 2014 Geotechnical Test Pits

Six (6) test pits, designated PD2-TP-1 through PD2-TP-6, were excavated at the locations shown on Figure 3.7A. The test pits were excavated between 25 June and 1 July 2014 in the vicinity of potential support of excavation (SOE) locations around the site. The test pits were excavated by American Environmental Assessment Corporation (AEAC) using a John Deere track-mounted excavator, Model 200 CL. The test pits were between about 12 ft to 25 ft long, 5 ft to 8.5 ft wide, and 4 ft to 12 ft deep. Soils were excavated in lifts and segregated by depth on plastic sheeting. Backfilling was performed in the reverse order of excavation so that soils were returned to the approximate depth from which they were excavated. Photographs were taken of the open pits and spoils piles. Test pits were backfilled on the same day they were excavated. Test pits were monitored in the field by a representative of Haley & Aldrich. Logs and photographs of the test pits are included in Attachment B.

The test pits encountered miscellaneous fill soils, along with non-soil materials such as brick, pipes (PVC, cast iron, and concrete), steel and concrete pieces, copper wire, concrete slabs, granite blocks, roofing materials, wood, railroad ties, steel structures, and glass. Water infiltration was observed in the deeper pits, generally at about 5.5 to 7.5 ft bgs.

Refer to the individual test pit logs in Attachment B for information on conditions encountered in the test pits.

3.7.3 Subsurface Conditions

At the site, the stratigraphy encountered during the PDI consisted of man-placed Fill over fine-grained Marine Deposits (Marine Silt) overlying coarser Marine Deposits (Basal Sand). The Fill was encountered at the on-shore boring locations PD2-GL-001 and PD2-GL-002, and at all of the test pit locations.

A generalized description of the strata encountered in the recent borings is provided below. Refer to the individual logs for a detailed description of each test boring.

Concrete – The land borings, PD2-GL-001 and PD2-GL-002, encountered an approximate 15 in. thick concrete slab.

Miscellaneous Fill – Miscellaneous Fill (Fill) was encountered underlying the surface layer in the land borings. The Fill descriptions varied widely, but the layer is generally classified as very loose to medium dense silty SAND (SM), poorly graded SAND (SP), clayey SAND (SC), with varying amounts of silt, clay, and gravel. The Fill contains miscellaneous debris with varying amounts of non-soil materials such as

wood, brick, concrete with reinforcing bars, ash and cinders, glass, plastic, slag, shells, asphalt, and copper wire. The Fill generally became less dense with depth, and at boring location PD2-GL-001, the Fill appeared to be intermixed with the underlying Marine Silt layer at depth. Sample recoveries in the Fill were often poor.

In the land borings PD2-GL-001 and PD2-GL-002, the Fill was approximately 21 ft thick.

Marine Silt – A stratum of soft Marine Deposits was encountered at the mudline in the water borings and underlying the Fill in the land borings. The layer was generally gray and very soft (with blowcounts typically weight of rods or weight of hammer in 24 in.). The Marine Silt typically consisted of SILT (ML), with some samples of ORGANIC SOILS (OL/OH), lean CLAY (CL), fat CLAY (CH), silty SAND (SM), or clayey SAND (SC) with varying amounts of silt, clay, and sand.

Eleven (11) of the 12 borings penetrated through this stratum and into the underlying sand unit. In some borings the Marine Silt gradually became sandier with depth, evidenced by higher blowcounts toward the bottom of the layer.

The thickness of the Marine Silt ranged from 42 to 71.8 ft, and, in the borings completed for this investigation, was thicker in the river than on land.

Basal Sand – A layer of sandy Marine Deposits, referred to as the Basal Sand, was encountered underlying the Marine Silt. Six (6) borings were terminated within the Basal Sand unit. This stratum was generally described as medium dense to very dense, gray to red-brown silty SAND (SM), poorly graded SAND (SP), and/or sandy SILT (ML) with varying amounts of gravel, sand, and silt. The Basal Sand was generally separated from the overlying Marine Silt by a layer of gravel.

Five (5) of the 12 borings penetrated through this stratum to the underlying bedrock. For the land boring, the Basal Sand was 45 ft thick. For the river borings in the north, the Basal Sand was about 52.5 to 55.5 ft thick. For the river boring in the south, the Basal Sand was about 32 ft thick.

Bedrock – For the borings that penetrated through the Basal Sand, bedrock was encountered underlying the Basal Sand layer. The bedrock was encountered at depths ranging from 84.5 to 120 ft beneath existing grades or mudline. In the land boring, rock was encountered at about El. -110. In the river borings in the north, rock was encountered between El. -130 to El. -140. In the river boring in the south, rock was encountered at about El. -104. Approximately 5 ft of bedrock was cored at each of the 5 borings (one on land, and 4 in the river). In the north, the bedrock was generally described as hard to very hard, fresh, medium to fine grained, light gray to black GNEISS with vertical to moderately dipping foliation. In the river boring in the south (PD2-GR-008), the rock was hard, fresh to slightly weathered, fine to medium grained, light gray to tan MARBLE with moderately dipping to high angle foliation.

3.7.4 Geotechnical Laboratory Testing

Representative samples of the Marine Silt and Basal Sand were selected for geotechnical laboratory testing. The samples were submitted to TerraSense, LLC of Totowa, New Jersey. Results of individual tests are briefly summarized below. Refer to the Table 3.7A for a more detailed summary of results of individual tests, and to Attachment D for the laboratory test data sheets.

Moisture Content

Two hundred four (204) samples were submitted for moisture content testing: 195 from the Marine Silt and 9 from the Basal Sand. Moisture content tests were performed on Shelby tube samples collected from the Marine Silt and split spoon samples collected from the Basal Sand. Testing was performed in general conformance with ASTM D2216. The water content for the Marine Silt ranged from about 21% to 102%, and the water content for the Basal Sand ranged from about 16% to 53%.

Grain Size Analysis

Forty-nine (49) samples were submitted for grain size analysis testing: 43 from the Marine Silt and 6 from the Basal Sand. A full sieve and hydrometer analysis was generally performed, except for samples with less than approximately 10% fines content, when a wash 200 was performed rather than full hydrometer analysis. Refer to Figure 3.7B for a plot of the fines content versus elevation for the Marine Silt stratum. Testing was performed in general conformance with ASTM D423.

Atterberg Limits

Forty-nine (49) samples were submitted for Atterberg Limits testing: 43 from the Marine Silt and 6 from the Basal Sand. Refer to Figure 3.7C for a plot of the Atterberg Limits results versus elevation, and corresponding water content measurements. Figure 3.7D shows a plot of the plasticity index (PI) versus elevation, and the corresponding Burmister classification. The data shows that the plasticity index generally decrease with decreasing elevation; or in other words, the Marine Silt becomes less clayey with depth. Atterberg Limits data were plotted on the USCS Plasticity Chart in Figure 3.7E. Liquidity index (LI) versus elevation was also summarized and plotted on Figure 3.7F. Testing was performed in general conformance with ASTM D4318.

Organic Content

Two (2) samples were submitted from the Marine Silt for organic content testing. The percent organic content of the samples was about 3%. Testing was performed in general conformance with ASTM D2974.

Additionally, 21 Atterberg Limit tests were completed by performing both conventional air-dried and oven-dried analyses, for an estimate of whether the soil would be classified as organic according to ASTM. The ratio of the oven-dried liquid limit to the air-dried liquid limit for these samples ranged from 0.59 to 1.03 with an average of 0.78. Accordingly, some of the tested soil is classified as organic, and some as non-organic. (Per ASTM, soil is classified as organic if the ratio of the oven-dried liquid limit to the air-dried liquid limit is less than 0.75).

Total Unit Weight

One-hundred and twenty-one (121) samples were submitted from the Marine Silt for total unit weight testing. The total unit weight ranged from approximately 89.9 to 126 pounds per cubic foot (pcf). Testing was performed in general conformance with ASTM D7263.

One-Dimensional Consolidation

Thirty-two (32) samples from the Marine Silt were submitted for one-dimensional consolidation tests. Testing was performed in general conformance with ASTM D2435.

The compression ratio CR (strain per log cycle stress) ranged from 0.12 to 0.42 , with an average of 0.24. The CR was determined from a plot which had been corrected for effects of disturbance in accordance with the method presented by Duncan and Buchignani (1976). The recompression ratio RR (strain per log cycle stress) ranged from approximately 0.003 to 0.043, with an average of 0.02. Overconsolidation ratio (OCR) was estimated using lab preconsolidation pressures, and ranged from 0.86 to 5.2 with 25 out of the 32 calculated values less than OCR=2. Refer to Figures 3.7G to 3.7I for plots of preconsolidation pressure, CR, and RR versus elevation, respectively.

Direct Simple Shear

Twenty (20) samples from the Marine Silt were submitted for direct simple shear testing (DSS). Testing was performed in general conformance with ASTM D6528.

The DSS shear strength of the samples tested ranged from 140 to 970 psf. Refer to Figure 3.7J for a plot of the DSS shear strength versus elevation.

Consolidated Undrained Triaxial

Twenty-six (26) samples from the Marine Silt were submitted for consolidated undrained (CU) Triaxial tests. Testing was performed in general conformance with ASTM D4767.

The CU undrained shear strength of the samples tested (defined as half the deviator stress at failure, corrected based on mean stress) ranged from 82 to 1705 psf. For samples that did not exhibit strain softening behavior, failure was defined at 12% strain. Refer to Figure 3.7J for a plot of the CU undrained shear strength versus elevation.

Note that the undrained shear strength shown in the figure was determined from the lab data are correcting it to account for the mean in situ effective stress. As such, the data plotted in the Figure 3.7J may vary slightly from the raw data presented on the lab results page in Attachment D.

Modifications

The number of test pits was initially planned to be between 5 and 10. During the work, some locations were shifted or deleted, to accommodate Site conditions. The changes include:

- Deleted planned test pit in the southwest corner of the site because it was close to a previous test pit excavation.
- Deleted planned test pit in footprint of former Building 72A after new delineation data indicated that only a 6 ft excavation would likely be required in that location.
- Added test pits to the west of former Building 52B and near the southwest corner of Building 52 to obtain obstruction information
- At least one geotechnical boring was originally planned in the Old Marina but was later deleted due to physical site restrictions that precluded barge access (very shallow water and the presence of existing piles and dock structures).
- Some geotechnical borings were drilled deeper than planned, due to rock being encountered deeper than expected, especially in the river borings in the north.

Compliance with procedures described in the work plan was maintained through work completion with adjustments noted above. Based on the results of this investigation the objective of the work plan has been met, except at the Old Marina, explorations were limited by the physical site access restrictions (such as the existing piles and dock structures). The design of the remedy will identify any additional information required prior to construction or additional data collection that may be planned during construction.

3.8 BENCH TESTING

The purpose of the bench testing was to evaluate various design parameters associated with the handling of residuals, for treatments that could be performed on-site to prepare the residuals for final disposition. The following bench tests were described in the work plan:

- Solids Dewatering: The ability of mechanical means to remove free water from the excavated solids in order to transport the material off-site or place on-site. The solids included both sediment and on-site soils;
- Stabilization: Identify potential additives to dewatered solids that would modify the physical properties of the solid to aid in disposal. Two types of stabilization were investigated: Bulking (to prevent the release of free liquid during transport) and solidification (to add compressive strength for future use on-site);
- Construction Water Treatment: Identify the potential contaminants in water generated during construction (groundwater removed from excavations during on-shore soil removal & water generated during sediment dewatering activities). Identify treatment technologies and design parameters that are likely to meet regulatory standards and allow the water to be discharged to the Hudson River or some other outfall.
- Long-Term Groundwater Treatment: Identify the design parameters for a long-term (post-construction) groundwater treatment system, and determine if passive treatment is possible.

The Pre-Design Bench Tests are described in the following sections. All testing has been performed by Kemron Environmental Services of Atlanta, Georgia.

3.8.1 Solids Dewatering

The solids dewatering studies occurred during two separate investigations:

- Previously in 2006, a dewatering test was performed on a composite sample of saturated soils. Soil samples were obtained from four (4) to thirteen (13) feet below ground surface (bgs), as part of test pitting investigations. Thirty gallons of soil was homogenized for testing. Gravity drainage was evaluated with both a raw sample and one with 5% diatomaceous earth added as a dewatering aid. In addition, the raw soil was tested used a Bariod filter press at various positive pressures, ranging from 25 to 100 psig. The reduction in moisture content was evaluated for both gravity drainage and filter press operations. The results of the bench test are provided in Attachment D.
- In 2014, as part of this work plan, a dewatering test was performed on a composite sample of near-shore sediments. Three sediment samples were obtained in March 2014 which were shipped to Kemron and homogenized for analysis. This sample was tested for gravity and filter press dewatering in a manner nearly identical to the 2006 test. The reduction in moisture

content was evaluated for both gravity drainage and filter press operations. The results of the bench test are provided in Attachment D.

In general, results indicated the following:

- Gravity drainage alone, even with a dewatering aid, is not sufficient to allow for the off-site transportation of either soil or sediment; and
- Filter press operations will sufficiently remove moisture from on-shore soils, but not from sediments. Additional dewatering options should be investigated for sediments.

3.8.2 Stabilization

Stabilization testing was performed based on the results of the solids dewatering tests described in Section 3.8.1, which showed that dewatering alone was not sufficient for sediments to pass the liquid release test. Additional testing was performed to identify amendments that could be added to the sediment to pass either liquid release tests (for off-site disposal) or compressive strength tests (for on-site re-use).

Vibracore sampling was conducted to collect sediment samples as discussed in Sections 3.5 and 3.6. After environmental samples were collected (approximately 4 oz per sampling interval), the remaining sediment from the sampled intervals was placed in a labeled 5 gallon bucket.

Nineteen buckets were selected in order to provide sufficient volume for sediment and pore water testing. Based on analytical from each of the sample locations contained in the buckets, the average PCB concentration in the buckets was estimated to be 50 mg/kg. Table 3.8A provides a summary of the buckets that were used of the stabilization testing. Sediment was homogenized and dewatered, using a Bariod filter press at 50 psig. The supernatant (pore water) was set aside for testing under 3.8.3, Construction Water Treatment.

In addition, 25 gallons of on-site soil was obtained from on-going test pitting operation, to determine if the highly granular on-site soils could be used as a stabilizing additive.

Testing was performed as follows:

a. Untreated Characterization: The physical characteristics of the soil and dewatered sediment were documented.
b. Mixture testing: Additive testing was performed in two phases:
    i. Five (5) stabilization agents were added separately to the sediment samples and tested for generalized observation and testing of changes in physical characteristics.
    ii. Based on the results of (b)(i) above, ten (10) additives or combinations of additives were selected, and each was added to the sediment at two or three separate addition rates. A total of twenty-one (21) combinations were evaluated additional testing.
c. Soil addition testing. Soil addition testing was also performed in two phases.
    i. Soil and sediment alone were mixed in several ratios and screened for general changes in physical characteristics that would aid in the sediment bulking and removal of water from the solid matrix.

ii. Based on the screening results of (c)(i), a total of twelve (12) additional mixtures of soil & sediment along with stabilization agents (at smaller addition rates) were evaluated with more substantial testing.
iii. During testing, results indicated to the Kemron personnel that a mixture which contained non-dewatered sediment may provide better results. As such, three (3) additional mixtures using non-dewatered sediments

In general, results indicated the following:

- Sediment can bulked with a variety of additives (including Portland cement, cement kiln dust, and lime kiln dust) and combinations of these additives and be transportable off-site without releasing water;
- Wet sediment can be stabilized with Portland cement to greater than 50 psig compressive strength, for use on-site as structural fill;
- Adding excess on-site soils alone to dewatered sediment at addition rates of at least 1:1 will likely allow the mixture to be transported off-site.; and
- Bulking or Stabilization addition rates can be reduced with the addition of on-site soils.

The bench test report and physical testing results are included as Attachment D.

3.8.3 Construction Water Treatment

Previously, filtration testing was performed in 2006 on a small amount of collected groundwater in order to determine if metals and PCBs could be removed by filtration alone. The testing was unsuccessful in removing all of the contaminants. Results are provided in Attachment D.

As part of the 2015 bench testing, both groundwater and sediment pore water were tested separately and then combined to identify a treatment train that would successfully remove PCBs and metals from the water streams. Unit operations were testing individually on the individual streams and then combined as an overall treatment train.

On 26 March 2015, 20 gallons of groundwater was collected from monitoring wells PDMW-22S, MW-10, RW-12, and HARW-1. Porewater from filter press dewatering performed on the selected sediment samples used in the stabilization testing was used for pore water.

(1) Initial Raw Water Testing: Analytical tests of the raw groundwater and pore water (from the stabilization testing) were performed as a baseline. Pore water showed little to no PCB concentrations. An additional bucket of sediment (see bucket # 20 on Table 3.8A) of high concentration sediment was sent to Kemron and filter pressed. The sediment and pore water were analyzed. This pore water was used for the filtrations test, while the initial pore water was used for all other tests.

(2) Filtration Testing: Filtration testing was performed separately on groundwater and pore water.

- Groundwater results did not pass some QC factors, but general trends showed a 90% removal at 1 micron and 97% at 0.45 micron, with no additional removal at 0.1 microns. There was very little to no metals removal, which is understandable as raw data showed most if not all of the metals in the dissolved phase.

- Pore Water showed complete removal of all PCBs at filtration of 10 microns and smaller. Metals concentrations (both total and dissolved), showed very little change, with the exception of zinc concentration when filtered to less than one micron.

(3) Carbon Adsorption Testing: Carbon adsorption testing was performed only on the groundwater, as there was not sufficient high concentration pore water to test more than filtration. All four tests (two carbon types and two empty bed contact times) removed all PCBs from the water stream.

(4) Precipitation Testing: Precipitation testing was performed separately on groundwater and pore water; however results were similar in both waters. Initial small batch testing at for different pH values (8.5, 9.5, 10.5, and 11.5) and with different additives (hydrated lime slurry, sodium hydroxide, ferric chloride, calcium chloride, sodium sulfate and sodium sulfide) was performed with strictly visual confirmation of precipitate and water quality. Six precipitation conditions were selected for analytical testing. In nearly all cases, lead and zinc were completely removed from the water streams. Copper concentrations were present in all pore water samples and two of the groundwater samples, with concentrations less than 0.10 milligrams per liter (mg/L).

(5) System Testing: After individual streams and unit operations were tested as individual units, a basic treatment train was established to treat the stream of combined water. The treatment train selected was as follows:

- Filtration to 1 micron;
- Carbon adsorption with coal-based carbon at a 10 minutes Empty Bed Contact Time (EBCT); and
- Precipitation with lime slurry to 11.5 SU, with filtration to 10 micron.

Results indicate that all PCBs and metals were removed from the combined stream.

These results indicate that treatment of either or a combined stream of waters generated at the site will be capable of removing PCBs to at least 0.010 ug/l and metals to part per billion ranges.

Testing details and all testing results are included in Attachment D.

3.8.4 Long-Term Groundwater Treatment.

The bench tests for long-term groundwater treatment have not been performed at this time. They have been deferred until the design is complete and groundwater flow and potential residual contaminant levels can be better determined.

4. Data Interpretation and Data Gaps

4.1 SUBSURFACE ANOMALIES – LNAPL

As described in Section 3.2, LNAPL was identified at several locations across the site. PCB analytical results of soil from borings that exhibited evidence of LNAPL droplets or of adjacent borings (if interval containing evidence of LNAPL was not sampled) were reviewed. Based on this review, LNAPL identified in soil borings is not a source of PCBs in the interval analyzed (i.e. PCBs were less than 500 mg/kg), with the exception of one boring (WB-301). An assessment of borings containing evidence of LNAPL with respect to removal areas (discussed in Section 4.2) resulted in the following applicable categories:

- Evidence of LNAPL is present at locations and depths that coincide with excavation limits identified in the OU-1 Excavation Pre-delineation investigation and will removed upon implementation of the remedy.
- Evidence of LNAPL is present outside excavation limits; however adjacent boring logs or wells do not indicate the presence of LNAPL; this potential LNAPL is isolated and not significant.
- Evidence of LNAPL is present outside excavation limits and the extents are not well defined.

An evaluation of soil borings indicating evidence of LNAPL is detailed in Table 4.1A and shown on Figure 4.1A.

Measurable LNAPL has not been identified in shallow onsite monitoring wells with the exception of LNAPL present in the Water Tower area and in PDMW-22S. Therefore, the on-shore remedy selected in the ROD (excavation of soil containing PCBs > 10 mg/kg and capping), provides adequate protection of human health and the environment. Therefore, further investigation or remedial action is not required in these areas.

4.2 OU-1 EXCAVATION PRE-DELINEATION INVESTIGATION

Delineation of areas within OU-1 that that exceeded removal criteria was performed as described in Section 2.3 of this document. The removal criteria for PCBs is 10 mg/kg in soils with excavation up to a maximum depth of 9 or 12 feet based on location. This criteria is also applicable to soils between surface and two feet since surface soils will not be present after the remedy implemented site cover. For Lead Hotspots the removal criteria used was lateral confirmation samples which were less than 1,000 mg/kg. In general, delineation was completed surrounding existing historical data points where PCB concentrations exceeded removal criteria. Resample of historical and other locations used for delineation are tabulated in section 3.3.

The vertical and lateral extents of these areas were developed using guidance for excavation verification sampling requirements described in DER-10 5.4(b)5ii (one sample per 30 feet of linear sidewall and one sample per 900 square feet of excavation bottom area). Based on this guidance and analytical results, the maximum excavation depth of each area was determined based on the deepest interval in which an exceedance of removal criteria was reported (e.g. in a given boring, if a sample from 6 to 8 feet was reported to exceed criteria, however the deeper sample from 8 to 10 feet did not exceed criteria, a maximum excavation depth of 8 feet would be assigned).

Approximately 500 borings were completed and over 2,500 samples were collected and analyzed to determine PCB and/or lead concentrations including quality control samples analyzed to comply with

the QAPP. Results of the PCB soil analyses are summarized in Table 3.3A. Historical PCB soil results are provided for reference in Table 3.3B. Results of lead soil analyses are included in Table 3.3B.

Many excavation areas have been completed, by satisfying both sidewall and bottom area minimum sampling frequency requirements as per DER-10. In a few select areas, these requirements were not met due to either the forced lateral termination of excavation (e.g. excavation abuts a building or other structure), or the lack of adequate data to bound an excavation side wall. In cases where the excavation will not extend laterally due to the existence of a building or other obstruction, documentation sampling, as defined by DER-10 5.4(b)1, will be conducted during remedial implementation.

As described in the work plan, PCBs are present at concentrations that exceed removal criteria beneath Building 52, as identified in the CSM. Delineation of excavation areas adjacent to Building 52 was halted adjacent to the footprint of the building due to the uncertainty regarding the remedy implementation within Building 52. In the event that soil remediation under Building 52 is determined to be required, the work plan will be amended or a separate work plan submitted.

4.2.1 Partial Delineation Areas

Areas in which the maximum extents of excavation could not be delineated due to insufficient or unavailable data are summarized below. Typically, the delineation could not be completed due to exceedances of criteria in samples which were collected during the PDI, but released afterwards and therefore offsets were not drilled, or the area in which sampling was required could not be feasibly accessed during the investigation.

- Job Trailers: This area is adjacent to the area currently occupied by semi-permanent job trailers is not yet fully delineated due to the inability to advance borings below or in close proximity to the trailers. Excavation areas bound the job trailers on all sides at various depths. Excavation areas N-10, N-14, N-5, N-6, and N-7 are therefore only partially delineated having incomplete sidewall delineation.
- Areas adjacent to Building 52: These areas adjacent to Building 52 are not yet fully delineated due to the inability to advance borings below or in close proximity to the building. Excavation areas adjacent to building 52 are delineated to various depths. Excavation areas N-8, N-16, N-17, N-18, N-22, N-23, N-36, N-39, N-44, N-45, and N-48 are therefore only partially delineated having incomplete sidewall delineation.
- Vicinity of SS and SM locations: The area is not yet fully delineated due to criteria exceedances at various locations and depths of 6, 8, and 10 feet bgs. The lateral bounds for the 10 to 12 foot depth interval of excavation S-15 are well defined but results at various locations around the perimeter at shallower depths make sidewall samples incomplete. Excavation areas S-15, S-16, S-17, S-18, and S-20 are only partially delineated having incomplete sidewall delineation. PDI Location SS-232 was collected but results are not currently required for delineation.
- Limited Access near shoreline: Two excavation areas near the South Boat Slip are not yet fully delineated due to access limitations near the shoreline. Excavation areas L-2 and L-3 are extended laterally up to the shoreline for the purposes of delineation. Additionally, two historical locations were directly adjacent to the shoreline and were not delineated due to access restrictions. These areas will be removed by the construction of the sloped shoreline and therefore no delineation was required. Historical samples where this is applicable include HB-006 at a Lead Hotspot and PDSB-38.

- Obstructions to delineation: The area north and adjacent to excavation area S-27 is not yet fully delineated due to the existence of subsurface vaults, the size and extents of which are unconfirmed. Delineation is deferred to design or implementation and is recommended to extend to the southern edge of the vault and then be terminated.
- WC-202: The area north of excavation area N-28 is not yet fully delineated due to criteria exceedances at depths between surface and 2 feet bgs. Delineation is deferred to design or implementation.
- Minor deviations from DER-10: Areas include:
    - Excavation area N-37 is bounded using samples from both the 8-10 and 10-12 ft intervals.
    - Excavation area S-14 bottom sample at SC-302 is slightly above 10 mg/kg.
    - Excavation area N-48 bottom sample at NN-301 is slightly above 10 mg/kg.
    - Excavation area N-31 bottom sample at NJ-305 (8 to 10 feet bgs) is not available and the excavation was assigned the maximum excavation depth of 9 ft. Documentation samples will be collected during implementation.
- Area under additional review: PD2-GL-002 was collected as part of a different PDI activity and has not been delineated. Delineation is deferred to design or implementation.

4.2.2 Excavation Boundary Suitability

The lateral excavation area limits, developed using the method as described in DER-10 5.4(b)5ii, established sufficient delineation for calculation of a minimum excavation volume for remediation. Lateral area boundary geometry may be modified during design of the remedy to realize construction efficiencies while maintaining extents of recommended removal.

4.2.3 Excavation Delineation

The data provided on tables and figures show that sufficient sampling exists for adequate delineation of on-shore contamination, with only minimal deviations from DER-10 guidance, as necessary. Sample intervals with concentrations which exceed removal criteria are displayed on Figures 4.2B through 4.2H, as laterally contained within one or more defined excavation area boundaries at depths equal to or shallower than the removal depth. All lateral excavation boundaries are delineated by sidewall samples at the interval at the bottom of removal (shaded red on Figures 4.2B-H). However, where two or more boundaries are adjacent, sidewall samples are not required for the shallower excavation area, as the sidewall does not exist laterally due to the continuation of excavation towards the deeper area (shaded gray on Figures 4.2B-H). The following sample interval below the maximum removal depth (shaded green on Figures 4.2B-H) includes the bottom sample intervals, which confirm the concentrations below the maximum removal depth do not exceed criteria. Results of the PCB soil analyses and maximum PCB concentration results are shown on Figure 3.3A. Historical PCB soil results are provided for reference in Table 3.3B. Results of lead soil analyses are included in Table 3.3B and shown on Figure 3.3C.

Any samples within the excavation that indicate the potential presence of a horizon are identified as such. Where a potential horizon may extend to the lateral excavation limit and is not captured by an

adjacent excavation, supporting and sufficient data is provided to indicate that the horizon does not extend beyond the lateral excavation limits.

Conclusions

Remedial action is recommended in areas with complete delineation as shown on figures 4.2A. Remedial action would be removal of soils within each delineation area up to the depth specified.

Additional pre-delineation sampling may be completed in select areas after structures are moved (i.e. site job trailers), demolished (i.e. Building 52), or upgraded (i.e. sanitary force main). The design will specify requirements for confirmation or documentation sampling during construction for areas without complete pre-delineation. Documentation sampling for removal adjacent to property boundaries will be completed during construction where locations completed in close proximity to property boundaries are not available.

4.3 DEEPWATER INVESTIGATION REMOVAL EVALUATION

Section 2.5 provided the rationale and techniques for the deepwater investigation. The purpose of the deepwater sediment sampling was to gather additional data where PCBs in excess of 50 mg/kg are known or suspected to be present, for making decisions regarding design of the remedy and to provide information for delineation of dredge areas. This investigation addressed areas in the proximity of existing exceedances and areas between existing borings EB-10 and EB-14, and used a phased approach to refine contamination extents to further understand lateral and vertical PCB contamination. As described in Section 3.5, the investigation results are summarized below and included the following four tasks.

- *Resampling* (EB-10, EB-14, CS-19) - Results indicated the following:
    - PDI resample intervals corresponding to historical results greater than 50 mg/kg PCBs ranged from 0.2 to 1.3 mg/kg.
    - PCBs were detected at concentrations in excess of 50 mg/kg in one of the three vibracore locations (VC-103 at 3-4 ft) collected but at an interval deeper than the corresponding historical sample (CS-19 at 2-3.2 ft).
    - These data points provide replacement results of the historical data for the purposes of removal evaluation and provide similar depth intervals that can be evaluated uniformly throughout the data set.
- *Investigation Unit Sampling* - PCBs were detected at concentrations in excess of 50 mg/kg in one of the five vibracore locations (VC-108 at 2-3 ft).
- *Decision Unit Sampling* - In addition to VC-103 and VC-108 (see above), PCB concentrations in excess of 50 mg/kg were detected in four of the thirty three additional vibracore locations (VC-110, VC-123, VC-130, and VC-139) and only at the 3-4 ft bml interval.
- *Variability Sampling* - PCBs were detected at concentrations in excess of 50 mg/kg in the 3-4 ft interval at three of the nine vibracore locations (VC-101B, VC-102A, and VC-103B) and at the 4-6 ft interval at VC-103B.

Sampling Grid

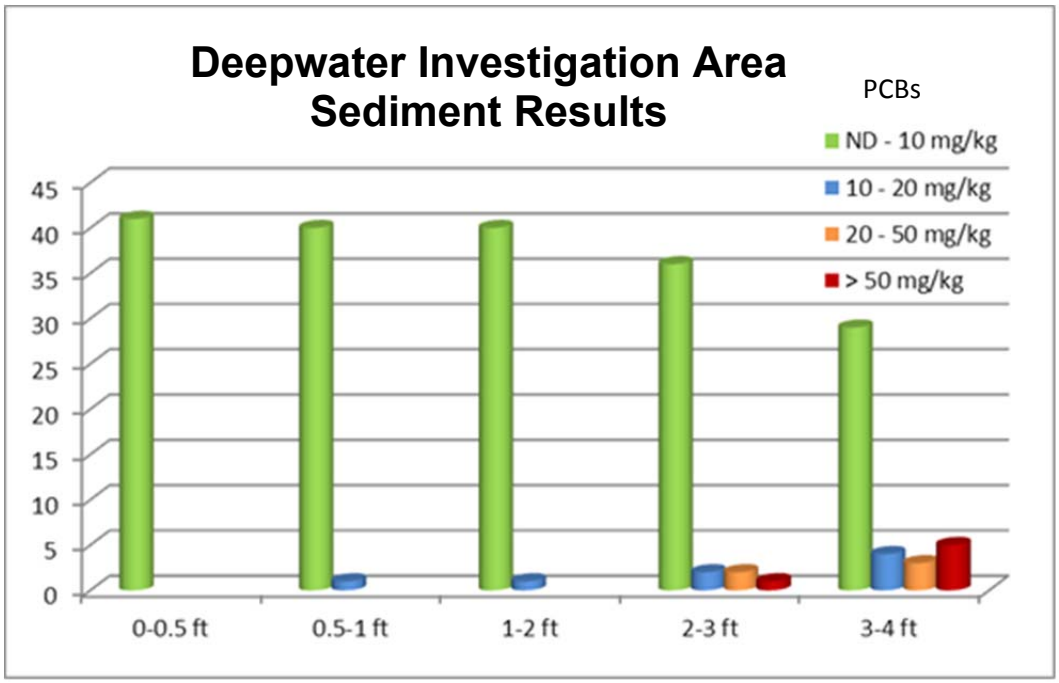
As discussed in previous sections and in the work plan, the investigation program employed a 160-foot triangulation grid for investigation areas and an 80-foot triangulation grid for delineation of extents of contamination. This grid system creates hexagonal areas referred to as Investigation Units and Decision Units, with areas of approximately 0.5 and 0.13 acres, respectively.

This grid system was applied uniformly because the investigation area is not directly adjacent to suspected on-shore point sources and the sediment is uniform across this site. Previous grain size analysis data indicated that sediments are predominantly fine grained material of similar properties and direct observations of sediments during the PDI were consistent with these data.

Variability Evaluation

The variability sampling within the surface to 3 ft intervals showed PCB concentrations consistent with VC-101, VC-102 and VC-103. The variability sampling at the 3-4 ft interval and the 4-6 ft interval at VC-103 showed varied concentrations with some results that exceed action limits However, if the samples are averaged, the PCB concentration are less than 50 mg/kg PCBs.

Variability was also considered for the entire investigation area by reviewing all decision units. The histogram below provides a summary of the findings:



Variability near the surface is very low and generally increases with depth. Only a very small fraction of samples exceed 10 mg/kg PCBs in the upper 3 feet of sediment. While there were some results greater than 50 mg/kg PCBs in the 3-4 ft interval, a very small fraction of samples exceed 50 mg/kg PCBs when considering all samples collected between surface and a depth of 4 feet. The following is a summary of these results:

- Surface to 3 ft interval of sediment: 96% of results are less than 10 mg/kg PCBs.

- Surface to 4 ft interval of sediment: 98% of results are less than 50 mg/kg PCBs.
- While there is an increase in variability in the 3 to 4 foot depth interval, greater than 70% of results are less than 10 mg/kg PCBs.

Decision Unit Data Evaluation

An evaluation of the collected data is provided below to determine the appropriate remedial action and define any removal that may be required. Actions are based on the primary sample results for each decision unit unless otherwise specified to include variability sampling. The following factors for determining the appropriate remedial action are specified in the ROD and considered hereafter:

"The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs."

- *Depth of PCB contamination*

  Five of the six sample results that exceeded 50 mg/kg were isolated to within the 3-4 foot interval. The sampling results indicated PCB concentrations greater than 50 mg/kg were found in only one shallower location (VC-108 at 2 to 3 ft).

- *Type of environment (erosional or depositional)*

  The Hudson River Estuary Sediment Environment Map (NYS DEC, 2006) determined that the majority of OU-2 is within a depositional area. This report defined the area adjacent to the site as thick deposition meaning a layer of sediment accumulation greater than 50 centimeters (cm) in thickness. The limits of the dynamic and depositional areas with respect to sediment sampling locations are shown on Figure 4.3A.

- *Contiguous areas of contamination*

  Areas of PCB results greater than 50 mg/kg are isolated except for at the 3-4 ft interval. There are two separate areas where there are adjoining decision units greater than 50 mg/kg. The first location is VC-130 & VC-139 where concentrations are 1,090 and 857 mg/kg PCBs, respectively. The second location is VC-103 & VC-123 where concentrations are 70.6 and 108 mg/kg PCBs, respectively. Variability sampling location VC-103C lies between VC-103 and VC-123 and was < 1 mg/kg PCBs at the 3-4 ft interval. Approximately 425 ft south to north, separate VC-130 and VC-103. Each of these two areas accounts for approximately 0.25 acres.

- *Thickness of clean sediment above the PCB contamination*

  All 6 decision units with PCB contamination greater than 50 mg/kg have a minimum of 2 feet of sediment cover that is less than 50 mg/kg. Specifically, all cover sediment sample results were less than 2.3 mg/kg PCBs. Results are summarized below:

	Depth Intervals (feet)					
Sample Locations Results in mg/kg	0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6
VC-103	0.75	0.80	1.7	1.3	71	9.9
VC-108	0.15	0.19	0.40	490	11	-
VC-110	0.21	0.27	0.36	0.57	110	9.0
VC-123	0.32	0.16	0.45	2.3	380	ND
VC-130	0.80	0.25	0.36	0.97	1,100	32
VC-139	0.17	0.20	0.33	1.5	860	0.11

- *Duration of dredging and associated potential for migration of re-suspended sediments*

  While the duration of dredging up to 6 decision units is not insignificant, it is also not a driving factor for consideration. However, these Decision Units are located in water depths of 30-35 feet and as indicated in the Revised Feasibility Study 2011, "Effective turbidity control in deepwater is not feasible and dredging without turbidity control will result in mobilizing contaminated sediments to extensive areas located downstream. While the intent of dredging is to remove contaminated sediments from the Deepwater Area, the long-term impact of the suspended sediment migration poses a more significant threat than the in-situ sediments because the resulting areas impacted would far exceed the existing extents of Deepwater Area contaminated sediments. This increase of areal distribution would result in increased short- and long-term impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain." The ROD acknowledged that "dredging without turbidity control … could mobilize contaminated sediment to other areas" and therefore potential for migration of re-suspended sediments remains an important factor in determining the remedial action that is most protective of human health and the environment.
- *Area weighted surface concentrations of PCBs*

  Area weighted surface concentrations were calculated over the entire investigation area with all sediment samples being equally weighted since each sample characterizes a decision unit and decision units are of equal area.

  Surface samples (0-0.5 ft) are near background conditions with an Area Weighted Average (AWA) concentration of 0.44 mg/kg PCBs. Additionally, Figure 3.6I provides results for all historical surface samples throughout the Deepwater Area for review and consideration.

  Samples in the upper sediments (0.5 - 2 ft) AWA concentrations of 0.98 mg/kg PCBs for the 0.5-1 ft interval and 1.34 mg/kg PCBs for the 1-2 ft interval. While not near the surface, average concentration for the 2-3 ft interval remains significantly less than 50 mg/kg regardless of whether VC-108 is included in the average.

<u>Conclusions</u>

The description of the Selected Remedy in the OU-2 ROD includes the following statement about removal of sediment: "Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging."

The basis for selection of the Remedy in the OU-2 ROD also states that "The majority of targeted PCB dredging areas identified in the deepwater are within the top two feet. Therefore, the targeted dredging

will remove sediments which have the highest levels of PCBs and the greatest potential to migrate and be an ongoing source to the environment." Additional discussion about the remediation of deepwater sediments is found in Response 62 of the OU-2 ROD.

Based on the guidance above and an evaluation of the six factors discuss previously, dredging in this area is not consistent with the basis for remedy selection, is not feasible and may pose a greater risk to the environment than leaving the limited number of isolated sediments in place. Therefore removal is not recommended as the remedial action for this area.

The following evaluation factors specifically support this conclusion:

1. Sediments greater than 50 mg/kg PCBs are at least 2-3 feet below the sediment surface and are well below the bioturbation layer.
2. All of these Decision Units are located in a thick deposition zone and have already been buried by natural deposition.
3. Impacted sediments are found only in small isolated areas that are well below the surface.
4. There is at least 2-3 feet of cover less than 50 mg/kg at all of these locations
5. Potential for migration of re-suspended sediments poses a threat to the environment that currently does not exist and based on the factors above would be sequestered in perpetuity.
6. Area weighted surface concentrations of PCBs are at or near 1 mg/kg for the upper two feet of the investigation area.

4.4 NEARSHORE, BACKWATER AND NORTHWEST AREA REMOVAL EVALUATION

The purpose of this evaluation is to examine the various off-shore areas where PCBs and/or metals are known or suspected to be present in excess of removal criteria. Sample collection in these areas provides supplementary data for making decisions regarding remedial action and to provide information for delineation of dredge areas. In compliance with the work plan, off-shore sediment sampling was conducted in three separate areas at the Site: Nearshore Area, Backwater Areas, and deeper waters adjacent to the Northwest Off-shore Area referred to as the Northwest Area.

The scope and results of the work completed in these areas is summarized in Sections 2.6 and 3.6. Interpretation of the data provides a basis for recommended remedial action or identifies the need for additional delineation which may be completed as part of the design or remedial construction. An evaluation is discussed for each of the three investigation areas.

The OU-2 ROD calls for removing sediment containing greater than 1 mg/kg PCBs and metals exceeding background from the Nearshore and Backwater Areas, where the potential for public health and environmental exposures are most likely. For the deepwater areas where dredging activities cannot be fully contained, the ROD indicates that the selected remedy removes PCBs in targeted areas at a higher threshold. Specifically, the ROD states:

Removal of sediment and fill that contains PCB concentrations greater than 1 ppm and/or copper, zinc and lead concentrations above the background concentrations listed in Table 2 of Exhibit A, to a maximum excavation depth of 6 feet within the area where sediment resuspension controls, such as a fixed silt curtain, are feasible. This area generally corresponds to a water depth of 15 feet and a distance from the shoreline into the river of approximately 60 to 80 feet and along approximately 2000 feet of shoreline.

Removal of sediment from a targeted area outside the northwest extension area in deeper than 15 feet of water that is defined by PCB concentrations greater than 50 ppm, to maximum depth of 6 feet. During the design, sampling will be performed to determine whether additional areas of PCBs greater than 50 ppm exist. Based upon an evaluation of the significance of the distribution of contaminants and the feasibility of removal, additional areas of sediment may be targeted for dredging.

4.4.1 Nearshore Area Evaluation

The nearshore portion of the program consisted of sampling in the areas along the site shoreline bounded by the expected silt curtain alignment on the west and the OU-1/OU-2 boundary on the east (i.e., river area where mudline is shallower than El. -15). Historical information was sufficient in areas north of the North Boat Slip to indicate that removal to the maximum depth of six feet would be recommended. Samples were collected in areas adjacent to and south of the North Boat Slip in order to provide more uniform sampling information on which to base remedial action. Additional information about the sampling grid is provided below.

Sampling

The sampling program employed a sampling grid in order to fill data gaps or address uneven distribution of existing data. Sample spacing of approximately 80 feet on centers produces uniform data to better understand the distribution of contaminants in the sediment and provide a basis for design of the remedy. Twenty two vibracore borings were advanced in the Nearshore Area.

Analysis

The sampling results indicated that PCB concentrations ranged from Non-Detect to over 100 mg/kg. The average concentration was approximately 5 mg/kg between the surface and six feet below mudline for the 22 VC-400 series sample locations. Individual locations averaged between less than 1 mg/kg up to approximately 20 mg/kg PCBs with about one third of the locations having an average concentration of less than 2 mg/kg between the surface and 6 feet below mudline. There were three samples collected having results greater than 50 mg/kg PCBs.

The sampling results showed Copper, Lead and Zinc concentrations greater than background were often co-located and the results ranged from less than background to more than 10 times background. While surface sediments (0-0.5 ft bml) were predominantly less than background for all metals, concentrations generally increased with depth with the highest values between 2 and 5 feet below mudline.

Table 4.4A and Figure 4.4G shows vibracore locations and maximum concentrations between surface and six feet bml with Figures 3.6I thru 3.6U showing results for each sampling interval. Table 4.4A presents PCB results and indicates which metals are greater than background. Tables 3.6B, 3.6C and 3.6D provide analytical results for contaminants of potential concern.

Sampling locations VC-413 thru VC-416 were near background for all contaminants of potential concern for sediments between the surface and 3-4 feet below mudline. Sampling locations VC-406 thru VC-408 contained the highest concentrations of metals.

Conclusions

Removal is the recommended remedial action in the nearshore between VC-301 and the proposed bulkhead alignment based on the results of historical sampling. Removal is also recommended at locations VC-301 thru VC-412 and VC-417 thru VC-422 based on PDI sample results. Removal of these sediments up to the maximum depth of six feet is warranted. Remedial action is not recommended at locations VC-413, VC-414, VC-415 and VC-416 based on PCB and metals results being less than or near background for both sediments between the surface and three feet bml and for the overall average for sediments between surface and six feet bml. Recommended removal areas are shown on Figure 4.4H and Residuals are shown on Figure 4.4I where applicable.

4.4.2 Backwater Areas Evaluation

This portion of the program consisted of sampling in the Old Marina, North Boat Slip, and South Boat Slip. The Backwater Areas are characterized by slower river velocities and increased deposition. Samples were collected in portions of each of the Backwater Areas with additional borings added to the program as needed to delineate the extents of known or suspected contamination and in order to provide more uniform sampling information on which to base remedial action. Additional information about sampling, analysis and conclusions is provided below for each area.

Old Marina

A uniform grid was applied to this area with samples spaced at approximately 80 feet on center. Eleven Old Marina delineation sampling locations were chosen based on existing sampling locations and data, the potential source of criteria exceedance located in the southeastern portion of the Old Marina area near a potential Building 52 outfall and where data gaps have been identified within this area. Specifically, historical sample location RB-37 at the southeast corner of the Old Marina had PCB results significantly higher than other samples collected in this area and was proximate to the potential Building 52 outfall. PDI sample location VC-501 was also located in the southeast corner of the Old Marina and likewise had PCB results higher than any other location. Five additional locations were added to the grid based on results from VC-503, VC-507 and VC-510. Figure 4.4G shows vibracore locations and maximum concentrations between surface and six feet bml with Figures 3.6I thru 3.6U showing results for each sampling interval. Table 4.4A presents PCB results and indicates which metals are greater than background. Tables 3.6B, 3.6C and 3.6D provide analytical results for contaminants of potential concern.

Concentrations of PCBs and metals are generally less than or near background in the sediments near the surface. Samples in deeper sediments between three and six feet bml have PCB concentrations near 4 mg/kg with metals predominantly near or slightly greater than background with the exception of VC-501. Figure 4.4H provides a depiction of all PDI PCB results within the Old Marina.

Further evaluation and potential additional sampling may be warranted in this area. Therefore, determination of remedial action is deferred to Preliminary Design. Factors for further evaluation include potential future use, presence of depositional sediments with concentrations less than or near background throughout the near-surface sediments, potential collection of additional data north and/or west of the PDI data, and sediments in the proximity to VC-501 near the potential Building 52 outfall.

North Boat Slip

A uniform grid was applied to this area parallel to the Nearshore Area sampling with locations spaced at approximately 80 feet on center. Initially, three delineation sampling locations were chosen to focus on the northern portion of this boat slip. Two additional locations were added to the grid based on results from VC-603 and VC-604 sequentially.

Sampling results showed PCBs and metals are generally less than or near background in the sediments near the surface with slightly higher concentrations in the north portion of the boat slip as anticipated based on historical results nearby. Concentrations increase with depth until they consistently exceed background at five to six feet bml. Samples in sediments between three and six feet bml have PCB concentrations near 3 mg/kg with metals predominantly near or slightly greater than background with the exception of one sample between five and six feet bml at location VC-604. Figure 4.4G shows vibracore locations and maximum concentrations between surface and six feet bml with Figures 3.6I thru 3.6U showing results for each sampling interval. Table 4.4A presents PCB results and indicates which metals are greater than background. Tables 3.6B, 3.6C and 3.6D provide analytical results for contaminants of potential concern.

Remedial action is recommended in the entirety of the North Boat Slip consistent with the removal recommended for adjacent nearshore locations VC-401 thru VC-405. Removal of these sediments up to the maximum depth of six feet is warranted. Recommended removal area is shown on Figure 4.4H.

South Boat Slip

The purpose of sampling in the South Boat Slip was to delineate a historical sample (CS-38) which identified a significant lead exceedance within the 0-2 foot interval. A step-out sampling program was used to delineate CS-38. Specifically, CS-38 was resampled with 4 surrounding samples placed at 20 foot offsets. Sampling and analysis was conducted for lead in sediments. Additional step-out locations were not required or could not be sampled due to access restrictions. Additional sampling east of VC-703, toward the shoreline, was not completed due to river conditions. Figure 4.4G shows vibracore locations and maximum concentrations between surface and six feet bml with Figures 3.6Q thru 3.6U showing metals results for each sampling interval. Tables 3.6C provides analytical results for lead.

Remedial action is recommended at locations VC-701 and VC-703 extending east toward the shoreline. Removal of these sediments to a depth of four feet is warranted. Recommended removal area is shown on Figure 4.4H.

4.4.3 Northwest Area Evaluation

Section 2.6 provided the rationale and techniques for the deepwater delineation. The purpose of this deepwater sediment sampling was to gather additional data where dredging has been specified by the ROD where PCBs in excess of 50 mg/kg are known or suspected to be present in a localized off-shore area west of the bulkhead extension. Data will be used for making decisions regarding remedial action and to provide information for delineation of dredge areas. This investigation addressed areas in the proximity of existing exceedances and used offsets to provide further delineation. Results of this investigation are provided in Section 3.6 and interpretation of that data is provided below.

Sampling

The Northwest Area is located off-shore immediately west and southwest of the Northwest Off-shore area portion of OU-2 up to approximately 225 feet from the shoreline, as shown in the ROD, and was further divided into the two following areas:

- **Shallow Contamination Area (up to 2 feet)** – Where historical results indicated the need to dredge approximately 2 feet of sediment. These areas were evaluated to a 3 foot depth and further delineated for PCB concentrations greater than 50 mg/kg.
- **Deep Contamination Area (up to 6 feet)** – Where historical results indicated the need to dredge up to 6 feet of sediment. These areas were evaluated up to an 8 foot depth and further delineated for PCB concentrations greater than 50 mg/kg.

Resampling was completed at historical locations with results greater than 50 mg/kg to confirm depth and concentration data, to provide reference for additional sampling, and to provide a more accurate representation of current conditions. Initial sample locations were established on a step-out system where three to four locations were sampled within approximately 25 feet of the original impacted sampling locations. Additional step-out sample locations were added throughout the program with locations selected based on results and proximity to other samples. Due to river dynamics and debris in the vicinity of the sampling, final locations varied from proposed. For the purposes of evaluation of remedial action and delineation of dredge areas, a grid system with cells measuring 30 ft by 30 ft was applied to the data. As described in Section 3.6, the investigation results are summarized below and included the following four tasks.

PDI resample intervals corresponding to historical results greater than 50 mg/kg PCBs are highlighted in the table provided within Section 3.6.3. Inconsistencies in results were encountered between the historic sample locations and resampled locations, potentially due to sediment deposition since the previous sampling at some locations.

Northwest Area Data Evaluation

An evaluation of the collected data is provided below to determine the appropriate remedial action and define any removal that may be required. Actions are based on the sample results for each grid cell. Similar to other deepwater areas, the following factors for determining the appropriate remedial action were considered as specified in the ROD:

"The additional delineation sampling data from the deepwater areas to be collected during the remedial design will be further evaluated and the following factors will be considered in determining the final deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs."

Cells with PCB results greater than 50 mg/kg within the top 2 ft are recommended to be removed and are excluded from the following evaluation. All other locations are evaluated below using the six factors described above.

- *Depth of PCB contamination*

  Approximately half of the sample locations contained results greater than 50 mg/kg. These results were found at all depth intervals as shown in the following table:

Initial Sample Locations	Depth Intervals (feet)							
	0-0.5	0.5-1	1-2	2-3	3-4	4-5	5-6	6-8
Results > 50 mg/kg	1	4	8	15	13	11	7	5

- *Type of environment (erosional or depositional)*

  The Hudson River Estuary Sediment Environment Map (NYS DEC, 2006) determined that the majority of OU-2 is within a depositional area. This report defined the area adjacent to the site as thick deposition meaning as a layer of sediment accumulation greater than 50 centimeters (cm) in thickness. The limits of the depositional area with respect to sediment sampling locations in shown on Figures 4.4A through 4.4F. Some locations are near the transition between depositional and dynamic river environments.

- *Contiguous areas of contamination*

  Areas of PCB results greater than 50 mg/kg are sporadic throughout the sampling area and vary by depth, thickness, and concentration.

- *Thickness of clean sediment above the PCB contamination*
  - There are 13 locations that have 2 ft of sediment cover over samples greater than 50 mg/kg as shown in the excerpt of Table 3.6A below. It should be noted that while sampling locations VC-312 and VC-339 are overlain by 2 ft of sediment cover, both locations are in the dynamic river environment.

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
	VC-302	0.21	0.29	0.77	58	130	23	-	-
	VC-303	0.27	4.7	1.7	1000	44	340	31	-
	VC-304	3.4	4.5	12	330	6400	250	3.3	1.1
	VC-305	0.79	2.1	24	560	6200	5900	49	-
	VC-306	0.23	0.46	11	1500	560	110	200	0.92
	VC-309	6.3	16	38	470	800	430	2100	59
	VC-312	1.1	0.17	0.23	120	39	-	-	-
	VC-316	0.83	1.4	9.4	770	12	3.1	0.91	46
	VC-318	2.1	0.26	0.44	720	13	0.2	110	1000
	VC-327	1.2	0.54	3.7	310	0.38	1.8	ND	1.3
	VC-332	0.47	21	25	58	270	29	-	-
	VC-355	4.1	4.3	27	590	140	1.1	-	-
	VC-359	0.27	1.6	2.9	83	16	-	-	-

  - There are 14 locations with at least 3 ft of sediment cover over samples greater than 50 mg/kg PCBs as shown in the excerpt of Table 3.6A below and are all located in the depositional river environment.

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
	VC-329	0.15	0.2	0.4	0.47	53	5.6	0.27	ND
	VC-349	-	6.6	11	21	370	0.24	-	-
	VC-315	4.3	1.1	1.1	3.2	61	85	0.11	ND
	VC-370	0.39	0.21	0.53	0.78	58	93	-	-
	VC-317	1.1	0.46	3.7	1	20	530	0.068 J	ND
	VC-344	0.16	0.33	1	4.1	6.1	100	-	-
	VC-347	0.87	0.35	1.2	23	0.72	1200	0.14	-
	VC-363	3.2	0.98	0.75	0.56	11	200	0.21	-
	VC-328	0.28	0.33	1.2	0.72	1.8	13	6900	0.61
	VC-311	0.53	2.1	15	20	2.2	ND	9800	-
	VC-341	33	0.41	0.28	0.79	0.73	41	55	-
	VC-346	14	0.97	0.92	0.93	6.7	27	8500	6300
	VC-338	0.39	ND	ND	9.9	0.63	0.17	ND	700
	VC-342	9.6	6.2	1	0.37	0.34	0.33	ND	66

- *Duration of dredging and associated potential for migration of re-suspended sediments*

  While the duration of dredging cells is not insignificant, it is also not a driving factor for consideration. However, these cells are located in water depths of up to 35 feet and as indicated in the Revised Feasibility Study 2011, "Effective turbidity control in deepwater is not feasible and dredging without turbidity control will result in mobilizing contaminated sediments to extensive areas located downstream. While the intent of dredging is to remove contaminated sediments from the Deepwater Area, the long-term impact of the suspended sediment migration poses a more significant threat than the in-situ sediments because the resulting areas impacted would far exceed the existing extents of Deepwater Area contaminated sediments. This increase of areal distribution would result in increased short- and long-term impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain." The ROD acknowledged that "dredging without turbidity control … could mobilize contaminated sediment to other areas" and therefore potential for migration of re-suspended sediments remains an important factor in determining the remedial action that is most protective of human health and the environment.

- *Area weighted surface concentrations of PCBs*

  Average concentrations were calculated over the entire investigation area with all sediment samples being equally weighted for simplicity. For comparison, the average concentrations near the surface are provided for two options. Option 1 removal does not include cells that have 2 feet of cover and Option 2 removal does not include cells that have 3 feet of cover. Removal is assumed to continue up to the maximum depth of six feet for cells with continuous results greater than 50 mg/kg.

Average PCB concentrations (mg/kg)

Depth	Cells	Existing	Option 1	Option 2
0 - 0.5 (ft)	64	7.9	3.1	2.7
0.5 - 1 (ft)	65	52	2.2	1.4
1 - 2 (ft)	66	49	5.3	2.9
2 - 3 (ft)	62	110	110	21
0 - 3 (ft)	*~ 64*	*64*	*40*	*2.9*
Removal	-		*9-10 cells*	*22 cells*

PDI surface results (0-0.5 ft) are less than 50 mg/kg PCBs except at VC-337. Average concentration is 7.9 mg/kg PCBs as shown in the table above and is reduced to approximately 3 mg/kg assuming the removal of sediments within the cell at VC-337. Figure 3.6A provides results for surface samples.

PDI results in the upper sediment (0.5 - 2 ft) are less than 50 mg/kg PCBs at all except 9 cell locations. Cell average would be reduced from about 50 mg/kg PCBs to less than 10 mg/kg PCBs as shown in the table above with either option

Residual contamination in the 2-3 ft interval would be reduced to less than 10 mg/kg PCBs only for removal option 2.

Conclusions

Remedial action is recommended in areas with PCBs greater than 50 mg/kg within the top 2 ft. Additionally, based on the evaluation of the six factors discuss previously, remedial action is recommended for cells that do not provide a minimum of three feet of cover. Remedial action would be removal of sediments within each cells up to a depth where results are no longer greater than 50 mg/kg and where backfill would provide at least three feet of cover up to a maximum depth of 6 ft.

Recommended removal is shown on Figures 4.4A through 4.4F. Average concentrations based on the recommended remedial action are provided in the following table.

Average PCB concentrations (mg/kg)

Depth	Cells	Existing	Residual
0 - 0.5 (ft)	64	7.9	2.7
0.5 - 1 (ft)	65	52	1.4
1 - 2 (ft)	66	49	2.9
2 - 3 (ft)	62	110	21
3 - 4 (ft)	50	310	19
4 - 5 (ft)	40	240	70
5 - 6 (ft)	32	870	800
6 - 8 (ft)	14	580	580
0 - 3 (ft)	*~ 64*	*64*	*2.9*
Removal	-		*22 cells*

It should be noted that the Northwest area is not yet fully delineated. Additional sampling areas are recommended to resolve data gaps including sampling near RB-19, VC-344, and VC-336.

5. Data validation

Analytical results for environmental samples collected as part of the PDI were reviewed by Environmental Standards, Inc. (ESI), an independent the data management subcontractor, to determine the data usability in accordance with the procedures outlined in the project specific quality assurance project plan (QAPP).

During the data validation process, the following quality control/quality assurance (QA/QC) criteria were reviewed:

- Sample Data Reporting Format
- Holding Time and Sample Preservation Compliance
- GC/MS Instrument Performance Check (where applicable)
- Initial Calibration and Continuing Calibration Procedures
- Field/Method/Preparation Blank Sample Analysis
- System Monitoring Compound Recoveries (where applicable)
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Internal Standard Recoveries (where applicable)
- Field Duplicate Sample Analysis
- ICP Interference Check Sample Performance (where applicable)
- ICP Serial Dilution Replicate Percent Difference (where applicable)

Below is a brief description of the procedures used in the evaluation and example corrective actions implemented as a result of the assessment. The intent of this summary is to assist the data user with an understanding of the data qualification procedures implemented for their use in the evaluation of the current site conditions.

5.1 SAMPLE DATA REPORTING PROCEDURES

The reported results for each project sample were provided in a NYSDEC Analytical Services Protocol (ASP) Category B deliverables format. The data reporting format was evaluated within each SDG and when found to be non-compliant with the project data quality objectives (DQOs) additional documentation was requested and received from the laboratory as part of the validation process.

5.2 HOLDING TIME AND SAMPLE PRESERVATION COMPLIANCE

Maximum allowable holding times, for each parameter, were measured from the time of sample collection to the time of sample preparation or analysis for each project sample. When a project sample was identified as analyzed after the expiration of the USEPA recommended maximum holding time, the reported sample results were qualified with a “J” as estimated and non-detected parameters were qualified with an “R” as rejected.

5.3 GC/MS INSTRUMENT PERFORMANCE CHECK

GC/MS instrument performance checks were evaluated to ensure proper tuning of the instrument for mass resolution, compound identification, and sensitivity. It was determined that the analysis of the instrument performance solutions was performed at the beginning of each 12-hour period during which

samples or standards were analyzed, and that the instrument performance check met the ion abundance criteria specified by the promulgated USEPA method. In all instances, the GC/MS instrument performance checks for the instruments used in the analysis of project samples fell within method specific criteria without exception.

5.4 INITIAL CALIBRATION AND CONTINUING CALIBRATION PROCEDURES

Instrument calibration procedures for the analysis of project samples were evaluated based on the requirements of the National Functional Guidelines and/or prescribed by the laboratory standard operating procedures (SOPs) when not directly addressed by the guidelines. Generally, the calibration procedures implemented by the laboratory were consistent with USEPA guidance. However, during the analysis of organic parameters by EPA Methods 8260B and 8270C, the continuing calibration acceptance criteria for several target compounds were greater than the EPA guidance criteria of 25 percent difference (%D) from the initial calibration relative response factor (RRF).

In cases where target compounds were detected and reported using a RRF from a non-compliant continuing calibration standard, the result was flagged with a "J" and the reporting limits for non-detect samples were flagged with a "UJ" indicating that the reported values and reporting limits are estimated.

5.5 FIELD/METHOD/PREPARATION BLANK SAMPLE ANALYSES

The presence of target compounds in associated method and/or trip blank samples prepared and analyzed concurrently with the project samples was determined as part of each laboratory sample data package. If target compounds were reported at a concentration greater than the method detection limit (MDL) for organic parameter analyses or the instrument detection limit (IDL) for inorganic parameter analyses, the associated sample results were qualified.

In the case of method blank samples for organic parameter analyses, if the target compound detected was identified as a "common laboratory contaminant" by the USEPA Functional Guidelines, an action level of 10 times (10x) the blank contamination level was calculated. For all other parameters an action level of 5 times (5x) the blank contamination level was calculated. In the case of inorganic method blank sample analyses, an action level of 10 times (10X) the blank contamination level was calculated. In accordance with EPA guidance, if the detection of the blank contaminant in the associated project samples was reported at a concentration between the MDL and the action level, the result was flagged with a "U". This data qualification indicates that the parameter was not present in the sample at a concentration greater than the adjusted reporting level.

5.6 SYSTEM MONITORING/SURROGATE COMPOUND RECOVERIES

System monitoring/surrogate compounds were added to each sample prior to analysis of organic parameters by EPA Method 8082 to confirm the efficiency of the sample preparation procedures. The calculated recovery for each surrogate compound was evaluated to confirm the accuracy of the reported results.

Generally, the calculated recovery of these compounds fell within the laboratory specific quality control criteria. In a few instances, sample extracts prepared for the analysis of polychlorinated biphenyls (PCBs) by EPA Method 8082 required dilution prior to analysis. This dilution procedure was implemented by the laboratory to enable quantification of the detected target analytes within the

instrument calibration range. Where applicable, the laboratory qualified the reported results indicating the system monitoring compound recovery could not be calculated due to a sample extract dilution.

In cases where the surrogate recovery fell outside the laboratory acceptance criteria, the results greater than the reporting limit were qualified "J", and the reporting limits for non-detect samples were flagged "UJ", as estimated.

5.7 LABORATORY CONTROL SAMPLES, MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES

Analytical precision and accuracy were evaluated based on the laboratory control (LCS) and matrix spike (MS/MSD) sample analyses performed concurrently with the project samples. For LCS analyses, after the addition of a known amount of each target analyte into laboratory reagent water, the LCS was analyzed to confirm the ability of the analytical system to accurately quantify the target analytes. For MS/MSD samples, after the addition of a known amount of each target analyte to the sample matrix, the MS/MSD samples were analyzed to confirm the ability of the analytical system to identify the target analytes within the sample matrix.

The percent recovery calculated for each target analyte was evaluated for compliance with method specific criteria. Generally the reported recovery of MS and LCS analyses fell within the laboratory QA acceptance criteria. However, if the LCS recovery fell below the acceptance criteria, the result for the non-compliant target analyte from the project samples analyzed concurrently was qualified with a "J" as estimated or "UJ" if reported as non-detect.

5.8 INTERNAL STANDARD (IS) COMPOUND RECOVERIES

Internal Standard (IS) compounds were added to each sample prior to the analysis of organic parameters by EPA Methods 8260B, and 8270C to quantify the amount of the target compounds detected within the sample matrix. The response of each IS compound was confirmed to be within the QA/QC criteria of +100% and – 50% of the corresponding 12 hour continuing calibration verification (CCV) standard. If the IS response fell below the –50% acceptance criteria, the target compound concentrations calculated within this sample were qualified with a "J" as estimated. If the IS response fell to below –90% the corresponding CCV standard, the reported results in the project sample were flagged with an "R" as rejected.

5.9 FIELD DUPLICATE SAMPLE ANALYSIS

Field duplicate samples were collected and analyzed to determine the precision for the sampling and analysis process through calculation of the relative percent difference (RPD) between the original and duplicate sample target analyte concentrations. If the calculated RPD for analytes detected at concentrations greater than five times (5X) the reporting limit exceeded the RPD criteria, the reported results were qualified "J" as estimated.

5.10 ICP INTERFERENCE CHECK SAMPLE PERFORMANCE

The results of the ICP Interference Check Samples analyzed concurrently with the project samples were evaluated versus an acceptance criteria prescribed by USEPA guidance. If the calculated recovery an analyte fell outside these criteria, the analyte result for the project samples analyzed concurrently within the analytical batch was flagged with a "J" as estimated.

5.11 ICP SERIAL DILUTION REPLICATE PERCENT DIFFERENCE (RPD)

The results of the ICP Serial Dilution samples analyzed concurrently with the project samples were evaluated for compliance with the USEPA protocol criteria of less than 10% replicate percent difference (RPD) between the diluted and undiluted sample, if the analyte concentration was greater than fifty times (50X) the method detection limit in the original sample. If an analyte exhibited a serial dilution RPD greater than 10%, the corresponding sample result was qualified with a "J" as estimated.

Data Usability Reports prepared by ESI are included in Attachment E.

5.12 VALIDATION COMPLETENESS

Based on the iterative nature of the program completed during three mobilizations, sample validation is not complete. Based on DURs provided by ESI to date, data validation has resulted in only minor changes in results or flags. Upon completion of validation, updated tables will be provided to NYSDEC and the EQUIS data base will be uploaded. Any changes to conclusions or interpretations resulting from completion of the validation process will be provided as an addendum.

6. Site Management

6.1 HEALTH & SAFETY

The Site Health, Safety, Security and Environment Plan (HSSE Plan) was developed by Haley & Aldrich to establish the health and safety procedures required to minimize potential risk to personnel or the environment during PDI activities.

The provisions of the HSSE plan applied to all persons entering the Site or involved in field activities that may be exposed to safety and/or health hazards related to activities performed during the PDI. The HSSE Plan was prepared in accordance with Health and Safety requirements set forth by AR and in accordance with the requirements for Hazardous Waste Operations and Emergency Response (HAZWOPER) 29 CFR1910.120 or 29 CFR 1926.65.

6.2 AIR MONITORING PROGRAM

Perimeter air monitoring was conducted during on-shore ground intrusion activities (i.e. drilling, air knife, and test pitting) associated with three field events conducted between September 2013 and October 2014 in accordance with the PDI Community Air Monitoring Plan (Haley & Aldrich, 2014). Prior to the beginning of each field event, a baseline monitoring event was conducted for two days prior to beginning intrusive activities (24-25 September 2013, 12-13 May 2014, and 15-17 October 2014) to determine background dust and PCB concentrations. Data was provided to NYSDEC on a weekly basis indicating the orientation of dust and PCB monitoring equipment and results. Based on the absence of PCB-detections in air samples collected for analysis during completion of air knife and drilling activities, PCB sampling was reduced to twice per week and then discontinued for these activities after 7 November 2013. Subsequent air monitoring for PCBs was conducted during test pitting activities.

PCBs were not detected in air samples collected during completion of PDI activities. Exceedances noted for dust are listed in in Table 6.2A. Weekly CAMP and PCB Summary tables and figures submitted to the DEC are included in Attachment F.

6.3 WASTE MANAGEMENT

Investigation Derived Wastes (IDW) (soil, sediment, and fluids resulting from investigation activities, sampling equipment decontamination, PPE, and sampling supplies (e.g., gloves, paper towels, foil, etc.)) were placed into appropriate containers and staged on-Site for disposal. In general, waste was managed in drums, roll offs, and frac tanks. Waste was appropriately profiled and shipped to Waste Management located in Model City, NY for appropriate disposal. As described in the work plan, spoils resulting from test pit activities were returned to the point of collection. Prior to returning spoils resulting from test pitting activities, visual observations were made confirm the absence of DNAPL, LNAPL, or obvious signs of semi-solid PCBM.

7. Summary & Conclusions

The PDI was performed in general accordance with the work plan, Former Anaconda Wire & Cable Plant Site, prepared by Haley & Aldrich of New York (Haley & Aldrich) for AR, dated July 2014. The work plan was completed and implemented as required by the OU-1 and OU-2 RODs and the Amended Order on Consent. The purpose of completing the PDI and the PDI Data Summary Report was to collect data that will support completion of the design, to provide data to NYSDEC, and to gain acceptance of interpretations of extents of remedial actions, which will be the basis of the design of the remedy. All work was performed in compliance with procedures described in the work plan. Some adjustments to the work plan were required during implementation of field activities and were generally the result of field conditions as documented in previous sections of this report.

As described in this document, collected data is sufficient to establish extents of remedial actions and complete the Preliminary Design with the exception of two areas in which structures inhibited access to complete explorations (beneath site trailers and within Building 52). Additional data will be collected once the structures are demolished or relocated. Upon acceptance of this PDI Summary Data Report by NYSDEC, AR plans to begin the Preliminary Design as required by the ROD.

7.1 PHASE 1 PDI INVESTIGATION

The purpose of Phase 1 of the PDI investigation was to collect site related data that could be used to complete the work plan and design of the remedy. The scope and results of this phase of work is described below.

- Ground Penetrating Radar (GPR)

A GPR pilot was completed to evaluate the presence of subsurface structures, voids, and utilities. If successful, the program would be expanded. However, based on results of the pilot, this technology was ineffective due to site conditions such and the program was not expanded.

- Site Survey

A site survey was completed to update site topography and site features for the purposes.

- Bathymetric Survey (completed as part of the baseline sampling)

A bathymetric survey was completed to document bathymetric and shoreline elevations.

7.2 OU-1 SUPPLEMENTAL INVESTIGATION

Groundwater Levels

Groundwater level loggers were installed in 13 existing site wells and in 7 newly installed wells for up to 18 months to monitor hydraulic gradient and tidal influence in the Fill and Basal Sand hydrostratigraphic units for the purpose of constructing a groundwater model.

Groundwater Sampling

Baseline groundwater sampling was completed in 4 monitoring wells up gradient and 3 monitoring wells located on the western shoreline to monitor shallow groundwater prior to remedial construction, to evaluate the long term effectiveness of the remedy. The results indicated the presence of PCBs in one of the upgradient wells greater than drinking water standards. A new monitoring well was installed further

upgradient indicated the presence of PCBs greater than drinking water standards. Additional action is deferred until additional sampling rounds are completed. Groundwater sampling will continue annually until the beginning of construction.

Void Assessment

There are several areas of the Site, especially in areas adjacent to the Hudson River, where evidence of soil erosion or subsidence beneath concrete slabs, including voids, has been observed. An assessment of potential voids was conducted to obtain a better understanding of the depth and extent of the void spaces beneath the various surface cover concrete slabs. Void extents were evaluated at approximately 127 locations along portions of the western shoreline including concrete slab areas that contained existing holes that exhibited voids and in concrete slab areas that were indicated based on the initial GPR pilot test. Results indicated that expansive voids are not present at the site.

Subsurface Anomalies

There are several areas of the Site in which subsurface anomalies were identified during previous investigations and during routine site work as described below.

Potential basements

Potential basements were investigated to determine whether historic operations resulted in environmental impacts and the footprints of these structures. Results of the investigation indicated a large basement, trench, and former storm sewer with no evidence of environmental impacts. Their locations will be documented and addressed during the design (i.e. backfilling, etc.). Remedial action is not required in these areas.

Potential NAPL

There were two areas on the site in which site employees indicated that NAPL was observed during previous intrusive activities (i.e. installing utility poles, etc.). Borings were completed in these areas and samples collected at horizons. NAPL as previously described was not observed and samples indicated that PCBs were present less than removal criteria. Additional remedial action is not required in these areas.

Additionally, during completion of subsurface investigations or monitoring well installations, evidence of LNAPL was observed at or near the water table at on-shore locations of the Site. Many of these areas coincide either partially or entirely with excavation areas. Implementation of remedy specified in the ROD will either eliminate any LNAPL in the subsurface or potential exposure pathways for areas of the site in which evidence of LNAPL was observed and is therefore protective of human health and the environment. Remedial actions for potential LNAPL in addition to those required by the ROD to remove PCBs and lead are not required.

Potential production wells

As described in the work plan and based on review of historical site drawings, two production wells were identified as being potentially present at the Site. A public records search was performed to identify the locations of potential production wells and to determine whether additional wells may be present on the site. Site reconnaissance indicated the presence of one of the wells; the second well was not located. The located former production well was accessed and while the well was disconnected

from service, it had not been abandoned. The Westchester County Health Department and NYSDEC were notified and the well was properly abandoned.

Building 17 concrete slab

A historic concrete core sample (completed in 2009) exhibited concentrations of PCBs greater than 50 mg/kg. Historic drawings indicated the presence of former wastewater conveyances (trenches) in this former building; however historical soil borings were not completed in this area. During the PDI, two soil borings were completed adjacent to these former trenches. Analytical results from both soil sampling locations indicated the presence of PCBs above 10 mg/kg. Based on these results, the area was added to the OU-1 Excavation Pre-delineation investigation, and offsets and step outs were completed to delineate PCBs in this area.

Building 52 Outfall Investigations

During the PDI, five potential Building 52 outfalls and one outfall from Building 15 were evaluated through historical document review and/or field investigations to determine whether the pipes were a source of PCB impacts. The results generally indicated the following:

- Many of the Building 52 outfalls will be completely removed during excavation activities to remove PCBs present above removal criteria as part of the on-shore excavation program.
- The Building 15 outfall will be completely removed during excavation of the shoreline.
- Based on historical document review, two of the potential outfalls identified in the work plan were associated with non-process piping and do not require investigation.
- One test pit was completed. PCB analytical results of suspected Building 52 pipe outfall pipe bedding indicated results not sufficiently high to indicate the presence of PCB source material.
- Further evaluation of one of the potential Building 52 outfalls may be required during the design to determine the sufficiency of the current data set.

Existing Underground Utilities

During prior site investigation activities, storm sewers and other utilities were identified but not well defined with respect to alignments and outfall locations. During the PDI, the presence, locations, and general conditions of existing utilities were evaluated for the purposes of determining utilities that cross the site from offsite locations. This information will be incorporated into the design and may impact future easements and required discharge permits. The investigation used a combination of historical document review, direct visual observation (e.g. opening manholes), invert surveying, and utility tracer equipment to refine locations of utilities. Results indicated the presence of several utilities that will require protection during construction and have been documented on the site utilities drawings.

7.3 OU-1 EXCAVATION PRE-DELINEATION

The purpose of the OU-1 soil sampling was to pre-delineate on-shore excavation areas which will be completed during remedial construction. Excavation limits were delineated in both lateral and vertical directions, to determine where PCB and/or lead exceeded removal criteria. Establishing excavation limits (area and depth) in this manner will allow a focused design, reduce uncertainty and increase worker safety during construction, and reduce changes in the field which may result from completing excavation confirmation sampling during remedial construction.

The work was completed as described in the work plan with some exceptions resulting from field conditions. The results of the investigation indicate that vertical and horizontal extents of PCBs have been delineated in general accordance with DER-10 with exceptions identified in Section 3.3 of this report. Deviations from DER-10 were generally due to relocating borings due to field conditions and deviations which generally are a result of excavations adjacent to property boundaries or in the vicinity of active utilities. Delineation of three areas of the site could not be completed due to the presence of structures: within Building 52, underneath existing site trailers, or were in the vicinity of an active utility. Additionally, one excavation area was not investigated. These areas will be further investigated either during design of the remedy or during construction.

Based on data collected and evaluations conducted, delineations described in this report adequately describe the required limits of remedial action and will be the basis of excavation design.

7.4 EXTENSION ALIGNMENT INVESTIGATION

The purpose of the PCBM and obstruction probes was to evaluate the presence of both PCBM and obstructions along the alignments of the proposed bulkhead extension wall and deadman. Confirmation that semi-solid or liquid PCBM does not exist along the alignment is important since this material could be dragged down to the Basal Sand aquifer during construction of the wall. Confirmation that obstructions do not exist along the alignment is important since they could impede the ability to construct the wall. Land and water based probes were completed in the vicinity of the proposed bulkhead extension wall and deadman anchor.

Fifty-one probes were completed off-shore (41 using mud rotary and 10 using vibracore (PCBM evaluation only)) and 17 probes were completed on shore. Based on the findings of the extension alignment investigation, a corridor has been identified where no PCB Material (either as DNAPL or semi-solid), or major obstructions exist. This corridor will be the basis of the alignment during the design.

7.5 DEEPWATER INVESTIGATION

The goal of this investigation is to examine deepwater areas where PCBs in excess of 50 mg/kg are known or suspected to be present in order to gather data for making decisions regarding remedial action.

The following factors were considered for the evaluation of the deepwater dredge area: 1) depth of PCB contamination, 2) type of environment (erosional or depositional), 3) contiguous areas of contamination, 4) thickness of clean sediment above the PCB contamination, 5) duration of dredging and associated potential for migration of resuspended sediments, and 6) the area weighted surface concentration of PCBs.

Based on the evaluation of the data with respect to the above six factors, dredging in this area is not consistent with the basis for selection, is not feasible and may pose a greater risk to the environment than to leave the limited number of isolated sediments in place and therefore is not recommended.

The following factors specifically support this conclusion:

1. Sediments greater than 50 mg/kg are at least 2-3 feet below the sediment surface and are well below the bioturbation layer.

2. All of these Decision Units are located in a thick deposition zone and have already been buried by natural deposition.
3. Impacted sediments are found only in small isolated areas that are well below the surface.
4. There is at least 2-3 feet of clean cover at all of these locations
5. Potential for migration of re-suspended sediments poses a threat to the environment that currently does not exist and based on the factors above would be sequestered in perpetuity.
6. Area weighted surface concentrations of PCBs are at or near 1 mg/kg for the upper two feet of the investigation area.

7.6 OFF-SHORE PRE-DELINEATION

The purpose of this Off-shore Pre-Delineation investigation was to examine the various off-shore areas where PCBs or metals in excess of remedial criteria are known or suspected to be present (as specified in the ROD), in order to gather supplementary data for making decisions regarding remedial action and to provide information for delineation of dredge areas. The following conclusions were made based on an evaluation of additional data collected

- Near shore: A majority of the nearshore sediments will be removed to a maximum depth of depth of 6 ft in the vast majority of the area.
- Old Marina: Determination of remedial action is deferred to design of the remedy and the results of additional sampling, potential future use, and presence of deposition below or near background throughout the sediments near the surface and potential collection of additional data north of the Old Marina. Additional sampling will require coordination with the property owner. Design of the remedy will specifically address the sediments in the proximity to VC-501.
- North Boat Slip: Remedial action is recommended in the entirety of the North Boat Slip consistent with the removal recommended for adjacent nearshore locations VC-401 thru VC-405. Removal of these sediments up to the maximum depth of six feet will be completed.
- South Boat Slip: Remedial action is recommended at locations VC-701 and VC-703 extending east toward the shoreline in order to remove lead present at historical locations at concentrations greater than removal criteria.
- Northwest Area: Remedial action is recommended in various locations to remove sediments greater than 50 mg/kg up to three feet bml and deeper where contiguous contamination greater than 50 mg/kg exists up to a maximum depth of 6 ft. Remaining locations were evaluated with the six factors and were will remain covered in place.

7.7 GEOTECHNICAL EXPLORATION

The geotechnical portion of the PDI consisted of soil borings, test pits, and geotechnical laboratory testing to evaluate subsurface conditions. The purpose of the geotechnical explorations is to provide additional stratigraphy information in several areas: in the general vicinity of the planned deadman anchor (which will be located west of Building 52), in the general vicinity of the planned Northwest Extension bulkhead wall, and in the general off-shore area between the North Boat Slip and the South Boat Slip. The information will be used for bulkhead and deadman design, excavation support design, design of the sloped shore, and general site geotechnical analysis (such as settlement). Additionally, test pits were excavated at select locations around the site where support of excavation (SOE) may be used

during construction (i.e., “hot spot” excavation locations that are about 6 ft bgs or greater). The purpose of the test pits is to gather information on soil conditions, excavation effort, and potential obstructions that could affect the design and/or construction of the SOE walls. The results of the investigation provided geotechnical data required to complete the Preliminary Design.

7.8 BENCH TESTING

The purpose of the bench testing was to evaluate various design parameters associated with the handling of residuals, for treatments that could be performed on-site to prepare the residuals for final disposition. Specific tests and conclusions are provided below.

Solids Dewatering

Results indicate that gravity draining onsite soils is not sufficient to allow for transport off site. Filter presses will be required to reduce the sufficiently reduce the water content for on-shore soils. Gravity drainage or filter presses will not be adequate for sediments dewatering; additional dewatering technologies are required to be evaluated for sediments.

Stabilization

Stabilization testing was performed based on the results of the solids dewatering test which indicated that dewatering alone will not be sufficient for sediments to pass the liquid release test. Stabilization testing results indicate that numerous additives will allow the sediments to be transported off-site. If sediment can be used on-site, there are very limited amendments that will provide 50 psi of compressive strength.

Construction Water Treatment

In 2006, filtration testing alone was performed on a small amount of collected groundwater in order to determine if metals and PCBs could be removed by filtration alone. The testing was unsuccessful in removing all of the contaminants.

As part of the 2015 bench testing, both groundwater and sediment pore water were tested separately and then combined to identify a treatment train that would successfully remove PCBs and metals from the water streams. Unit operations were testing individually on the individual streams and then combined as an overall treatment train.

Results of this testing indicated that a treatment train of filtration, carbon adsorption and metals precipitation (through pH adjustment) is capable of removing PCBs and metals to very low levels, anticipated to be below discharge requirements.

Long Term Groundwater Treatment

The long-term groundwater treatment bench tests were not performed. Completion of this work has been deferred until the design of the remedy is complete and groundwater flow and potential residual contaminant levels can be better determined.

8. References

1. 50% Design Report for Operable Unit No.1 (OU1), Former Anaconda Wire and Cable Plant Site, NYSDEC Site # 3-60-22, Volumes I-III, Haley & Aldrich of New York, July 2006

2. Modified Conceptual Site Model, Harbor at Hastings Site, Haley & Aldrich of New York, October 2008

3. Supplemental Northwest Corner Investigation Findings Report, NYSDEC Site # 3-60-22, Haley & Aldrich of New York, January 2009

4. DER-10: Technical Guidance for Site Investigation and Remediation, NYSDEC, May 2010.

5. DNAPL IRM Recover Well Installation Memorandum, Former Anaconda Wire and Cable Plant Site, Haley & Aldrich of New York, November 2010.

6. Rip Rap Field Investigation Data Report, Former Anaconda Wire and Cable Plant Site, Haley & Aldrich of New York, December 2010

7. Geotechnical Discussion Appendix H, Revised Feasibility Study, Former Anaconda Wire & Cable Plant Site, NYSDEC Site # 3-60-22, Haley & Aldrich of New York, October 2011

8. Record of Decision Amendment for the Harbor at Hastings site, Operable Unit No.1, NYSDEC, March 2012

9. Record of Decision for the Harbor at Hastings site, Operable Unit No.2, NYSDEC, March 2012

10. Revised Feasibility Study, Former Anaconda Wire & Cable Plant Site, NYSDEC Site # 3-60-22, Haley & Aldrich of New York, October 2011

TABLES

TABLE I
SUMMARY OF HISTORICAL SITE INVESTIGATIONS
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE & CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Investigator	Time Period of Investigation	Date of Report	Location	Number of Borings	Number of Wells	Number of Subsurface Soil Samples	Number of Surface Soil Samples	Number of Groundwater Samples	Number of Structural Samples	Number of Sediment Samples	Reference
Dolph Rotfeld Associates	-	1976	OU-1	20	N/A	N/A	N/A	N/A	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Converse Engineering	-	1986	OU-1	4	N/A	N/A	N/A	N/A	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Malcolm Pimie, Inc.			OU-1								Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Phase I	Nov 1986	Dec 1987	OU-1	10	0	10	3	0	2 sump samples		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Phase II	Summer 1987	Dec 1987	OU-1	18	5	17	4	5	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Olko Engineering	Jan 1988	1988	OU-1	4	0	1	0	0	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
EPA	N/A	Jan 1989	OU-1	N/A	N/A	N/A	N/A	N/A	N/A		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Groundwater Technology, Inc.	Mar 1989		OU-1	6	3	6	0	2	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Eldon Environmental	May to Aug 1989	Oct 1989	OU-1	21	3	21	6	5	5 PCB wipe samples		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Parish & Weiner, Inc.	N/A	Oct 1989	OU-1	N/A	N/A	N/A	N/A	N/A	N/A		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Westchester Dept of Health	Sep 1994	Dec 1994	OU-1	0	0	0	0 on-site 104 off-site	0	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Golder Associates	Dec 1995 to Mar 1996	Oct 27 2000	OU-1	50	3	112	0	6	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Fluor Daniel	Sep 1997 to Aug 1998	Oct 27 2000	OU-1	85	10	326	0	0	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
Fluor Daniel	May 1998	Nov 1998	OU-2	43	0	0	0	0	0	185	Offshore Sampling Supplemental Testing, Harbor At Hastings, Hastings-On-Hudson, New York NYSDEC Site # 360022
Fluor Daniel/IT Corp	Jun 1999 to May 2000	Oct 27 2000	OU-1	90	7	453	0	0	0		Remedial Investigation Report, Harbor-at-Hastings Site, Hastings-on-Hudson, NY, HYSDEC Site Code # 3-60-022
IT Corp	Sep to Oct 2001	Nov 30, 2001	OU-1	0	3	22	0	0	0		Peer Review Summary Report, Excavation Evaluation for Operatble Unit #1, Harbor at Hastings Site, Hastings on Hudson, New York
Earth Tech of New York, Inc.	Aug 2000 to Apr 2001	Mar 10, 2003	OU-1	48	0	189	42	0	0		Final Feasibility Study Report, Harbor at Hastings Site (OU#2) Site 3-60-022, Work Assignment No. D003821-15
Parsons	Sep 2004 to Nov 2004	Jan 6, 2005	OU-2	86	0	0	0	0	0	86	Field Work Summary Report for Fall 2004, Atlantic Richfield Supplemental Offshore Investigation, Former Anaconda Plant Site, Operable Unit No. 2
Parsons	July 2005	Nov 30, 2005	OU-2	19	0	19	0	0	0		Field Work Summary Report for Summer 2005, Physical Site Characterization and Sediment Sampling Effort, Former Anaconda Plant Site, Operable Unit No. 2
Parsons	Nov 2005	Feb 2006	OU-2	10	0	37	0	0	0		Fall 2005 Field Sampling Summary Report--Focused AVS-SEM Sediment Sampling, Operable Unit 2 (OU-2) of Harbor-at-Hastings Site (Site 3-60-022) Hastings-on-Hudson, New York
Haley & Aldrich	Jan 2007 to Dec 2008	Jan 2009	OU-1 & OU-2	66	1	32				152	Supplemental Northwest Corner Investigations Finding Report, NYSDEC Site (#3-60-022), Hastings-On-Hudson, New York
Haley & Aldrich	Aug to Sep 2010	Nov 2010	OU-1		4						DNAPL IRM Recovery Well Installation Memorandum
Haley & Aldrich	Sep 2010	Dec 2010	OU-2	24							Rip Rap Field Investigation Data Report, Former Anaconda Wire and Cable Plant Site, Hastings-on-Hudson, New York
Haley & Aldrich	Jun to July 2011	Sep 2010	OU-1		4						DNAPL IRM Recovery Well Field Expansion Summary Memorandum

TABLE 3.2A
SCHEDULE OF TRANSDUCER DEPLOYMENT
FORMER ANACONDA WIRE & CABLE COMPANY
HASTINGS ON HUDSON, NEW YORK

		Download 1 5/31/2013- 6/6/2013	Download2 6/6/2013- 7/2/2013	Download 3 7/2/2013- 8/7/2013	Download 4 8/7/2013- 10/18/2013	Download 5 10/18/2013- 12/13/2013	Download 6 12/13/2013- 3/4/2014	Download 7 3/4/2014- 5/8/2014	Download 8 5/8/2014- 7/29/2014	Download 9 7/29/2014- 11/7/2014
Shallow Fill	MW-09				x	x	x	x	x	x
	PDMW-07				x	x	x	x	x	x
	PDMW-10	x	x	x	x	x	x	x	x	x
	PDMW-12				x	x	x	x	x	x
	PSMW-16S	x	x	x	x	x	x	x	x	x
	PDMW-18S	x	x	x	x	x	x	x	x	x
	PDMW-20S						NR	x	x	x
	PDMW-21S						x	x	x	x
	PDMW-22S						x	x	x	x
	PDMW-23S						x	x	x	x
	PDMW-24S						x	x	x	x
	PDMW-26S						x	x	x	x
	RW-03	x	x	x	x	x	x	x	x	x
Basal Sand	MW-01B				x	x	NR	x	x	x
	MW-13A				x	x	x	x	x	x
	MW-15A	x	x	x	x	x	x	x	x	x
	PDMW-16D	x	x	x	x	x	x	x	x	x
	PDMW-17D	x	x	x	x	x	x	x	x	x
	PDMW-18D	x	x	x	x	x	NR	x	x	x
	PDMW-25D						x	x	x	x

NR - data not recorded; technical problems encountered during download.

TABLE 3.2B
RECORDED HIGH AND LOW GROUNDWATER ELEVATIONS
FORMER ANACONDA WIRE & CABLE COMPANY
HASTINGS ON HUDSON, NEW YORK

		Low			High		
		Date	Time	GW Elev	Date	Time	GW Elev
Shallow Fill	MW-09	3/6/2014	9:15	0.45	5/1/2014	0:45	3.77
	PDMW-07	2/12/2014	3:30	0.04	5/1/2014	1:00	4.03
	PDMW-10	1/28/2014	4:30	-0.06	5/1/2014	1:15	2.96
	PDMW-12	1/30/2014	5:45	-0.91	4/29/2014	23:15	3.78
	PDMW-16S	9/30/2014	15:00	2.53	5/1/2014	2:00	5.48
	PDMW-18S	9/24/2014	20:00	1.87	5/1/2014	1:30	4.61
	PDMW-20S	9/24/2014	15:30	1.89	5/1/2014	2:30	4.03
	PDMW-21S	9/25/2014	10:00	0.62	5/1/2014	0:45	4.65
	PDMW-22S	1/28/2014	4:30	0.21	5/1/2014	1:15	3.70
	PDMW-23S	9/4/2014	12:30	-0.50	4/29/2014	23:30	9.65
	PDMW-24S	3/6/2014	10:15	0.69	5/1/2014	3:45	3.21
	PDMW-26S	2/12/2014	5:45	0.47	5/1/2014	3:30	3.21
	RW-03	1/28/2014	2:15	-0.24	5/1/2014	0:15	3.35
Basal Sand	MW-01B	12/14/2013	0:30	2.49	5/3/2014	1:00	5.90
	MW-13A	1/7/2014	22:15	1.14	5/17/2014	0:30	5.28
	MW-15A	1/7/2014	22:15	1.53	5/7/2014	0:30	5.26
	PDMW-16D	12/14/2013	1:30	3.09	5/17/2014	1:30	6.57
	PDMW-17D	12/14/2013	1:30	3.18	5/17/2014	0:30	6.32
	PDMW-18D	11/4/2014	1:00	3.11	5/1/2014	1:15	5.46
	PDMW-25D	11/4/2014	1:00	2.67	5/1/2014	0:30	5.53

TABLE 3.2C - SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
WELL SAMPLING LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Location	**Standards, Criteria, and Guidance Values (Unfiltered) (ug/L)**	PDMW-16S	PDMW-19S	PDMW-20S	PDMW-27S	MW-01A	MW-05	MW-09	MW-09
Sample Date		08/01/2014	08/04/2014	08/04/2014	12/02/2014	08/05/2014	08/05/2014	08/04/2014	08/04/2014
Sample Type		N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	FD, Unfiltered
Sample Name		0710-080114-1105	0710-080414-1030	0710-080414-1520	0710-120214-1630	0710-080514-0915	0710-080514-1235	0710-080414-1230	0710-080414-0002
Total Metals (ug/L)									
Beryllium	3	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
Copper	200	ND (5)	**23**	ND (5)	**43**	ND (5)	**6.1**	**180**	**180**
Lead	25	ND (5)	**18**	ND (5)	**81**	ND (5)	ND (5)	ND (5)	ND (5)
Zinc	2000	ND (5)	**110**	ND (5)	**70**	ND (5)	**16**	**750**	**750**
PCBs (ug/L)									
Aroclor 1016	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1221	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1232	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1242	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1248	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1254	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1260	-	ND (0.05)	**0.98**	ND (0.05)	ND (0.05)	ND (0.05)	**0.83**	**0.24**	**0.27**
Aroclor 1262	-	ND (0.05)	ND (0.1)	ND (0.05)	**0.65**	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1268	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Total PCBs	0.09	ND (0.05)	**0.98**	ND (0.05)	**0.65**	ND (0.05)	**0.83**	**0.24**	**0.27**

Notes:
ND (Not detected above laboratory detection limits)
1. Results in **bold** were detected.
2. Results shaded in red are above SCG values.

TABLE 3.2D
VOID PROBE SUMMARY
FORMER ANACONDA WIRE & CABLE COMPANY
HASTINGS ON HUDSON, NEW YORK

Void Location ID	Date Completed	Surface Cover Thickness (inches)	Void Present Below Surface Cover	If Void Present - Thickness (inches)
V - 012	9/26/2013	11	No	-
V - 013	9/26/2013	10	No	-
V - 014	9/26/2013	10	No	-
V - 015	9/26/2013	7	No	-
V - 016	9/26/2013	11	No	-
V - 017	9/26/2013	3	No	-
V - 018	9/26/2013	3	No	-
V - 019	9/26/2013	2	No	-
V - 020	9/26/2013	2	No	-
V - 021	9/26/2013	4	No	-
V - 022	9/26/2013	6	Yes	2
V - 023	9/26/2013	6	Yes	6
V - 024	9/26/2013	10	No	-
V - 025	9/26/2013	11	No	-
V - 026	9/26/2013	11	No	-
V - 027	9/26/2013	12	No	-
V - 028	9/26/2013	10	No	-
V - 029	9/26/2013	6	No	-
V - 030	9/26/2013	12	No	-
V - 031	9/26/2013	8	No	-
V - 032	9/26/2013	6	No	-
V - 033	9/26/2013	10	No	-
V - 034	9/26/2013	11	No	-
V - 035	9/26/2013	6	No	-
V - 036	9/26/2013	6	No	-
V - 037	9/26/2013	6	No	-
V - 038	9/26/2013	7	No	-
V - 039	9/26/2013	5	No	-
V - 040	9/26/2013	6	No	-
V - 041	9/26/2013	7	No	-
V - 042	9/26/2013	8	No	-
V - 043	9/26/2013	10	No	-
V - 044	9/26/2013	10	No	-
V - 045	9/26/2013	10	No	-

Locations labeled "VE-XXX" indicate existing voids.
Locations V-001 through V-011, V-54 through V-59, and V-120 through V-122 not completed.

TABLE 3.2D
VOID PROBE SUMMARY
FORMER ANACONDA WIRE & CABLE COMPANY
HASTINGS ON HUDSON, NEW YORK

Void Location ID	Date Completed	Surface Cover Thickness (inches)	Void Present Below Surface Cover	If Void Present - Thickness (inches)
V - 046	9/27/2013	10.5	No	-
V - 047	9/27/2013	12	No	-
V - 048	9/27/2013	12	No	-
V - 049	9/27/2013	11	No	-
V - 050	9/27/2013	10	No	-
V - 051	9/27/2013	10	No	-
V - 052	9/27/2013	8	No	-
V - 053	9/27/2013	11.5	No	-
V - 060	11/21/2013	2	No	-
V - 061	11/21/2013	2	No	-
V - 062	11/21/2013	4	No	-
V - 063	11/21/2013	2	No	-
V - 064	11/21/2013	2	No	-
V - 065	11/21/2013	8	No	-
V - 066	11/21/2013	8	No	-
V - 067	11/21/2013	2	No	-
V - 068	11/21/2013	2	No	-
V - 069	11/21/2013	8	Yes	4
V - 070	11/21/2013	10	No	-
V - 071	11/21/2013	10	No	-
V - 072	11/21/2013	10	No	-
V - 073	11/21/2013	10	No	-
V - 074	11/21/2013	11	No	-
V - 075	11/21/2013	11	Yes	10
V - 076	11/21/2013	12	No	-
V - 077	11/21/2013	13	Yes	3
V - 078	11/21/2013	11.5	Yes	2.5
V - 079	11/21/2013	14	No	-
V - 080	11/21/2013	14	No	-
V - 081	11/21/2013	14	Yes	1
V - 082	11/21/2013	18	No	-
V - 083	11/21/2013	14	No	-
V - 084	11/21/2013	13	Yes	4
V - 085	11/21/2013	15	Yes	3

Locations labeled "VE-XXX" indicate existing voids.
Locations V-001 through V-011, V-54 through V-59, and V-120 through V-122 not completed.

TABLE 3.2D
VOID PROBE SUMMARY
FORMER ANACONDA WIRE & CABLE COMPANY
HASTINGS ON HUDSON, NEW YORK

Void Location ID	Date Completed	Surface Cover Thickness (inches)	Void Present Below Surface Cover	If Void Present - Thickness (inches)
V - 086	11/21/2013	13	No	-
V - 087	11/21/2013	14	Yes	4
V - 088	11/22/2013	12	Yes	8
V - 089	11/22/2013	15	Yes	6
V - 090	11/22/2013	14	Yes	4
V - 091	11/22/2013	16	Yes	2
V - 092	11/22/2013	12	No	-
V - 093	11/22/2013	17	Yes	1
V - 094	11/22/2013	18	No	-
V - 095	11/22/2013	18	Yes	4
V - 096	11/22/2013	16	Yes	2
V - 097	11/22/2013	18	No	-
V - 098	11/22/2013	11	Yes	12
V - 099	11/22/2013	12	Yes	8
V - 100	11/22/2013	18	No	-
V - 101	11/22/2013	10	Yes	3
V - 102	11/22/2013	8	No	-
V - 103	11/22/2013	8	No	-
V - 104	11/22/2013	6	No	-
V - 105	11/22/2013	4	No	-
V - 106	11/25/2013	10	Yes	4
V - 107	11/25/2013	16	No	-
V - 108	11/25/2013	12	Yes	3
V - 109	11/25/2013	18	No	-
V - 110	11/25/2013	18	No	-
V - 111	11/25/2013	18	No	-
V - 112	12/2/2013	13	Yes	42
V - 113	12/2/2013	20	No	-
V - 114	12/2/2013	18	No	-
V - 115	12/2/2013	18	No	-
V - 116	12/2/2013	18	No	-
V - 117	12/2/2013	13	Yes	5
V - 118	12/2/2013	13	Yes	3
V - 119	12/2/2013	12	Yes	6

Locations labeled "VE-XXX" indicate existing voids.
Locations V-001 through V-011, V-54 through V-59, and V-120 through V-122 not completed.

TABLE 3.2D
VOID PROBE SUMMARY
FORMER ANACONDA WIRE & CABLE COMPANY
HASTINGS ON HUDSON, NEW YORK

Void Location ID	Date Completed	Surface Cover Thickness (inches)	Void Present Below Surface Cover	If Void Present - Thickness (inches)
V - 123	12/4/2013	14	Yes	3
V - 124	12/4/2013	18	No	-
V - 125	12/4/2013	15	Yes	3
V - 126	12/4/2013	16	Yes	1
V - 127	12/4/2013	12	Yes	16
V - 128	12/4/2013	12	Yes	4
V - 129	12/4/2013	12	Yes	41
V - 130	12/4/2013	18	No	-
V - 131	12/4/2013	17	Yes	1
V - 132	12/4/2013	12	Yes	2
V - 133	12/4/2013	13	Yes	3
VE - 01	12/6/2013	6	Yes	33
VE - 02	12/6/2013	8	Yes	8
VE - 03	12/6/2013	9	Yes	10
VE - 04	12/6/2013	5	Yes	11
VE - 05	12/6/2013	4	Yes	11
VE - 06	12/6/2013	9	Yes	14
VE - 07	12/6/2013	8	Yes	3
VE - 08	12/6/2013	8	Yes	11
VE - 09	12/6/2013	8	Yes	4
VE - 010	12/6/2013	7	Yes	52
VE - 011	12/6/2013	12	Yes	42
VE - 013	12/6/2013	13	Yes	6
VE - 014	12/6/2013	12	Yes	8
VE - 015	12/6/2013	10	Yes	8

Locations labeled "VE-XXX" indicate existing voids.
Locations V-001 through V-011, V-54 through V-59, and V-120 through V-122 not completed.

TABLE 3.2E
SUMMARY OF EVIDENCE OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)
Appendix 2 South Boat Slip	PDI-2-00	6.4-11.5
Appendix 2 Former Brook Tunnel	FBT-2	6-12
	PDMW-23S (ORIGINAL RDWP	6-10
Appendix 2 PDMW-24S and PDMW-26S	PDMW-24S	5-15
	PDMW-26S	7.5-10
Appendix 4 Northwest	LP-14	26-26.5
	LP-6	5-7, 8-10
NA	NA-101	5-6
	NA-102	4.0-4.5
	NA-202	4.8-9
	NA-203	6-7.8
NC	NC-101	8.5-10.5
	NC-102	9-10
NE	PD2-GL-001	5-9
	NE-301	5.8-7.5
NH	NH-106	6.5-10
NI/NH	NH-211	7.2-9.4
	NI-303	8.2 - 9.8
	NI-310	8.75-10
NI	NI-305	7.5-11.25

TABLE 3.2E
SUMMARY OF EVIDENCE OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)
NI/NK	NI-307	10-14
	NI-308	8.75-12
	NI-309	8-10
	NK-201	8-8.3
	NK-303A	7
	NI-301	6-9
	PD2-GL-002	6.2-6.5
	NK-203	9.2
	NK-301	7.5-10
NL	NL-102	6-10
	NL-201	5-8
	NL-202	5.8-8
	NL-301	4-8
NN	NN-104	8-10
	NN-306	6-10
SC	SC-103	8-10
SM	SM-201	5-6.5

TABLE 3.2E
SUMMARY OF EVIDENCE OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)
SS	SS-101	8-10
	SS-102	4.3-10
	SS-206	7-12.5
	PDMW-22S-08	5(?)
	SS-222	11-14
	PDMW-22S	5-12
	PDMW-22S-01	2-4.5
	PDMW-22S-01	5-10
	PDMW-22S-02C	8.5-12
	PDMW-22S-03	8-9.5
	PDMW-22S-05	4-8
	SS-212	12-13.25
	SS-213	7.3-8.8
	SS-214	10-12.25
	SS-220	8-10
	SS-221	11.5-12.5
	SS-227	6-9.75
WA	WA-103	3.5, 6
	WA-107	6
	WA-113	6-10
	WA-115	5
	WA-116	5 ft 7 in
	WA-117	4-6

TABLE 3.2E
SUMMARY OF EVIDENCE OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)
WA/WB	WA-125	5.5-10
WB	WB-201	2.6-5.6
	WB-301	10-12

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NA	NA-101	320	-	12	0.8	15	0.22	ND
	NA-102	140	120	6.2	5.4	3	0.11	-
	NA-201	13	ND	1.1	-	-	ND	-
	NA-202	-	ND	5.7	-	-	-	-
	NA-203	-	ND	-	-	-	-	-
	NA-204	-	-	ND	-	0.093	ND	-
	NA-301	8.2	-	-	-	-	-	-
	NA-302	1.3	-	-	-	-	-	-
NB	NB-001	-	-	-	7.9	2.8	1.3	ND
NC	NC-001	-	-	-	12	ND	-	-
	NC-002	-	-	-	300	40	26	ND
	NC-003	-	-	-	84	2	-	-
	NC-004	-	ND	ND	-	-	-	-
	NC-101	29	-	-	-	-	-	-
	NC-102	50	-	-	-	-	2.5	-
	NC-103	43	-	-	-	-	-	-
	NC-104	140	-	-	-	-	-	-
	NC-105	-	-	100	-	-	-	-
	NC-108	-	-	-	78	0.46	-	-
	NC-114*	-	-	-	-	16	0.079	-
	NC-115	-	-	-	-	0.34	-	-
	NC-116	-	-	-	-	2	-	-
	NC-117	-	-	-	0.47	ND	-	-
	NC-118	-	-	-	1.3	ND	ND	-
	NC-119*	-	-	-	3.2	-	-	-
	NC-120	-	-	-	9.8	0.13	-	-
	NC-201	-	-	-	-	0.54	0.12	-
	NC-202	-	-	-	2.5	-	-	-
	NC-203	2.8	-	-	6.3	-	-	-
	NC-204	32	0.67	-	-	-	-	-
	NC-205	5.4	-	4.2	7.8	0.29	-	-
ND	ND-101	-	-	ND	-	-	-	-
	ND-102	-	-	0.076	0.17	-	-	-
	ND-103	-	-	200	42	0.42	-	-
	ND-104	-	-	3.1	0.45	-	-	-
	ND-201	-	-	630	43	0.15	-	-
	ND-202	-	-	3.6	1.3	-	3.6	-
NE	NE-101	1200	8.5	-	-	-	-	-
	NE-102	20	ND	-	-	-	-	-
	NE-103	87	0.12	-	-	-	-	-
	NE-104	23	15	-	0.097	-	-	-
	NE-201	22	6.6	-	-	-	-	-
	NE-202	0.16	1.9	-	-	-	-	-
	NE-203	11	-	0.66	170	0.046 J	-	-
	NE-204	32	1.5	0.19	0.047 J	-	-	-
	NE-301	3.1	-	-	-	-	-	-
NF	NF-101	-	-	ND	-	-	ND	-
	NF-102	-	-	0.065	-	-	0.21	-
	NF-202	1.6	-	-	-	-	-	-
NG	NG-001	-	-	-	-	-	11	0.87
	NG-101	-	-	-	-	-	6.2	-
	NG-102	-	-	-	-	-	2.3	-
	NG-103	-	-	-	-	-	8.2	-
	NG-104	-	-	-	-	-	10	-
	NG-201	-	-	170	160	260	12	4.3
	NG-202	-	-	-	1700	33	2.2	-
	NG-203	-	-	-	-	-	0.083	-
	NG-204	-	-	-	-	-	36	0.75

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NH	NH-001	-	5.3	ND	-	-	-	-
	NH-002	-	11	3.1	6.3	ND	-	-
	NH-003	-	30	0.7	-	-	-	-
	NH-101	260	0.092	-	-	-	-	-
	NH-105	9200	-	-	-	99	1.3	-
	NH-106	31	0.28	ND	-	0.79	-	-
	NH-107	-	0.22	-	-	-	-	-
	NH-108	-	0.9	-	-	-	-	-
	NH-109	-	26	14	ND	-	-	-
	NH-110	-	17	10	0.15	-	-	-
	NH-111	-	0.17	-	-	-	-	-
	NH-112	-	0.12	0.12	-	-	-	-
	NH-113	540	-	810	0.22	ND	-	-
	NH-114	21	-	0.2	-	9.6	-	-
	NH-115	91	-	2100	2.5	6.7	-	-
	NH-116	280	-	4.3	2.9	-	-	-
	NH-117	25	11	540	37	0.8	-	-
	NH-118	1100	0.74	65	5.9	-	-	-
	NH-119	-	23	600	550	180	46	1
	NH-120	-	4.4	-	-	-	-	-
	NH-121	-	4.2	-	-	-	-	-
	NH-201	-	-	2.2	-	-	-	-
	NH-202	-	-	3.3	-	-	-	-
	NH-203	-	ND	ND	-	-	-	-
	NH-204	-	2.5	0.67	-	-	-	-
	NH-205	37	9.3	-	-	-	-	-
	NH-206	180	0.16	-	-	-	-	-
	NH-207	130	3.4	ND	-	-	-	-
	NH-208	2700	300	0.81	-	-	-	-
	NH-209	42	0.21	0.6	0.62	-	0.079	-
	NH-210	-	180	13	20	3.9	0.74	-
	NH-211	-	28	16	88	10	4.2	-
	NH-212	2800	2100	1	-	-	-	-
	NH-213	800	-	20	0.92	-	-	-
	NH-214	-	-	-	-	0.33	-	-
	NH-215	290	5.2	1.3	-	-	-	-
	NH-301	4900	-	-	-	-	-	-
	NH-302	250	-	-	-	-	-	-
	NH-304	290	-	-	-	-	-	-
	NH-305	48	0.73	-	7.4	-	-	-
	NH-306	47	6	-	-	-	-	-
	NH-307	60	5	-	-	-	-	-
	NH-308	23	0.74	-	-	-	-	-
	NH-309	2	150	0.12	-	-	-	-
	NH-310	340	34	3.5	-	0.3	-	-
	NH-311	-	-	-	4.5	2.7	-	-
	NH-312	-	99	7.1	6	3.2	-	-
	NH-313	13	ND	-	-	-	-	-
	NH-314	0.051 J	6.9	-	-	-	-	-
	NH-315	23	4.8	-	-	-	-	-
	NH-316	-	1.1	-	-	-	-	-
	NH-318	550	140	14	11	-	-	-
	NH-319	84	6.4	-	1.2	-	-	-
	NH-320	20	1.7	-	-	-	-	-
	NH-321	23	0.4	-	-	-	-	-
	NH-322	29	0.38	-	-	-	-	-
	NH-323	3.8	-	-	-	-	-	-
	NH-324	0.43	-	-	-	-	-	-
	NH-325	ND	-	-	-	ND	-	-
	NH-326	0.11	-	-	-	-	-	-

Notes & Abbreviations

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* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NI	NI-001	-	-	-	-	-	9.1	1.7
	NI-002	-	65	0.81	-	-	-	-
	NI-101	-	12	290	2.7	5.8	-	-
	NI-102	-	-	3.1	0.28	-	-	-
	NI-103	-	-	0.14	2	-	-	-
	NI-104	-	-	960	39	0.78	-	-
	NI-105	-	38	1.1	-	-	-	-
	NI-106	-	29	0.79	-	-	-	-
	NI-107	-	0.18	1.5	-	-	-	-
	NI-108	-	-	130	0.53	-	-	-
	NI-201	-	48	0.85	0.37	-	-	-
	NI-202	-	39	0.28	1.4	0.63	-	-
	NI-203	-	23	0.58	-	-	-	-
	NI-204	-	0.68	5.9	-	-	-	-
	NI-205	-	-	0.92	-	-	-	-
	NI-206	-	-	1.7	-	-	-	-
	NI-207	-	-	0.68	-	-	-	-
	NI-210	-	60	0.52	ND	0.11	-	-
	NI-301	-	24	0.25	-	-	2	-
	NI-302	-	21	47	ND	0.79	-	-
	NI-303	-	620	3000	410	190	14	-
	NI-304	-	11	0.62	-	-	ND	-
	NI-305	-	-	43	1.6	-	-	-
	NI-306	-	-	260	29	0.13	24	4.4
	NI-307	-	-	89	0.99	2.3	3.4	-
	NI-308	-	0.41	0.46	-	-	-	-
	NI-309	-	8.5	-	-	-	-	-
	NI-310	-	-	7.3	-	15	3.5	-
NJ	NJ-001	-	44	ND	-	-	-	-
	NJ-101	-	4.4	0.43	-	-	-	-
	NJ-102	-	0.13	0.99	-	-	-	-
	NJ-103	-	0.26	0.06	-	-	-	-
	NJ-104	-	37	ND	-	-	-	-
	NJ-105	ND	0.6	-	-	-	-	-
	NJ-106	0.079	0.63	-	-	-	-	-
	NJ-201	-	25	1.4	-	-	-	-
	NJ-301	-	7.7	-	-	-	-	-
	NJ-302	-	110	0.033 J	-	0.23	-	-
	NJ-303	-	1600	0.092	-	-	-	-
	NJ-304	16	0.19	-	-	-	-	-
	NJ-305	24	2400	420	750	-	-	-
	NJ-306	-	0.071	-	3.8	0.41	-	-
	NJ-307	12	0.07	-	-	-	-	-
	NJ-308	6.3	-	-	-	-	-	-
NK	NK-101	-	66	0.99	-	-	-	-
	NK-102	-	3.3	-	-	-	-	-
	NK-103	-	20	0.61	-	-	-	-
	NK-104	-	83	7.9	-	-	-	-
	NK-201	-	13	1.6	-	-	-	-
	NK-202	-	ND	2	-	-	-	-
	NK-203	-	3.4	5.4	-	-	-	-
	NK-204	-	26	2.1	-	-	-	-
	NK-301	-	2	-	-	-	-	-
	NK-302	-	130	1.5	-	-	-	-
	NK-303	-	0.12	2.5	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

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1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

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FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
NL	NL-001	-	9.4	-	-	-	-	-
	NL-101	1400	2.8	-	-	-	-	-
	NL-102	230	3.4	-	-	-	-	-
	NL-103	53	0.13	-	-	-	-	-
	NL-201	24	ND	-	-	-	-	-
	NL-202	110	0.9	-	-	-	-	-
	NL-203	2.3	-	-	-	-	-	-
	NL-204	0.21	-	-	-	-	-	-
	NL-301	1.7	-	-	-	-	-	-
	NL-302	34	ND	-	-	-	-	-
	NL-303	780	6.8	-	-	-	-	-
	NL-304	29	ND	-	-	-	-	-
	NL-305	0.59	-	-	-	-	-	-
	NL-306	0.35	-	-	-	-	-	-
	NL-307	0.21	-	-	-	-	-	-
	NL-308	0.38	-	-	-	-	-	-
NM	NM-101	0.1	-	-	-	-	-	-
	NM-102	220	190	130	15	3.4	-	-
	NM-103	5	-	-	-	-	-	-
	NM-104	1.1	-	-	-	-	-	-
	NM-201	85	0.44	-	1.8	-	-	-
	NM-202	86	120	66	15	0.99	-	-
	NM-203	48	-	21	2.1	-	-	-
	NM-204	-	-	1.1	-	-	-	-
	NM-301	-	-	-	47	9.9	-	-
	NM-302	-	-	0.29	-	-	-	-
	NM-303	-	ND	-	7	-	-	-
NN	NN-001	-	-	-	550	26	28	21
	NN-002	-	5.9	0.87	-	-	-	-
	NN-101	45	7.7	-	-	-	-	-
	NN-102	-	-	-	2.3	ND	-	-
	NN-103	-	-	2	-	3.4	-	-
	NN-104	-	-	-	-	55	50	0.22
	NN-105	260	6.8	-	2	-	-	-
	NN-201	140	6.1	0.32	-	-	-	-
	NN-202	-	-	-	150	39	2.2	-
	NN-301	110	11	1.7	-	-	-	-
	NN-302	140	28	38	4.6	-	-	-
	NN-303	3	-	6.5	-	-	-	-
	NN-304	0.17	-	0.44	-	-	-	-
	NN-305	86	4.3	6.8	-	-	-	-
	NN-306	-	-	29	2.2	-	-	-
	NN-307	75	5.4	36	6.5	-	-	-
	NN-308	61	2.9	-	-	-	-	-
	NN-309	7	2.6	1.5	-	-	-	-
	NN-310	4.6	1.4	1.6	-	-	-	-
NS	NS-001	-	-	0.024 J	81	4.2	-	-
	NS-101	-	-	0.045 J	24	2.1	-	-
	NS-102	-	-	ND	52	0.3	-	-
	NS-103	-	-	0.043 J	68	5.6	12	-
	NS-104	-	-	0.68	200	2.3	-	-

Notes & Abbreviations

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FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
PDMW	PDMW-22S	-	-	-	-	-	3.9	-
	PDMW-22S-01	-	-	430	-	-	550	0.046 J
	PDMW-22S-03	-	-	28	220	12	6.2	-
	PDMW-22S-04	-	-	0.97	-	0.48	ND	-
	PDMW-22S-10	-	-	87	-	-	47	0.2
	PDMW-24S	-	-	-	1.2	-	-	-
SA	SA-001	-	11	ND	-	-	-	-
	SA-002	1.7	0.23	0.15	-	-	-	-
	SA-003	-	-	240	18	4.9	-	-
	SA-004	-	36	0.61	-	-	-	-
	SA-103	-	7.8	-	-	-	-	-
	SA-104	-	ND	-	-	-	-	-
	SA-105	-	-	0.15	ND	-	-	-
	SA-107	-	ND	-	-	-	-	-
	SA-108	-	2.3	-	-	-	-	-
	SA-201	2.9	-	0.72	3	-	-	-
	SA-202	-	0.14	-	-	-	-	-
SB	SB-001	11	8.1	0.043 J	-	-	-	-
	SB-101	15	13	1.5	-	-	-	-
	SB-201	-	ND	-	-	-	-	-
SC	SC-001	-	0.38	23	-	-	-	-
	SC-101	-	-	19	6.1	-	-	-
	SC-102	-	-	24	-	-	-	-
	SC-103	-	-	12	5.4	0.8	-	-
	SC-201	-	-	ND	-	-	-	-
	SC-202	-	-	0.34	0.043 J	-	-	-
	SC-203	-	-	33	22	ND	-	-
	SC-204	-	-	19	13	1.1	-	-
	SC-205	-	-	17	21	6.8	-	-
	SC-301	-	-	-	7.3	15	0.72	-
	SC-302	-	-	-	19	22	11	-
	SC-303	-	-	-	0.61	-	-	-
	SC-304	-	-	-	0.19	-	-	-
	SC-305	-	-	-	1.9	-	-	-
	SC-306	-	-	-	14	ND	-	-
	SC-307	-	-	-	-	17	6.2	-
	SC-308	-	-	-	-	0.34	-	-
	SC-309	-	-	-	-	ND	-	-
	SC-310	-	-	-	2.4	-	-	-
	SC-311	-	-	-	3.2	-	-	-
	SC-312	-	-	-	-	16	35	1.2
	SC-313	-	-	-	-	3.7	3.3	-
	SC-314	-	-	-	0.2	-	-	-
	SC-315	-	-	16	4.2	-	2.1	-
	SC-316	-	-	-	-	17	12	0.44
	SC-317	-	-	-	-	1.8	0.56	-
	SC-318	-	-	-	-	0.37	0.11	-
	SC-319	-	-	-	-	3.2	5.6	-
SE	SE-101	-	-	-	0.24	-	ND	-
	SE-102	-	-	-	0.17	-	510	0.057
	SE-103	-	-	-	-	-	1.5	-
	SE-201	-	-	-	-	-	ND	-
	SE-202	-	-	-	-	-	0.29	-

Notes & Abbreviations

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AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
SG	SG-001**	-	-	-	7.4	ND	ND (9-11)	-
	SG-002	-	-	-	ND	ND	-	-
	SG-004**	-	2400	-	-	-	-	-
	SG-006	-	-	1.8	ND	-	-	-
	SG-101**	-	5.1	-	-	-	-	-
	SG-102**	-	-	-	0.095	-	-	-
	SG-103	-	-	-	-	0.11	-	-
	SG-104**	-	65	24	0.62	-	-	-
	SG-201	-	-	38	1.9	-	-	-
	SG-202	-	-	22	6	-	-	-
	SG-203**	-	1	-	-	-	-	-
	SG-301	-	-	1.4	-	-	-	-
	SG-302	-	-	0.46	-	-	-	-
	SG-303	-	-	0.2	-	-	-	-
	SG-304	-	-	0.56	-	-	-	-
SH	SH-001	-	1.7	-	-	-	-	-
	SH-101	0.054	-	-	-	-	-	-
	SH-102	1.1	-	-	-	-	-	-
	SH-103	0.13	-	-	-	-	-	-
	SH-104	8.6	-	-	-	-	-	-
SL	SL-101	-	14	4.8	-	-	-	-
	SL-102	-	0.19	-	-	-	-	-
	SL-103	-	0.55	-	-	-	-	-
	SL-201	-	ND	-	-	-	-	-
	SL-202	-	0.036 J	-	-	-	-	-
	SL-203	-	0.44	-	-	-	-	-
SM	SM-101	1.3	-	-	-	-	-	-
	SM-102	200	92	14	-	-	-	-
	SM-201	0.16	-	1.4	0.098	-	-	-
	SM-202	0.044 J	-	2.8	-	-	-	-
	SM-203	2	9.9	7.2	23	-	-	-
	SM-204	-	-	-	15	7.7	-	-
SN	SN-001	-	-	-	2.5	-	-	-
	SN-101	-	3.9	1.6	-	-	-	-
	SN-102	-	ND	0.2	-	-	-	-
SO	SO-101	0.23	-	-	-	-	-	-
	SO-102	0.75	-	-	-	-	-	-
	SO-103	ND	-	-	-	-	-	-
SP	SP-001	9.8	0.58	1.1	4	-	-	-
	SP-101	2.1	3.2	-	-	-	-	-
	SP-102	11	4.8	-	-	-	-	-
	SP-103	3	0.22	-	-	-	-	-
	SP-104	7.5	-	-	-	-	-	-
	SP-105	5.4	ND	-	-	-	-	-
	SP-106	1.4	-	-	-	-	-	-
	SP-201	5.5	-	-	-	-	-	-
SQ	SQ-001	-	3.3	-	-	-	-	-
	SQ-101	3.7	7.5	-	-	-	-	-
	SQ-102	320	21	0.91	-	-	-	-
	SQ-103	4.3	33	25	0.74	-	-	-
	SQ-104	38	2.1	3.1	-	-	-	-
	SQ-105	25	31	0.29	-	-	-	-
	SQ-106	1.6	10	-	-	-	-	-
	SQ-201	-	-	0.5	-	-	-	-
	SQ-202	33	-	25	0.038 J	-	-	-
	SQ-203	6.2	4.3	-	-	-	-	-
	SQ-204	3.5	ND	-	-	-	-	-
	SQ-301	-	-	0.38	-	-	-	-
	SQ-303	-	3.3	-	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
PD2	PD2-GL-001**	-	-	-	0.064	-	-	-
	PD2-GL-002**	-	-	22	-	-	-	-
PDI2	PDI2-17-01	35	0.16	1.9	-	0.054 J	-	-
	PDI2-17-02	-	2.2	1900	310	140	180	19
	PDI2-FH-01	-	-	0.17	-	-	-	-
	PDI2-POLE-01	-	-	-	6.1	-	-	-
SS	SS-101	-	-	280	-	180	25	2.6
	SS-102	-	-	150	190	200	67	ND
	SS-103	-	-	560	-	340	49	240
	SS-104	-	-	540	450	140	540	130
	SS-105	-	-	53	0.055 J	5.7	2	-
	SS-106	-	-	1.8	46	2.2	-	-
	SS-107	-	-	13	0.17	1	0.2	-
	SS-201	-	-	13	3.1	-	0.76	-
	SS-202	-	-	5.2	-	-	-	-
	SS-203	-	-	100	37	2.4	-	-
	SS-204	-	-	24	16	1.3	0.81	-
	SS-205	-	-	22	190	6.1	5.6	-
	SS-206	-	-	240	-	-	90	2.6
	SS-207	-	-	100	-	-	58	4.7
	SS-208	-	-	19	27	1.7	ND	-
	SS-209	-	-	1000	0.14	170	84	0.32
	SS-210	-	-	12	210	3.1	1.4	-
	SS-211	-	-	7	290	2.9	1.8	-
	SS-212	-	-	450	-	-	130	8.3
	SS-213	-	-	11	31	23	2.1	-
	SS-214	-	-	140	-	-	55	0.53
	SS-215	-	-	120	5	-	4.1	-
	SS-216	-	-	15	2.4	-	-	-
	SS-217	-	-	2	1.6	-	-	-
	SS-218	-	-	0.36	0.81	-	0.26	-
	SS-219	-	-	0.65	1.2	-	0.23	-
	SS-220	-	-	48	2.1	30	2.7	-
	SS-221	-	-	11	9.7	ND	3.7	-
	SS-222	-	-	100	3.2	9.1	2.3	-
	SS-223	-	-	53	1.6	1.7	-	-
	SS-224	-	-	3.1	-	-	-	-
	SS-225	-	-	0.44	-	-	-	-
	SS-226	-	-	ND	14	6.3	-	-
	SS-227	-	-	8.8	-	3.2	-	-
	SS-228	-	-	-	20	8	5.5	-
	SS-229	-	-	1.6	9.7	2.2	-	-
	SS-230	-	-	28	130	1.6	8.8	-
	SS-231	-	-	28	0.36	0.25	-	-
WA	WA-001	-	-	-	32	18	-	-
	WA-002	-	34	1.3	-	-	-	-
	WA-101	-	-	-	-	0.12	-	-
	WA-102	-	-	-	-	ND	-	-
	WA-103	-	-	-	-	0.57	-	-
	WA-104	-	-	-	-	ND	-	-
	WA-105	-	-	-	-	1.8	-	-
	WA-106	-	-	-	-	290	-	-
	WA-106A	-	-	-	-	320	-	-
	WA-107	-	-	-	-	110	-	-
	WA-108	-	-	-	-	19	-	-
	WA-110	-	-	-	-	0.87	-	-
	WA-112	-	-	-	-	0.24	-	-
	WA-113	110	-	-	-	0.27	-	-
	WA-114	690	-	-	-	ND	-	-
	WA-115	140	ND	-	-	0.087	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
	WA-116	480	29	0.13	-	0.21	-	-
	WA-117	260	3.4	3	-	ND	-	-
	WA-118	3200	1.6	0.21	-	ND	-	-
	WA-119	10000	1.5	-	-	0.15	-	-
	WA-120	7900	48	18	3.4	ND	-	-
	WA-121	1100	-	-	-	100	-	-
	WA-122	2200	-	-	-	61	-	-
	WA-123	-	950	44	0.72	2.7	-	-
	WA-124	-	30	0.21	-	0.28	-	-
	WA-125	-	0.33	-	-	ND	-	-
	WA-126	-	0.081	-	-	1.1	-	-
	WA-127	-	140	0.4	-	0.18	-	-
	WA-128	-	ND	-	ND	ND	-	-
	WA-129	9400	-	300	0.044 J	2	-	-
	WA-130	-	0.099	-	-	ND	-	-
	WA-131	-	0.27	-	-	ND	-	-
	WA-132	-	2	0.26	-	ND	-	-
	WA-133	-	2.8	-	-	200	-	-
	WA-134	-	0.2	-	-	ND	-	-
	WA-135	-	1.6	-	-	ND	-	-
	WA-136	-	-	-	-	ND	-	-
	WA-137	-	-	-	-	7	-	-
	WA-138	-	-	-	-	1.1	-	-
	WA-139	-	-	-	-	1.2	-	-
	WA-140	-	-	-	-	ND	-	-
	WA-141	-	870	0.26	-	1.3	-	-
	WA-142	-	-	0.17	-	0.097	-	-
WA	WA-143	-	-	0.28	-	0.17	-	-
	WA-144	-	-	0.1	-	3	-	-
	WA-145	-	-	-	-	1.3	-	-
	WA-146	-	0.19	-	-	2.3	-	-
	WA-147	-	0.34	-	-	0.11 J	-	-
	WA-148	-	1000	-	-	38	-	-
	WA-149	-	-	-	210	13	-	-
	WA-152	-	-	200	-	1500	-	-
	WA-153	-	-	-	46	0.082	-	-
	WA-154	-	-	85	22	9.9	-	-
	WA-157	-	ND	-	-	0.093	-	-
	WA-158	-	-	-	-	0.12	-	-
	WA-159	-	-	-	-	5.4	-	-
	WA-160	-	-	0.12	-	0.13	-	-
	WA-161	-	-	3.2	-	0.98	-	-
	WA-162	-	-	5.7	-	8.7	-	-
	WA-163	-	-	0.4	9.2	3.1	-	-
	WA-201	-	-	-	-	ND	-	-
	WA-202	380	57	7.7	-	5.2	-	-
	WA-203	120	0.049 J	-	-	-	-	-
	WA-204	31	ND	-	-	-	-	-
	WA-205	-	2.2	-	-	-	-	-
	WA-206	-	-	-	ND	0.81	-	-
	WA-207	-	-	ND	-	ND	-	-
	WA-208	-	ND	-	-	-	-	-
	WA-209	-	2.5	-	-	ND	-	-
	WA-210	-	ND	-	-	ND	-	-
	WA-211	-	ND	-	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3A - SUMMARY OF SOIL ANALYTICAL RESULTS - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)						
Results in mg/kg		0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	10 - 12	12 - 14
WB	WB-101	690	390	2.9	-	-	-	-
	WB-102	2200	2.4	ND	-	-	-	-
	WB-103	480	380	0.29	-	-	-	-
	WB-104	43	ND	-	-	-	-	-
	WB-201	18	0.34	-	ND	-	-	-
	WB-202	57	1.2	-	-	-	-	-
	WB-203	-	0.28	-	-	-	-	-
	WB-204	-	-	ND	-	-	-	-
	WB-205	-	120	180	1.1	-	-	-
	WB-206	8	-	-	ND	-	-	-
	WB-301	62	8100	410	53	890	700	1.9
	WB-302	4.5	-	-	-	-	-	-
	WB-303	-	0.49	-	0.061	2900	ND	-
WC	WC-001	-	29	-	-	-	-	-
	WC-002	-	-	0.7	-	-	-	-
	WC-101	-	ND	-	-	-	-	-
	WC-102	-	ND	ND	-	-	-	-
	WC-103	-	0.12	ND	-	-	-	-
	WC-104	-	0.63	-	-	-	-	-
	WC-105	-	0.24	-	-	-	-	-
	WC-201	160	ND	13	ND	-	-	-
	WC-202	410	-	-	-	-	-	-
WD	WD-001	0.81	690	7200	2200	210	-	-
WE	WE-001	-	-	-	11	12	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

* Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 0.5 ft deeper than interval indicated to account for the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Asterisk indicates sample(s) were collected at 1.0 ft deeper than interval indicated to account for the height of the concrete pad.

1. Results shaded grey are < 10 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 10 mg/kg.

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
SURFICIAL SAMPLE LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals
	0 - 0.5 (ft)
FL-01	460
FL-02	16
FL-03	100
FL-04	17
FL-05	140
FL-06	540
FL-07	510
FL-08	1800
FL-09	4.1
FL-10	2400
FL-11	1900
FL-12	920
FL-13	190
FL-14	250
FL-15	150
FL-16	37
FL-17	43
FL-18	180
FL-19	4400
FL-20	8.7
FL-21	14
FL-22	13
FL-23	6
FL-24	21
FL-25	6
GRAB1	10
GRAB2	1.4
GRAB3	0.66
GRAB4	5.5
GRAB5	22

Notes & Abbreviations
ND: Not detected above laboratory detection limits
1. Results are in mg/kg.

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH EVEN SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals								
	0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)	14 - 16 (ft)	16 -18 (ft)
DB-11	911		30.2		33.9		3.86		1.31
DB-12	10700		450		93		14.8		15
DB-13	3440		987		145		79		16
DB-14	480		33		1.74		1.52		0.047
DB-15	540		250				5		7.2
DB-16			4800				58		51
DB-17	32000		420		730				1.11
DB-18	140		17000		4900		36000		6900
DB-19	160000		29000		13000		22500		19700
DB-20	360				14800		381000		23700
DB-22	88500		62200		100		3.98		1.5
DB-23				2360	2410		127		6
DB-24	136				3100		15000		8000
DB-25	21000	270000		20000			53000		12000
DB-26	370		1100		9400		17000		26000
DB-27	16000		1900		3600		3700		6400
DB-28	78	1700	680	970			42		
DB-29	150	7500		970	500				
DB-30	7.3		92		110	0.31		ND	0.049
DB-31	1.91		0.12		0.13		0.36		
EE-08			ND		ND	ND			
EE-10			0.4	ND					
EE-14			ND	ND		ND			
EE-15			160				2.1		
EE-23		520							
HA-116						580			
HA-121						8.1			
HB-05	0.41								
MW-02A(TB-02)			ND		ND				
MW-10	1250		153				9.98		4.47
PDSB-01	35.8	21.6	47.6	48.3	31.9	28.4			
PDSB-02	141	532	27.4	31	26.2	10.8			
PDSB-03	ND	ND	195	81	17.6	28.8			
PDSB-04	120	54	66.6	36.9	100	31.3			
PDSB-05	8000	601	6300	1680	760	1620			
PDSB-06	10.8	2.58		ND	ND	9.8			
PDSB-07	304	ND	226	284	426	147			
PDSB-08	114	177			47.9	4.5			
PDSB-09	39.4	2.47		5.6	1.47	1.19			
PDSB-10	1120	3.68	640	59	110	140			

Notes Abbreviations:
ND: Not detected above laboratory detection limits
1. Results are in mg/kg

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH EVEN SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals								
	0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)	14 - 16 (ft)	16 -18 (ft)
PDSB-100						12.2	1.23		
PDSB-101						ND	ND		
PDSB-102				8	4.2	4.96	1.33		
PDSB-103						ND	ND		
PDSB-104				ND	ND				
PDSB-105						ND	ND		
PDSB-106		26.8	5.5	0.25	ND				
PDSB-107				ND	ND				
PDSB-108		ND	0.24						
PDSB-109		536	52						
PDSB-11		8.6		87	30.1	30			
PDSB-110				ND	ND				
PDSB-111						17000			
PDSB-112				4.72	3.45	ND	4.8		
PDSB-113		0.79	0.44						
PDSB-114	ND	ND							
PDSB-115	2.82	4.1							
PDSB-12	107	220	91	108	92	89			
PDSB-13	4.5	0.14			0.5	1.02			
PDSB-14	26.5	30.9	31.1	9.1	0.245	0.026			
PDSB-15	1050	6.7		19.9	19.2	11.8			
PDSB-16	19	1.15	11.5	5.6	2.73				
PDSB-17	1090	712	760	481	285	71			
PDSB-18		2700		869					
PDSB-19		2020		910					
PDSB-20		1039		66		6.8			
PDSB-21	145	7300	470	1540	120	249			
PDSB-22		50		5.3					
PDSB-23	108	5800	790	68	197	79			
PDSB-24	474	3400	4500	5100	2390	1940			
PDSB-25	0.8	110	9.7	3.63	3	1.32			
PDSB-26	36.5	17.2	1.41	9.8	2.74	0.483			
PDSB-27	239	17.7	11.6	257	126				
PDSB-28	0.68	20.5		620	91				
PDSB-29	0.375	2.53	10600	910	1620				
PDSB-30	1.4	610	123	2.33	4.12				
PDSB-31	28	24.2	48.6	95	26.1				
PDSB-32	7.2	3.98	2.27	3.7	3.78				
PDSB-33	37.1	10.6	1.47	1.44	1.12				
PDSB-34	49.8	116.8	278						
PDSB-35	0.67								

Notes Abbreviations:
ND: Not detected above laboratory detection limits
1. Results are in mg/kg

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH EVEN SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals								
	0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)	14 - 16 (ft)	16 -18 (ft)
PDSB-36	0.038	ND	3.43						
PDSB-37		1.99							
PDSB-38	13.4	1.64	0.87	0.743	2.36	1.04			
PDSS-01	0.206								
PDSS-02	97								
PDSS-03	2.13								
PDSS-04	1.3								
PDSS-05	3.34								
PDSS-06	7.06								
PDSS-07	0.227								
PDSS-08	0.387								
PDSS-09	0.023								
PDSS-10	1.1								
PDSS-11	1.49								
PDSS-12	0.058								
PDSS-13	0.51								
PDSS-14	0.028								
PDSS-15	3.87								
PDSS-16	0.172								
PDSS-17	0.49								
SB-035	970								
SB-056	8.6		1.36						
SB-057	1.14		0.165						
SB-058	30		0.81						
SB-059	5.8		104						
SB-060	ND				ND				
SB-061	18		5.1		22.3				
SB-062	175		500		310				
SB-063	100		8.5		8.9				
SB-064	176		11.9		6.2				
SB-065	78		51000						
SB-066	25		150		8.2				
SB-067	30		10.9			0.86			
SB-068	0.45		ND		ND	0.22	0.043		
SB-069	24		ND	ND					
SB-070	0.021		4.5		0.042	ND			
SB-072	99		0.065		14	ND	17	0.44	
SB-073	24	0.054		3.5		0.75		ND	
SB-074	2.1	0.042		ND		ND		0.031	
SB-075	11	ND		100		0.478		0.068	
SB-076	333	10.49		24		0.66		0.669	

Notes Abbreviations:
ND: Not detected above laboratory detection limits
1. Results are in mg/kg

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH EVEN SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals								
	0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)	14 - 16 (ft)	16 -18 (ft)
SB-077	19	0.228		ND		ND			
SB-078	4.9	0.034		0.026		0.053			
SB-079	5.54	160		6.6		0.058		0.041	
SB-080	110	27		11		10		0.039	
SB-081	19	26		ND		ND		ND	
SB-082	1.9	ND		20.7				2.3	
SB-083	8.3	1.4		ND		ND		ND	
SB-084	ND	4600		210		180		3.4	
SB-085	3400	0.78		1900		180		0.21	
SB-086	9.2	0.12		0.87				ND	
SB-087		5		0.033		0.027		ND	
SB-088	23	33		14				0.02	
SB-089	3.4	0.32				ND		0.034	
SB-090	9			ND		0.11		0.08	
SB-091	2.83	0.106		ND		ND		ND	
SB-092	ND	0.1		0.079		ND			
SB-093	280		16		1.5		0.11		ND
SB-094		0.055		2.9		0.27		0.1	
SB-095A	10.3								
SB-095B		0.11		0.03		ND		ND	
SB-096	2.4	ND		0.55		0.091		0.048	
SB-097	0.28	0.048		0.35		0.049		ND	
SB-098	0.254	28		0.97		1.7		0.42	
SB-099	7.3	0.75		ND		ND		ND	
SB-100	0.24	ND		0.058		0.058			
SB-101	1.4	0.45		0.039		ND			
SB-102	320	0.023		5.2		0.28		0.03	
SB-103	49	1.7		1.5		0.36		0.26	
SB-104	0.028	ND		ND		ND		ND	
SB-105	2.4	6.1		1.44		0.31		0.28	
SB-106		1.4		0.15		0.023		ND	
SB-107	ND					ND		ND	
SB-108		1.4		0.41		ND		ND	
SB-109		0.038		0.028		ND		ND	
SB-110	0.068	0.82		ND		ND		ND	
SB-111	3.4	13		3		1.4		0.39	
SB-112	3.6	110		0.029		0.34			
SB-113	0.11	0.45		0.213		0.081		ND	
SB-114	ND	ND		0.045		0.026		ND	
SB-115	5800	24		0.83		8.2		1.3	
SB-116	2700	0.666		0.42		0.37		0.13	

Notes Abbreviations:
ND: Not detected above laboratory detection limits
1. Results are in mg/kg

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH EVEN SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals								
	0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)	14 - 16 (ft)	16 -18 (ft)
SB-117	210	1100		70		1400		430	
SB-118	6.7	40		0.018		0.1		ND	
SB-119	58	1800		800		64		1.6	
SB-120	480	44		1100		8.4		43	
SB-121	210	3.3		7.3		0.042		ND	
SB-122	240	5.5		0.68		ND			
SB-123	1300	0.27		0.054		0.036		ND	
SB-124	150	ND		ND		ND		0.11	
SB-125	169	0.186		33.2		0.058		ND	
SB-126	19	49		17					
SB-146	0.11	0.082		ND		ND		ND	
SB-147	2	ND		ND					
SB-148	ND	7.3		ND					
SB-151	2.4	110		0.27		7.8		ND	
SB-152	11.2	6.3		ND		ND			
SB-153	ND	16		2		1.7			
SB-154	32.4	12		0.31		ND		ND	
SB-155	8.3	ND		6.07		0.037		0.1	
SB-156	ND	ND		6.8		0.023			
SB-157	2.4								
SB-158	5.9	ND		ND		ND			
SB-159								23.9	
TB-01			ND			ND			
TB-03			ND			ND			
TB-05			0.13				1.6		
TB-06			0.32						
TB-07			ND						
TB-08			62	13					
TB-09					194	920			
TB-10			110	44					
TB-11			2.45	0.045					
TB-12			1.31		0.36				
TB-13			61						
TB-14			64.2						
TB-15				0.25					
TB-17		4.4	26						
TB-18		350							
TB-19			0.41		0.38				
TB-21				0.34					

Notes Abbreviations:
ND: Not detected above laboratory detection limits
1. Results are in mg/kg

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH ODD SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations	Depth Intervals							
	0 - 3 (ft)	3 - 5 (ft)	5 - 7 (ft)	7 - 9 (ft)	9 - 11 (ft)	11 - 13 (ft)	13 - 15 (ft)	15 - 17 (ft)
EE-01		93	6.1	5.6			4.2	
EE-02			ND	ND	ND			
EE-03		82	290	0.7	ND			
EE-04			21	ND	ND	ND		
EE-05		ND	ND	ND				
EE-06		ND		ND	ND			
EE-07		ND	ND	ND	ND			
EE-15				36				
EE-16			ND	ND	ND			
EE-19		ND	ND	ND				
EE-20			ND	ND	ND			
EE-22			1.7	1.1	0.79			
EE-23			1400	4100				
EE-24		1.2	ND	ND				
HA-115	13000		22	320	4600	6700		770
HA-116	7100							
HA-118-A								0.74
HA-121								0.34
MW-01A			0.95	13				
SB-060			ND					
TB-13				4.3	44			
TB-16		0.12	0.86					
TB-18			570	290				

Notes & Abbreviations
ND: Not detected above laboratory detection limits
1. Results are in mg/kg.

TABLE 3.3B - SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS - TOTAL PCBs
LOCATIONS WITH MISCELLANEOUS SAMPLE COLLECTION DEPTH INTERVALS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Location	Depth Intervals	Results
CAM	2 - 2.5 (ft)	0.34
CAM	5 - 6 (ft)	21
EE-02	1 - 3 (ft)	ND
HA-116	0 - 5 (ft)	7100
HA-116	12 - 15 (ft)	1500
HA-116	15 - 20 (ft)	1200
HA-116	5 - 10 (ft)	1100
HA-118-A	10 - 15 (ft)	5.3
HA-118-A	5 - 10 (ft)	1100
HB-01	0 - 1 (ft)	43
HB-02	0 - 1 (ft)	1
HB-03	1 - 2 (ft)	ND
HB-04	0 - 1 (ft)	ND
HB-06	0 - 1 (ft)	370
MW-04	12 - 12 (ft)	320
MW-04	4 - 4 (ft)	10700
MW-04	8 - 8 (ft)	31
MW-05	8 - 8 (ft)	1300
MW-13A	0 - 0 (ft)	0.23
MW-14A	0 - 0 (ft)	1.95
MW-15A	0 - 0 (ft)	0.067
PDSB-01	-1	32.7
PDSB-05	-1	2780
PDSB-08	-1	139
PDSB-11	-1	28.9
PDSB-14	-1	20.6
PDSB-17	-1	670
PDSB-22	-1	67
PDSB-24	-1	4000
PDSB-25	-1	13.8
PDSB-27	-1	135
PDSB-30	-1	140
PDSB-35	-1	0.29
PDSB-38	-1	4.87
SB-012	4 - 4 (ft)	140
SB-062	1 - 1.5 (ft)	28000
SB-065	8 - 9 (ft)	90000
SB-065	9 - 10 (ft)	21000
SB-095A	2 - 3.5 (ft)	1.18
SB-095A	3 - 5.4 (ft)	0.005
SB-153	14 - 15.5 (ft)	1.7

Notes & Abbreviations

ND: Not detected above laboratory detection limits

1. Results are in mg/kg.

TABLE 3.3C - SUMMARY OF SOIL ANALYTICAL RESULTS - LEAD
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

2013-2014		
Sample Locations		**Depth Interval**
Results in mg/kg		0 - 2 (ft)
SA	SA-001	220
	SA-106	79
	SA-107	19
	SA-201	830
	SA-202	1700
SI	SI-101	280
	SI-102	540
	SI-103	2600
	SI-104	1000
	SI-201	420
	SI-202	340
SJ	SJ-101	740
	SJ-102	120
	SJ-103	81
	SJ-104	360
SK	SK-101	590
	SK-102*	41
	SK-103	56
	SK-104	130
SR	SR-101	120
	SR-102	95
	SR-103	2000
	SR-104	4900
	SR-201	120
	SR-202	43000
	SR-203	2000
	SR-204	180
	SR-205	61
	SR-301	380

Historic				
Sample Locations	**Depth Intervals (ft)**			
Results in mg/kg	0 - 2	2 - 6	6 - 10	10 - 14
HB-06	43200			
SB-131	19600			
SB-128	15500			
SB-100	30900	272	81.8	7.3

SK-102*: Samples at this location was collected at 0 - 1.5 ft

1. Results shaded grey are < 1000 mg/kg (or "-") overlying a sample > 10 mg/kg.
2. Results shaded red are > 1000 mg/kg.

TABLE 3.3D - SUMMARY OF SOIL ANALYTICAL RESULTS - COPPER AND ZINC
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

		Depth Interval	
Sample Locations Results in mg/kg		**Copper** 0 - 2 (ft)	**Zinc** 0 - 2 (ft)
SA	SA-001	530	290
	SA-106	390	92
	SA-107	51	32
	SA-201	530	1200
	SA-202	-	-
SI	SI-101	600	210
	SI-102	3400	890
	SI-103	2000	790
	SI-104	1500	390
	SI-201	1400	650
	SI-202	3000	450
SJ	SJ-101	2000	490
	SJ-102	370	53
	SJ-103	100	28
	SJ-104	920	130
SK	SK-101	3400	120
	SK-102*	14	37
	SK-103	1000	60
	SK-104	1200	60
SR	SR-101	1100	63
	SR-102	1200	61
	SR-103	-	-
	SR-104	-	-
	SR-201	7700	87
	SR-202	-	-
	SR-203	-	-
	SR-204	1200	320
	SR-205	3100	400
	SR-301	4300	470

SK-102*: Samples at this location was collected at 0 - 1.5 ft

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Hastings-on-Hudson, New York
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TABLE 3.4A
SUMMARY OF PCB AND OBSTRUCTION PROBE RESULTS, OFFSHORE

		WP-25 Completed 10/30/13	WP-33A Completed 11/7/13 Drilled to 6 ft before sampling. Wood debris from 6 to 12 ft.		PD2-GR-002A Completed 7/17/14		VC-311B Completed 9/10/14 Semi-solid PCBM from 5-6 ft	VC-311A Completed 10/30/14 Semi-solid PCBM observed at 8ft			WP-1A/WP-1A1 Completed 8/5/14 For WP-1A, rollerbit through probable riprap/rubble obstruction from 5.6 to 7.5 ft. For WP-1A1, no obstructions.	WP-3F3 Completed 8/6/14 No obstructions.	WP-42 Completed 11/15/13	
WP-26 Completed 11/2/13	WP-34 Completed 11/8/13	WP-23 Completed 11/8/13 Trace to semi-solid PCBM was encountered at the mudline (0-4 ft), and also in the Marine Silt (12-20 ft).	WP-33 Completed 11/7/13 Trace PCBM from 4 to 7 ft. Borehole abandoned at 12 ft due to possible timber pile obstruction. Moved approx. 2 ft west to WP-33A.	WP-30 Completed 11/6/13 Wood pieces observed from 2.5 to 6.5 ft. Trace PCBM observed at 17 ft.	PD2-G2-002 Completed 6/23/14 Semi-solid PCBM was observed at 13ft and 29 ft.	WP-27 Completed 10/30/13	WP-41 Completed 11/15/13	WP-9A Completed 10/17/13 Brick and concrete fragments/ debris 1.5 to 3.5 ft	WP-35 Completed 11/8/13 Trace PCBM observed between 12 and 14 ft.		WP-36/WP-36A/WP-36B Completed 11/9/13 WP-36 - terminated at 8 ft (likely steel obstruction). WP-36A (approx. 3 ft southwest of WP-36) terminated at 14 ft, casing could not be advanced after rollerbit through approx. 1 ft obstruction. WP-36B (approx. 3 ft north of WP 36) terminated at 5 ft, casing could not be advanced and rollerbit refusal.	WP 3F/WP-3F1/WP-3F2 Completed 8/6/14 For WP-3F, rollerbit through cobbles to 6 ft. No obstructions 6 to 25 ft. For WP-3F1, rollerbit through obstructions from 0.5 to 4ft. No obstructions 4 to 25 ft. For WP-3F2, push casing through obstructions to 4 ft. No obstructions 4 to 25 ft.	WP-40 Completed 11/14/13 Small lump of rubber-like material (semi-solid PCBM) observed between 9 to 11 ft. Obstruction encountered from 8 to 9 ft.	CONTINUED ON PAGE 2
		WP-4 Completed 10/10/13 Trace PCBM observed at 19-21 ft, trace to semi-solid PCBM observed at 21-23 ft.						WP-9 Completed 10/16/13 Trace PCBM was observed at 8ft. 3-5" cobbles/riprap at 1 to 2.5ft. Casing became misaligned during tide shift and hole had to be abandoned at 8ft.		WP-11 Completed 10/23/13 Possible trace PCBM. Drilled through brick/concrete fragments and debris 2 to 6.5ft.	WP-1B Completed 8/5/14 Rollerbit through probable riprap/rubble obstructions from 8 to 12 ft.	WP-29 Completed 11/5/13 Debris encountered to 9 ft depth. Obstruction drilled through from 3.5 to 5 ft.		

Legend:

gray shading indicates probe completed, no PCBM observed
pink shading indicates obstruction encountered
green shading indicates semi-solid PCBM observed at depth (non-excavatable)
blue shading indicates trace PCBM observed
yellow shading indicates PCBM observed at shallow depth and is assumed to be excavatable

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TABLE 3.4A
SUMMARY OF PCB AND OBSTRUCTION PROBE RESULTS, OFFSHORE (CONTINUED)

CONTINUED FROM PAGE 1				WP-38 Completed 11/13/13	WP-39 Completed 11/14/13 Trace PCBM observed between 10 to 12 ft.	WP-3E1 Completed 8/7/14 No obstructions.	WP-20A Completed 10/15/13 Concrete debris 7.5 to 8.5 ft.	WP-1C3 Completed 8/7/14 No obstructions.	VC-1A Completed 10/30/14	VC-2B Completed 10/30/14	VC-3A Completed 10/30/14	VC-4A Completed 10/30/14	VC-5A Completed 10/30/14	VC-6A Completed 10/30/14	VC-7A Completed 10/29/14	VC-8A Completed 10/29/14	VC-9A Completed 10/30/14
	WP-28 Completed 10/31/13 Concrete fragments from 2 to 4 ft.	WP-32 Completed 11/6/13	WP-24 Completed 10/29/13	WP-37 Completed 11/11/13 Semi-solid PCBM lumps observed between 8 to 10 ft. Drilled through obstruction (likely concrete) from 11 to 13.5 ft depth.	WP-31 Completed 11/6/13 Hard drilling from 9.5 to 12 ft. Boring terminated at 12 ft due to rollerbit refusal (likely reinforced concrete).	WP-3E Completed 8/7/14 Rollerbit through probable riprap from 5 to 7.6 ft.	WP-20 Completed 10/14/13 Wood obstruction at 12.5 ft.	WP-1C1 Completed 8/7/14 Rollerbit through probable riprap 0 to 12 ft.									
			WP-17 Completed 10/24/13 Semi-solid PCBM observed at 12-16ft. 6-12" piece of wood (inferred based on roller bit action) at 6ft.; 4" piece of concrete at 8ft.	WP-18 Completed 10/21/13 Rollerbit refusal on wood at 13ft.				WP-21 Completed 11/4/13 Rollerbit refusal at 10 ft (likely rip-rap).								

Legend:

gray shading indicates probe completed, no PCBM observed
pink shading indicates obstruction encountered
green shading indicates semi-solid PCBM observed at depth (non-excavatable)
blue shading indicates trace PCBM observed
yellow shading indicates PCBM observed at shallow depth and is assumed to be excavatable

1 River Street
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TABLE 3.4B
SUMMARY OF PCB AND OBSTRUCTION PROBE RESULTS, ONSHORE

BULKHEAD EXTENSION		DEADMAN													NORTH PROPERTY LINE - ANGLED BORINGS				
LP-2 Completed 11/13/13 Semi-solid PCBM observed between 8 to 17 ft. Trace PCBM below 18 ft.	LP-3 Completed 11/12/13 Trace PCBM observed at approx. 7 ft.	LP-16 Completed 10/15/13	LP-4 Completed 10/11/13	LP-5 Completed 10/14/13	LP-6 Completed 10/10/13	LP-7 Completed 10/7/13	LP-8 Completed 10/10/13	LP-9 Completed 10/8/13 Semi-solid PCBM observed from 1 to 1.2 ft depth (shallow and can be excavated)	LP-10 Completed 10/8/13 Semi-solid and 0.5 in diam. globs of PCBM observed from 31-31.5ft	LP-11 Completed 10/3/13 Semi-solid PCBM observed at 31ft	LP-12 Completed 10/4/13	LP-13 Completed 10/9/13	LP-14 Completed 10/9/13	LP-15 Completed 10/2/13	PLP-1 Completed 10/25/13 Trace PCBM stringers generally encountered in most samples; semi-solid PCBM encountered 39-41 ft.	PLP-2 Completed 10/24/13 Trace to semi-solid PCBM encountered generally from 7.5ft to 39.5 ft.	PLP-3 Completed 10/23/13 Semi-solid PCBM hardened chunk observed at 8ft; trace from 8-13ft; trace PCBM 38-39ft	PLP-4 (25°) Completed 10/18/13 Trace PCBM at 13 ft	PLP-5 (59°) Completed 10/22/13
LP-18 Completed 11/13/13 Trace PCBM at 9 ft, 12 ft and 15.5 ft.									LP-17 Completed 10/15/13 Added location.									PLP-4A (59°) Completed 10/21/13	

Legend:

- gray shading indicates probe completed, no PCBM observed
- pink shading indicates obstruction encountered
- green shading indicates semi-solid PCBM observed at depth (non-excavatable)
- blue shading indicates trace PCBM observed
- yellow shading indicates PCBM observed at shallow depth and is assumed to be excavatable

TABLE 3.5A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR DEEPWATER INVESTIGATION - TOTAL PCBs
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (feet)						
Results in mg/kg		0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6	6-8
Deepwater Investigation	VC-101	0.46	0.19	0.36	0.59	1.7	-	-
	VC-102	0.22	0.3	0.35	2.5	24	-	-
	VC-103	0.75	0.8	1.7	1.3	71	9.9	-
	VC-104	0.15	0.46	0.23	0.9	1.2	-	-
	VC-105	0.19	0.17	0.15	1.1	2.2	-	-
	VC-106	0.49	0.43	0.45	2.6	6.3	-	-
	VC-107	0.15	4.1	1	0.98	18	-	-
	VC-108	0.15	0.19	0.4	490	11	-	-
	VC-109	1.8	0.26	0.31	0.59	3.5	-	-
	VC-110	0.21	0.27	0.36	0.57	110	9	-
	VC-111	0.2	0.39	5.7	0.99	42	-	-
	VC-112	1.2	0.6	1.3	47	0.6	-	-
	VC-113	0.17	0.63	0.61	6.4	0.68	-	-
	VC-114	0.12	0.32	0.42	0.8	38	-	-
	VC-115	0.34	0.32	0.48	3.2	ND	-	-
	VC-116	0.26	0.25	0.056 J	0.058 J	ND	-	-
	VC-117	0.15	0.21	1.5	1.7	1.9	-	-
	VC-118	0.28	6.4	20	16	9.2	-	-
	VC-119	0.79	0.25	0.6	10	5.5	-	-
	VC-120	0.19	2	0.2	4.3	0.77	-	-
	VC-121	0.78	0.31	0.63	0.34	ND	-	-
	VC-122	0.14	0.19	1.2	ND	ND	-	-
	VC-123	0.32	0.16	0.45	2.3	380	ND	-
	VC-124	0.33	0.58	0.85	8.7	9.2	-	-
	VC-125	0.3	0.21	0.48	1	9.2	-	-
	VC-126	0.73	0.18	0.71	3	ND	-	-
	VC-127	1.4	0.31	0.57	0.74	7.6	-	-
	VC-128	0.21	16	0.38	0.45	ND	-	-
	VC-129	0.16	0.34	0.69	1.9	17	-	-
	VC-130	0.8	0.25	0.36	0.97	1100	32	-
	VC-131	0.4	0.23	0.23	1.2	0.15	-	-
	VC-132	0.55	0.23	0.74	5	15	-	-
	VC-133	0.27	0.34	1.2	1.5	0.11	-	-
	VC-134	0.2	0.3	0.56	3	5	-	-
	VC-135	0.67	1.3	4.9	36	ND	-	-
	VC-136	1.5	0.17	3.4	0.67	ND	-	-
	VC-137	0.26	0.22	0.41	2.8	1.4	-	-
	VC-138	0.17	0.19	0.26	1.4	ND	-	-
	VC-139	0.17	0.2	0.33	1.5	860	0.11	-
	VC-140	0.41	0.39	0.82	2.3	8.2	-	-
	VC-141	0.18	0.25	0.23	0.38	ND	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

TABLE 3.5B SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR DEEPWATER INVESTIGATION - TOTAL PCBs
VARIABILITY SAMPLING LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (feet)						
Results in mg/kg		0 - 0.5	0.5 - 1	1-2	2-3	3-4	4-6	6-8
Deepwater Investigation Variability Sampling	VC-101	0.46	0.19	0.36	0.59	1.7	-	-
	VC-101A	-	0.31	0.53	0.78	3.7	0.72	-
	VC-101B	*	0.31	0.57	0.72	70	ND	-
	VC-101C	-	0.27	0.42	0.64	4.5	0.052 J	-
	VC-102	0.22	0.3	0.35	2.5	24	-	-
	VC-102A	*	0.23	0.34	1.1	91	ND	-
	VC-102B	-	0.37	0.87	5.1	9.1	ND	-
	VC-102C	-	0.35	0.7	0.11	ND	ND	-
	VC-103	0.75	0.8	1.7	1.3	71	9.9	-
	VC-103A	-	0.41	1.2	17	10	21	-
	VC-103B	*	0.65	0.55	2.5	70	95	-
	VC-103C	-	0.39	0.58	2.7	0.083	ND	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

* Sample indicated as < 50 mg/kg based on entire VC-100 series: average < 1 mg/kg; max < 2 mg/kg

TABLE 3.6A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NORTHWEST AREA DEEPWATER LOCATIONS - TOTAL PCBs
NORTHWEST AREA DEEPWATER LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-301	8.3	0.25	0.58	0.73	-	-	-	-
	VC-302	0.21	0.29	0.77	58	130	23	-	-
	VC-303	0.27	4.7	1.7	1000	44	340	31	-
	VC-304	3.4	4.5	12	330	6400	250	3.3	1.1
	VC-305	0.79	2.1	24	560	6200	5900	49	-
	VC-306	0.23	0.46	11	1500	560	110	200	0.92
	VC-307	1.3	900	61	1	-	-	-	-
	VC-308	1.1	84	130	0.35	-	-	-	-
	VC-309	6.3	16	38	470	800	430	2100	59
	VC-310	0.3	0.35	38	1.9	ND	ND	ND	-
	VC-311	0.53	2.1	15	20	2.2	ND	9800	-
	VC-312	1.1	0.17	0.23	120	39	-	-	-
	VC-313	0.14 J	0.57	1.1	5.2	ND	-	ND	-
	VC-314	20	0.5	1.7	0.3	-	1.3	13	-
	VC-315	4.3	1.1	1.1	3.2	61	85	0.11	ND
	VC-316	0.83	1.4	9.4	770	12	3.1	0.91	46
	VC-317	1.1	0.46	3.7	1	20	530	0.068 J	ND
	VC-318	2.1	0.26	0.44	720	13	0.2	110	1000
	VC-319	0.26	0.6	0.47	ND	-	-	-	-
	VC-320	0.53	22	5.1	ND	-	-	-	-
	VC-321	0.29	0.27	130	13	-	-	-	-
	VC-322	0.33	0.35	57	ND	-	-	-	-
	VC-323	0.3	25	0.52	ND	-	-	-	-
	VC-324	0.35	0.26	0.73	0.35	-	-	-	-
	VC-325	2.4	2.2	32	ND	-	-	-	-
	VC-326	7.1	0.6	0.52	0.83	16	5.6	ND	0.46
	VC-327	1.2	0.54	3.7	310	0.38	1.8	ND	1.3
	VC-328	0.28	0.33	1.2	0.72	1.8	13	6900	0.61
	VC-329	0.15	0.2	0.4	0.47	53	5.6	0.27	ND
	VC-330	25	900	250	72	150	31	-	-
	VC-331	31	1.9	ND	ND	ND	-	-	-
	VC-332	0.47	21	25	58	270	29	-	-
	VC-334	2.3	0.32	0.41	0.74	11	ND	ND	-
	VC-335	0.29	0.35	0.62	32	0.056 J	ND	ND	-
	VC-336	0.3	1.9	870	0.23	ND	ND	ND	-
	VC-337	280	1400	0.32	ND	110	3.5	ND	-
	VC-338	0.39	ND	ND	9.9	0.63	0.17	ND	700
	VC-339	-	-	-	75	0.42	ND	ND	-
	VC-340	-	-	-	-	-	ND	ND	-
	VC-341	33	0.41	0.28	0.79	0.73	41	55	-
	VC-342	9.6	6.2	1	0.37	0.34	0.33	ND	66
	VC-343	24	0.32	0.37	0.94	3.6	ND	ND	-
	VC-344	0.16	0.33	1	4.1	6.1	100	-	-
	VC-345	0.79	9.1	220	20	18	11	-	-
	VC-346	14	0.97	0.92	0.93	6.7	27	8500	6300
	VC-347	0.87	0.35	1.2	23	0.72	1200	0.14	-
	VC-348	0.34	0.42	0.87	0.42	0.58	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

TABLE 3.6A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NORTHWEST AREA DEEPWATER LOCATIONS - TOTAL PCBs
NORTHWEST AREA DEEPWATER LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-349*	-	6.6	11	21	370	0.24	-	-
	VC-350	4.1	4.4	7.6	20	24	-	-	-
	VC-351	0.28	0.37	7.9	-	-	-	-	-
	VC-352	0.25	0.25	1.2	-	-	-	-	-
	VC-353	0.32	0.31	1.1	-	-	-	-	-
	VC-354	0.29	0.71	0.82	-	-	-	-	-
	VC-355	4.1	4.3	27	590	140	1.1	-	-
	VC-356	0.43	1.1	0.98	9.1	0.17	-	-	-
	VC-357	0.36	0.22	1.6	-	-	-	-	-
	VC-358	0.31	0.24	0.3	-	-	37	-	-
	VC-359	0.27	1.6	2.9	83	16	-	-	-
	VC-360	1.3	0.93	15	0.51	ND	-	-	-
	VC-361	0.51	0.22	1200	3.3	-	-	-	-
	VC-362	1.7	0.08 J	4.3	0.42	0.55	0.95	0.47	-
	VC-363	3.2	0.98	0.75	0.56	11	200	0.21	-
	VC-364	0.44	0.072 J	0.54	0.73	0.57	1.4	3.5	-
	VC-365	-	-	-	ND	-	-	-	-
	VC-367	-	-	24	27	0.084 J	-	-	-
	VC-368	1.1	0.7	0.64	0.32	3.3	-	-	-
	VC-370	0.39	0.21	0.53	0.78	58	93	-	-
	VC-372	-	-	-	-	35	-	-	-
	VC-373	0.34	ND	ND	ND	ND	-	-	-
	VC-375	0.39	0.51	4.2	8.4	4.8	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 50 mg/kg overlying a sample > 50 mg/kg.
2. Results shaded green are < 50 mg/kg overlying a sample > 50 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 50 mg/kg.

TABLE 3.6B - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NEARSHORE AND BACKWATER - TOTAL PCBs
NEARSHORE, OLD MARINA, AND NORTH BOAT SLIP LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Interval							
Results in mg/kg		0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Nearshore	VC-401	1.4	3.3	4.9	5.2	8.5	8.2	7.3	4.3
	VC-402	0.68	1.2	2.7	5	3.5	5.1	5.2	2.8
	VC-403	0.11 J	0.36	1.9	2.4	4.8	7.3	1.5	1.5
	VC-404	2.2	0.68	11	1.3	2.8	4.8	6.7	3.1
	VC-405	0.47	0.95	5.9	2.7	5.1	5.4	6.2	0.84
	VC-406	0.32	0.13	0.33	ND	ND	ND	ND	ND
	VC-407	0.11	ND	ND	ND	ND	ND	ND	ND
	VC-408	0.32	110	7.5	ND	ND	ND	ND	ND
	VC-409	0.36	5.7	28	1.7	2.9	0.25	ND	0.081 J
	VC-410	0.4	1.6	3.1	3.7	6.6	1.2	0.13	ND
	VC-411	0.32	0.61	1.4	3.5	1.7	58	ND	ND
	VC-412	0.21	0.76	1	5.6	4	5.6	11	13
	VC-413	0.24	0.39	1.8	0.65	0.63	2.3	4.1	4.7
	VC-414	0.39	0.52	0.5	0.45	0.53	4.3	1.4	4.3
	VC-415	0.27	0.36	0.51	0.55	1	1.4	1.3	2.6
	VC-416	0.47	1.6	0.8	0.82	1.5	2.9	1.9	3.6
	VC-417	0.3	0.61	1.5	2.3	1.4	3	2.8	4.2
	VC-418	0.19	9.1	110	2.3	2.4	3.3	4.4	2.2
	VC-419	19	1.8	1.1	0.85	3.9	6	4	ND
	VC-420	0.68	1.4	0.87	2.9	4.2	22	0.18	0.081 J
	VC-421	0.89	2	4.9	13	4.7	23	0.1	ND
	VC-422	0.73	2.9	3	2.3	6.8	2.4	3	ND
Old Marina	VC-501	4.5	2.6	1.5	2.1	2.8	4	170	31
	VC-502	0.25	1.9	1.3	2.3	3.4	5.3	4	0.3
	VC-503	0.091 J	1.6	2.4	3.7	4.6	5.1	5.8	4.5
	VC-504	1.1	1.7	1.3	2.5	3.7	5	4.6	2.9
	VC-505	0.41	1.6	1.7	4.1	5.7	6.1	4.3	1.7
	VC-506	0.13	0.21	0.72	2.4	3.3	4.8	5.4	7.8
	VC-507	0.33	0.26	0.46	1	3.9	6.3	3.2	ND
	VC-508	0.19	0.27	1.4	0.79	1.6	7.8	5.2	0.83
	VC-509	0.77	1.6	2.6	3.4	5.5	5.9	7	8.3
	VC-510	0.46	0.21	0.32	0.73	1.6	3	4.9	5.2
	VC-511	0.24	0.35	0.25	0.52	0.55	0.8	4.1	11
	VC-512	0.27	0.3	0.34	0.48	0.51	9.9	0.49	4.3
	VC-513	0.31	0.65	3.2	4.1	5.1	2.6	5.5	ND
	VC-514	0.31	0.33	0.24	0.76	2	1.8	1.1	17
	VC-515	0.25	0.29	0.32	1.2	3.2	9.8	0.092	ND
	VC-516	0.39	0.24	0.82	2.2	3.2	14	ND	ND
North Boat Slip	VC-601	0.6	2.3	3.2	1.1	3.9	3.1	4	7.3
	VC-602	0.41	0.15	0.46	1	2.2	1.8	2.6	4.6
	VC-603	0.36	0.42	0.55	0.8	0.99	2.9	2.3	6.1
	VC-604	1.6	0.59	0.51	0.79	1.2	1.7	25	2.7
	VC-605	0.24	0.21	0.27	1.1	1.3	3.4	8.8	3.5

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded grey are < 1 mg/kg overlying a sample > 1 mg/kg.
2. Results shaded green are < 1 mg/kg overlying a sample > 1 mg/kg and contiguous for at least 3 ft.
3. Results shaded red are > 1 mg/kg.

TABLE 3.6C - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NEARSHORE AND BACKWATER LOCATIONS - COPPER AND LEAD
NEARSHORE AND BACKWATER LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations Results in mg/kg		Depth Intervals (ft)															
		0 - 0.5		0.5 - 1		1 - 2		2 - 3		3 - 4		4 - 5		5 - 6		6 - 8	
		Copper	Lead	Copper	Lead	Copper	Lead	Copper	Lead	Copper	Lead	Copper	Lead	Copper	Lead	Copper	Lead
Nearshore	VC-401	82	55	110	110	200	130	340	160	390	150	330	130	370	170	360	170
	VC-402	66	43	89	130	140	110	240	130	370	140	350	120	350	110	420	170
	VC-403	61	62	75	60	86	88	130	120	220	150	270	160	320	180	430	150
	VC-404	64	58	59	53	83	79	110	130	140	140	200	150	290	170	350	160
	VC-405	66	47	63	56	85	90	120	130	130	140	150	140	220	170	450	170
	VC-406	180	51	1500	190	3600	180	9800	1500	8500	1100	6600	330	8600	250	6000	120
	VC-407	86	48	1300	190	4000	210	6400	360	3600	230	3200	170	1900	160	860	160
	VC-408	73	49	550	95	1300	150	1400	190	2600	200	2100	270	920	160	290	110
	VC-409	79	48	1300	170	640	310	780	140	1800	180	1000	120	290	130	160	110
	VC-410	67	50	630	67	3900	140	810	140	960	150	6300	150	1200	160	630	170
	VC-411	59	56	85	66	180	92	960	290	440	140	450	140	280	130	410	150
	VC-412	53	51	150	73	170	100	570	130	260	140	550	840	540	140	520	160
	VC-413	58	47	63	62	90	72	130	82	140	88	240	110	340	120	940	170
	VC-414	68	54	85	65	99	74	140	76	110	110	100	93	120	100	510	150
	VC-415	73	51	110	60	86	69	74	71	160	110	120	100	22	20	120	120
	VC-416	67	62	77	74	82	72	120	80	120	86	130	110	94	91	210	120
	VC-417	100	63	130	69	150	70	150	87	120	97	770	160	940	120	1300	200
	VC-418	54	52	300	76	210	100	270	100	1800	140	5500	170	1200	160	880	170
	VC-419	170	71	1100	150	210	120	400	110	530	140	670	160	450	180	240	130
	VC-420	72	49	230	91	400	99	800	120	1600	280	850	370	560	170	290	200
	VC-421	81	66	760	110	730	130	1900	140	4400	230	1600	360	550	210	220	120
	VC-422	67	61	360	130	340	130	590	150	550	120	860	210	270	140	95	63
Old Marina	VC-501	42	40	69	62	96	100	120	120	120	120	130	150	190	160	360	200
	VC-502	40	42	95	88	78	71	140	140	130	130	170	150	230	160	240	110
	VC-503	48	48	98	97	120	120	120	120	170	140	170	140	180	160	190	160
	VC-504	48	47	68	63	96	91	120	120	140	140	150	150	170	160	220	160
	VC-505	51	45	110	110	110	110	130	130	190	150	180	170	210	180	250	130
	VC-506	45	44	55	52	83	72	110	120	110	120	140	130	180	160	190	160
	VC-507	54	52	49	48	63	59	90	89	190	140	270	140	260	130	330	130
	VC-508	53	51	52	47	69	68	65	60	100	100	140	140	190	160	180	130
	VC-509	59	58	100	110	130	130	120	140	130	140	190	150	180	170	250	150
	VC-510	56	59	55	50	61	52	93	75	120	120	120	130	170	150	180	160
	VC-511	51	50	56	51	65	59	62	57	64	59	96	94	130	140	180	170
	VC-512	60	63	57	58	59	59	60	56	71	65	85	79	96	89	190	140
	VC-513	59	60	65	59	110	110	140	140	170	100	180	110	310	130	280	130
	VC-514	52	55	54	54	61	57	80	70	110	110	320	150	280	140	310	150
	VC-515	48	50	57	53	60	60	87	88	390	130	280	150	190	120	200	130
	VC-516	54	50	54	52	69	68	220	120	280	130	290	130	150	130	310	120
North Boat Slip	VC-601	47	44	59	45	83	75	95	160	170	320	220	210	380	200	1400	240
	VC-602	180	39	30	31	47	44	65	130	69	100	180	120	360	180	370	190
	VC-603	72	63	55	53	69	65	95	90	110	110	130	130	150	390	210	170
	VC-604	52	51	59	60	64	51	46	47	98	97	110	120	140	150	190	160
	VC-605	51	55	57	57	78	75	100	100	110	130	150	170	210	170	200	180
South Boat Slip	VC-701	-	55	-	56	-	61	-	370	-	84	-	-	-	-	-	-
	VC-702	-	54	-	51	-	64	-	82	-	91	-	-	-	-	-	-
	VC-703	-	56	-	63	-	65	-	77	-	200	-	-	-	-	-	-
	VC-704	-	57	-	56	-	65	-	69	-	110	-	-	-	-	-	-
	VC-705	-	48	-	49	-	61	-	68	-	79	-	-	-	-	-	-

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected

1. For copper, results shaded red are > 129 mg/kg. For lead, results shaded in red are > 132 mg/kg.

TABLE 3.6D - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NEARSHORE AND BACKWATER LOCATIONS - ZINC
NEARSHORE AND BACKWATER LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations		Depth Intervals (ft)							
Results in mg/kg		0 - 0.5	0.5 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 8
Nearshore	VC-401	150	160	190	210	200	200	250	300
	VC-402	110	140	140	210	210	190	190	470
	VC-403	130	130	140	190	240	260	290	290
	VC-404	140	120	160	180	210	220	260	280
	VC-405	130	150	150	220	240	230	270	380
	VC-406	470	1200	3400	12000	16000	11000	16000	6900
	VC-407	170	800	3800	6700	6900	5000	2700	1300
	VC-408	140	320	760	1500	3000	3100	1600	310
	VC-409	130	430	400	820	2000	1600	310	220
	VC-410	150	180	210	270	280	320	1200	1100
	VC-411	150	160	160	230	260	270	300	390
	VC-412	130	150	170	180	170	210	220	270
	VC-413	120	120	160	160	160	180	190	230
	VC-414	140	140	170	160	180	180	200	250
	VC-415	140	150	160	160	200	180	110	200
	VC-416	150	160	160	180	170	180	190	220
	VC-417	150	150	150	170	180	210	160	200
	VC-418	140	160	190	170	200	190	210	260
	VC-419	230	180	320	200	210	220	250	220
	VC-420	130	170	180	190	220	250	230	220
	VC-421	150	220	210	210	230	300	230	210
	VC-422	150	190	190	180	180	250	210	120
Old Marina	VC-501	110	120	180	230	230	250	250	270
	VC-502	110	170	150	250	240	230	260	330
	VC-503	130	200	250	230	240	240	270	260
	VC-504	130	140	170	230	240	250	260	260
	VC-505	130	220	240	230	250	260	260	240
	VC-506	120	140	160	230	230	230	260	260
	VC-507	140	140	160	190	230	230	230	390
	VC-508	140	140	150	140	200	230	240	220
	VC-509	160	210	250	250	230	240	260	240
	VC-510	150	150	150	180	240	230	250	260
	VC-511	140	140	160	160	160	210	250	260
	VC-512	170	160	160	150	160	160	180	250
	VC-513	170	150	190	230	180	190	240	430
	VC-514	150	150	160	170	220	260	270	280
	VC-515	140	150	160	190	230	250	210	230
	VC-516	150	150	160	220	260	220	230	370
North Boat Slip	VC-601	120	48	120	190	230	260	250	290
	VC-602	57	200	89	87	110	170	260	240
	VC-603	170	140	140	190	180	240	210	270
	VC-604	140	160	130	130	190	210	250	250
	VC-605	140	160	170	200	240	260	250	270

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. Results shaded red are > 234 mg/kg.

TABLE 3.7A

SUMMARY OF GEOTECHNICAL LABORATORY TEST DATA ON SAMPLES FROM MARINE SILT STRATUM

1 RIVER STREET

HASTINGS-ON-HUDSON, NEW YORK

BORING NO.	GROUND SURF ELEV.	SAMPLE NO.	DEPTH (ft)	ELEV.	USCS CLASSIFICATION	WATER CONTENT	ATTERBERG LIMITS					% PASSING NO. 200 SIEVE	% SILT	% CLAY	ORGANIC CONTENT	DSS					CU TRIAXIAL						CONSOLIDATION PARAMETERS								UNIT WEIGHT			
																											Corrected					Lab					
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	LIQUIDITY INDEX	LLoven/ LLair					w% initial	ρ_d (pcf)	σv'	peak sh stress (psf)	Su/p	w% initial	ρ_d initial (pcf)	1/2 sdev (lab) (psf)	1/2 sdev (corrected) (psf)	% STRAIN	σ'con (psi)	Pp (tsf)	Pp (psf)	CR	RR	εvo (%)	Pp (tsf)	Pp (psf)	OCR	DSS (pcf)	CU TRX (pcf)	Consol (pcf)	(pcf)
PD-GL-001	7	U-3	28	-21																																113.6
PD-GL-001	7	U-3	27.45	-20.45		42.6																														
PD-GL-001	7	U-3B	27.7	-20.7	CL	45.2	40	21	19.0	1.3		65		10	3.4												2	4000	0.21	0.015	9	1.7	3400	2.32			110.4	
PD-GL-001	7	U-3	28	-21		47.1																														
PD-GL-001	7	U-3C	28.25	-21.25	CL	44.3															44.3	76.2	1460	965	8.7	12.7								110		
PD-GL-001	7	U-4	36	-29																																116
PD-GL-001	7	U-4A	35.2	-28.2	CL	31.1															31.1	87.0	1040	694	6.3	14.7								114.1		
PD-GL-001	7	U-4B	35.6	-28.6	CH	55	60	30	30.0	0.8		87.7		19													2	4000	0.23	0.026	3	2	4000	1.98			105.3	
PD-GL-001	7	U-5	43	-36																																120.6
PD-GL-001	7	U-5	42.25	-35.25		39.8																														
PD-GL-001	7	U-5	42.8	-35.8		24.8																														
PD-GL-001	7	U-5	43.05	-36.05	SC	25.8															25.8	100.2	1580	1086	15	16.6								126		
PD-GL-001	7	U-5	43.35	-36.35		33.8																														
PD-GL-001	7	U-5C	43.6	-36.6	CL	36.2	43	23	20.0	0.7		69.4		18													1.7	3400	0.21	0.028	6	1.5	3000	1.41			108.2	
PD-GL-002	7	U-4	39	-32																																101.9
PD-GL-002	7	U-4	38.55	-31.55		50.8																														
PD-GL-002	7	U-4B	38.8	-31.8	CH	52.1	62	28	34.0	0.7		87		17	3												1.1	2200	0.21	0.019	7	1.1	2200	1.03			106.8	
PD-GL-002	7	U-4	39.1	-32.1		58.4																														
PD-GL-002	7	U-4	39.35	-32.35	CH	61.7															61.7	63.1	1010	661	12.7	15.8								102.1		
PD2-GR-001	-10.9	U-1	11.5	-22.4																																91.9
PD2-GR-001	-10.9	U-1	10.75	-21.65		67.1																														
PD2-GR-001	-10.9	U-1A	11	-21.9	MH	80.8															80.8	50.2	180	111	8.7	3.0								90.7		
PD2-GR-001	-10.9	U-1	11.3	-22.2		71.5																														
PD2-GR-001	-10.9	U-1B	11.55	-22.45	MH	70.8	66	37	29.0	1.2	0.8	93.2		26													0.7	1400	0.31	0.027	4	0.4	800	1.27			94	
PD2-GR-001	-10.9	U-3	26.5	-37.4																																99
PD2-GR-001	-10.9	U-3	25.8	-36.7		67.4																														
PD2-GR-001	-10.9	U-3A	26.05	-36.95	ML	60.3										60.3	62.6	1500	500	0.33														100.4			
PD2-GR-001	-10.9	U-3	26.35	-37.25		58.4																														
PD2-GR-001	-10.9	U-3B	26.6	-37.5	ML	65.3															65.3	60.4	540	357	5.3	6.9								99.9		
PD2-GR-001	-10.9	U-3	26.9	-37.8		67.5																														
PD2-GR-001	-10.9	U-3C	27.15	-38.05	ML	57.4	44	27	17.0	1.8	1.0	92.8		17													0.7	1400	0.22	0.014	4	0.7	1400	0.86			103.5	
PD2-GR-001	-10.9	U-4	36.5	-47.4																																105
PD2-GR-001	-10.9	U-4	35.7	-46.6		50.1																														
PD2-GR-001	-10.9	U-4	36.25	-47.15		54.3																														
PD2-GR-001	-10.9	U-4B	36.5	-47.4	CH	60															60	63.1	870	578	13.1	9.5								100.9		
PD2-GR-001	-10.9	U-4	36.8	-47.7		54.2																														
PD2-GR-001	-10.9	U-4C	37.05	-47.95	CH	66.4	50	23	27.0	1.6		66.9		13													1.2	2400	0.42	0.016	3	0.8	1600	1.23			99.4	
PD2-GR-001	-10.9	U-5	46.5	-57.4																																115.5
PD2-GR-001	-10.9	U-5	45.75	-56.65		61.1																														
PD2-GR-001	-10.9	U-5A	46	-56.9	CL	54.4	47	23	24.0	1.3		66.9		17													1.5	3000	0.23	0.017	9	0.9	1800	1.25			105.1	
PD2-GR-001	-10.9	U-5	46.3	-57.2		31.7																														
PD2-GR-001	-10.9	U-5B	46.55	-57.45	SM	32.4															32.4	87.5	1800	1281	15	12.1								115.9		
PD2-GR-001	-10.9	U-5	46.85	-57.75		31.8																														
PD2-GR-002A	-24.3	U-5	37	-61.3																																90.4
PD2-GR-002A	-24.3	U-5	36.5	-60.8	CL	58.7															58.7	65.0	640	428	4.1	9.7								103.1		
PD2-GR-002A	-24.3	U-5	36.8	-61.1		65.1																														
PD2-GR-002A	-24.3	U-5	37.05	-61.35	CL	53.8										53.8	67.0	2090	520	0.25														103.1			
PD2-GR-002A	-24.3	U-5	37.35	-61.65		60																														
PD2-GR-002A	-24.3	U-5	37.6	-61.9	CL	56.7	30	18	12	3.2		70.6		21													0.7	1400	0.2	0.015	8	0.7	1400	0.88			106.2	
PD2-GR-002A	-24.3	U-7	57	-81.3																																117.8
PD2-GR-002A	-24.3	U-7	56.35	-80.65		29.7																														
PD2-GR-002A	-24.3	U-7	56.9	-81.2		25.6																														
PD2-GR-002A	-24.3	U-7	57.15	-81.45	CL	27.8															27.8	94.6	880	637	4.5	14.9								120.9		
PD2-GR-002A	-24.3	U-7	57.45	-81.75		29.9																														
PD2-GR-002A	-24.3	U-7	57.7	-82	CL	33.4	44	19	25	0.6	0.8	63.6		20													1.7	3400	0.2	0.007	4	1.4	2800	1.11			117.3	
PD2-GR-003	-27.7	U-2	13.5	-41.2																																105.3
PD2-GR-003	-27.7	U-2	12.85	-40.55		59.2																														
PD2-GR-003	-27.7	U-2B	13.1	-40.8	OH	44.1															44.4	79.1	220	155	9.3	3.5								114.2		
PD2-GR-003	-27.7	U-2	13.4	-41.1		68.7																														
PD2-GR-003	-27.7	U-2C	13.65	-41.35	OH	76.7	53	26	27.0	1.9	0.7	68.7		10													0.7	1400	0.3	0.033	4	0.6	1200	3.32			94.9	
PD2-GR-003	-27.7	U-3	23.5	-51.2																																101.1
PD2-GR-003	-27.7	U-3	22.8	-50.5		59.6																														
PD2-GR-003	-27.7	U-3B	23.05	-50.75	CH	57.5															57.5	64.4	400	266	6.2	6.1								101.4		
PD2-GR-003	-27.7	U-3	23.35	-51.05		39.4																														
PD2-GR-003	-27.7	U-3	23.45	-51.15	CH	66.9										66.9	58.8	1330	360	0.27														98.2			
PD2-GR-003	-27.7	U-3C	23.6	-51.3	CH	57.9	54	23	31.0	1.1	0.8	82.8		16													0.75	1500	0.28	0.023	5	0.8	1600	1.61			103.6	
PD2-GR-003	-27.7	U-5	48.5	-76.2																																110.6
PD2-GR-003	-27.7	U-5	48.05	-75.75		52.7																														
PD2-GR-003	-27.7	U-5B	48.3	-76	ML	47.2	41	26	15.0	1.4	0.8										47.2	72.5	820	560	11.4	12.7								106.7		
PD2-GR-003	-27.7	U-5	48.6	-76.3		25.2																														
PD2-GR-003	-27.7	U-5C	48.85	-76.55	ML	40.6						57.3		13													1.5	3000	0.17	0.010	6	1.2	2400	1.30			111.4	
PD2-GR-004	-9.8	U-1	9	-18.8																																92.2
PD2-GR-004	-9.8	U-1	8.2	-18		79.7																														
PD2-GR-004	-9.8	U-1	8.45	-18.25	CH	88.1										88.1	48.3	510	180	0.35														90.9			
PD2-GR-004	-9.8	U-1	8.7	-18.5		83.7																														
PD2-GR-004	-9.8	U-1	8.95	-18.75	CH	77.7															77.7	53.5	250	160	9.8	2.4								95		
PD2-GR-004	-9.8	U-1	9.3	-19.1		70.1																														
PD2-GR-004	-9.8	U-1	9.55	-19.35	CH	75.9	85	33	52	0.8	0.78	95.8		23													0.4	800	0.25	0.023	4	0.5	1000	2.88			93.1	
PD2-GR-004	-9.8	U-2	19	-28.8																																95
PD2-GR-004	-9.8	U-2	18.4	-28.2		79.8																														
PD2-GR-004	-9.8	U-2	18.65	-28.45	CH	82										82	51.2	1090	360	0.33														93.1			
PD2-GR-004	-9.8	U-2	18.95	-28.75		84.3																														
PD2-GR-004	-9.8	U-2	19.2	-29	CH	78.2															78.2	53.0	390	250	7	4.9								94.4		
PD2-GR-004	-9.8	U-2	19.5	-29.3		65.6																														
PD2-GR-004	-9.8	U-2	19.75	-29.55	CH	65.1	57	28	29	1.3	0.81	85.2		14													0.45	900	0.25	0.014	4	0.6	1200	1.27			100	
PD2-GR-004	-9.8	U-3	30	-39.8																																98.5
PD2-GR-004	-9.8	U-3	28.25	-38.05		66.6																														
PD2-GR-004	-9.8	U-3	28.8	-38.6		58.8																														
PD2-GR-004	-9.8	U-3	29.05	-38.85	CH	63.8	56	29	27	1.3		78.3		15																							
PD2-GR-004	-9.8	U-3	29.35	-39.15		72.4																														
PD2-GR-004	-9.8	U-5	44	-53.8																																120.3
PD2-GR-004	-9.8	U-5	43.2	-53		39.3																														
PD2-GR-004	-9.8	U-5	43.75	-53.55		33.1																														
PD2-GR-004	-9.8	U-5	44	-53.8	SP-SC	49.4	25	17	8	4.1		10.8		1																							
PD2-GR-004	-9.8	U-6	54	-63.8																																102.2
PD2-GR-004	-9.8	U-6	53.35	-63.15		47.5																														
PD2-GR-004	-9.8	U-6	53.9	-63.7		53.1																														
PD2-GR-004	-9.8	U-6	54.15	-63.95	CL	51.1															51.1	70.2	800	546	4.5	14.1								106		

TABLE 3.7A
SUMMARY OF GEOTECHNICAL LABORATORY TEST DATA ON SAMPLES FROM MARINE SILT STRATUM
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BORING NO.	GROUND SURF ELEV.	SAMPLE NO.	DEPTH (ft)	ELEV.	USCS CLASSIFICATION	WATER CONTENT	ATTERBERG LIMITS					% PASSING NO. 200 SIEVE	% SILT	% CLAY	ORGANIC CONTENT	DSS					CU TRIAXIAL						CONSOLIDATION PARAMETERS								UNIT WEIGHT			
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	LIQUIDITY INDEX	LLoven/ LLair					w% initial	ρ_d	σv'	peak sh stress	Su/p	w% initial	ρ_d initial	1/2 sdev (lab)	1/2 sdev (corrected)	% STRAIN	σ'con	Corrected					Lab		OCR	DSS	CU TRX	Consol	
																	(pcf)										Pp (tsf)	Pp (psf)	CR	RR	εvo (%)	Pp (tsf)	Pp (psf)		(pcf)	(pcf)	(pcf)	(pcf)
						(%)						(%)	(%)	(%)	(%)				(psf)			(pcf)	(psf)	(psf)		(psi)											
PD2-GR-005	-22.4	U-1	8.75	-31.15		73.2																														
PD2-GR-005	-22.4	U-1	9	-31.4	OH	79.8															79.8	53.4	210	136	4.4	2.4								96.1		
PD2-GR-005	-22.4	U-1	9.3	-31.7		87.8																														
PD2-GR-005	-22.4	U-1	9.55	-31.95	OH	102.5	68	32	36	2.0	0.59	90		20													0.2	400	0.3	0.031	3	0.2	400	1.54		91.2	
PD2-GR-005	-22.4	U-2	20	-42.4																																107.4
PD2-GR-005	-22.4	U-2	19.6	-42		57.2																														
PD2-GR-005	-22.4	U-2	20.15	-42.55		58.1																														
PD2-GR-005	-22.4	U-2	20.4	-42.8	CL	57.1	40	21	19	1.9	1.03	92.3		17																						
PD2-GR-005	-22.4	U-3	30	-52.4																																102.1
PD2-GR-005	-22.4	U-3	29.3	-51.7		62.7																														
PD2-GR-005	-22.4	U-3	29.85	-52.25		66.2																														
PD2-GR-005	-22.4	U-3	30.4	-52.8		50.3																														
PD2-GR-005	-22.4	U-3	30.65	-53.05	CH	81.7	60	27	33	1.7		95.1		23																						
PD2-GR-005	-22.4	U-4	40	-62.4																																
PD2-GR-005	-22.4	U-4	39.25	-61.65		21																														121.8
PD2-GR-005	-22.4	U-4	39.5	-61.9	SC	26.7															26.7	97.7	2335	1705	15	10.4								123.8		
PD2-GR-005	-22.4	U-4	39.8	-62.2		21.4																														
PD2-GR-005	-22.4	U-4	40.05	-62.45	CL	36.1	35	16	19	1.1		55.9		7													1.3	2600	0.12	0.005	4	1	2000	1.32		113.1	
PD2-GR-005	-22.4	U-5	50	-72.4																																102.3
PD2-GR-005	-22.4	U-5	49.55	-71.95		59.8																														
PD2-GR-005	-22.4	U-5	50.1	-72.5		53.2																														
PD2-GR-005	-22.4	U-5	50.35	-72.75	CH	45.3	53	27	26	0.7		92.4		29																						
PD2-GR-006	-4.9	U-1	8	-12.9																																92.9
PD2-GR-006	-4.9	U-1	7.6	-12.5		85.9																														
PD2-GR-006	-4.9	U-1	7.85	-12.75	MH	82.1															82.1	50.7	210	132	7.1	2.1								92.3		
PD2-GR-006	-4.9	U-1	8.15	-13.05		89.3																														
PD2-GR-006	-4.9	U-1	8.3	-13.2	MH	93.3										93.3	46.5	450	160	0.36														89.9		
PD2-GR-006	-4.9	U-1	8.5	-13.4	MH	93.8	80	40	40	1.3	0.78	92		28													0.23	460	0.27	0.043	2	0.4	800	2.08		90	
PD2-GR-006	-4.9	U-2	18	-22.9																																90.6
PD2-GR-006	-4.9	U-2	17.65	-22.55		78																														
PD2-GR-006	-4.9	U-2	17.9	-22.8	CH	84.2	89	33	56	0.9		95.9		27																						
PD2-GR-006	-4.9	U-3	28	-32.9																																99.2
PD2-GR-006	-4.9	U-3	27.4	-32.3		68.3																														
PD2-GR-006	-4.9	U-3	27.65	-32.55	MH	66															66	60.2	500	330	15	7.3								99.9		
PD2-GR-006	-4.9	U-3	27.95	-32.85		50.8																														
PD2-GR-006	-4.9	U-3	28.2	-33.1	MH	66.5	56	30	26	1.4	0.79	93.1		17													0.7	1400	0.29	0.018	4	0.7	1400	1.37		100.3	
PD2-GR-006	-4.9	U-3	28.5	-33.4		67.2																														
PD2-GR-006	-4.9	U-3	28.75	-33.65	MH	65.3										65.3	59.8	1580	470	0.30														98.8		
PD2-GR-006	-4.9	U-5	43	-47.9																																104.9
PD2-GR-006	-4.9	U-5	42.35	-47.25		44.2																														
PD2-GR-006	-4.9	U-5	42.6	-47.5	CL	54															54	69.1	710	484	10	11.2								106.4		
PD2-GR-006	-4.9	U-5	42.9	-47.8		68.3																														
PD2-GR-006	-4.9	U-5	43	-47.9	CL	55.8										55.8	66.1	2430	680	0.28														103		
PD2-GR-006	-4.9	U-5	43.2	-48.1	CL	50.1	48	27	21	1.1		90.1		18													0.95	1900	0.23	0.007	6	0.8	1600	1.04		106.3	
PD2-GR-006	-4.9	U-6	53	-57.9																																112.1
PD2-GR-006	-4.9	U-6	52.7	-57.6		32.5																														
PD2-GR-006	-4.9	U-6	52.95	-57.85	SC	28.9										28.9	95.0	2990	970	0.32														122.5		
PD2-GR-006	-4.9	U-6	53.25	-58.15		28																														
PD2-GR-006	-4.9	U-6	53.5	-58.4	SC	34.9	32	21	11	1.3		30.6		6													1.7	3400	0.17	0.003	6	1.6	3200	1.19		117.6	
PD2-GR-006	-4.9	U-7	63	-67.9																																107.7
PD2-GR-006	-4.9	U-7	62.3	-67.2		55.4																														
PD2-GR-006	-4.9	U-7	62.55	-67.45	CL	54.9										54.9	67.1	3540	810	0.23														104		
PD2-GR-006	-4.9	U-7	62.85	-67.75		44.8																														
PD2-GR-006	-4.9	U-7	63.1	-68	CL	49.6															49.6	72.6	990	683	5.6	16.5								108.6		
PD2-GR-006	-4.9	U-7	63.4	-68.3		50.7																														
PD2-GR-006	-4.9	U-7	63.65	-68.55	CL	43.8	41	22	19	1.1		87.8		18													2	4000	0.18	0.010	5	1.7	3400	1.36		110.2	
PD2-GR-007	-22.8	U-1	9	-31.8																																102.1
PD2-GR-007	-22.8	U-1	8.2	-31		74																														
PD2-GR-007	-22.8	U-1A	8.45	-31.25	CH	55.3										55.3	66.1	420	200	0.48														102.6		
PD2-GR-007	-22.8	U-1	8.75	-31.55		76.3																														
PD2-GR-007	-22.8	U-1	8.95	-31.75	CH	65.6	51	25	26.0	1.6	0.8	93.8		14													0.23	460	0.22	0.023	4	0.3	600	1.53		97.6	
PD2-GR-007	-22.8	U-2	19	-41.8																																101
PD2-GR-007	-22.8	U-2	18.2	-41		87.9																														
PD2-GR-007	-22.8	U-2	18.7	-41.5		66.5																														
PD2-GR-007	-22.8	U-2	19.25	-42.05		79.8																														
PD2-GR-007	-22.8	U-2C	19.55	-42.35	OH		61	30	31.0		0.6	86.5		12																						
PD2-GR-007	-22.8	U-3	29	-51.8																																105.5
PD2-GR-007	-22.8	U-3A	28.25	-51.05	OH	69.2	65	30	35.0	1.1	0.7	98.9		79																						
PD2-GR-007	-22.8	U-3	28.55	-51.35		74.5																														
PD2-GR-007	-22.8	U-3B	28.8	-51.6	OH	63.5																					0.7	1400	0.27	0.017	6	0.7	1400	1.36		99.8	
PD2-GR-007	-22.8	U-3	29.1	-51.9		41																														
PD2-GR-007	-22.8	U-3C	29.35	-52.15	SP-SM/OH	34.1															34.1	81.0	700	484	15	7.6								108.6		
PD2-GR-007	-22.8	U-4	38.85	-61.65		55.3																														
PD2-GR-007	-22.8	U-4B	39.1	-61.9	CL	55.6										55.6	66.1	2200	550	0.25														102.9		
PD2-GR-007	-22.8	U-4	39.4	-62.2		47.9																														
PD2-GR-007	-22.8	U-4	39.65	-62.45	CL	75.5	42	23	19.0	2.8	1.0	78.6		20													0.8	1600	0.31	0.030	4	0.7	1400	1.23		96.7	
PD2-GR-008	-19.3	U-1	8	-27.3																																91.7
PD2-GR-008	-19.3	U-1	7.15	-26.45		83.6																														
PD2-GR-008	-19.3	U-1A	7.4	-26.7	OH	76.6	82	33	49.0	0.9	0.6	84.6		12													0.3	600	0.26	0.015	7	0.2	400	2.53		96.1	
PD2-GR-008	-19.3	U-1	7.7	-27		88.5																														
PD2-GR-008	-19.3	U-1B	7.95	-27.25	OH	84.9															84.9	50.0	160	101	5.5	2.1								92.4		
PD2-GR-008	-19.3	U-1	8.25	-27.55		91.9																														
PD2-GR-008	-19.3	U-1C	8.5	-27.8	OH	86.7										86.7	49.2	450	140	0.31														91.8		
PD2-GR-008	-19.3	U-2	18	-37.3																																97.6
PD2-GR-008	-19.3	U-2	17.7	-37		81.2																														
PD2-GR-008	-19.3	U-2B	17.95	-37.25	OH	89.3										89.3	48.1	1010	280	0.28														91.1		
PD2-GR-008	-19.3	U-2	18.25	-37.55		61.8																														
PD2-GR-008	-19.3	U-2	18.55	-37.85	OL	36.2	46	26	20.0	0.5	0.7	88.3		19													2	4000	0.13	0.008	1	3.4	6800	4.30		114.1	
PD2-GR-008	-19.3	U-3	28	-47.3																																105.1
PD2-GR-008	-19.3	U-3	27.4	-46.7		69.5																														
PD2-GR-008	-19.3	U-3	27.95	-47.25		55.5																														
PD2-GR-008	-19.3	U-3	28.2	-47.5	CL	51.8										51.8	69.4	1580	350	0.22														105.3		
PD2-GR-008	-19.3	U-3	28.5	-47.8		67.1																														
PD2-GR-008	-19.3	U-3	28.8	-48.1	CL	64.5	49	23	26	1.6		92.8		16													0.6	1200	0.25	0.017	3	0.6	1200	1.11		101.5	
PD2-GR-008	-19.3	U-4	38	-57.3																																101.7
PD2-GR-008	-19.3	U-4	37.2	-56.5		61.4																														
PD2-GR-008	-19.3	U-4	37.75	-57.05		45.5																														
PD2-GR-008	-19.3	U-4	38.3	-57.6		52.3																														

TABLE 3.7A
SUMMARY OF GEOTECHNICAL LABORATORY TEST DATA ON SAMPLES FROM MARINE SILT STRATUM
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BORING NO.	GROUND SURF ELEV.	SAMPLE NO.	DEPTH (ft)	ELEV.	USCS CLASSIFICATION	WATER CONTENT	ATTERBERG LIMITS					% PASSING NO. 200 SIEVE	% SILT	% CLAY	ORGANIC CONTENT	DSS					CU TRIAXIAL						CONSOLIDATION PARAMETERS								UNIT WEIGHT			
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	LIQUIDITY INDEX	LLoven/ LLair					w% initial	ρ_d	σv'	peak sh stress (psf)	Su/p	w% initial	ρ_d initial (pcf)	1/2 sdev (lab) (psf)	1/2 sdev (corrected) (psf)	% STRAIN	σ'con (psi)	Corrected					Lab		OCR	DSS (pcf)	CU TRX (pcf)	Consol (pcf)	
																	(pcf)										Pp (tsf)	Pp (psf)	CR	RR	εvo (%)	Pp (tsf)	Pp (psf)					
						(%)						(%)	(%)	(%)	(%)																						
PD2-GR-008	-19.3	U-5	48.3	-67.6		58.5																														
PD2-GR-008	-19.3	U-5C	48.55	-67.85	ML	57.7	49	29	20	1.4		94		23																						
PD2-GR-009	-14.2	U-1	7	-21.2																																93.3
PD2-GR-009	-14.2	U-1A	6.45	-20.65	OH	74.8															74.8	53.8	130	82	12.3	1.8									94.1		
PD2-GR-009	-14.2	U-1	6.75	-20.95		76.8																														
PD2-GR-009	-14.2	U-1B	7	-21.2	OH	76.2	72	32	40	1.1	0.74	95.4		27													0.55	1100	0.29	0.035	2	0.5	1000	5.19			94.3	
PD2-GR-009	-14.2	U-1	7.25	-21.45		68.3																														
PD2-GR-009	-14.2	U-1C	7.5	-21.7	OH	77.8										77.8	52.2	400	170	0.43														92.8			
PD2-GR-009	-14.2	U-2	17	-31.2																																100.1
PD2-GR-009	-14.2	U-2	16.25	-30.45		49.3																														
PD2-GR-010	-14.2	U-3	16.8	-31		54.5																														
PD2-GR-009	-14.2	U-2	16.8	-31		54.5																														
PD2-GR-009	-14.2	U-2	17.35	-31.55		64.1																														
PD2-GR-009	-14.2	U-2C	17.6	-31.8	OH	63.3	66	38	28	0.9	0.67	81.9		4																						
PD2-GR-009	-14.2	U-3	27	-41.2																																105.1
PD2-GR-009	-14.2	U-3	26.35	-40.55		68																														
PD2-GR-009	-14.2	U-3	26.9	-41.1		51.4																														
PD2-GR-009	-14.2	U-3	27.15	-41.35	CL	60.3	39	21	18	2.2	0.9	94.8		15		60.3	62.6	1520	420	0.28														100.4			
PD2-GR-009	-14.2	U-3	27.3	-41.5	CL	57.5																					0.7	1400	0.23	0.023	4	0.7	1400	1.41		100.3	
PD2-GR-009	-14.2	U-3	27.45	-41.65		48.8																														
PD2-GR-009	-14.2	U-3C	27.7	-41.9	CL	41.4															41.4	81.7	500	356	7.9	7.1									115.5		
PD2-GR-009	-14.2	U-4	37	-51.2																																103.4
PD2-GR-009	-14.2	U-4	36.25	-50.45		65																														
PD2-GR-009	-14.2	U-4	36.8	-51		57.7																														
PD2-GR-009	-14.2	U-4	37.05	-51.25	CH	57.3										57.3	64.5	2090	540	0.26														101.4			
PD2-GR-009	-14.2	U-4	37.35	-51.55		49																														
PD2-GR-009	-14.2	U-4C	37.6	-51.8	CH	70.1	65	32	33	1.2		83.4		14													1.2	2400	0.35	0.027	3	1	2000	1.84		98.6	
PD2-GR-009	-14.2	U-5	47	-61.2																																109.8
PD2-GR-009	-14.2	U-5	46.2	-60.4		28.4																														
PD2-GR-009	-14.2	U-5	46.75	-60.95		45.4																														
PD2-GR-009	-14.2	U-5	47	-61.2	CL		38	24	14																											
PD2-GR-009	-14.2	U-5	47.55	-61.75		43.4																														
PD2-GR-009	-14.2	U-5B	48	-62.2	CL	49.1						83.1		14																						

Notes:
1. Elevations are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

Legend:
LL_{oven} = liquid limit by oven-dried method
LL_{air} = liquid limit by air-dried method
σ_{dev} = deviator stress at failure
$\sigma'_{confined}$ = effective confining stress
CU TRX = consolidated undrained triaxial test
ε_{vo} - strain at in-situ effective stress
CR = compression ratio (strain per log cycle stress)
RR = recompression ratio (strain per log cycle stress)
Pp = preconsolidation pressure

TABLE 3.7B

SUMMARY OF GEOTECHNICAL LABORATORY TEST DATA ON SAMPLES FROM BASAL SAND STRATUM

1 RIVER STREET

HASTINGS-ON-HUDSON, NEW YORK

										ATTERBERG LIMITS			
BORING NO.	GROUND SURFACE ELEV.	SAMPLE NO.	DEPTH (FT)	ELEV.	USCS CLASSIFICATION	WATER CONTENT (%)	% PASSING NO. 200 SIEVE (%)	% SILT (%)	% CLAY (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	LIQUIDITY INDEX
PD2-GR-001	-10.3	S-13	89-91	-100.9	SM	16.5	17.7	15.7	2				
PD2-GR-001	-10.3	S-14	94-96	-105.9	CL	30.2	70.3	63.3	7	25	17	8	1.65
PD2-GR-002A	-24.3	S-8	71-73	-93.6	CL-ML	21.3	73.1	69.1	4				
PD2-GR-002A	-24.3	S-10	81-83	-106.3	SP-SM	24.4	8.6	8.6	0				
PD2-GR-003	-27.7	S-11	77.5-79.5	-106.2	CL-ML	27	94.4	91.4	3				
PD2-GR-003	-27.7	S-14	92.5-94.5	-121.2	CL-ML	27.7	82.4	71.4	11	24	19	5	1.74
PD2-GR-007	-22.8	S-8	62.9-64.9	-86.7	CL	53.2				44	23	21	1.44
PD2-GR-007	-22.8	S-9	67.9-69.9	-91.7	CL	37.7				36	21	15	1.11
PD2-GR-007	-22.8	S-10	72.9-74.9	-96.7	CL	36.6				39	21	18	0.87

Notes:

1. Elevations are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

TABLE 3.8A - SUMMARY OF BENCH TESTING SEDIMENT LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Bucket #	Sampling Area	Sample Locations									
1	Deepwater	VC-123	VC-115	VC-116							
8	Deepwater	VC-105	VC-107	VC-112	VC-113	VC-130	VC-131	VC-132			
9	Deepwater	VC-104	VC-106	VC-108	VC-127	VC-128	VC-129	VC-132			
23	Deepwater	VC-137	VC-139	VC-140							
15	Northwest Area	VC-314	VC-315	VC-316	VC-326	VC-327	VC-328	VC-329			
16	Northwest Area	VC-330	VC-331	VC-332	VC-333						
17	Northwest Area	VC-302	VC-303	VC-304	VC-330	VC-331	VC-332	VC-333			
18	Northwest Area	VC-301	VC-306	VC-307	VC-308	VC-312					
21	Northwest Area	VC-317	VC-318								
24	Northwest Area	VC-339	VC-340	VC-341							
11	Nearshore	VC-401									
12	Nearshore	VC-402	VC-403	VC-404	VC-405						
13	Nearshore	VC-407	VC-408	VC-409							
19	Nearshore	VC-406	VC-410	VC-601	VC-602	VC-603	VC-604	VC-605			
20	Northwest Area	VC-305	VC-309	VC-310	VC-311	VC-313					
27	Nearshore	VC-411	VC-412	VC-413	VC-414	VC-415					
22	Old Marina	VC-501	VC-504	VC-508							
25	Old Marina	VC-505	VC-506	VC-507	VC-511						
26	Northwest Area	VC-510	VC-334	VC-335	VC-336	VC-343	VC-344	VC-351	VC-352	VC-353	VC-354

Notes:

1. All Nearshore and Old Marina samples were utilized, due to likelihood and volume of dredging in these areas.
2. All Northwest Area samples were utilized
3. Higher PCB concentration Northwest Area buckets were added to match anticipated dredge volumes and concentrations, as well as ensure enough sample to the testing lab.

Table 4.1A
EVALUATION OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)	Maximum Excavation Depth	PCB (mg/kg)	Limits Defined?	Contained within limits of excavation?	LNAPL Observed in Adjacent Well?	Adjacent Borings Used for Evaluation
Appendix 2 South Boat Slip	PDI-2-00	6.4-11.5		6.06	N	N	No adjacent wells	None available
Appendix 2 Former Brook Tunnel	FBT-2	6-12	None	NS	N	N	N	None available
	PDMW-23S (ORIGINAL RDWP LOCATION)	6-10		NS				
Appendix 2 PDMW-24S and PDMW-26S	PDMW-24S	5-15	0	1.247	N	N	N	None available
	PDMW-26S	7.5-10	0	NS	N	N	N	
Appendix 4 Northwest	LP-14	26-26.5	9	NS	N	N	No adjacent wells	None available
	LP-6	5-7, 8-10	9	NS	Y	N		WA-138, WA-139 and WA-140
NA	NA-101	5-6	4	12.39	Y	N	No adjacent wells	WA-105, NA-201, NC-201, WA-104, WA-201, WA-110
	NA-102	4.0-4.5		6.16				
	NA-202	4.8-9		5.7 [1]				
	NA-203	6-7.8		NS				
NC	NC-101	8.5-10.5	10	NS	Y	N	No adjacent wells	WA-110, NC-201, PDSB-14, NC-001, WA-112
	NC-102	9-10		2.53 [1]				
NE	PD2-GL-001	5-9	None	0.0636 [1]	Y	N	No adjacent wells	PDSB-16, PDSB-31, NF-101, NF-102, NF-202 (boring extended to 8 feet), and NG-203
	NE-301	5.8-7.5	0	NS				
NH	NH-106	6.5-10	0	ND - 0.794	Y	N	No adjacent wells	NH-206, NH-NH-207, NH-002, and SB-072

NS: No samples collected
ND: Not Detected
Each 2 foot interval that coincided with NAPL observations were not sampled for PCBs. See Table 3.3A for sampling details in this boring.
[1] PCB results shown coincide with or are close to the interal in which NAPL was observed in the soil boring.

Table 4.1A
EVALUATION OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)	Maximum Excavation Depth	PCB (mg/kg)	Limits Defined?	Contained within limits of excavation?	LNAPL Observed in Adjacent Well?	Adjacent Borings Used for Evaluation
NI/NH	NH-211	7.2-9.4	10-12	10.23 - 88.3	Y	Y	No adjacent wells	NH-209, NI-306, NH-311, NH-312, NI-302
	NI-303	8.2 - 9.8		188.4				
	NI-310	8.75-10		14.66				
NI	NI-305	7.5-11.25	6	0.126-24.4	Y	N	No adjacent wells	NI-302, NI-202, NJ-101, NJ-102, NJ-103
NI/NK	NI-307	10-14	4	3.39 [1]	N	N	No adjacent wells	NI-304, NI-306, NK-302, PDSB-33, and NH-312
	NI-308	8.75-12	12	NS				
	NI-309	8-10	4	NS				
	NK-201	8-8.3	4	NS				
	NK-303A	7	4	NS				
	NI-301	6-9	6	0.251 - 1.95 [1]				
	PD2-GL-002	6.2-6.5	4	21.57 [1]				
	NK-203	9.2	4	NS				
	NK-301	7.5-10	0	NS				
NL	NL-102	6-10	6	NS	N	N	CHECK ON THIS	WA-161, WA-162, WA-163
	NL-201	5-8	0	0.997 - 8.68 [1]				
	NL-202	5.8-8	0	NS				
	NL-301	4-8	0	0.997 - 8.68 [1]				
NN	NN-104	8-10	0	55.04	Y	N	No adjacent wells	NM-201, NM-202, NN-202

NS: No samples collected
ND: Not Detected
Each 2 foot interval that coincided with NAPL observations were not sampled for PCBs. See Table 3.3A for sampling details in this boring.
[1] PCB results shown coincide with or are close to the interal in which NAPL was observed in the soil boring.

Table 4.1A
EVALUATION OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)	Maximum Excavation Depth	PCB (mg/kg)	Limits Defined?	Contained within limits of excavation?	LNAPL Observed in Adjacent Well?	Adjacent Borings Used for Evaluation
NN	NN-306	6-10	0	2.23	Y	N	N	NN-201, NN-303, NN-304, NN-305, NN-306, NN-302
SC	SC-103	8-10	forms the boarder 12 foot, 10 foot, 8 foot, and 6 foot excavations	5.44 [1]	Y	N	CHECK ON THIS	SC-201, SC-301, and SC-101
SM	SM-201	5-6.5	6	1.39	N	N	No adjacent wells	None available
SS	SS-101	8-10	12	178	Y	Y	CHECK ON THIS	SS-207, SS-212, SS-211, SS-103
	SS-102	4.3-10	12	153.4 - 201	Y	Y	CHECK ON THIS	SS-207, SS-212, SS-211, SS-103
	SS-206	7-12.5	12	90.2	Y	Y	CHECK ON THIS	SS-207, SS-212, SS-211, SS-103
	SS-201	5.25-6	boarder of 6 and 12 ' excavations	0.498	Y	Y	CHECK ON THIS	SS-207, SS-216, SS-215, SS-202
	PDMW-22S-08	5(?)	12	NS	Y	Y	Y	SS-214, SS-222
	SS-222	11-14	boarder of 6 and 12 ' excavations	2.66	Y		CHECK ON THIS	SS-215, SS-231, SS-230, SS-223
	PDMW-22S	5-12	12	3.85	Y	Y	No adjacent wells	None available
	PDMW-22S-01	2-4.5	12	427	Y	Y	Y	None available
	PDMW-22S-02C	8.5-12	12	NS	N	Y	Y	None available
	PDMW-22S-03	8-9.5	12	11.63	N	Y	Y	None available
	PDMW-22S-05	4-8	12	NS	N	Y	Y	None available
	PDMW-22S-06	4-8	12	NS	N	Y	Y	None available
	SS-213	7.3-8.8	0	31.21	N	Y	Y	None available
	SS-220	8-10	0	2.12 [1]	N	Y	Y	None available
	SS-221	6-11.5		ND - 9.73	N	Y	Y	None available
	SS-227	6-9.75		NS	N	N	CHECK ON THIS	None available
	SS-228	6-12.5	9	5.48 - 19.71	N	N	Y	None available

NS: No samples collected
ND: Not Detected
Each 2 foot interval that coincided with NAPL observations were not sampled for PCBs. See Table 3.3A for sampling details in this boring.
[1] PCB results shown coincide with or are close to the interal in which NAPL was observed in the soil boring.

Table 4.1A
EVALUATION OF LNAPL OBSERVATIONS
PRE-DESIGN INVESTIGATION
ATLANTIC RICHFIELD COMPANY
FORMER ANACONDA WIRE AND CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK

Appendix 3 Area Designation	Location	Anomaly Depth (ft)	Maximum Excavation Depth	PCB (mg/kg)	Limits Defined?	Contained within limits of excavation?	LNAPL Observed in Adjacent Well?	Adjacent Borings Used for Evaluation
WA	WA-103	3.5, 6	9	NS	Y	N	CHECK ON THIS	WA-102, WA-104, PDSB-11, WA-001
WA	WA-107	6	10	109 [1]	N	N	No adjacent wells	WA-114, PDSB-09, WA-202
WA	WA-113	6-10	4	0.273 1	Y	N	No adjacent wells	WA-114, WA-202, PDSB-09, PDSB-12, WA-102
WA	WA-115	5	0	ND [1]	Y	N	No adjacent wells	WA-202, WA-203, WA-204, PDSB-13
WA	WA-116	5 ft 7 in	4-9	0.131 [1]	Y	N	No adjacent wells	WA-114, WA-205, PDSB-10, WA-118, WB-101
	WA-117	4-6		2.999				
WA/WB	WA-125	5.5-10	2-9	ND [1]	Y	N	No adjacent wells	WA-126, WB-203, PDSB-20, and WA-124
WB	WB-201	2.6-5.6	2-10	0.344	Y	N	No adjacent wells	PDSB-13, ND-202, WB-303, WB-206, WA-206A, WA-204, WA-205, WB-104
	WB-301	10-12		887.5				

NS: No samples collected
ND: Not Detected
Each 2 foot interval that coincided with NAPL observations were not sampled for PCBs. See Table 3.3A for sampling details in this boring.
[1] PCB results shown coincide with or are close to the interal in which NAPL was observed in the soil boring.

TABLE 4.4A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NEARSHORE AND BACKWATER LOCATIONS - TOTAL PCBs & METALS
NEARSHORE, OLD MARINA, AND NORTH BOAT SLIP LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations Results in mg/kg		Depth Interval															
		0 - 0.5 (ft)		0.5 - 1 (ft)		1 - 2 (ft)		2 - 3 (ft)		3 - 4 (ft)		4 - 5 (ft)		5 - 6 (ft)		6 - 8 (ft)	
		PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals
Nearshore	VC-401	1.4		3.3		4.9	Cu	5.2	Cu Pb	8.5	Cu Pb	8.2	Cu	7.3	Cu Pb Zn	4.3	Cu Pb Zn
	VC-402	0.68		1.2		2.7	Cu	5	Cu	3.5	Cu Pb	5.1	Cu	5.2	Cu	2.8	Cu Pb Zn
	VC-403	0.11 J		0.36		1.9		2.4		4.8	Cu Pb Zn	7.3	Cu Pb Zn	1.5	Cu Pb Zn	1.5	Cu Pb Zn
	VC-404	2.2		0.68		11		1.3		2.8	Cu Pb	4.8	Cu Pb	6.7	Cu Pb Zn	3.1	Cu Pb Zn
	VC-405	0.47		0.95		5.9		2.7	Pb	5.1	Pb Zn	5.4	Cu Pb	6.2	Cu Pb Zn	0.84	Cu Pb Zn
	VC-406	0.32	Cu Zn	0.13	Cu Pb Zn	0.33	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Zn
	VC-407	0.11		ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn
	VC-408	0.32		110	Cu Zn	7.5	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Pb Zn	ND	Cu Zn
	VC-409	0.36		5.7	Cu Pb Zn	28	Cu Pb Zn	1.7	Cu Pb Zn	2.9	Cu Pb Zn	0.25	Cu Zn	ND	Cu Zn	0.081 J	Cu
	VC-410	0.4		1.6	Cu	3.1	Cu Pb	3.7	Cu Pb Zn	6.6	Cu Pb Zn	1.2	Cu Pb Zn	0.13	Cu Pb Zn	ND	Cu Pb Zn
	VC-411	0.32		0.61		1.4	Cu	3.5	Cu Pb	1.7	Cu Pb Zn	58	Cu Pb Zn	ND	Cu Zn	ND	Cu Pb Zn
	VC-412	0.21		0.76	Cu	1	Cu	5.6	Cu Pb	4	Cu Pb	5.6	Cu Pb	11	Cu Pb	13	Cu Pb Zn
	VC-413	0.24		0.39		1.8		0.65	Cu	0.63	Cu	2.3	Cu	4.1	Cu	4.7	Cu Pb
	VC-414	0.39		0.52		0.5		0.45	Cu	0.53		4.3		1.4		4.3	Cu Pb Zn
	VC-415	0.27		0.36		0.51		0.55		1	Cu	1.4		1.3		2.6	
	VC-416	0.47		1.6		0.8		0.82		1.5		2.9		1.9		3.6	Cu
	VC-417	0.3		0.61	Cu	1.5	Cu	2.3	Cu	1.4		3	Cu Pb	2.8	Cu	4.2	Cu Pb
	VC-418	0.19		9.1	Cu	110	Cu	2.3	Cu	2.4	Cu Pb	3.3	Cu Pb	4.4	Cu Pb	2.2	Cu Pb Zn
	VC-419	19	Cu	1.8	Cu Pb	1.1	Cu Zn	0.85	Cu	3.9	Cu Pb	6	Cu Pb	4	Cu Pb Zn	ND	Cu
	VC-420	0.68		1.4	Cu	0.87	Cu	2.9	Cu	4.2	Cu Pb	22	Cu Pb Zn	0.18	Cu Pb	0.081 J	Cu Pb
	VC-421	0.89		2	Cu	4.9	Cu	13	Cu Pb	4.7	Cu Pb	23	Cu Pb Zn	0.1	Cu Pb	ND	Cu
	VC-422	0.73		2.9	Cu	3	Cu	2.3	Cu Pb	6.8	Cu	2.4	Cu Pb Zn	3	Cu Pb	ND	

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

1. PCB results shaded grey are < 1 mg/kg overlying a sample > 1 mg/kg.
2. PCB Results shaded green are < 1 mg/kg overlying a sample > 1 mg/kg and contiguous for at least 3 ft.
3. PCB Results shaded red are > 1 mg/kg.
4. Metals column shaded in red indicates the metals that exceed criteria. Criteria for Cu (copper) is 129 mg/kg; Pb (lead) is 132 mg/kg; and Zn (zinc) is 234 mg/kg)

TABLE 4.4A - SUMMARY OF SEDIMENT ANALYTICAL RESULTS FOR NEARSHORE AND BACKWATER LOCATIONS - TOTAL PCBs & METALS
NEARSHORE, OLD MARINA, AND NORTH BOAT SLIP LOCATIONS
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

Sample Locations Results in mg/kg		Depth Interval															
		0 - 0.5 (ft)		0.5 - 1 (ft)		1 - 2 (ft)		2 - 3 (ft)		3 - 4 (ft)		4 - 5 (ft)		5 - 6 (ft)		6 - 8 (ft)	
		PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals	PCBs	Metals
Old Marina	VC-501	4.5		2.6		1.5		2.1		2.8		4	Zn	170	Zn	31	Zn
	VC-502	0.25		1.9		1.3		2.3	Zn	3.4	Zn	5.3	Cu Pb	4	Cu Pb Zn	0.3	Cu Pb Zn
	VC-503	0.091 J		1.6		2.4	Zn	3.7	Cu Pb	4.6	Zn	5.1	Cu Pb Zn	5.8	Cu Pb Zn	4.5	Cu Zn
	VC-504	1.1		1.7		1.3		2.5		3.7	Cu Pb Zn	5	Cu Pb Zn	4.6	Cu Pb Zn	2.9	Cu Pb Zn
	VC-505	0.41		1.6		1.7	Zn	4.1		5.7	Cu Pb Zn	6.1	Cu Pb Zn	4.3	Cu Pb Zn	1.7	Cu Pb Zn
	VC-506	0.13		0.21		0.72		2.4	Cu	3.3	Cu Pb	4.8	Cu Pb	5.4	Cu Pb Zn	7.8	Cu Zn
	VC-507	0.33		0.26		0.46		1		3.9		6.3	Cu	3.2	Cu Pb	ND	Cu Pb Zn
	VC-508	0.19		0.27		1.4		0.79		1.6	Cu Pb	7.8	Cu Pb	5.2	Cu Zn	0.83	Cu
	VC-509	0.77		1.6		2.6	Zn	3.4	Zn	5.5		5.9	Cu Pb Zn	7	Cu Pb Zn	8.3	Cu Zn
	VC-510	0.46		0.21		0.32		0.73	Pb	1.6	Cu Pb Zn	3	Cu Pb	4.9	Cu Pb Zn	5.2	Cu Pb Zn
	VC-511	0.24		0.35		0.25		0.52		0.55		0.8		4.1	Cu Pb Zn	11	Cu Pb Zn
	VC-512	0.27		0.3		0.34		0.48		0.51		9.9		0.49	Pb	4.3	Cu Pb Zn
	VC-513	0.31		0.65		3.2		4.1		5.1		2.6		5.5	Zn	ND	Cu Pb Zn
	VC-514	0.31		0.33		0.24		0.76	Cu Pb	2	Cu	1.8	Cu Zn	1.1	Cu Zn	17	Cu Zn
	VC-515	0.25		0.29		0.32		1.2		3.2		9.8	Cu Pb Zn	0.092	Cu Pb	ND	Cu Pb
	VC-516	0.39		0.24		0.82		2.2		3.2	Cu Zn	14	Cu Pb	ND	Cu	ND	Cu Zn
North Boat Slip	VC-601	0.6		2.3		3.2		1.1	Cu	3.9	Cu	3.1	Cu Zn	4	Cu Zn	7.3	Cu Zn
	VC-602	0.41	Cu	0.15		0.46		1	Pb	2.2	Cu Pb	1.8	Cu Pb	2.6	Cu Pb Zn	4.6	Cu Pb Zn
	VC-603	0.36		0.42		0.55		0.8	Pb	0.99		2.9	Cu Zn	2.3	Cu Pb	6.1	Cu Pb Zn
	VC-604	1.6		0.59		0.51		0.79		1.2		1.7		25	Cu Pb Zn	2.7	Cu Pb Zn
	VC-605	0.24		0.21		0.27		1.1		1.3	Zn	3.4	Zn	8.8	Cu Pb Zn	3.5	Cu Pb Zn

Notes & Abbreviations

ND (Not detected above laboratory detection limits); J (Estimated value); "-" (Sample not analyzed or not collected)

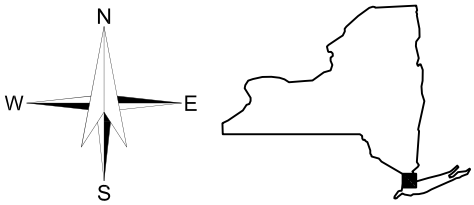
1. PCB results shaded grey are < 1 mg/kg overlying a sample > 1 mg/kg.
2. PCB Results shaded green are < 1 mg/kg overlying a sample > 1 mg/kg and contiguous for at least 3 ft.
3. PCB Results shaded red are > 1 mg/kg.
4. Metals column shaded in red indicates the metals that exceed criteria. Criteria for Cu (copper) is 129 mg/kg; Pb (lead) is 132 mg/kg; and Zn (zinc) is 234 mg/kg)

TABLE 6.2A - SUMMARY OF CAMP DUST EXCEEDANCES
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

DATE	MAX 15-MIN AVERAGE (mg/m3)	NOTES
10/21/2013	0.183	One 15-minute TWA above 0.15 ug/m3 was observed at 11:29AM. At the time of the elevated concentration, the difference between upwind and downwind 15-minute TWA was 0.158ug/m3. This concentration coincided with relocation of the dust monitor to accommodate drilling activities; subsequent dust readings were below threshold values.
10/24/2013	0.142	One 15-minute TWA above 0.10 ug/m3 was observed at 3:25PM. At the time of the elevated concentration, the difference between upwind and downwind 15-minute TWA was 0.135ug/m3. This elevated concentration coincided with offsite traffic in the vicinity of the dust monitor; subsequent dust readings were below threshold values.
10/25/2013	0.158	One 15-minute TWA above 0.10 ug/m3 was observed at 7:48AM. At the time of the elevated concentration, the difference between upwind and downwind 15-minute TWA was 0.149ug/m3. Onsite activities were not being conducted at this time; subsequent dust readings were below threshold values.
10/31/2013	0.105	On 10/31/2013, the maximum downwind 15-min average was greater than 0.100 mg/m^3. The difference between the downwind and corresponding upwind maximum 15-minute average was 0.017 mg/m^3, which is below the action level limit of 0.100 mg/m^3.
11/16/2013	0.106	On 11/16/2013, one 15-minute average above 0.100 mg/m3 was observed at 11:53AM. At the time of the elevated concentration, the difference between upwind and downwind 15-minute average was 0.028ug/m3, which is below the action level limit of 0.100 mg/m^3.

FIGURES

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY ALDRICH

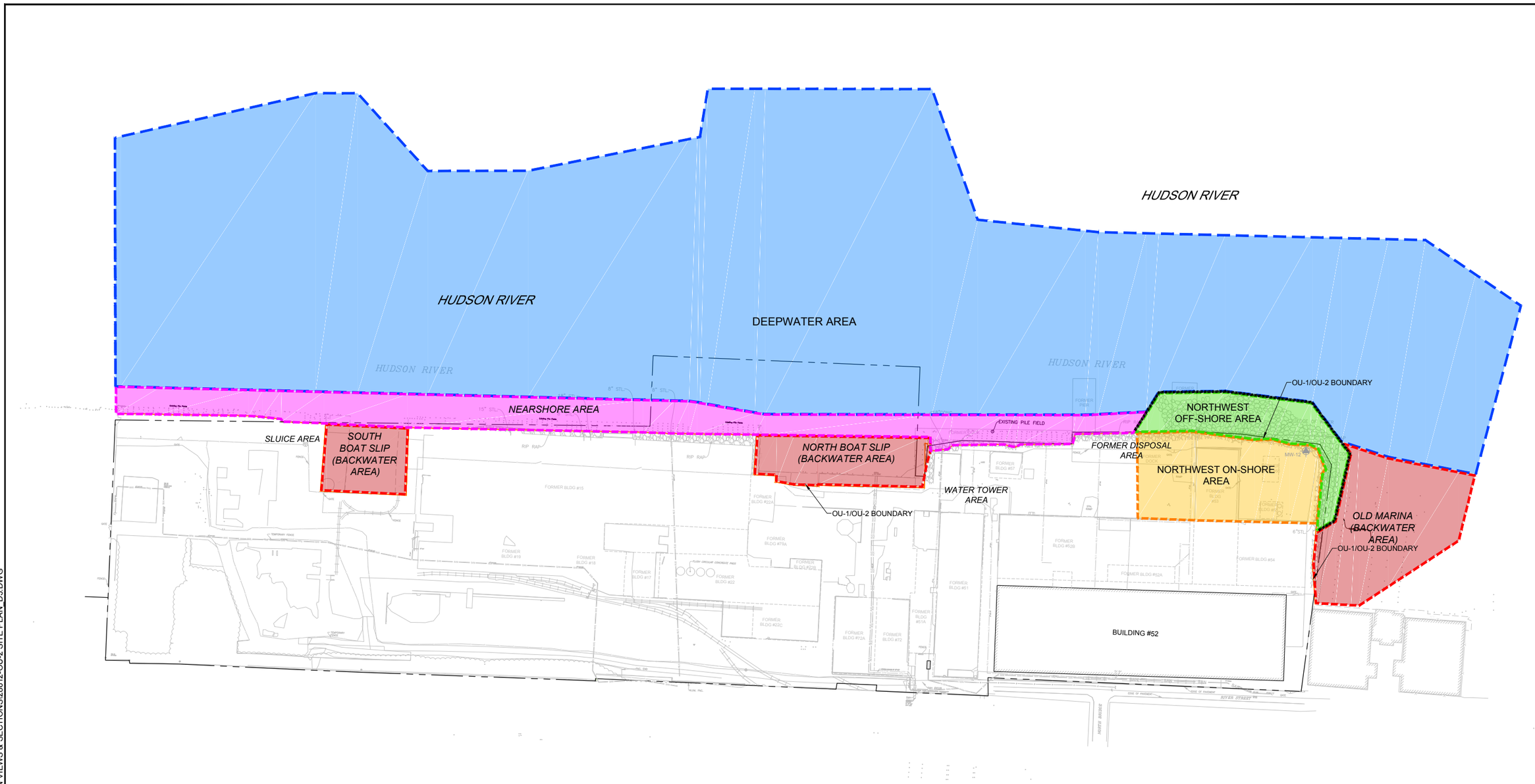
OU-1 REMEDIATION
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

SCALE: 1:24000
AUGUST 2015

FIGURE 1

G:\PROJECTS\28612 HASTINGS\H&S MASTER\HASPS\258_BUILDING 52 ASBESTOS\FIGURES\28612-LOCUS.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- EXISITNG STORM SEWER
- EXISITNG SANITARY SEWER
- RIP-RAP
- MW-12 MONITORING WELL
- DEEPWATER AREA
- NEARSHORE AREA
- NORTHWEST OFF-SHORE AREA
- NORTHWEST ON-SHORE AREA
- BACKWATER AREA

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
3. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
4. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
5. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
6. THE OU-2/OU-1 BOUNDARY IS LOCATED AT THE MHW.

N

0 100 200 300 400

SCALE IN FEET

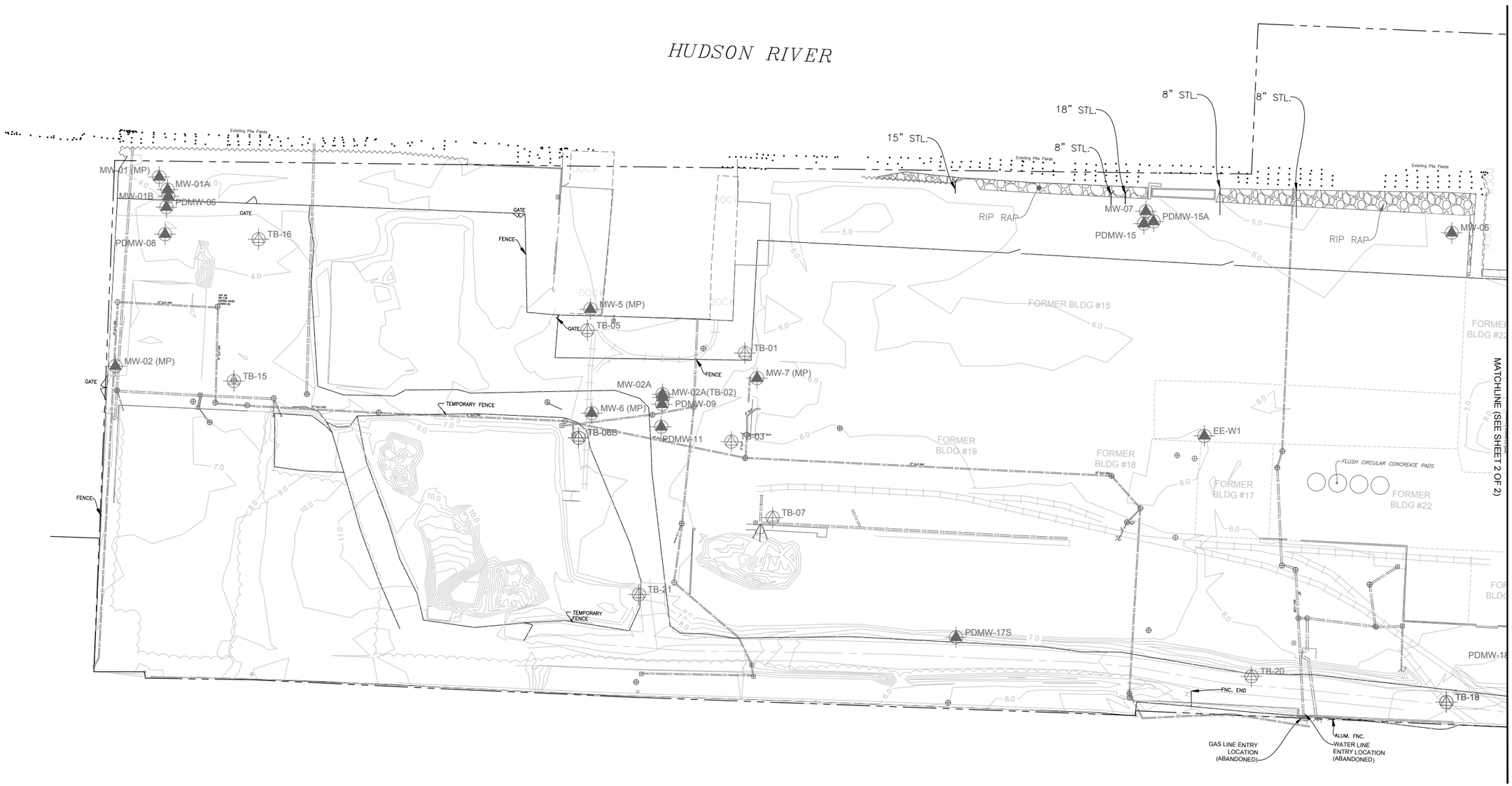
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE FEATURES

SCALE: AS SHOWN
AUGUST 2015

FIGURE 2



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- 11.0 EXISITNG GROUND SURFACE
- RIP-RAP
- MONITORING WELL
- PIEZOMETER
- EXISITNG STORM SEWER OUTFALLS
- EXISITNG SANITARY SEWER FORCE MAIN

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200
SCALE IN FEET

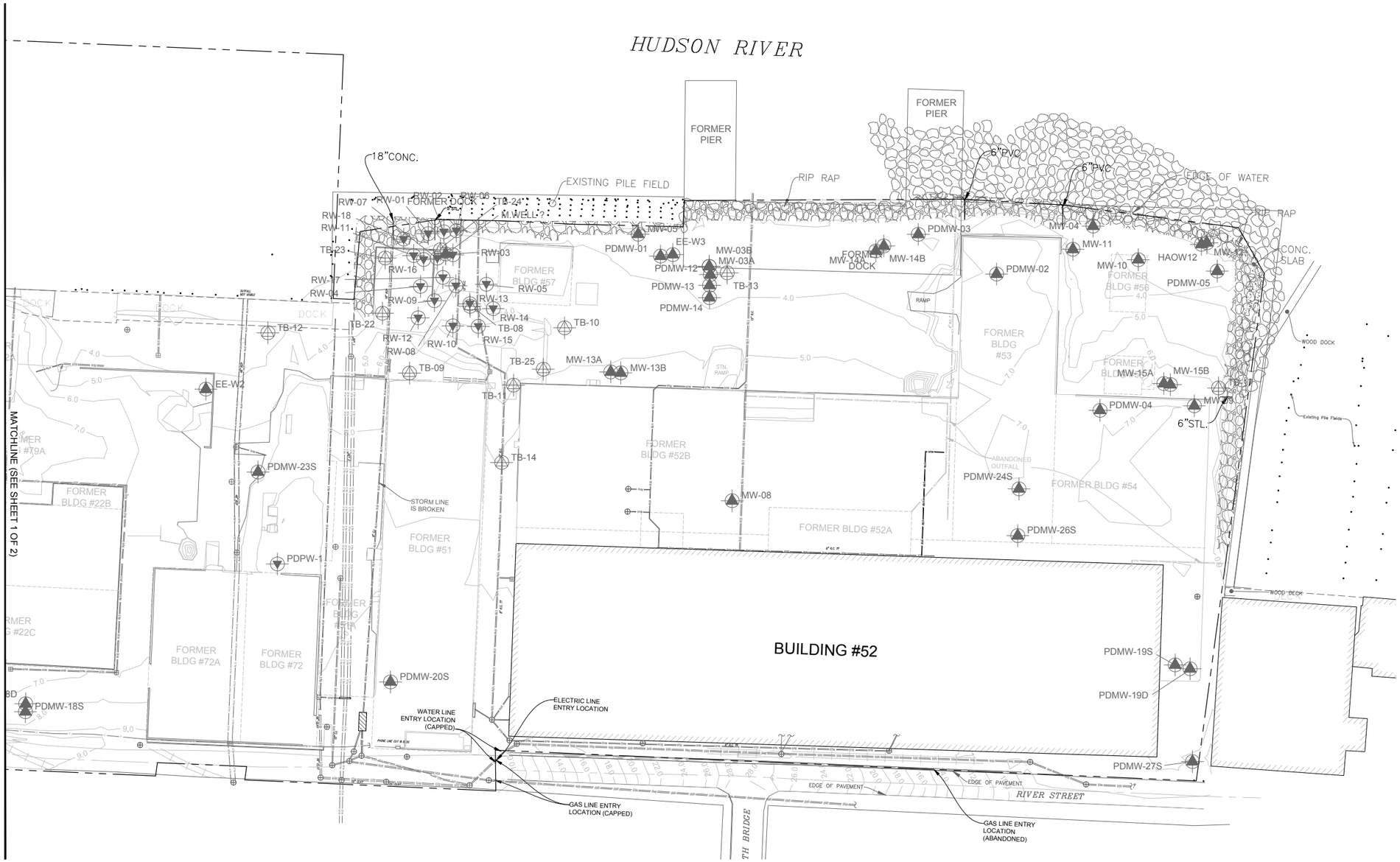
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE SURVEY PLAN (SHEET 1 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.1A



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- EXISITNG GROUND SURFACE
- RIP-RAP
- MONITORING WELL
- PIEZOMETER
- RECOVERY WELL
- EXISITNG STORM SEWER OUTFALLS
- EXISITNG SANITARY SEWER FORCE MAIN

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200

SCALE IN FEET

HALEY ALDRICH

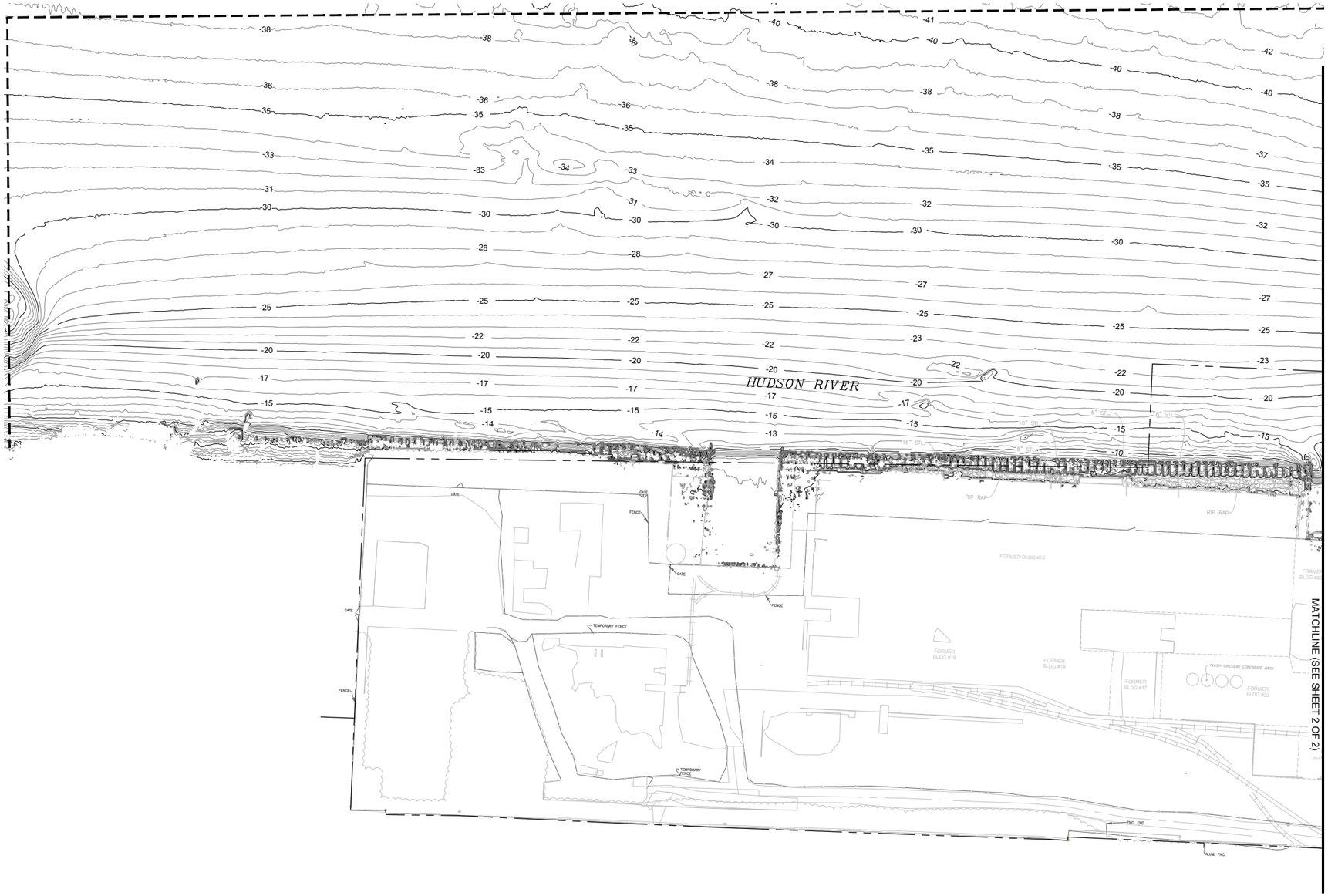
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE SURVEY PLAN (SHEET 2 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.1A

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:12 PM Layout: FIG 3.1A (2)
\\DTRCOMMON\28612_HASTINGS\293\CAD\28612-293-007 SITE SURVEY.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- 11.0 BATHYMETRIC CONTOUR
- EXTENT OF HYDROGRAPHIC SURVEY

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 80 160 240 320

SCALE IN FEET

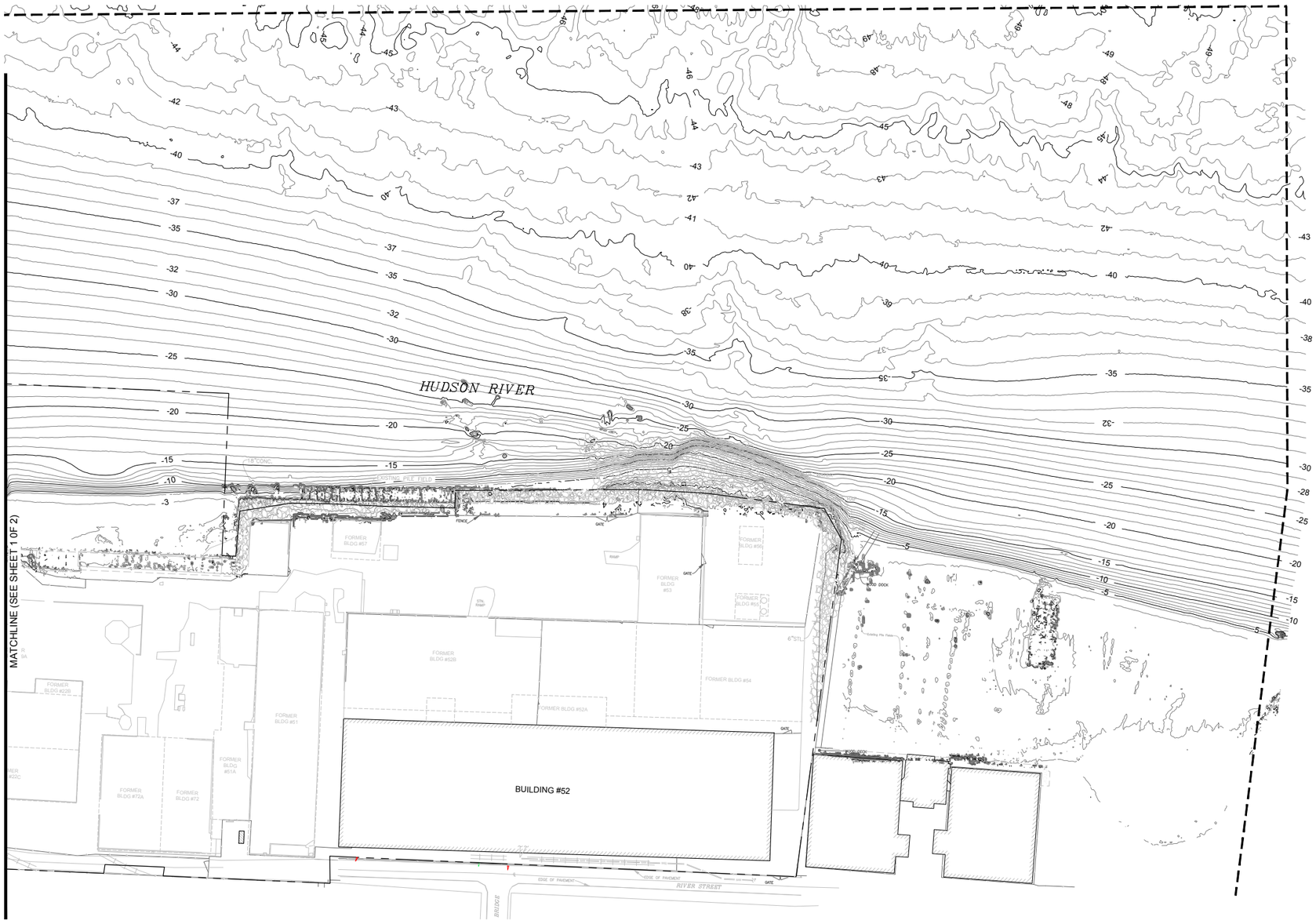
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BATHYMETRIC CONTOUR PLAN (SHEET 1 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.1B



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- 11.0 BATHYMETRIC CONTOUR
- EXTENT OF HYDROGRAPHIC SURVEY

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 80 160 240 320

SCALE IN FEET

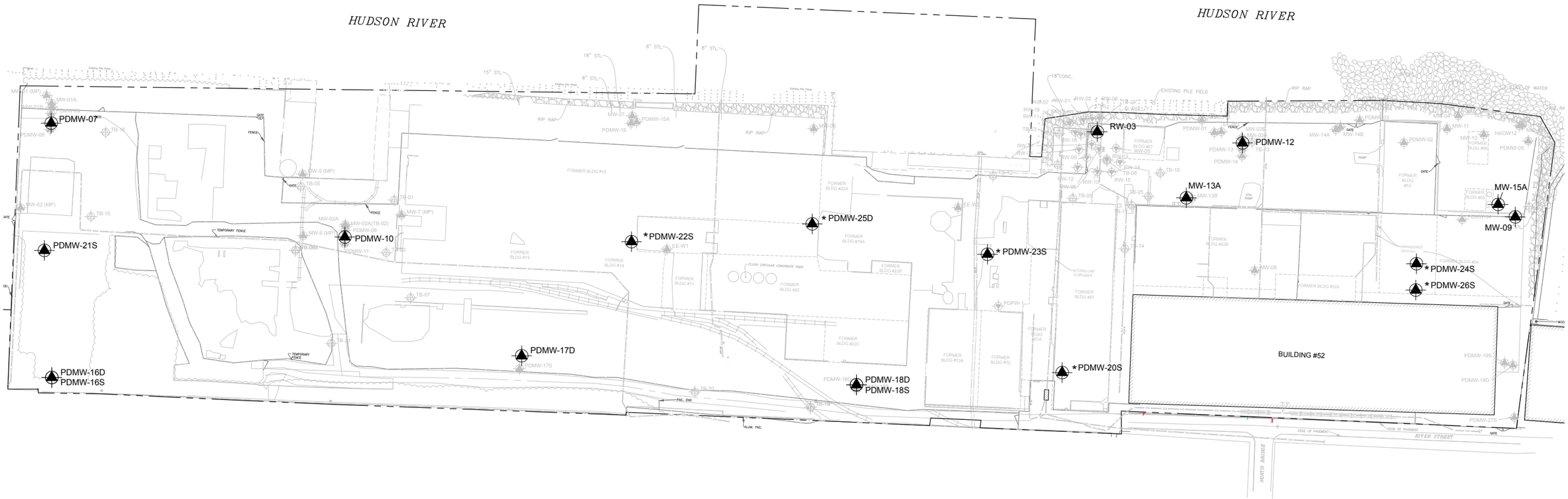
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BATHYMETRIC CONTOUR PLAN (SHEET 2 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.1B



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- EXISITNG STORM SEWER OUTFALLS
- EXISITNG SANITARY SEWER FORCE MAIN
- MONITORING WELL
- PIEZOMETER
- RECOVERY WELL
- EXISITNG MONITORING WELL (PART OF DATA LOGGER INSTALLATION PLAN)
- NEWLY INSTALLED MONITORING WELL (PART OF DATA LOGGER INSTALLATION PLAN)

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

0 80 160 240 320
SCALE IN FEET

HALEY ALDRICH

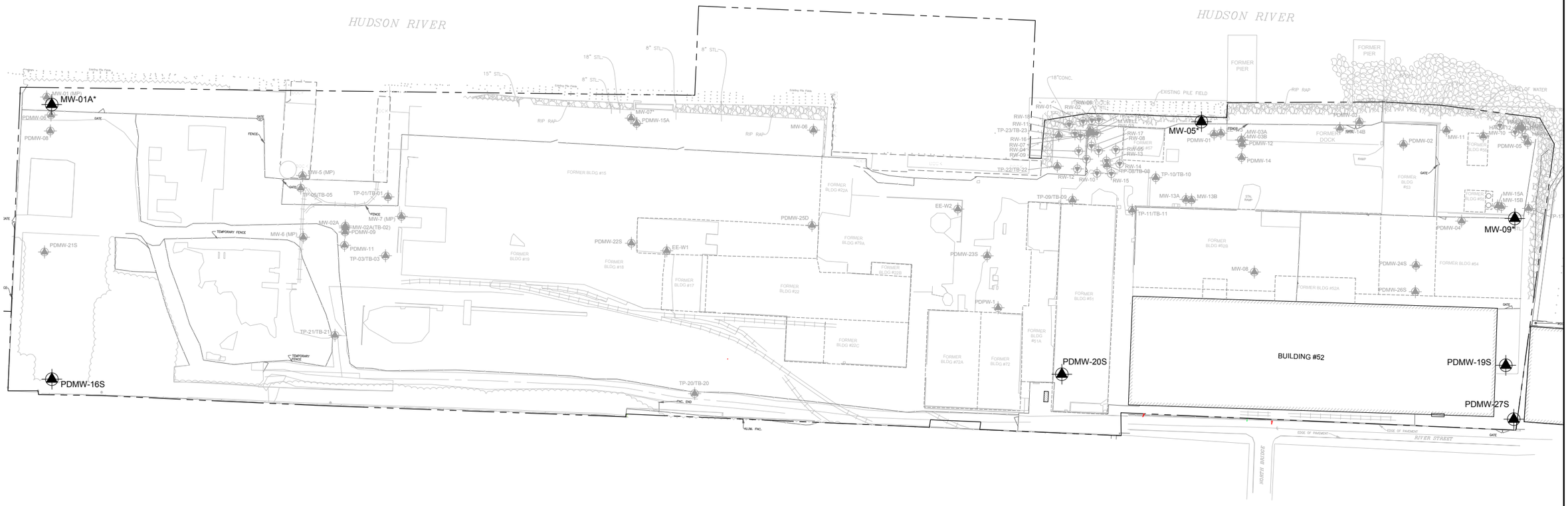
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

DATA LOGGER INSTALLATION PLAN

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2A

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:20 PM Layout: FIG 3.2A
\\DTRCOMMON\286\12_HASTINGS\293\CAD\28612-293-008 BATH CONT DATALOGGER.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP-RAP
- PDI SAMPLING WELL LOCATION
- EXISTING MONITORING WELL
- RECOVERY WELL

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200

SCALE IN FEET

HALEY ALDRICH

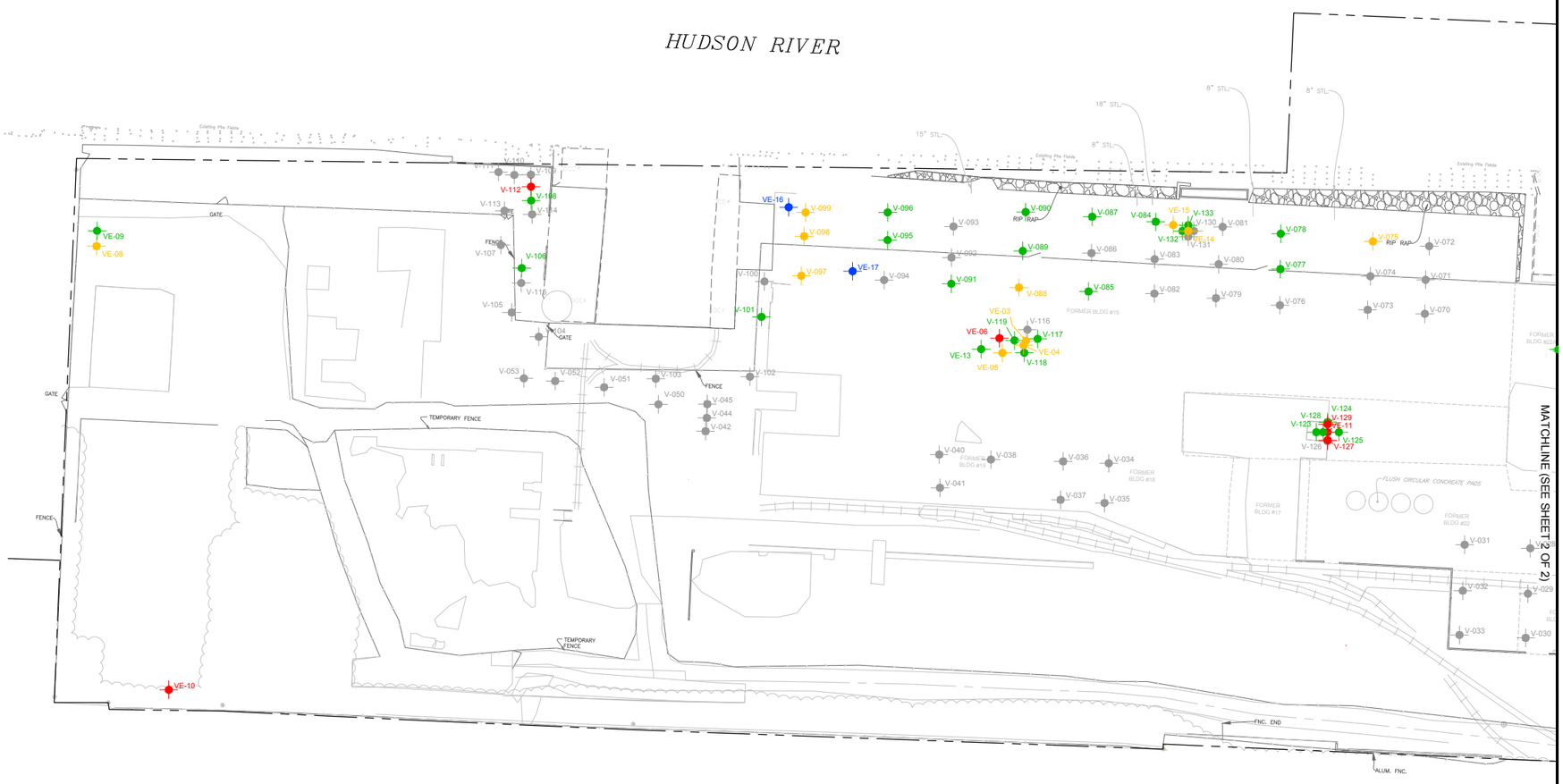
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

GROUNDWATER SAMPLING PLAN

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2B

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:15 PM Layout: FIG 3.2B
\\DTR\COMMON\28612_HASTINGS\293\CAD\28612-293-0010 2006 OU1 SAMPLING.DWG



LEGEND:

- V-073 — VOID INVESTIGATION BORING (0-1" DEPTH)
- V-089 — VOID INVESTIGATION BORING (2-6" DEPTH)
- V-075 — VOID INVESTIGATION BORING (7-12" DEPTH)
- V-031 — VOID INVESTIGATION BORING (13□ DEPTH)
- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP RAP

NOTES:

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

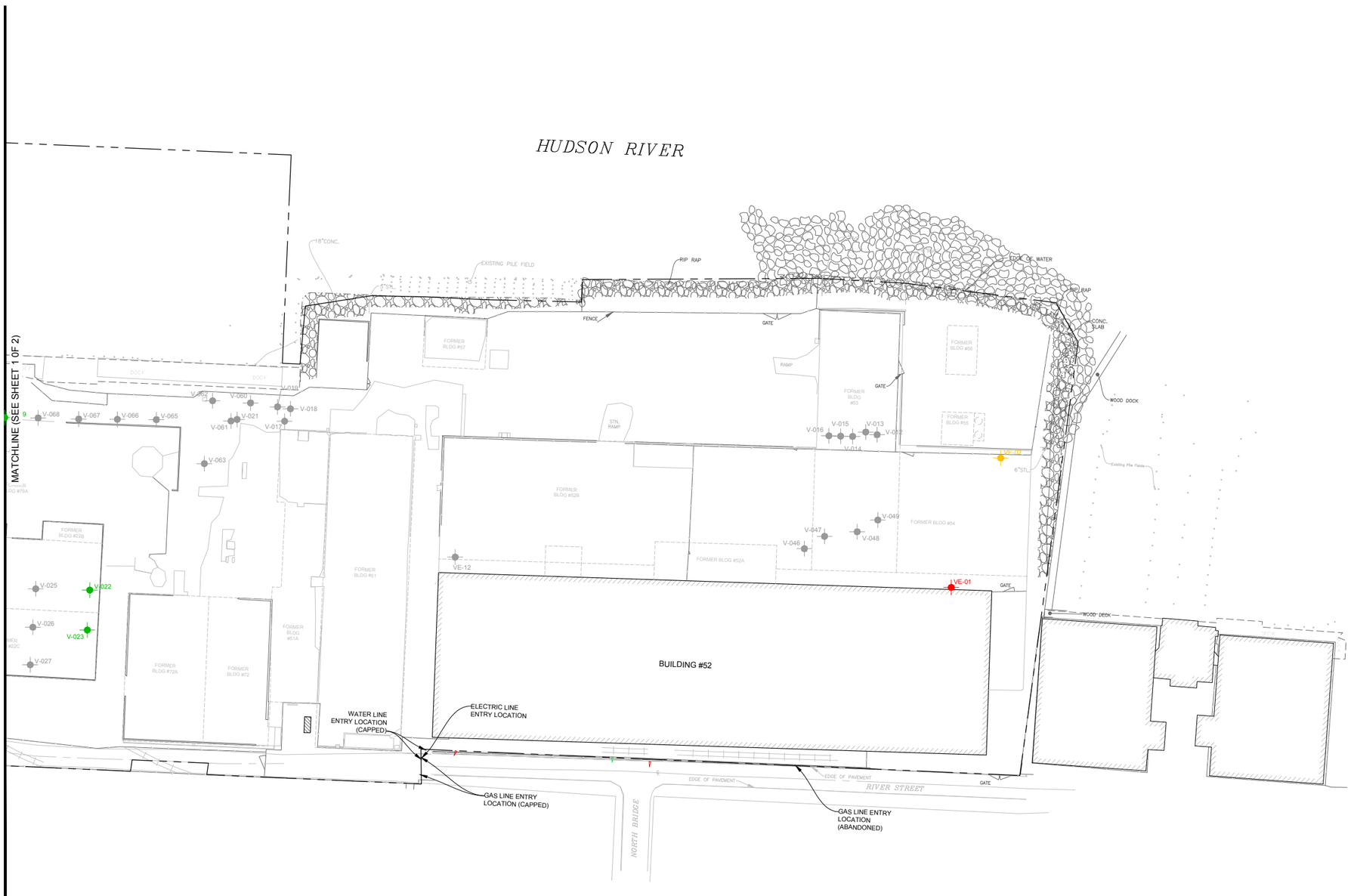
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

VOID PROBE LOCATIONS (SHEET 1 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2C



LEGEND:

- V-073 — VOID INVESTIGATION BORING (0-1" DEPTH)
- V-089 — VOID INVESTIGATION BORING (2-6" DEPTH)
- V-075 — VOID INVESTIGATION BORING (7-12" DEPTH)
- V-031 — VOID INVESTIGATION BORING (13□ DEPTH)
- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP RAP

NOTES:

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 60 120 180 240

SCALE IN FEET

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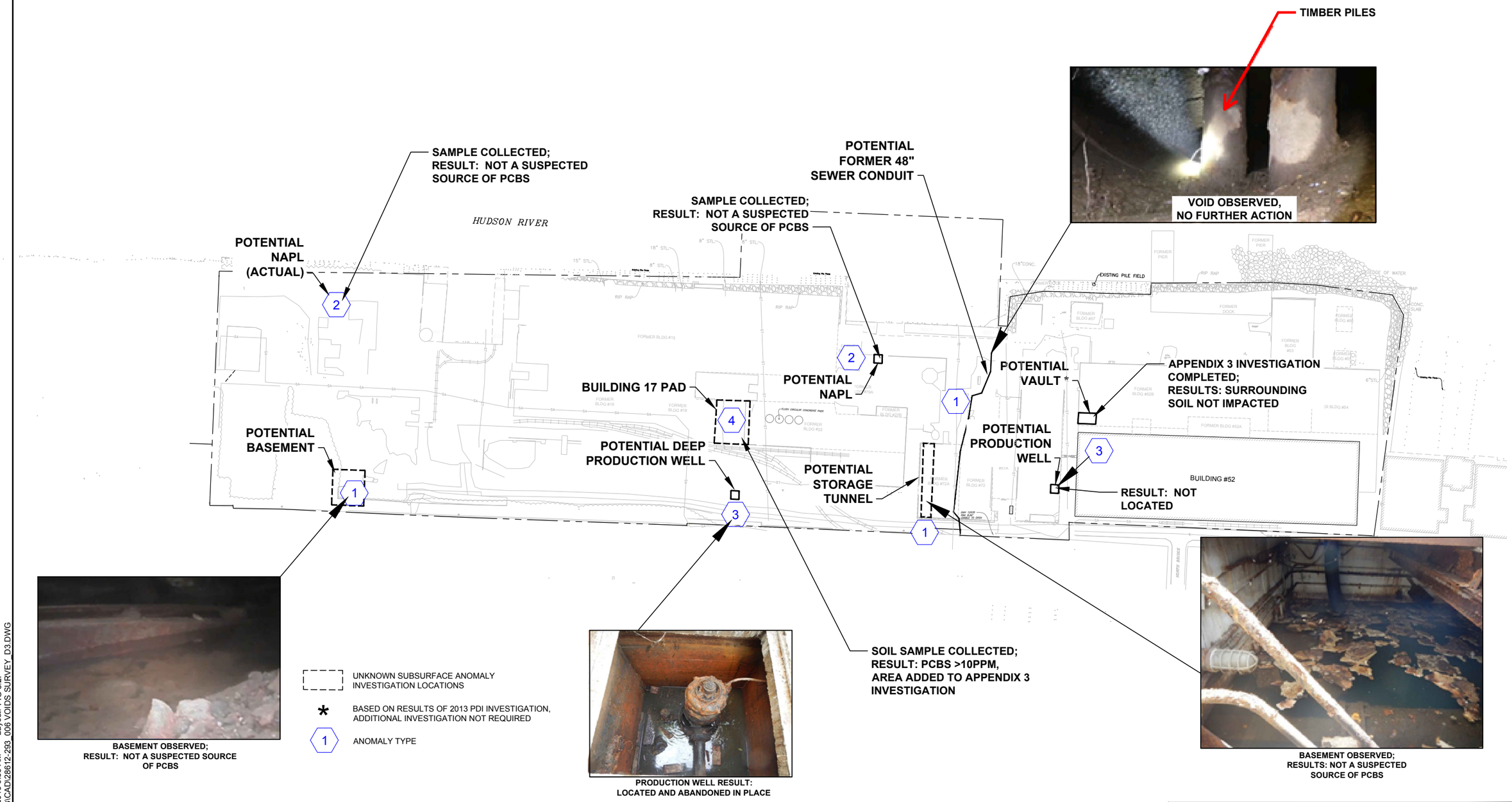
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

VOID PROBE LOCATIONS (SHEET 2 OF 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2C

POSTOLOWSKI, KEVIN Printed: 8/3/2015 1:38 PM Layout: FIG 3.2 (2)
\\DTRCOMMON\28612_HASTINGS\293\CAD\28612-293-009 VOIDS LOCATIONS.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- EXISTING FENCE
- EXISITNG STORM SEWER
- EXISITNG SANITARY SEWER
- RIP-RAP

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
3. ALL PERMANENT FENCE POSTS WERE INSTALLED TO 2 FEET BGS USING HYDRAULIC HAMMER.

W S N E

0 100 200 300 400

SCALE IN FEET

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SUBSURFACE ANOMALY INVESTIGATION

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2D

LEGEND

- LNAPL OBSERVATION
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

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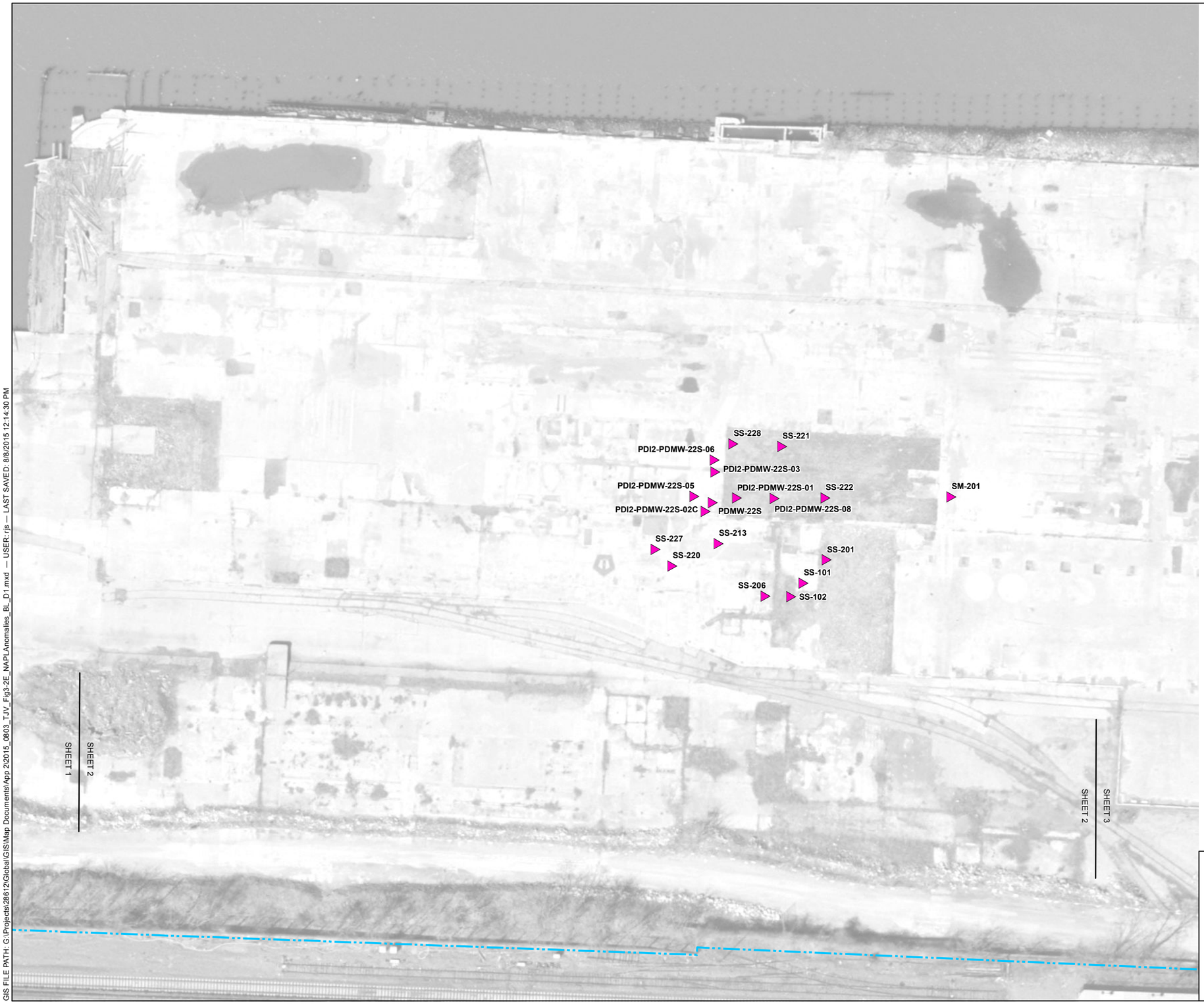
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SUBSURFACE ANOMALIES - LNAPL OBSERVATIONS

AUGUST 2015

FIGURE 3.2E
SHEET 1 OF 4



LEGEND

- LNAPL OBSERVATION
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SUBSURFACE ANOMALIES - LNAPL OBSERVATIONS

AUGUST 2015

FIGURE 3.2E
SHEET 2 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\App 2\2015_0803_TJV_Fig3-2E_NAPLAnomalies_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:14:30 PM

LEGEND

- LNAPL OBSERVATION
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

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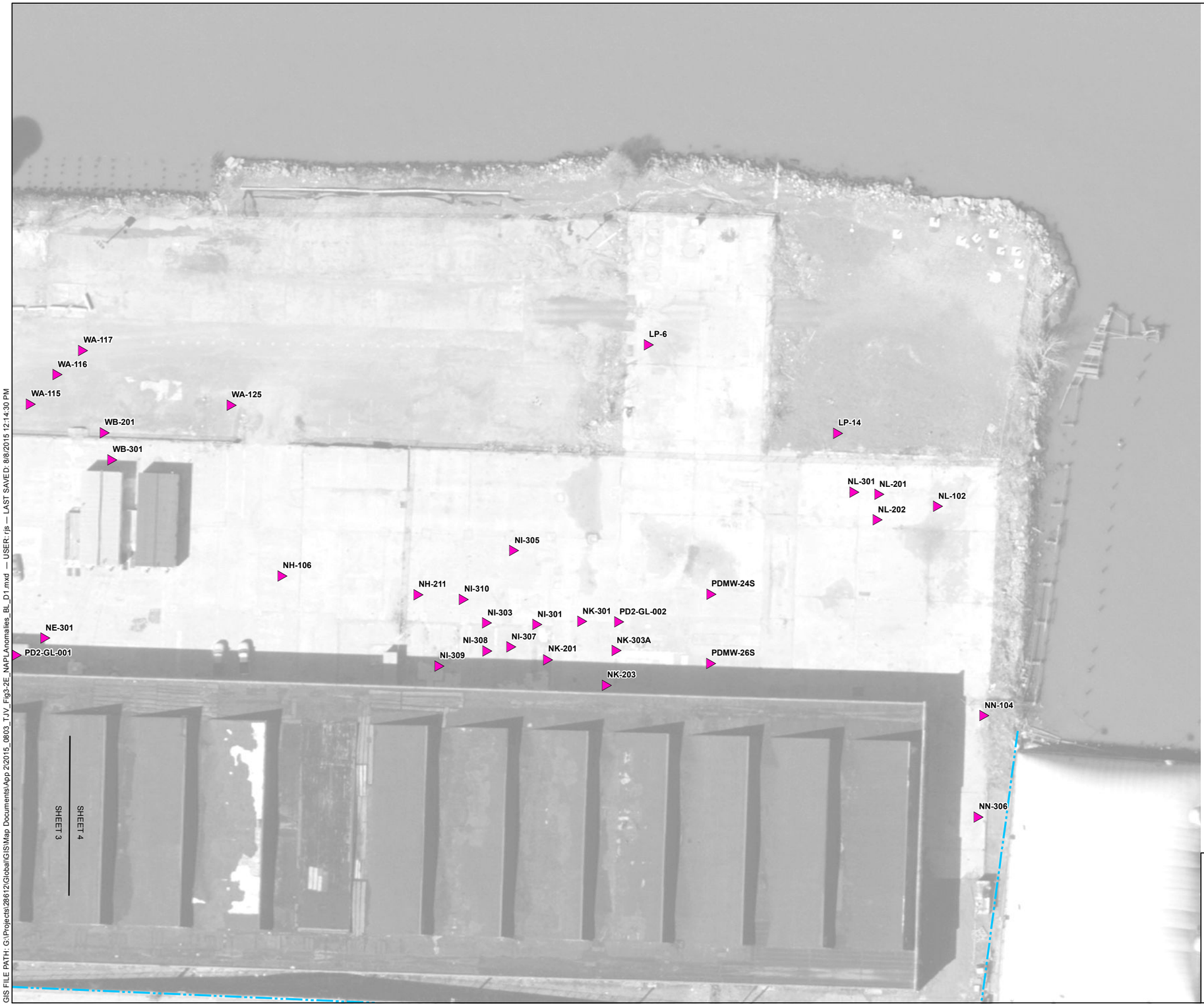
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SUBSURFACE ANOMALIES - LNAPL OBSERVATIONS

AUGUST 2015

FIGURE 3.2E
SHEET 3 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\App 2\2015_0803_TJV_Fig3-2E_NAPLAnomalies_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:14:30 PM



LEGEND

- LNAPL OBSERVATION
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

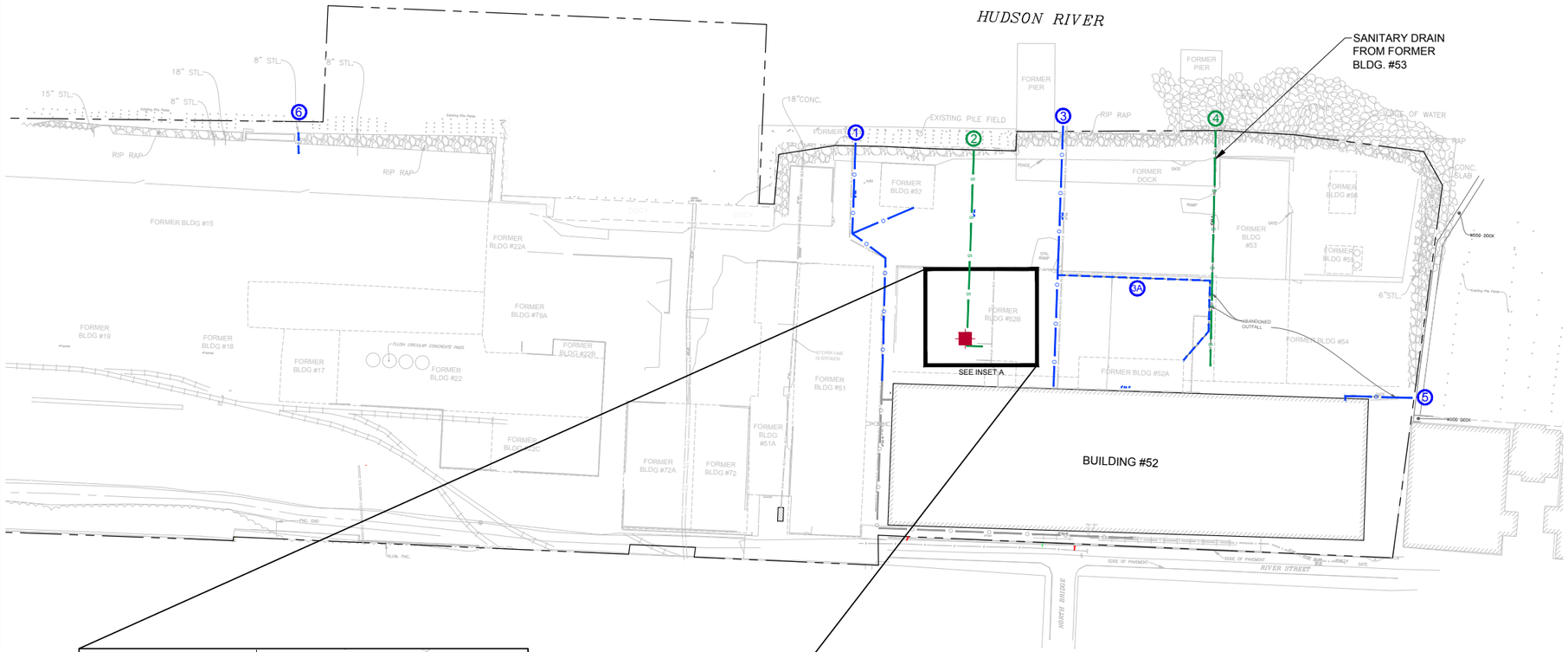
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

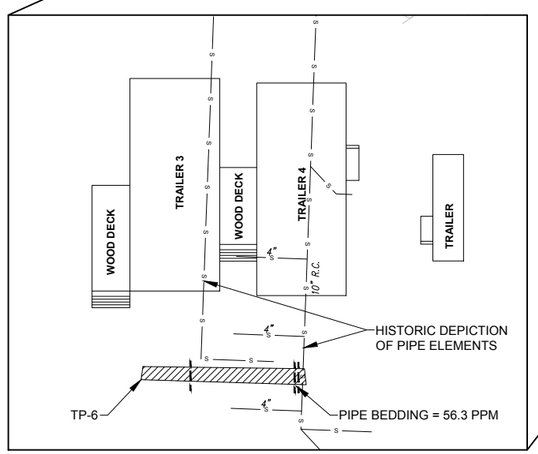
SUBSURFACE ANOMALIES - LNAPL OBSERVATIONS

AUGUST 2015

FIGURE 3.2E
SHEET 4 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\App 2\2015_0803_TJV_Fig3-2E_NAPLAnomalies_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:14:30 PM





INSET A
1" = 20'

LEGEND:

- TEST PIT (NUMBER AND LOCATION OF TEST PITS ARE SUBJECT TO CHANGE BASED ON SITE CONDITION.)
- POTENTIAL SOURCES OF CONTAMINATION FROM PROCESSES IN BUILDING 52/BUILDING 15
- HISTORIC NON-PROCESS SEWER OUTFALL
- ALTERNATE ALIGNMENT
- PROPERTY LINE
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RIP RAP

BUILDING 52 OUTFALLS:

1. DELINEATION OF EXCAVATION EXTENTS AS RESULT OF APPENDIX 3 CONCLUDED ENTIRE OUTFALL ALIGNMENT WILL BE REMOVED. RDWP DID NOT REQUIRE INVESTIGATION OF THIS OUTFALL.
2. TEST PIT COMPLETED. HISTORICAL DOCUMENT REVIEW INDICATES THIS IS NOT A BUILDING 52 OUTFALL.
3. 3A DELINEATION OF EXCAVATION EXTENTS AS RESULT OF APPENDIX 3 CONCLUDED A SIGNIFICANT PORTION OF THE OUTFALL ALIGNMENT WILL BE REMOVED. THE SUFFICIENCY OF DATA TO CHARACTERIZE THE PIPE WILL BE EVALUATED DURING THE REMEDIAL DESIGN.
4. INVESTIGATION NOT REQUIRED. HISTORICAL DOCUMENT REVIEW INDICATES A POTENTIAL ALTERNATE ALIGNMENT (AS COMPARED TO THE RDWP). THE SUFFICIENCY OF DATA TO CHARACTERIZE THE PIPE WILL BE EVALUATED DURING THE REMEDIAL DESIGN.
5. DELINEATION OF EXCAVATION EXTENTS AS RESULT OF APPENDIX 3 CONCLUDED ENTIRE OUTFALL ALIGNMENT WILL BE REMOVED. RDWP DID NOT REQUIRE INVESTIGATION OF THIS OUTFALL.

BUILDING15 OUTFALL:

6. RDWP DID NOT REQUIRE INVESTIGATION OF THIS OUTFALL. WILL BE ADDRESSED IN THE REMEDIAL DESIGN.

N

0 80 160 240 320
SCALE IN FEET

NOTES:

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
3. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
4. BORING LOCATIONS ON SHORE SURVEYED BY BOSWELL ENGINEERING IN SEPTEMBER 2007 & APRIL 2008.
5. EXISTING DATA BASED ON 2008 MODIFIED SITE CONCEPTUAL MODEL.

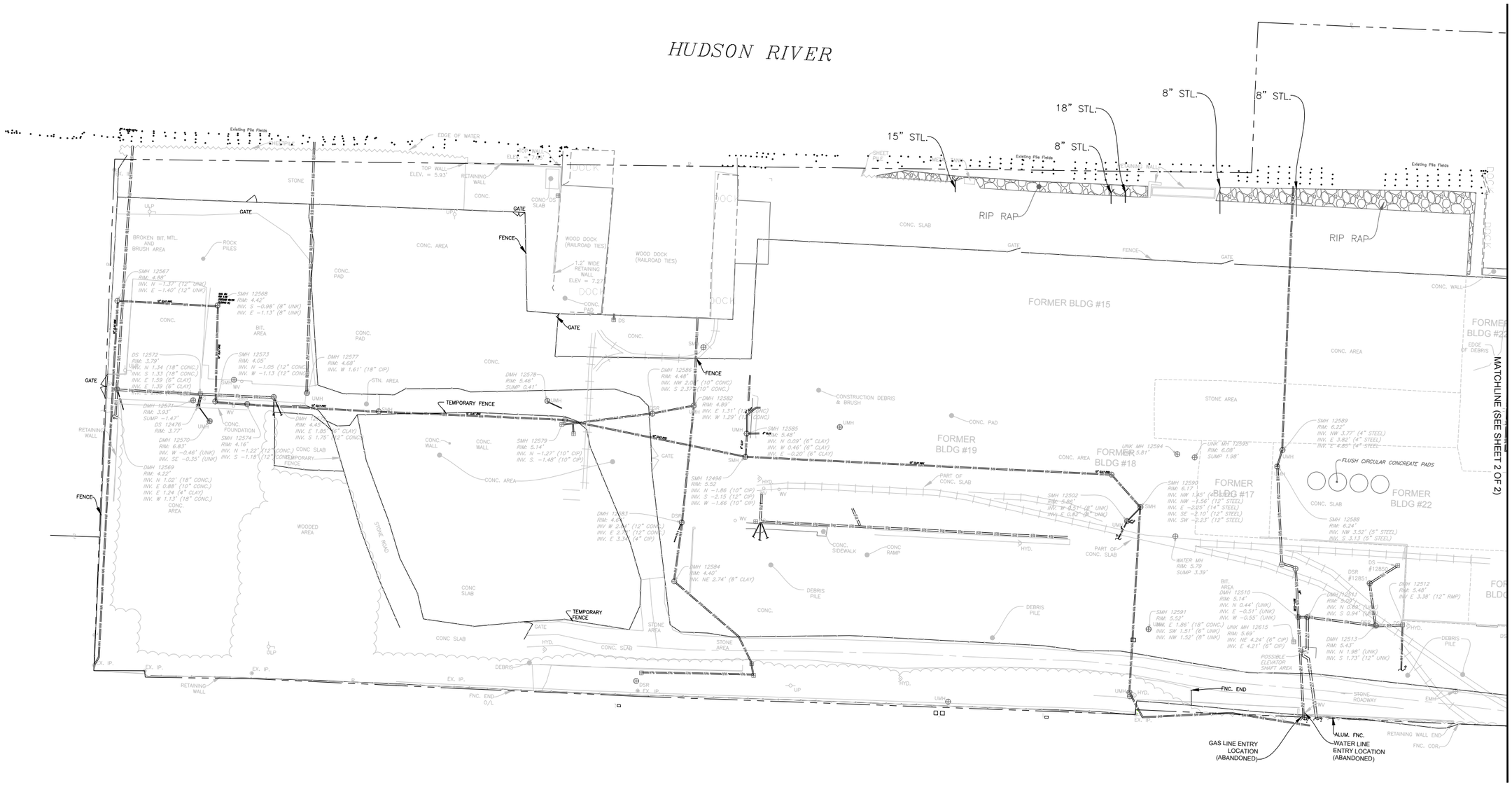
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OUTFALL INVESTIGATIONS

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2F



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP-RAP
- EXISITNG STORM SEWER OUTFALLS
- EXISITNG SANITARY SEWER FORCE MAIN

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200
SCALE IN FEET

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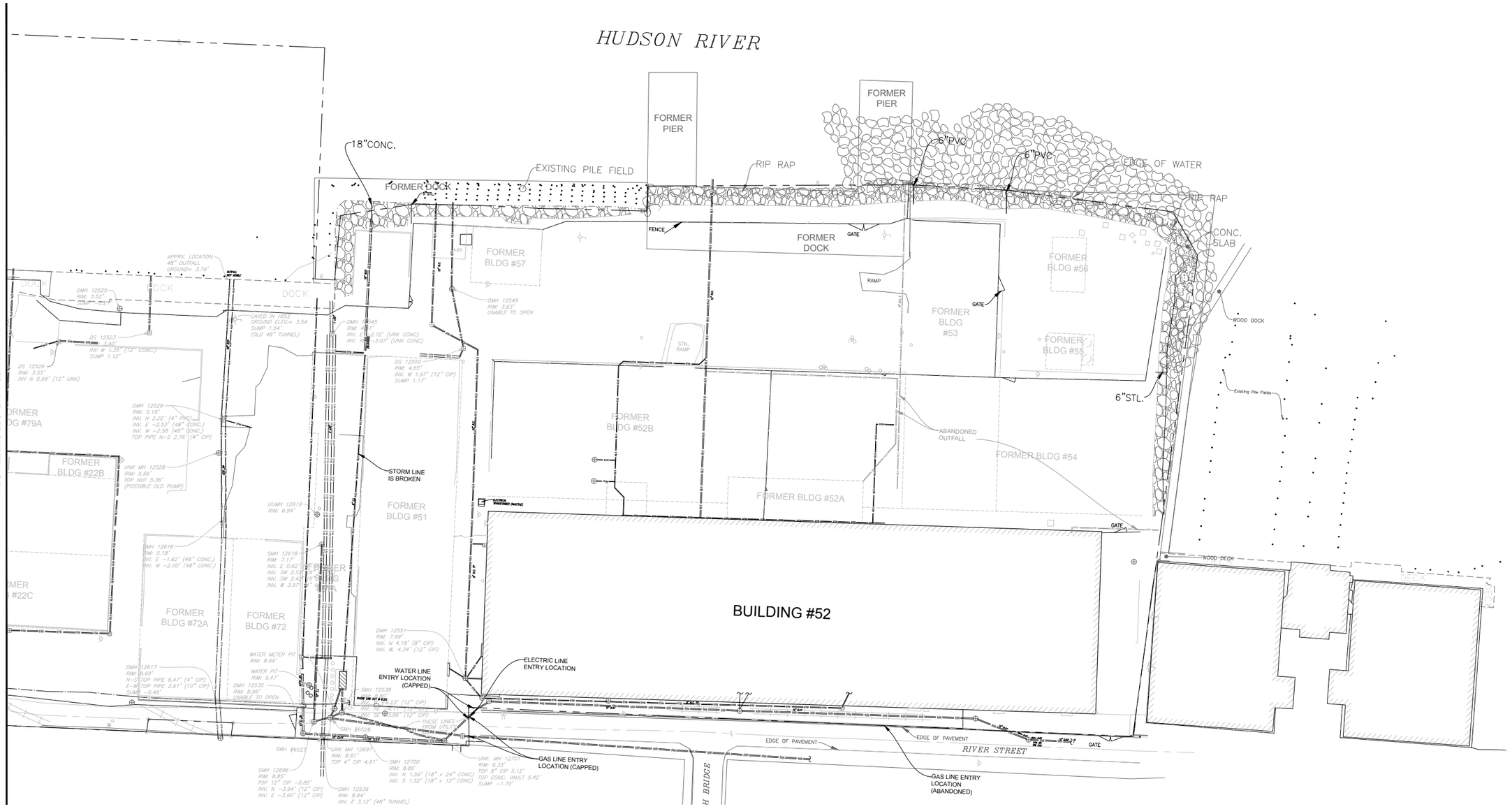
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE UTILITIES PLAN (SHEET 1 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2G

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:05 PM Layout: FIG 3.2H
\\DTRICOMMON\28612_HASTINGS\293\CAD\28612-293-0011 UTILITY MAP 2015.DWG



MATCHLINE (SEE SHEET 1 OF 2)

LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP-RAP
- EXISITNG STORM SEWER OUTFALLS
- EXISITNG SANITARY SEWER FORCE MAIN

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200
SCALE IN FEET

HALEY ALDRICH

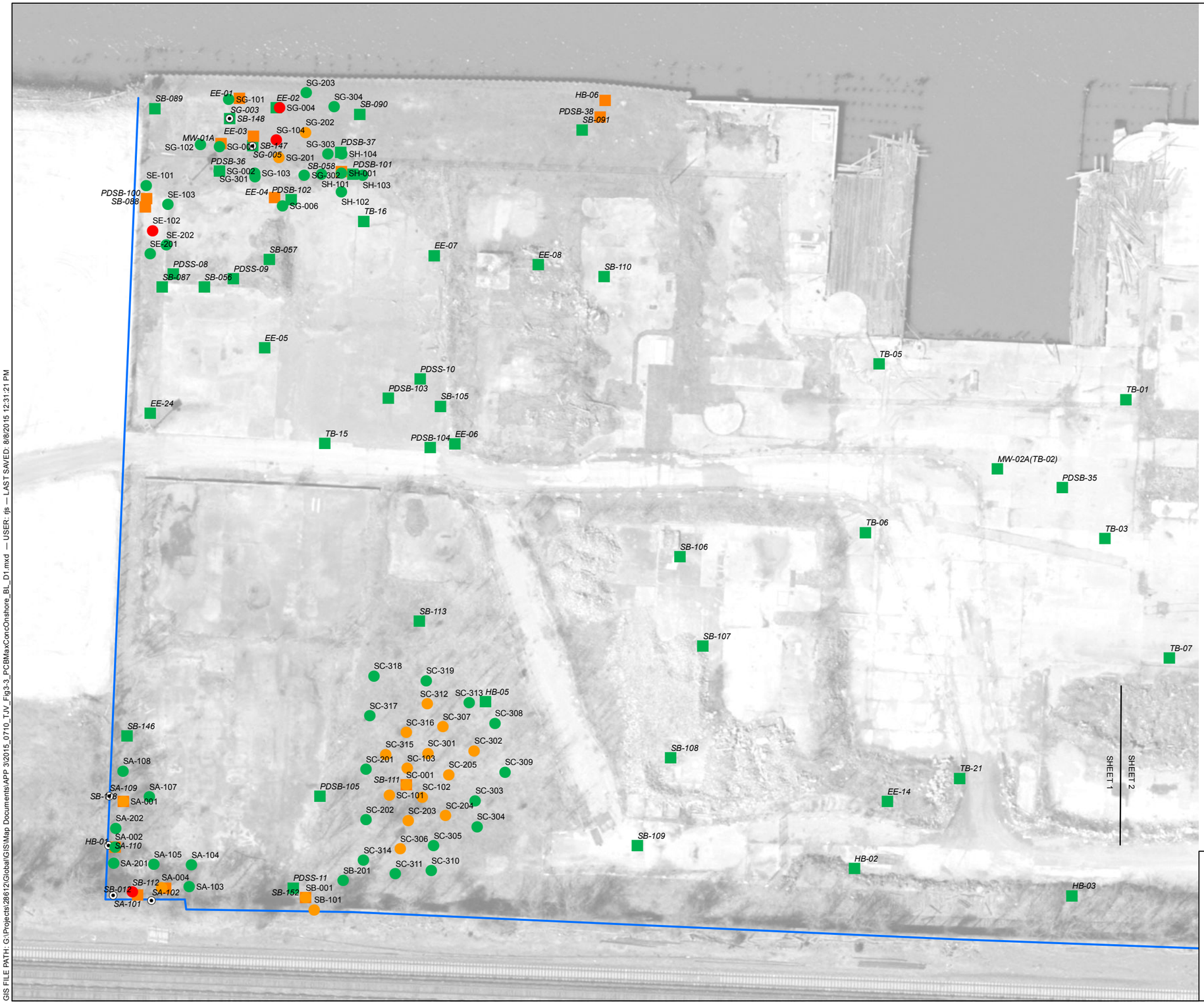
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE UTILITIES PLAN (SHEET 2 of 2)

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.2G

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:07 PM Layout: FIG 3.2H (2)
\\DTRICOMMON\28612_HASTINGS\293\CAD\28612-293-0011 UTILITY MAP 2015.DWG



LEGEND

PDI SAMPLES (MAX 0-12 FT)	*HISTORIC SAMPLES (MAX 0-12 FT)*
0-10 mg/kg	*0-10 mg/kg*
10-50 mg/kg	*> 10 mg/kg*
>50 mg/kg	
NO RESULT	

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

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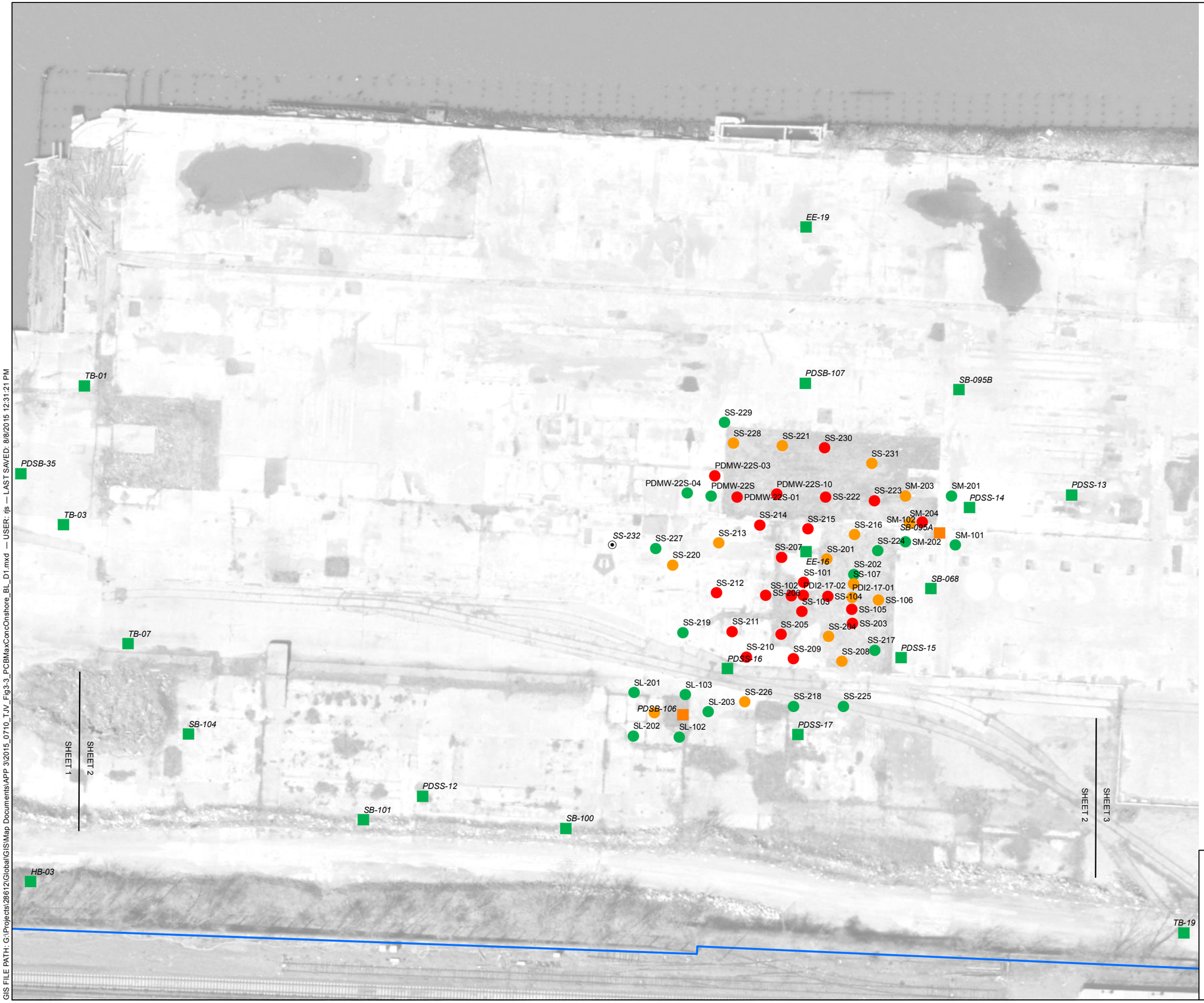
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - PDI PCB MAXIMUM RESULTS SURFACE TO 12 FOOT

AUGUST 2015

FIGURE 3.3A
SHEET 1 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0710_TJV_Fig3-3_PCBMaxConcOnshore_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:31:21 PM



GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\20150_0710_TJV_Fig3-3_PCBMaxConcOnshore_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:31:21 PM

LEGEND

PDI SAMPLES (MAX 0-12 FT)	*HISTORIC SAMPLES (MAX 0-12 FT)*
0-10 mg/kg	*0-10 mg/kg*
10-50 mg/kg	*> 10 mg/kg*
>50 mg/kg	
NO RESULT	

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - PDI PCB MAXIMUM RESULTS SURFACE TO 12 FOOT

AUGUST 2015

FIGURE 3.3A
SHEET 2 OF 4

LEGEND

PDI SAMPLES (MAX 0-12 FT)

- 0-10 mg/kg
- 10-50 mg/kg
- >50 mg/kg
- NO RESULT

HISTORIC SAMPLES (MAX 0-12 FT)

- *0-10 mg/kg*
- *> 10 mg/kg*

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

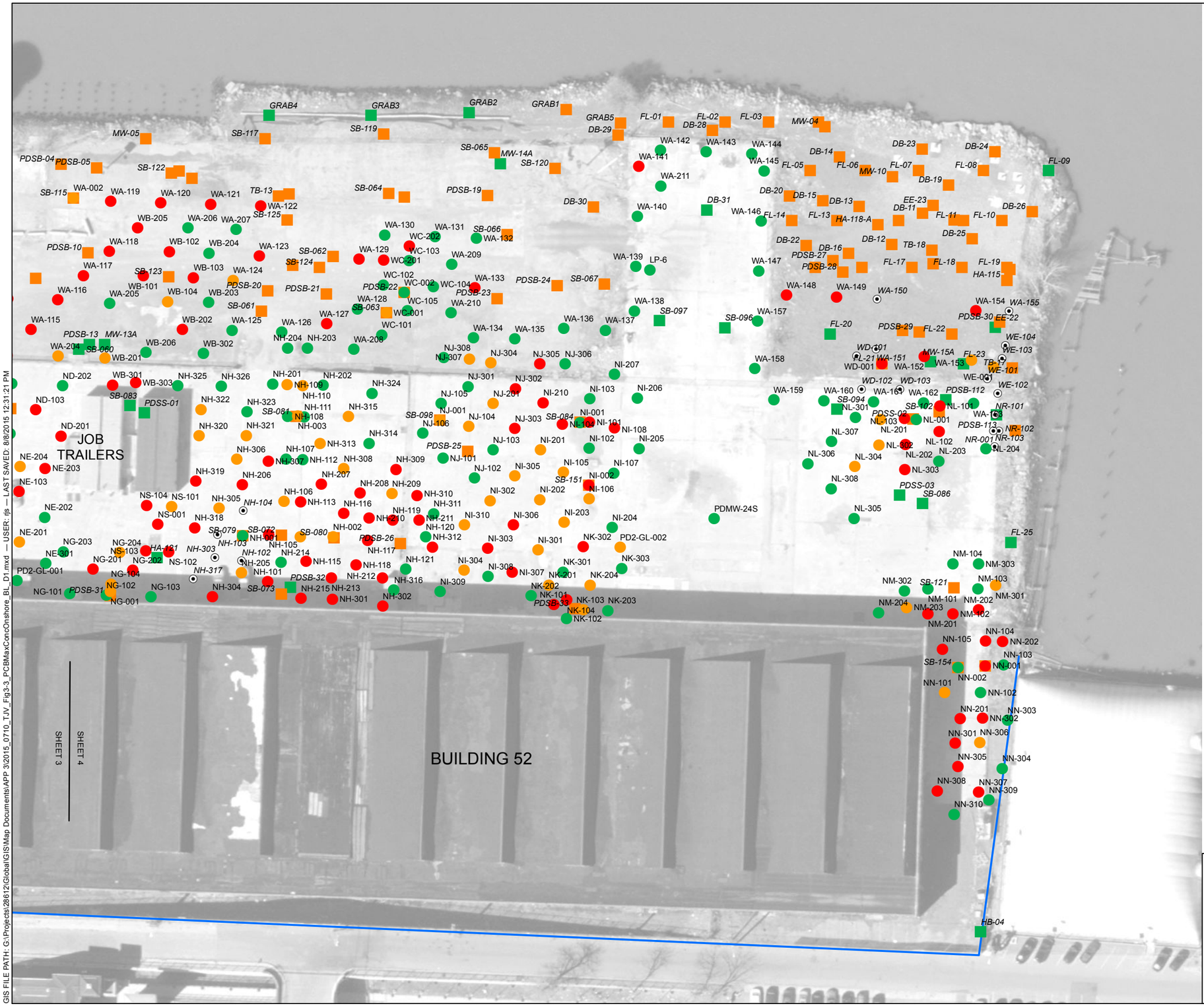
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - PDI PCB MAXIMUM RESULTS SURFACE TO 12 FOOT

AUGUST 2015

FIGURE 3.3A
SHEET 3 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0710_TJV_Fig3-3_PCBMaxConcOnshore_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:31:21 PM



LEGEND

PDI SAMPLES (MAX 0-12 FT)

- 0-10 mg/kg
- 10-50 mg/kg
- >50 mg/kg
- NO RESULT

HISTORIC SAMPLES (MAX 0-12 FT)

- *0-10 mg/kg*
- *> 10 mg/kg*

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

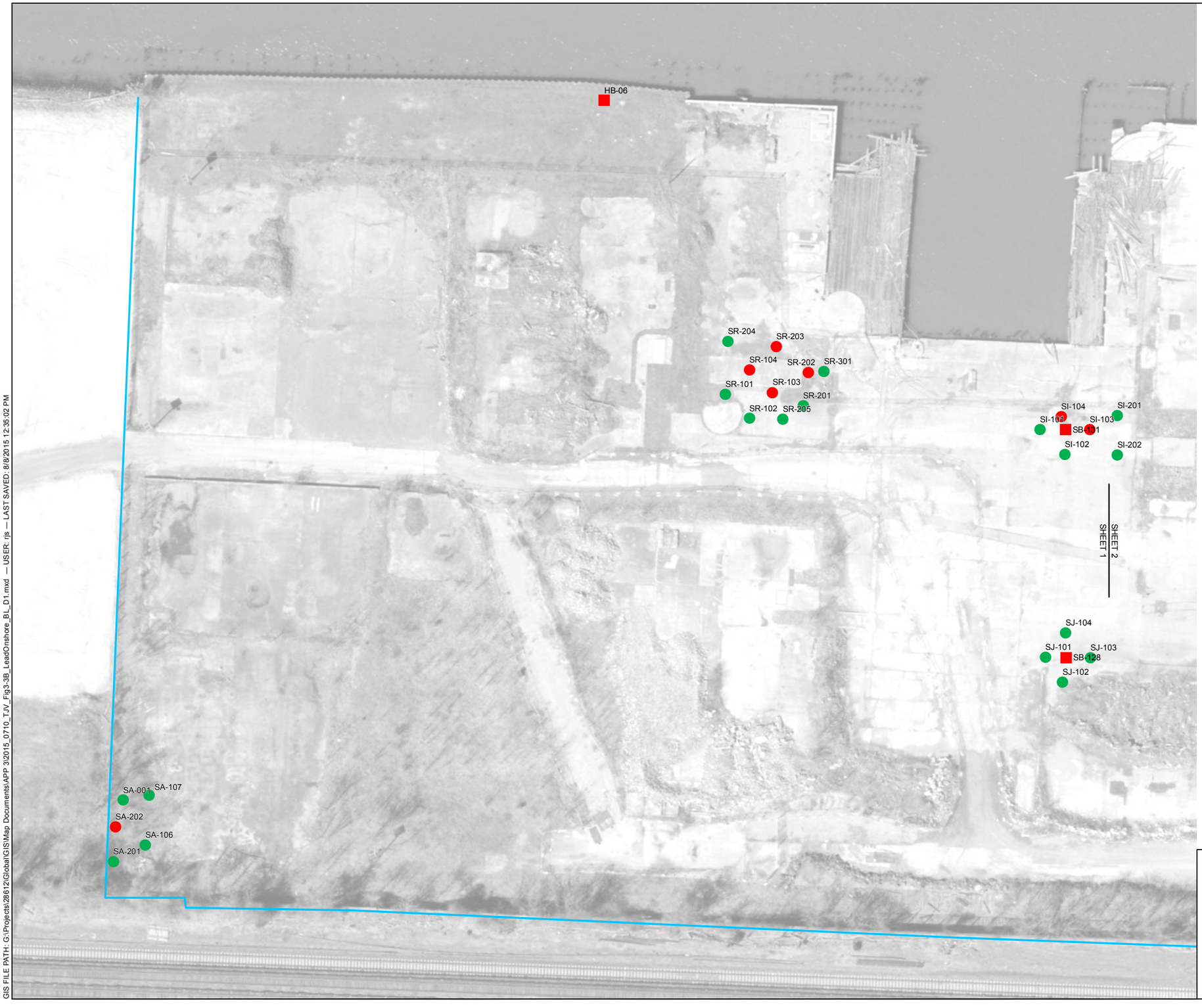
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - PDI PCB MAXIMUM RESULTS SURFACE TO 12 FOOT

FIGURE 3.3A
SHEET 4 OF 4

AUGUST 2015



LEGEND

PDI SAMPLES (0-2 FT)

- 0-1,000 mg/kg
- >1,000 mg/kg

HISTORIC SAMPLES (0-2 FT)

- *LEAD HOTSPOT*

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - PDI LEAD RESULTS

AUGUST 2015

FIGURE 3.3B
SHEET 1 OF 2

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0710_TJV_Fig3-3B_LeadOnshore_BL_D1.mxd — USER: rjs — LAST SAVED: 8/8/2015 12:35:02 PM

LEGEND

PDI SAMPLES (0-2 FT)

- 0-1,000 mg/kg
- >1,000 mg/kg

HISTORIC SAMPLES (0-2 FT)

- *LEAD HOTSPOT*

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

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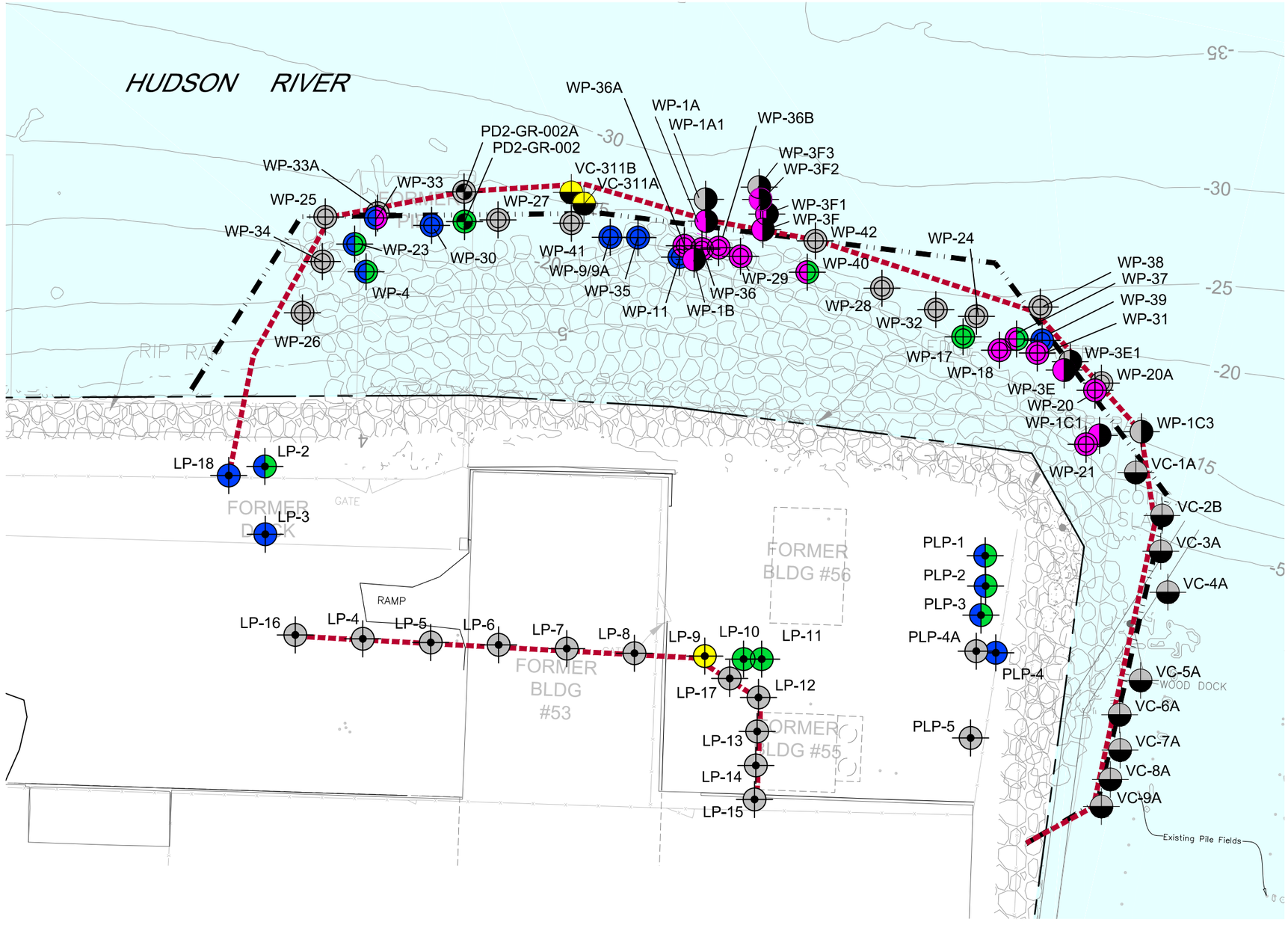
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - PDI LEAD RESULTS

AUGUST 2015

FIGURE 3.3B
SHEET 2 OF 2



LEGEND:

- PD2-GR-002 — DESIGNATION AND APPROXIMATE LOCATION OF GEOTECHNICAL TEST BORING DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2014.
- WP-1C3 — DESIGNATION AND APPROXIMATE LOCATION OF PCBM AND OBSTRUCTION PROBE DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2014.
- VC-1A — DESIGNATION AND APPROXIMATE LOCATION OF VIBRACORE EXPLORATIONS DRILLED IN THE RIVER OR OLD MARINA DURING PRE-DESIGN INVESTIGATION IN 2014.
- PLP-1 — DESIGNATION AND APPROXIMATE LOCATION OF PCBM AND OBSTRUCTION PROBE DRILLED ON LAND DURING PRE-DESIGN INVESTIGATION IN 2013.
- WP-32 — DESIGNATION AND APPROXIMATE LOCATION OF PCBM AND OBSTRUCTION PROBE DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2013.
- APPROXIMATE ALIGNMENT OF BULKHEAD WALL FROM RFS
- POTENTIAL ALIGNMENT OF BULKHEAD WALL AND DEADMAN ANCHOR BASED ON PCBM AND OBSTRUCTION DATA GATHERED FROM PDI EXPLORATIONS THROUGH 2014. ALIGNMENT IS APPROXIMATE AND SUBJECT TO CHANGE

KEY

- INDICATES PROBE COMPLETED, NO PCBM OBSERVED
- INDICATES, SEMI-SOLID PCBM OBSERVED AT DEPTH (NON-EXCAVATABLE)
- INDICATES TRACE PCBM OBSERVED
- INDICATES PROBE COMPLETED, SEMI-SOLID PCBM OBSERVED SHALLOW (EXCAVATABLE)
- INDICATES OBSTRUCTIONS ENCOUNTERED

W S Z E

0 50 100

SCALE IN FEET

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

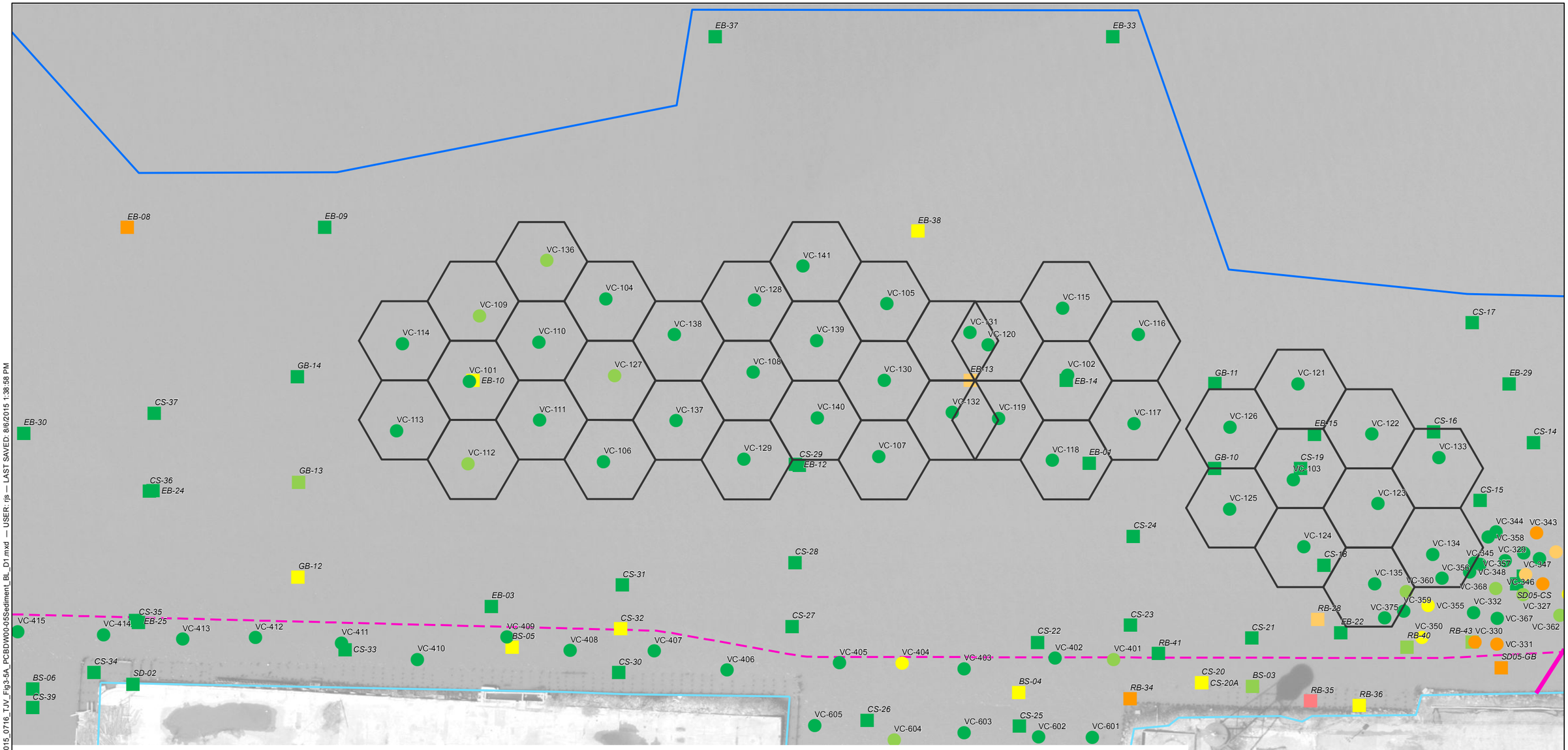
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

LOCATION PLAN - EXTENSION ALIGNMENT BORINGS AND PROBES

SCALE: AS SHOWN
AUGUST 2015

FIGURE 3.4A



LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

DEEPWATER INVESTIGATION - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

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FIGURE 3.5A

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0716_TJV_Fig3-5A_PCBDW00405Sediment_BL_D1.mxd — USER: rjs — LAST SAVED: 8/6/2015 1:38:58 PM

EB-37 EB-33 EB-08 EB-09 EB-38 CS-17 GB-14 CS-37 EB-30 EB-29 CS-14 GB-13 CS-36 EB-24 GB-12 CS-31 CS-28 EB-03 CS-35 EB-25 CS-32 CS-27 CS-24 CS-23 CS-22 CS-21 CS-34 SD-02 BS-06 CS-39 SD-49 BS-04 CS-20 CS-20A BS-03 CS-26 CS-25 SD-48 CS-15 EB-23 CS-18 SD-46 RB-28 EB-22 SD-45 RB-40 RB-43 SD05-GB HA-219 HA-216 RB-34 RB-35 RB-36 RB-41 SD-47 EB-15 CS-19 EB-01 EB-12 CS-29 EB-13 EB-14 EB-10 GB-11 GB-10

VC-136 VC-104 VC-141 VC-105 VC-128 VC-115 VC-109 VC-138 VC-139 VC-131 VC-120 VC-116 VC-114 VC-110 VC-108 VC-130 VC-102 VC-101 VC-127 VC-132 VC-119 VC-121 VC-126 VC-122 VC-133 VC-113 VC-111 VC-137 VC-140 VC-117 VC-107 VC-112 VC-106 VC-129 VC-118 VC-103 VC-125 VC-123 VC-124 VC-344 VC-343 VC-358 VC-134 VC-357 VC-329 VC-328 VC-348 VC-347 VC-326 VC-356 VC-345 VC-368 VC-346 VC-135 VC-360 VC-327 VC-355 VC-349 VC-375 VC-332 VC-367 VC-362 VC-359 VC-350 VC-330 VC-331 VC-415 VC-414 VC-413 VC-412 VC-411 VC-409 VC-408 VC-407 VC-410 VC-406 VC-405 VC-404 VC-403 VC-402 VC-401 VC-605 VC-604 VC-603 VC-602 VC-601

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

DEEPWATER INVESTIGATION - PDI PCB RESULTS - 0.5 TO 1 FOOT

AUGUST 2015

FIGURE 3.5B

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0716_TJV_Fig3-5C_PCBDW10-20Sediment_BL_D1.mxd — USER: mdancy — LAST SAVED: 8/6/2015 1:43:23 PM

EB-37 EB-33 EB-08 EB-09 EB-38 CS-17 EB-29 GB-14 CS-37 EB-30 CS-14 GB-13 CS-36 EB-24 CS-16 CS-15 CS-24 GB-12 CS-28 CS-31 EB-03 CS-35 EB-25 CS-32 CS-27 CS-23 CS-21 CS-34 SD-02 BS-06 CS-39 SD-49 CS-30 CS-22 CS-20 CS-20A BS-03 BS-04 CS-26 CS-25 HA-219 HA-216 SD05-GB SD05-CS SD-44 SD-46 SD-47 RB-28 RB-41 RB-34 RB-35 RB-36 RB-40 RB-42 RB-43 EB-22 SD-45 EB-23 EB-15 GB-11 GB-10 CS-19 CS-18 VC-136 VC-104 VC-141 VC-105 VC-115 VC-116 VC-109 VC-114 VC-110 VC-138 VC-128 VC-139 VC-131 VC-120 VC-101 EB-10 VC-127 VC-108 VC-130 EB-13 VC-102 EB-14 VC-132 VC-119 VC-117 VC-113 VC-111 VC-137 VC-140 VC-112 VC-106 VC-129 CS-29 EB-12 VC-107 VC-118 EB-01 VC-121 VC-126 VC-122 VC-133 VC-103 VC-125 VC-123 VC-124 VC-134 VC-135 VC-358 VC-343 VC-344 VC-342 VC-357 VC-329 VC-348 VC-347 VC-326 VC-356 VC-345 VC-346 VC-360 VC-368 VC-355 VC-327 VC-359 VC-349 VC-332 VC-362 VC-375 VC-367 VC-350 VC-330 VC-331 VC-415 VC-414 VC-413 VC-412 VC-411 VC-409 BS-05 VC-408 VC-407 VC-410 VC-406 VC-405 VC-404 VC-403 VC-402 VC-401 VC-605 VC-604 VC-603 SD-48 VC-602 VC-601

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

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DEEPWATER INVESTIGATION - PDI PCB RESULTS - 1 TO 2 FOOT

AUGUST 2015

FIGURE 3.5C

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0716_TJV_Fig3-5D_PCBDW20-30Sediment_BL_D1.mxd — USER: mdancy — LAST SAVED: 8/6/2015 1:45:52 PM

EB-37 EB-33 EB-08 EB-09 EB-38 GB-14 CS-37 EB-30 GB-13 CS-36 EB-24 GB-12 CS-28 CS-31 EB-03 CS-35 EB-25 CS-32 CS-27 CS-30 CS-39 SD-49 CS-24 CS-18 SD-46 RB-42 RB-28 EB-22 CS-21 SD-45 RB-40 RB-43 HA-219 HA-216 CS-20 RB-34 RB-35 RB-36 CS-22 CS-23 RB-41 SD-47 CS-26 SD-48 EB-29 CS-14 CS-16 CS-15 EB-23 EB-15 GB-11 GB-10 EB-11 EB-12 EB-13 EB-14 EB-01 EB-10

VC-136 VC-104 VC-109 VC-114 VC-110 VC-101 VC-127 VC-138 VC-141 VC-128 VC-105 VC-139 VC-108 VC-130 VC-131 VC-120 VC-115 VC-116 VC-102 VC-132 VC-119 VC-117 VC-113 VC-111 VC-137 VC-140 VC-112 VC-106 VC-129 VC-107 VC-118 VC-126 VC-121 VC-122 VC-133 VC-103 VC-125 VC-123 VC-124 VC-134 VC-344 VC-343 VC-342 VC-329 VC-348 VC-347 VC-326 VC-356 VC-345 VC-346 VC-368 VC-135 VC-360 VC-355 VC-327 VC-359 VC-375 VC-332 VC-362 VC-349 VC-367 VC-350 VC-330 VC-331 VC-415 VC-414 VC-413 VC-412 VC-411 VC-409 VC-410 VC-408 VC-407 VC-406 VC-405 VC-404 VC-403 VC-402 VC-401 VC-605 VC-604 VC-603 VC-602 VC-601

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

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DEEPWATER INVESTIGATION - PDI PCB RESULTS - 2 TO 3 FOOT

AUGUST 2015

FIGURE 3.5D

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0716_TJV_Fig3-5E_PCBDW30-40Sediment_BL_D1.mxd — USER: mdancy — LAST SAVED: 8/6/2015 1:47:44 PM

EB-37 EB-33 EB-08 EB-09 EB-38 VC-136 VC-141 VC-104 VC-128 VC-105 VC-115 VC-109 VC-138 VC-139 VC-131 VC-120 VC-116 VC-114 VC-110 VC-108 VC-130 VC-102 GB-14 VC-101 EB-10 VC-127 EB-13 EB-14 GB-11 VC-121 EB-29 CS-37 VC-140 VC-132 VC-119 VC-117 VC-126 EB-30 VC-113 VC-111 VC-137 EB-15 VC-122 CS-16 CS-14 VC-129 EB-12 VC-107 VC-118 EB-01 GB-10 VC-133 VC-112 EB-11 VC-106 CS-19 VC-103 CS-36 EB-24 GB-13 VC-125 VC-123 CS-15 EB-23 CS-24 VC-344 VC-343 VC-124 VC-134 VC-347 VC-342 CS-18 VC-348 VC-329 VC-356 VC-345 VC-326 CS-28 GB-12 CS-31 VC-135 VC-360 VC-327 SD-46 VC-368 VC-346 EB-03 VC-359 VC-332 VC-362 RB-28 VC-375 VC-335 VC-367 SD-44 CS-35 VC-415 VC-414 EB-25 VC-409 CS-32 CS-27 VC-349 EB-22 CS-23 VC-350 VC-330 VC-331 VC-413 VC-412 VC-411 CS-21 RB-40 RB-43 HA-219 CS-22 VC-402 VC-401 RB-41 SD-47 SD-45 VC-410 VC-408 VC-407 VC-405 VC-404 VC-403 CS-30 VC-406 HA-216 CS-20 RB-34 RB-35 RB-36 CS-39 VC-605 CS-26 VC-603 VC-602 VC-601 SD-49 VC-604 SD-48

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

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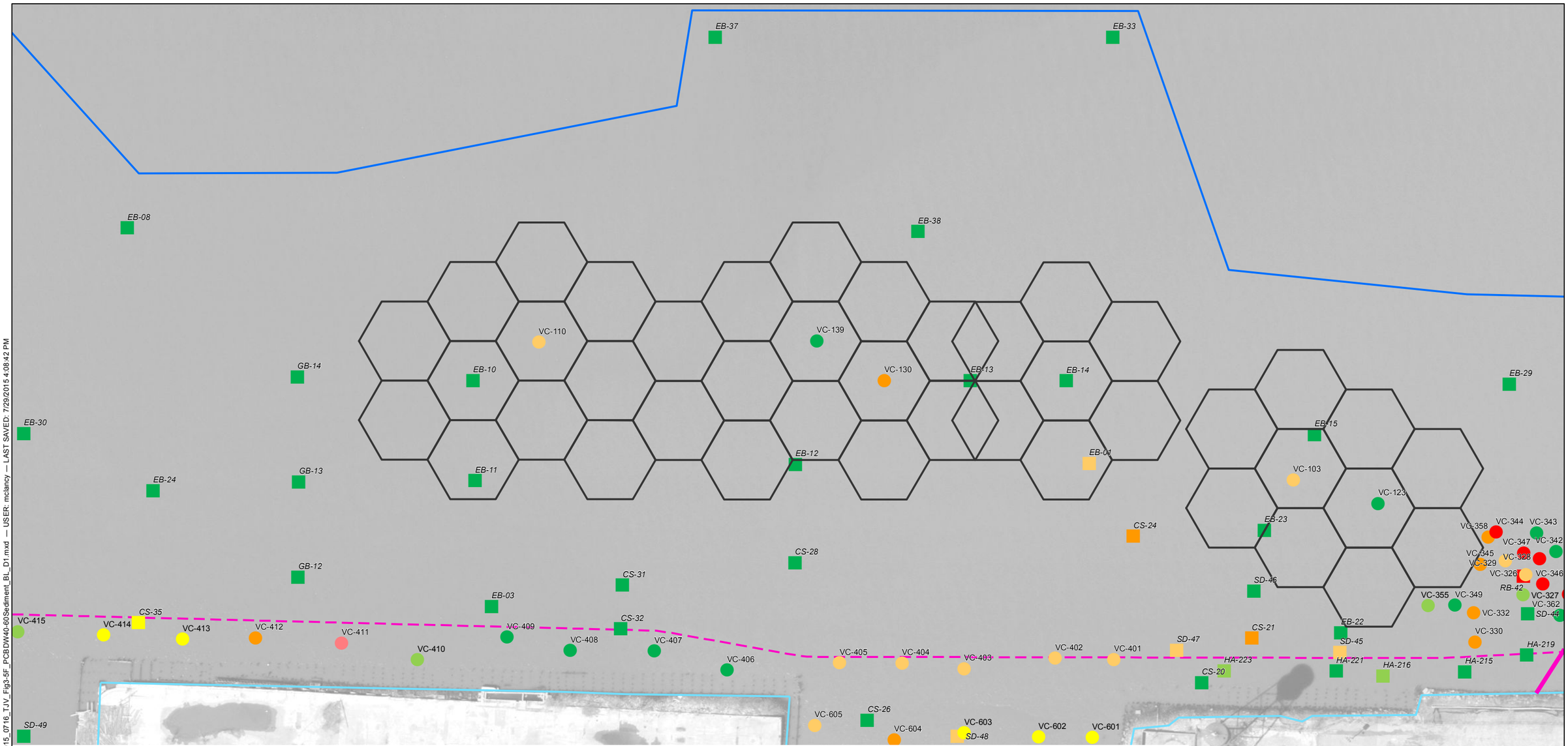
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

DEEPWATER INVESTIGATION - PDI PCB RESULTS - 3 TO 4 FOOT

AUGUST 2015

FIGURE 3.5E



LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

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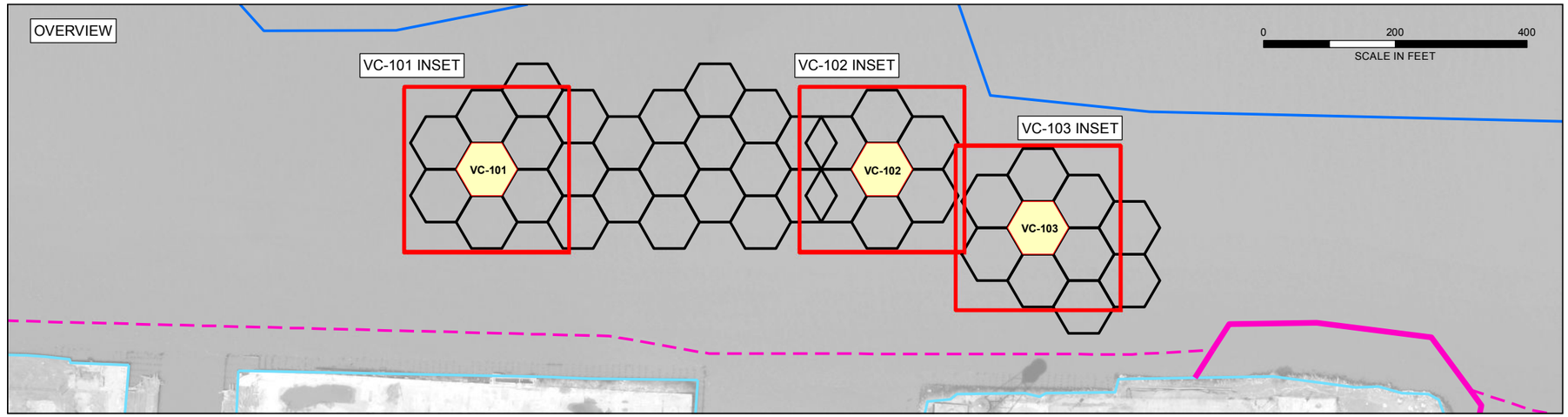
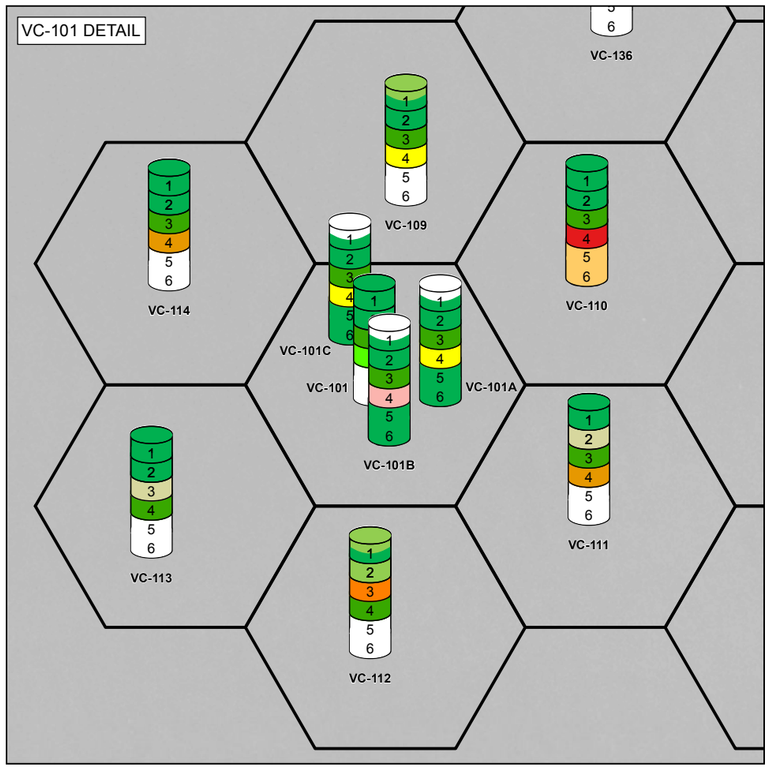
DEEPWATER INVESTIGATION - PDI PCB RESULTS - 4 FOOT TO 6 FOOT

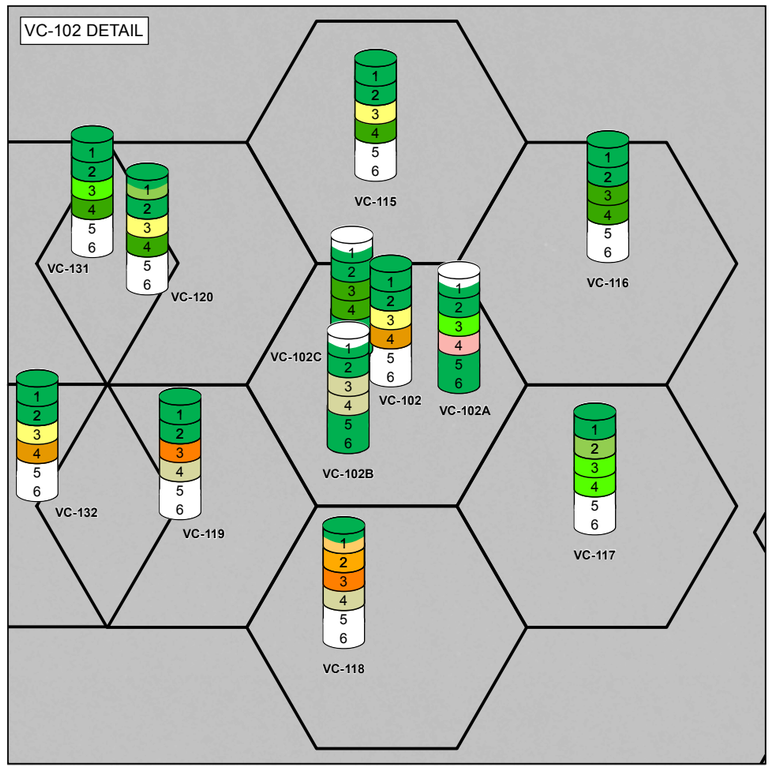
AUGUST 2015

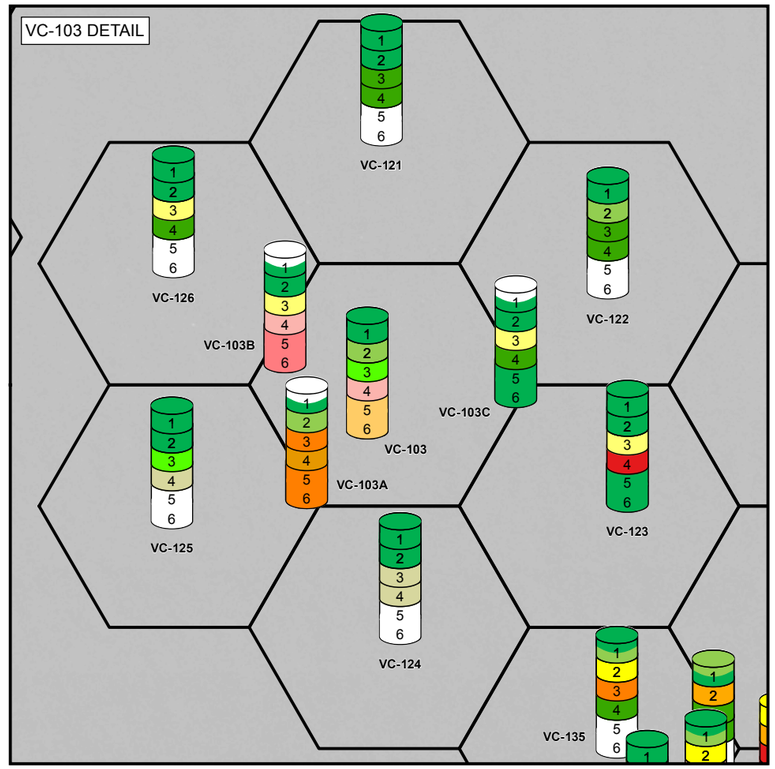
FIGURE 3.5F

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\20150_0716_TJV_Fig3-5F_PCBDW40-60Sediment_BL_D1.mxd — USER: mclancy — LAST SAVED: 7/29/2015 4:08:42 PM









LEGEND

- 0 - 1 mg/kg
- 1 - 2 mg/kg
- 2 - 5 mg/kg
- 5 - 10 mg/kg
- 10 - 50 mg/kg
- 50 - 100 mg/kg
- > 100 mg/kg
- Not Sampled or Not Analized

- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. # - INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL).

2. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

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DEEPWATER INVESTIGATION - PDI PCB RESULTS - VARIABILITY SAMPLING

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FIGURE 3.5G

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 5\2015_0803_TJV_Fig3.5G_VariabilitySampling_BL_D1.mxd — USER: mclancy — LAST SAVED: 8/3/2015 11:32:36 AM

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0715_TJV_Fig3-6A_PCB00-05NWCDredge_BL_D2.mxd — USER: rjs — LAST SAVED: 8/8/2015 1:57:15 PM

EB-29 GB-04 VC-122 CS-16 CS-14 CS-13 EB-16 VC-133 VC-103C VC-353 VC-352 VC-351 RB-17 RB-18 CS-05 VC-354 VC-323 VC-321 CS-10 VC-123 CS-15 VC-325 RB-14 VC-322 VC-372 CS-12 VC-319 VC-320 CS-04 VC-344 VC-343 VC-358 VC-324 RB-19 VC-365 VC-340 VC-339 SD02-CS VC-361 RB-16 SD01-CS VC-134 VC-347 VC-342 VC-373 VC-374 CS-18 VC-379 VC-377 VC-357 VC-345 VC-329 VC-328 VC-369 VC-366 SD01-GB VC-356 VC-348 VC-364 VC-341 VC-317 VC-318 VC-338 VC-313 VC-337 CS-11 VC-336 CS-09 RB-42 VC-326 SD05-CS VC-346 SD02-GB RB-21 VC-315 VC-370 VC-335 VC-135 VC-368 VC-309 VC-307 VC-306 VC-376 VC-360 VC-327 VC-363 VC-303 VC-334 VC-316 VC-311 RB-22 VC-371 RB-23 VC-304 SD04-CS CS-03 VC-355 VC-349 VC-305 VC-359 VC-314 VC-312 VC-308 VC-378 VC-375 VC-332 VC-362 VC-367 BS-02 VC-302 RB-27 EB-22 VC-301 VC-350 RB-15 VC-333 VC-330 RB-43 VC-331 RB-40 RB-13 SD04-GB SD05-GB CS-08 SD-04 CS-02 RB-36 VC-1 EB-19 VC-2A VC-2B VC-3 VC-511 RB-30 VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION- PDI RESULTS PCB - SURFACE TO 0.5 FOOT

AUGUST 2015

FIGURE 3.6A

EB-29 GB-04 VC-122 CS-16 CS-14 CS-13 EB-16 VC-133 VC-353 VC-352 VC-351 RB-17 RB-18 CS-05 VC-354 VC-323 VC-321 CS-10 VC-123 CS-15 VC-325 RB-14 VC-322 CS-04 VC-320 CS-12 VC-319 RB-19 VC-344 VC-358 VC-343 VC-324 SD02-CS VC-361 RB-16 SD01-CS VC-134 VC-347 VC-342 VC-373 CS-18 VC-357 VC-329 VC-328 VC-341 VC-310 SD01-GB VC-345 VC-348 VC-364 VC-317 VC-318 VC-338 VC-336 CS-11 VC-356 RB-42 VC-326 VC-313 VC-337 CS-09 VC-135 SD05-CS VC-346 SD02-GB VC-335 VC-368 RB-21 VC-315 VC-370 VC-309 VC-307 SD-53 VC-306 VC-360 VC-327 VC-363 SD-42 VC-303 VC-334 VC-316 RB-23 VC-304 CS-03 VC-355 VC-349 VC-311 VC-305 SD04-CS VC-359 VC-332 RB-22 VC-312 VC-308 RB-11 VC-375 SD-44 VC-362 VC-314 RB-12 BS-02 SD-52 VC-302 RB-27 VC-367 VC-301 SD-50 EB-22 SD-43 RB-07 VC-350 RB-02 RB-15 VC-330 VC-331 RB-20 RB-40 RB-43 SD04-GB SD-45 HA-219 HA-218 RB-13 RB-05 RB-01 RB-06 SD05-GB CS-08 HA-216 SD-04 RB-08 SD-41 RB-36 CS-02 EB-19 RB-09 SD-34 VC-511 RB-04 RB-30

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 0.5 TO 1 FOOT

AUGUST 2015

FIGURE 3.6B

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0715_TJV_Fig3-6C_PCB1-2NWCDredge_BL_D1.mxd — USER: rjs — LAST SAVED: 8/7/2015 10:23:23 AM

EB-29 GB-04 VC-122 CS-16 CS-14 CS-13 EB-16 VC-133 VC-353 VC-352 VC-351 CS-05 RB-18 RB-17 VC-354 VC-323 VC-321 CS-10 VC-123 CS-15 VC-325 RB-14 VC-322 CS-04 VC-320 CS-12 VC-319 RB-19 VC-344 VC-343 VC-358 VC-324 SD02-CS VC-361 RB-16 SD01-CS VC-134 VC-347 VC-342 VC-373 CS-18 VC-357 VC-345 VC-329 VC-328 VC-341 VC-364 VC-310 SD01-GB VC-348 VC-317 VC-318 VC-338 VC-336 RB-42 VC-326 VC-313 VC-337 CS-11 CS-09 VC-135 VC-356 SD05-CS VC-346 SD02-GB RB-21 VC-315 VC-370 VC-309 VC-307 SD-53 VC-335 VC-360 VC-368 VC-327 VC-363 SD-42 VC-316 VC-311 RB-22 VC-312 VC-303 VC-334 RB-23 VC-304 VC-305 SD04-CS CS-03 VC-355 VC-349 VC-359 VC-332 VC-314 VC-308 RB-11 VC-375 VC-367 SD-44 VC-362 RB-12 BS-02 SD-52 VC-302 RB-27 EB-22 VC-301 SD-50 RB-07 VC-350 SD-43 RB-02 RB-20 RB-15 VC-330 VC-331 RB-43 RB-40 SD04-GB SD-45 HA-219 HA-218 RB-13 RB-05 RB-01 RB-06 CS-08 HA-216 SD05-GB SD-04 RB-08 SD-41 RB-36 CS-02 EB-19 RB-09 SD-34 VC-511 RB-04 RB-30

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 1 TO 2 FOOT

AUGUST 2015

FIGURE 3.6C

EB-29
GB-04
VC-122
CS-16
EB-16
CS-14
VC-133
RB-17
RB-18
VC-123
CS-15
VC-323
VC-321
VC-325
RB-14
VC-322
VC-320
CS-12
VC-319
RB-19
VC-344
VC-343
VC-324
VC-365
VC-339
VC-361
RB-16
VC-134
VC-347
VC-342
VC-373
CS-18
VC-345
VC-329
VC-328
VC-341
VC-364
VC-310
VC-348
VC-317
VC-318
VC-338
VC-336
VC-326
VC-313
VC-337
CS-11
CS-09
VC-356
VC-135
RB-42
VC-346
VC-306
VC-335
VC-360
VC-368
RB-21
VC-315
VC-370
VC-309
VC-303
VC-334
VC-327
VC-363
SD-42
SD-53
VC-307
VC-316
VC-311
VC-304
CS-03
VC-355
VC-349
RB-12
VC-312
VC-305
VC-359
VC-308
VC-332
VC-314
VC-375
SD-44
VC-367
VC-362
SD-52
VC-302
RB-27
VC-301
SD-50
EB-22
SD-43
VC-350
RB-20
RB-15
VC-330
VC-331
RB-40
RB-43
SD-45
HA-219
HA-218
RB-03
HA-216
CS-08
SD-41
CS-02
RB-36
EB-19
SD-34
VC-511
RB-30

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 2 TO 3 FOOT

AUGUST 2015

FIGURE 3.6D

EB-29
GB-04
VC-122
CS-16
EB-16
CS-14
VC-133
RB-17
RB-18
VC-123
CS-15
RB-14
VC-372
CS-12
RB-19
VC-344
VC-343
VC-339
RB-16
VC-134
VC-347
VC-342
VC-373
CS-18
VC-345
VC-329
VC-328
VC-364
VC-341
VC-310
VC-348
VC-326
VC-318
VC-338
VC-336
VC-356
RB-42
VC-317
VC-313
VC-337
CS-11
CS-09
VC-135
VC-346
VC-306
VC-368
VC-315
VC-309
VC-335
VC-360
RB-21
VC-303
VC-327
VC-363
SD-42
SD-53
VC-334
VC-316
VC-311
VC-304
VC-355
VC-349
RB-12
VC-312
VC-305
CS-03
VC-359
VC-332
SD-44
VC-362
VC-375
VC-367
SD-52
VC-302
RB-27
EB-22
SD-43
SD-50
VC-350
RB-20
RB-15
VC-330
VC-331
RB-40
RB-43
SD-45
HA-219
HA-218
RB-03
HA-216
CS-08
SD-41
RB-36
CS-02
EB-19
SD-34
VC-511
RB-30

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 3 TO 4 FOOT

AUGUST 2015

FIGURE 3.6E

EB-29
EB-16
VC-123
RB-14
VC-344
VC-358
VC-343
VC-340
VC-339
VC-347
VC-342
VC-329
VC-328
VC-345
VC-341
VC-364
VC-317
VC-318
VC-338
VC-310
VC-337
CS-11
VC-336
VC-326
RB-42
VC-346
VC-315
RB-21
VC-370
VC-309
SD-53
VC-335
VC-306
VC-303
VC-334
VC-327
VC-363
SD-42
VC-316
VC-311
RB-12
VC-304
VC-305
VC-355
VC-349
VC-332
SD-44
VC-362
EB-21
VC-314
SD-52
VC-302
SD-50
RB-07
EB-22
SD-43
RB-02
RB-15
VC-330
RB-20
SD-45
HA-219
HA-218
RB-13
HA-217
HA-211
HA-206
RB-05
RB-01
HA-209
RB-03
RB-06
HA-221
HA-216
HA-215
HA-205
HA-203B
RB-08
SD-41
HA-203
CS-02
HA-201
EB-19
SD-34
VC-511
RB-04

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 4 TO 5 FOOT

AUGUST 2015

FIGURE 3.6F

EB-29
EB-16
VC-123
RB-14
VC-343
VC-340
VC-339
VC-347
VC-342
VC-329
VC-328
VC-341
VC-364
VC-310
VC-326
RB-42
VC-317
VC-318
VC-338
VC-313
VC-337
CS-11
VC-336
VC-346
VC-315
RB-21
VC-309
VC-335
VC-327
VC-363
SD-42
SD-53
VC-303
VC-334
VC-316
VC-311
VC-304
RB-12
VC-305
EB-21
SD-44
VC-362
VC-314
SD-52
SD-50
RB-07
EB-22
SD-43
RB-02
RB-20
RB-15
SD-45
HA-219
HA-218
RB-13
HA-217
HA-211
HA-206
RB-05
RB-01
HA-209
RB-03
RB-06
HA-221
HA-216
HA-215
HA-205
HA-203B
RB-08
SD-41
HA-203
CS-02
HA-201
EB-19
SD-34
VC-511
RB-04

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

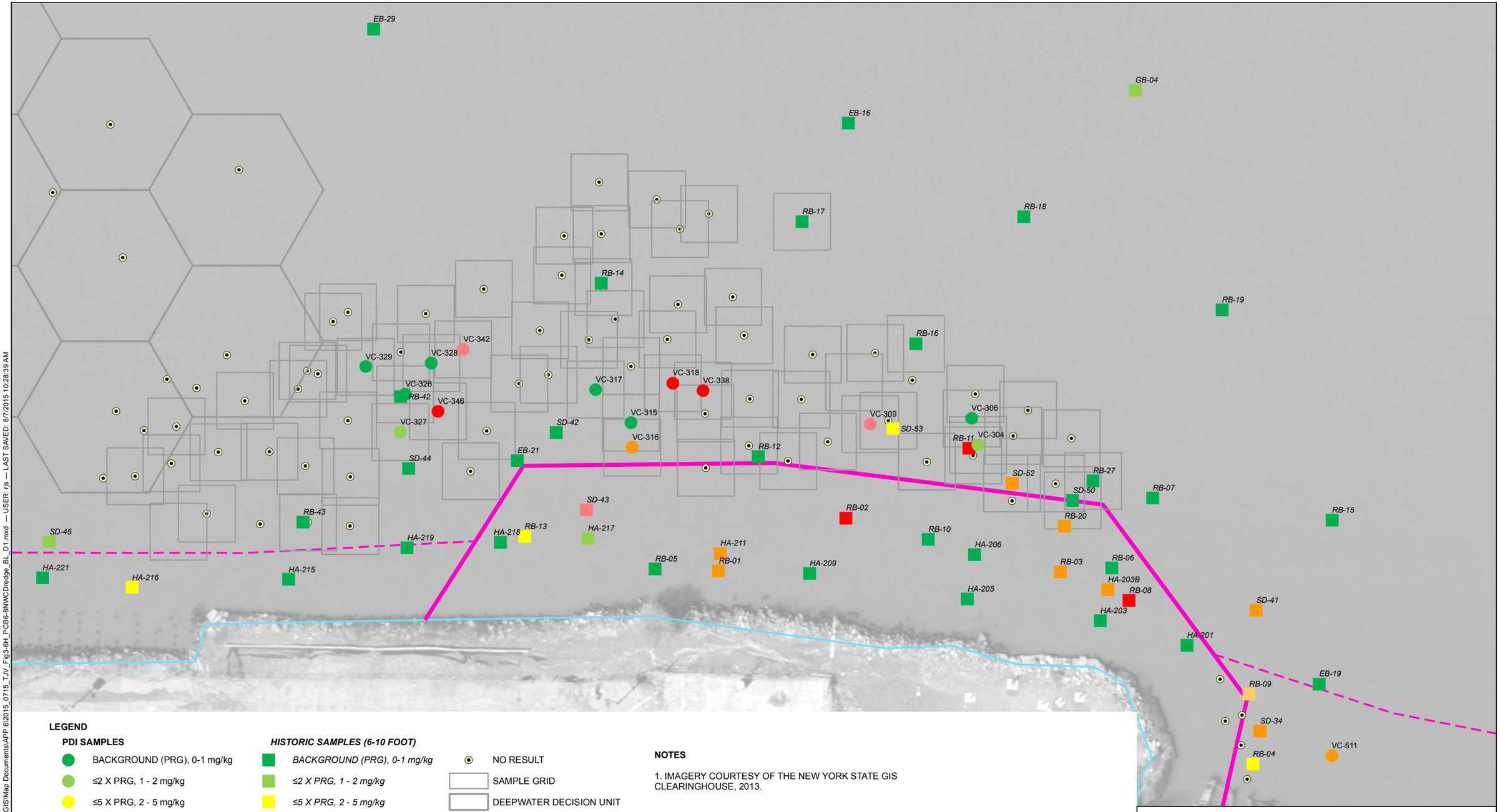
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 5 TO 6 FOOT

AUGUST 2015

FIGURE 3.6G



LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (6-10 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA INVESTIGATION - PDI PCB RESULTS - 6 TO 8 FOOT

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FIGURE 3.6H

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EB-06
EB-08
EB-09
EB-38
EB-07
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-114
VC-110
VC-138
VC-139
VC-120
GB-17
GB-14
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
CS-37
CS-47
CS-42
VC-113
VC-111
VC-137
VC-140
VC-132
VC-119
CS-45
EB-30
VC-112
VC-106
VC-129
CS-29
EB-12
VC-107
GB-16
CS-41
GB-13
CS-36
EB-24
CS-46
CS-44
EB-27
GB-12
CS-28
CS-31
SHEET 1
SHEET 2
CS-48
EB-28
VC-422
GB-15
RB-24
EB-03
VC-420
RB-26
VC-421
RB-25
VC-419
VC-418
SD03-CS
VC-417
CS-35
EB-25
VC-409
CS-32
CS-27
VC-416
EB-31
VC-415
VC-414
VC-413
VC-412
VC-411
BS-05
VC-408
VC-407
BS-07
CS-43
SD03-GB
CS-40
EB-26
CS-33
VC-410
RB-31
RB-32
SD-01
RB-33
CS-34
CS-30
VC-406
VC-405
VC-404
VC-403
SD-02
BS-06
CS-39
VC-605
CS-26
VC-603
VC-604
CS-38
SD-03

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 1 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6I_PCBNS00-05Sediment_BL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:06:23 PM

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SHEET 1

SHEET 2

SHEET 2

SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

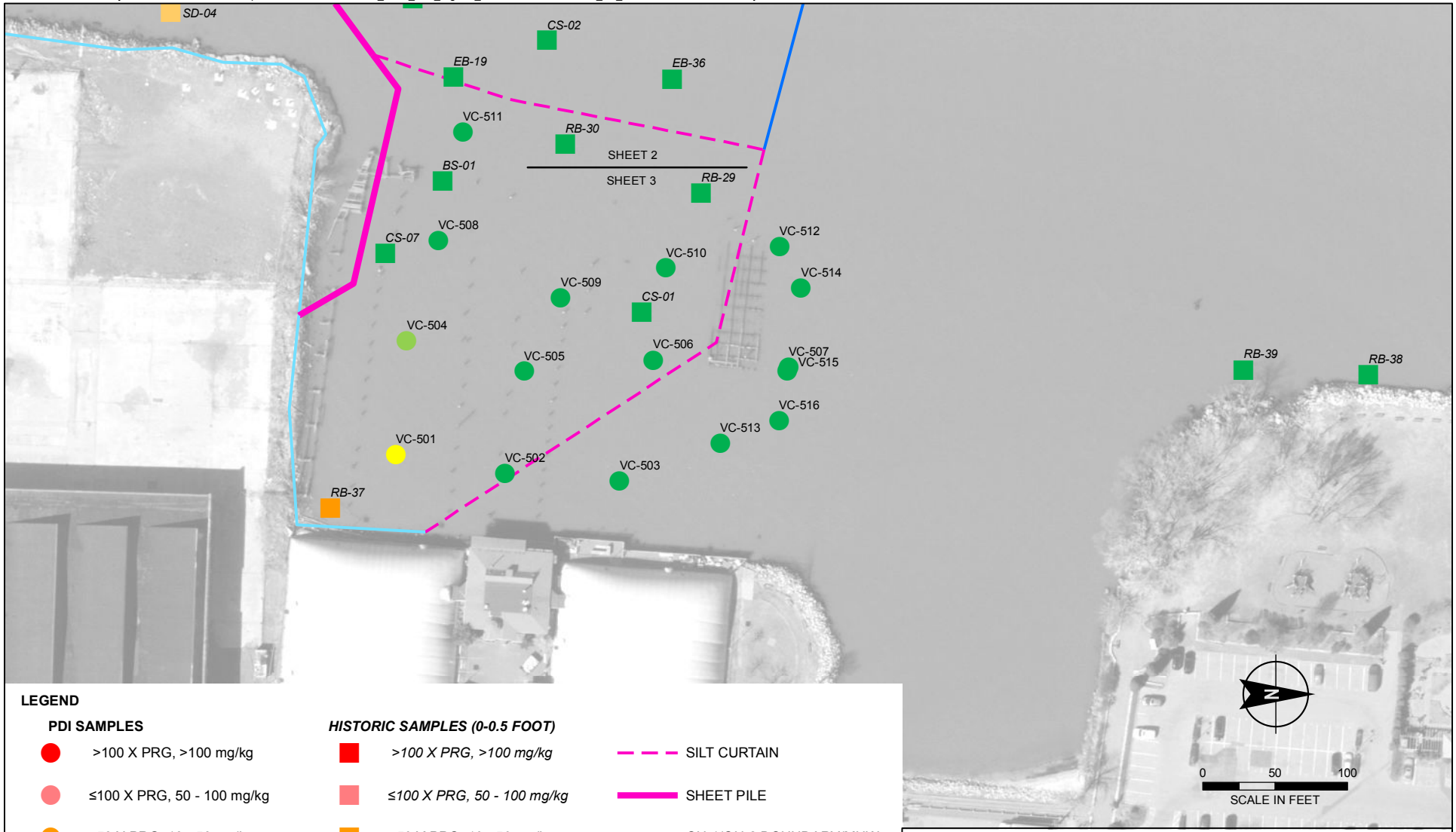
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 2 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6I_PCBOM00-05Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:09:37 PM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6I
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-06A
EB-08
EB-09
EB-38
EB-07
GB-17
GB-14
CS-47
CS-37
CS-42
CS-45
EB-30
GB-16
CS-41
GB-13
CS-36
EB-24
CS-46
CS-44
EB-27
CS-48
EB-28
VC-422
GB-15
RB-24
VC-421
RB-25
VC-420
RB-26
VC-419
VC-418
SD03-CS
EB-26
VC-417
BS-07
CS-43
SD03-GB
CS-40
VC-416
EB-31
VC-415
GB-12
CS-35
EB-25
VC-414
VC-413
VC-412
VC-411
CS-31
EB-03
RB-31
RB-32
SD-01
RB-33
CS-33
VC-410
VC-409
BS-05
VC-408
CS-32
VC-407
CS-28
CS-27
CS-34
SD-02
CS-30
VC-406
VC-405
VC-404
VC-403
BS-06
CS-39
SD-49
CS-38
VC-605
CS-26
VC-604
VC-603
SD-48
SD-03

VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-120
VC-114
VC-110
VC-138
VC-139
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
VC-132
VC-119
VC-113
VC-111
VC-137
VC-140
VC-112
VC-106
VC-129
CS-29
EB-12
VC-107

SHEET 1
SHEET 2

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 0.5 TO 1 FOOT

AUGUST 2015

FIGURE 3.6J
SHEET 1 OF 3

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SHEET 1
SHEET 2

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

SHEET 2
SHEET 3

HALEY ALDRICH

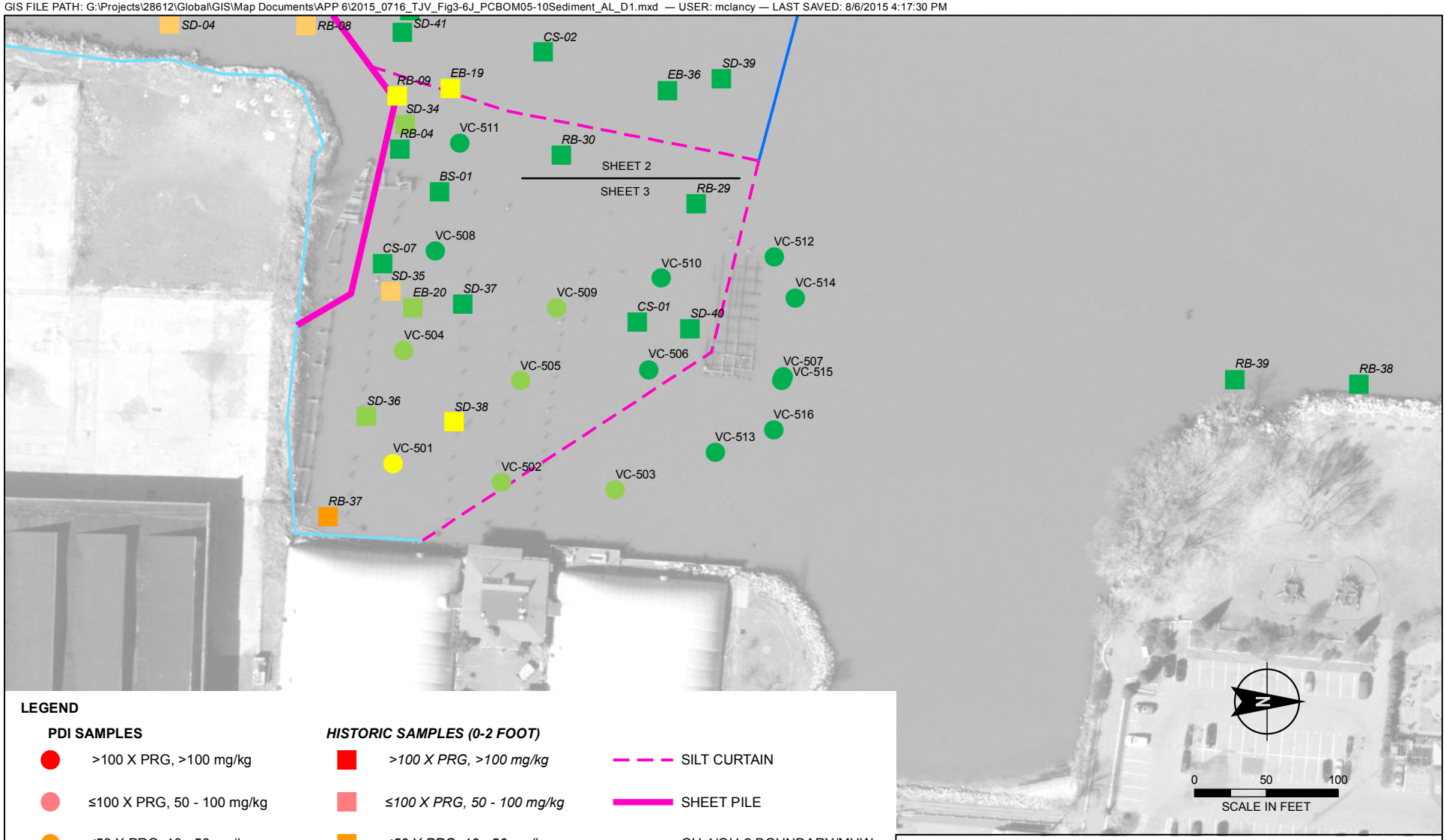
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 0.5 TO 1 FOOT

AUGUST 2015

FIGURE 3.6J
SHEET 2 OF 3

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6J_PCBOM05-10Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:17:30 PM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 0.5 TO 1 FOOT

AUGUST 2015

FIGURE 3.6J
SHEET 3 OF 3

EB-06
EB-06A
EB-07
EB-08
EB-09
EB-38
GB-17
CS-47
CS-45
CS-42
EB-30
CS-37
GB-14
GB-16
CS-41
CS-36
EB-24
GB-13
CS-46
CS-44
EB-27
CS-48
EB-28
VC-422
GB-15
RB-24
VC-421
RB-25
VC-420
RB-26
VC-419
VC-418
SD03-CS
EB-26
VC-417
BS-07
CS-43
SD03-GB
CS-40
VC-416
EB-31
VC-415
VC-414
CS-35
EB-25
VC-413
VC-412
VC-411
CS-33
VC-410
EB-03
VC-409
BS-05
VC-408
CS-32
VC-407
CS-31
CS-28
CS-27
VC-406
VC-405
VC-404
VC-403
RB-31
RB-32
SD-01
RB-33
CS-34
SD-02
CS-30
BS-06
CS-39
SD-49
CS-38
VC-605
CS-26
VC-604
VC-603
SD-48
SD-03
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-138
VC-131
VC-114
VC-110
VC-139
VC-120
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
VC-113
VC-111
VC-137
VC-140
VC-132
VC-112
VC-106
VC-129
CS-29
EB-12
VC-107
SHEET 1
SHEET 2

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 1 TO 2 FOOT

AUGUST 2015

FIGURE 3.6K
SHEET 1 OF 3

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SHEET 1

SHEET 2

SHEET 2
SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 1 TO 2 FOOT

FIGURE 3.6K
SHEET 2 OF 3

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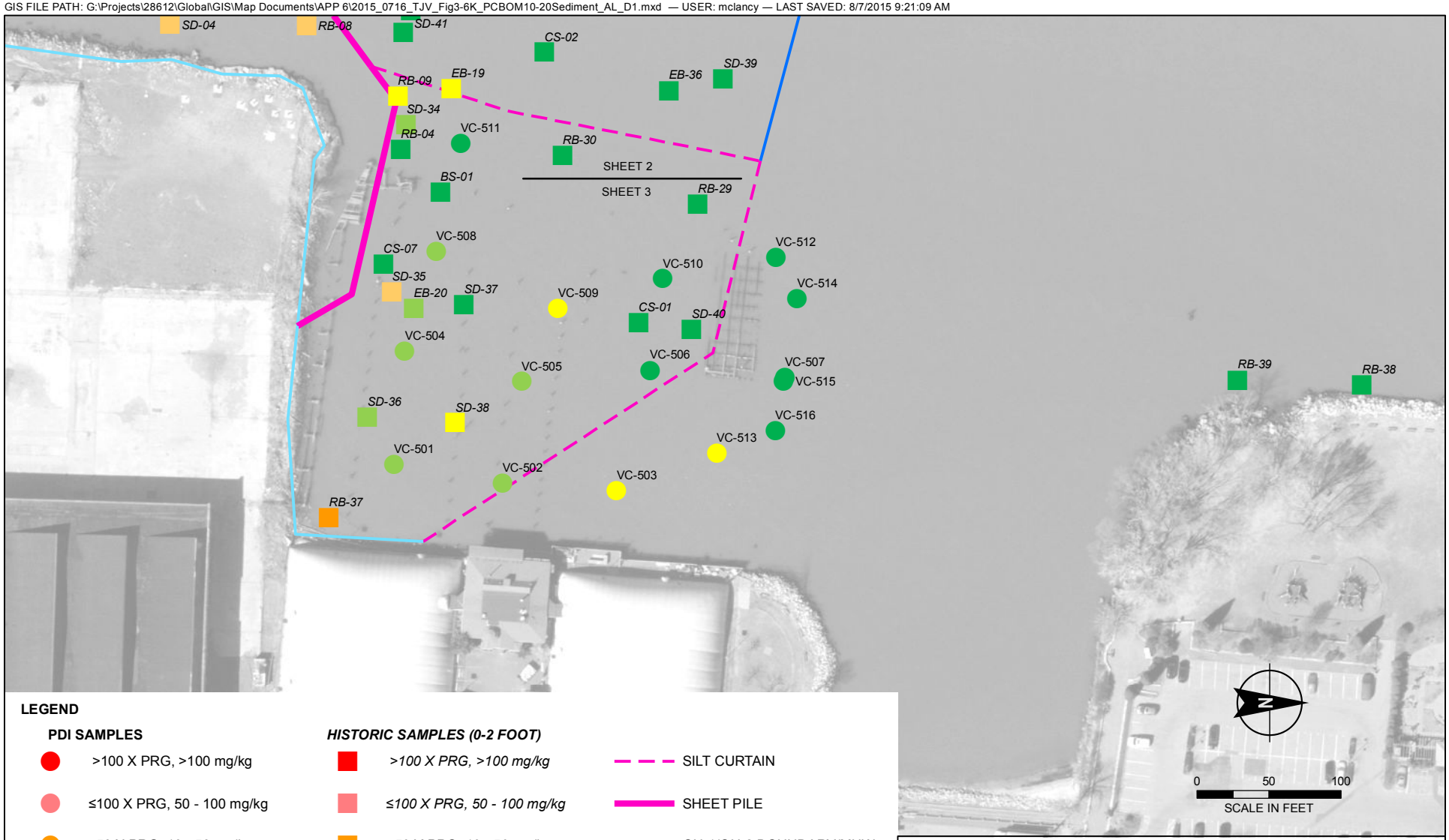

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 1 TO 2 FOOT

AUGUST 2015

FIGURE 3.6K
SHEET 3 OF 3

EB-06
EB-08
EB-09
EB-38
EB-07
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-138
VC-131
VC-120
VC-114
VC-110
VC-139
GB-17
GB-14
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
CS-37
CS-47
CS-42
EB-30
VC-113
VC-111
VC-137
VC-140
VC-132
VC-119
CS-45
VC-112
EB-11
VC-106
VC-129
EB-12
VC-107
GB-16
GB-13
CS-36
EB-24
CS-46
CS-44
CS-28
SHEET 1
SHEET 2
GB-12
CS-48
CS-31
EB-28
VC-422
GB-15
RB-24
EB-03
VC-420
RB-26
VC-421
RB-25
VC-419
VC-418
EB-26
VC-417
CS-35
EB-25
VC-414
VC-413
VC-412
VC-411
VC-409
CS-32
CS-27
EB-31
VC-416
VC-415
CS-43
VC-410
VC-408
VC-407
RB-33
CS-30
VC-406
VC-405
VC-404
VC-403
CS-39
SD-49
CS-38
VC-605
CS-26
VC-603
VC-604
SD-48

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 2 TO 3 FOOT

FIGURE 3.6L

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SHEET 1

SHEET 2

SHEET 2

SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 2 TO 3 FOOT

FIGURE 3.6L

Page 2 of 3

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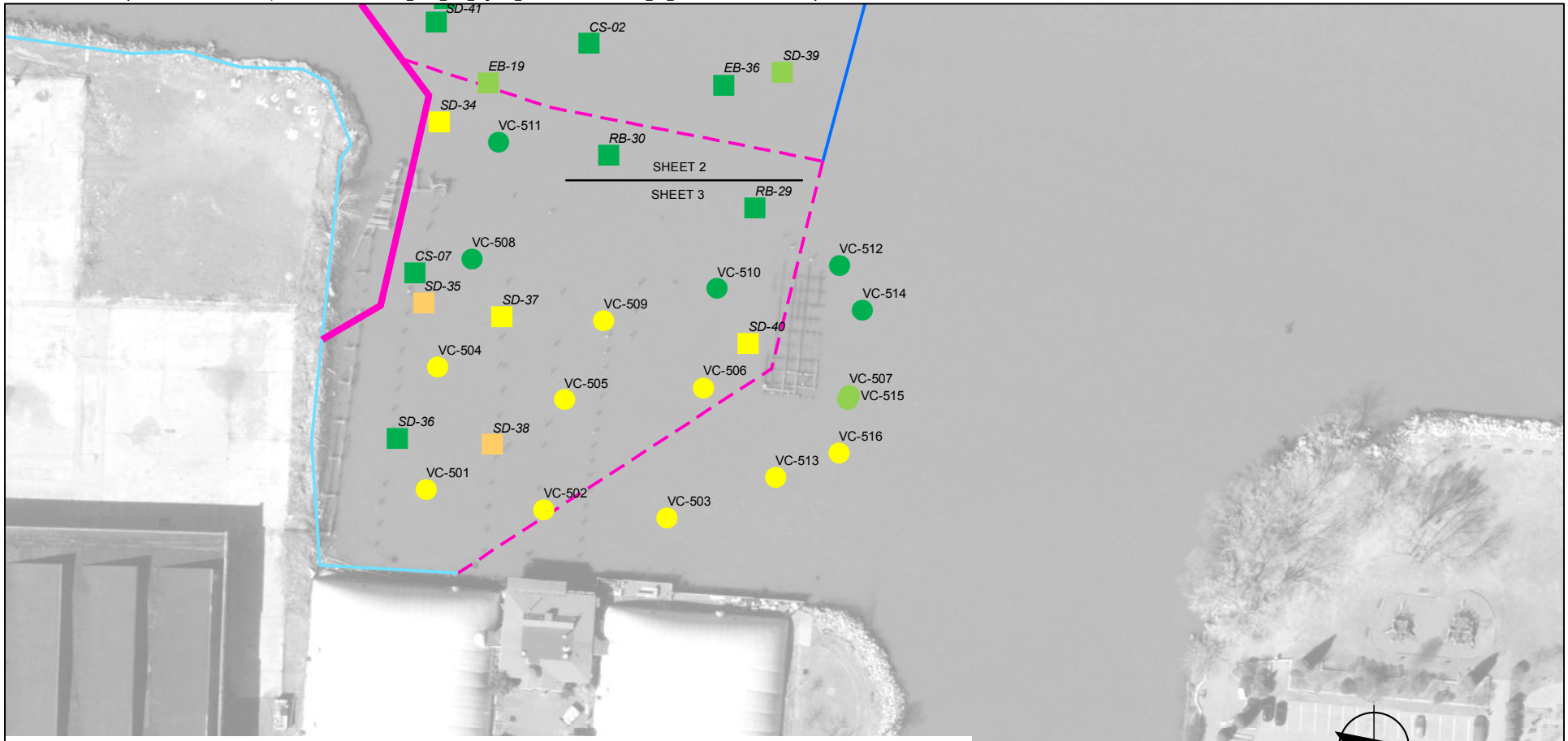

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 2 TO 3 FOOT

FIGURE 3.6L
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-08
EB-09
EB-38
EB-07
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-114
VC-110
VC-138
VC-139
VC-120
GB-17
GB-14
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
CS-47
CS-37
CS-42
CS-45
EB-30
VC-113
VC-111
VC-137
VC-140
VC-132
VC-119
GB-16
VC-112
EB-11
VC-106
VC-129
EB-12
VC-107
CS-46
GB-13
CS-36
EB-24
CS-44
CS-28
SHEET 1
SHEET 2
GB-12
CS-48
CS-31
EB-28
VC-422
GB-15
RB-24
EB-03
VC-420
RB-26
VC-421
RB-25
VC-419
VC-418
EB-26
VC-417
CS-35
EB-25
VC-414
VC-413
VC-412
VC-411
VC-409
CS-32
CS-27
EB-31
VC-416
VC-415
CS-43
VC-410
VC-408
VC-407
VC-406
VC-405
VC-404
VC-403
RB-33
CS-30
CS-39
VC-605
CS-26
VC-603
SD-49
VC-604
SD-48
CS-38

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 3 TO 4 FOOT

FIGURE 3.6M
Page 1 of 3

AUGUST 2015

SHEET 1

SHEET 2

SHEET 2

SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 3 TO 4 FOOT

FIGURE 3.6M
Page 2 of 3

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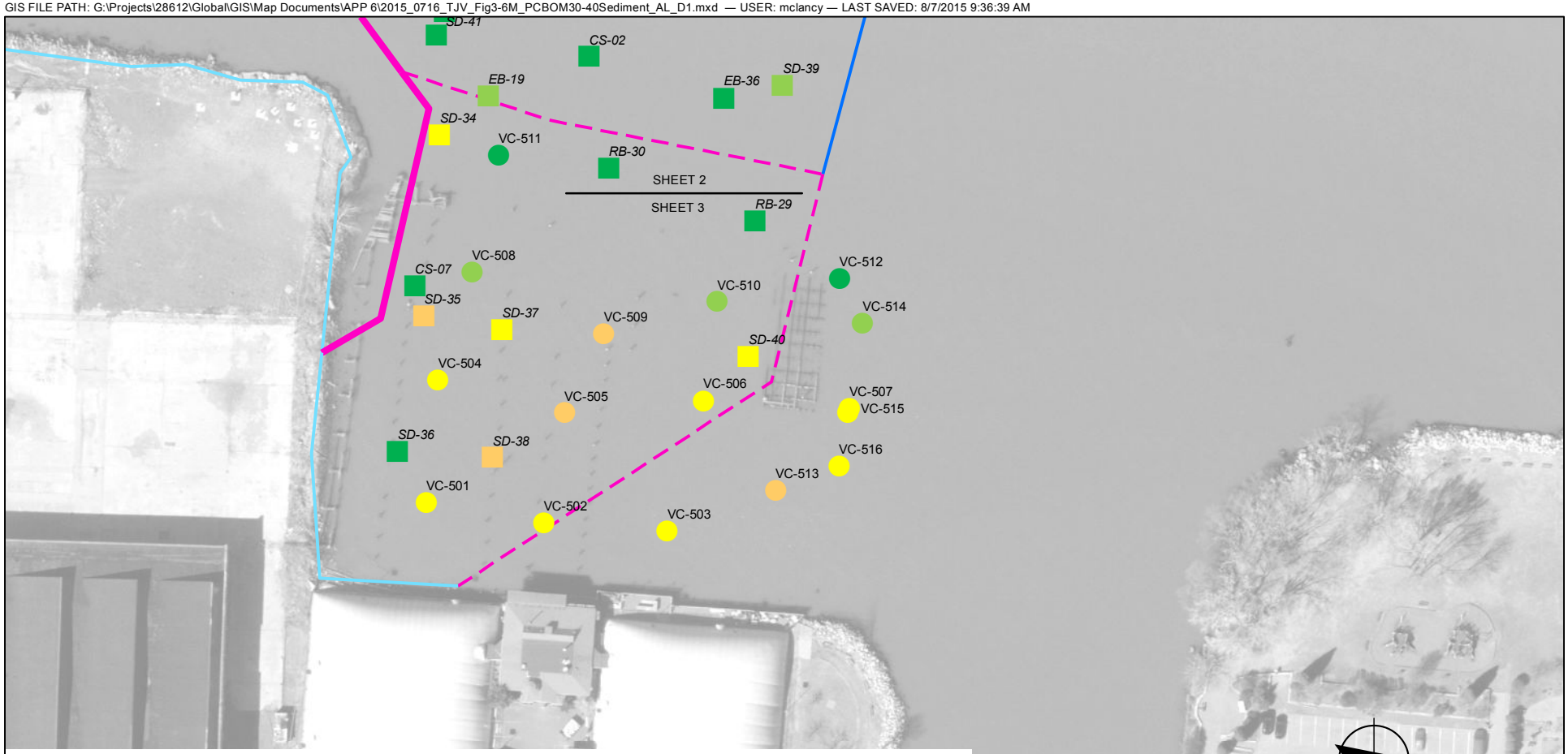

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 3 TO 4 FOOT

FIGURE 3.6M
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-08
EB-38
EB-07
GB-17
GB-14
EB-10
EB-13
CS-47
CS-45
EB-30
EB-12
GB-16
EB-24
GB-13
EB-11
EB-27
CS-28
GB-12
CS-31
EB-28
VC-422
GB-15
EB-03
VC-420
VC-421
VC-419
VC-418
EB-26
VC-417
VC-416
EB-31
VC-415
VC-414
CS-35
VC-413
VC-412
VC-411
VC-410
VC-409
VC-408
CS-32
VC-407
VC-406
VC-405
VC-404
VC-403
SHEET 1
SHEET 2
SD-49
VC-605
CS-26
VC-603
VC-604
SD-48

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 4 TO 5 FOOT

AUGUST 2015

FIGURE 3.6N
SHEET 1 OF 3

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EB-38
EB-13
EB-14
EB-01
EB-15
EB-29
EB-17
EB-16
GB-03
EB-18
CS-24
EB-23
RB-14
SD-46
EB-22
CS-21
SD-47
SD-45
CS-20
SD-48
CS-26
SHEET 1
SHEET 2
SHEET 2
SHEET 3

VC-405 VC-404 VC-403 VC-402 VC-401 VC-604 VC-603 VC-602 VC-601
VC-358 VC-344 VC-343 VC-347 VC-342 VC-345 VC-329 VC-326 VC-328 VC-346 VC-327 VC-363 VC-355 VC-349 VC-332 VC-362 VC-330
VC-341 VC-340 VC-339 VC-317 VC-318 VC-364 VC-315 VC-338 VC-370 VC-311 VC-337 VC-310 VC-309 VC-336 VC-306 VC-304 VC-303 VC-334 VC-335 VC-305 VC-302
VC-508 VC-512 VC-510 VC-514 VC-509 VC-506 VC-507 VC-515 VC-505 VC-511

SD-42 SD-44 SD-43 SD-53 SD-52 SD-50 SD-41 SD-34 SD-37 SD-40 SD-39
CS-11 CS-02
RB-42 RB-21 RB-12 RB-02 RB-20 RB-07 RB-15 RB-13 RB-05 RB-01 RB-03 RB-06 RB-08 RB-04
EB-21 EB-19 EB-36
HA-219 HA-218 HA-217 HA-211 HA-209 HA-206 HA-205 HA-203B HA-203 HA-201 HA-223 HA-221 HA-216 HA-215

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

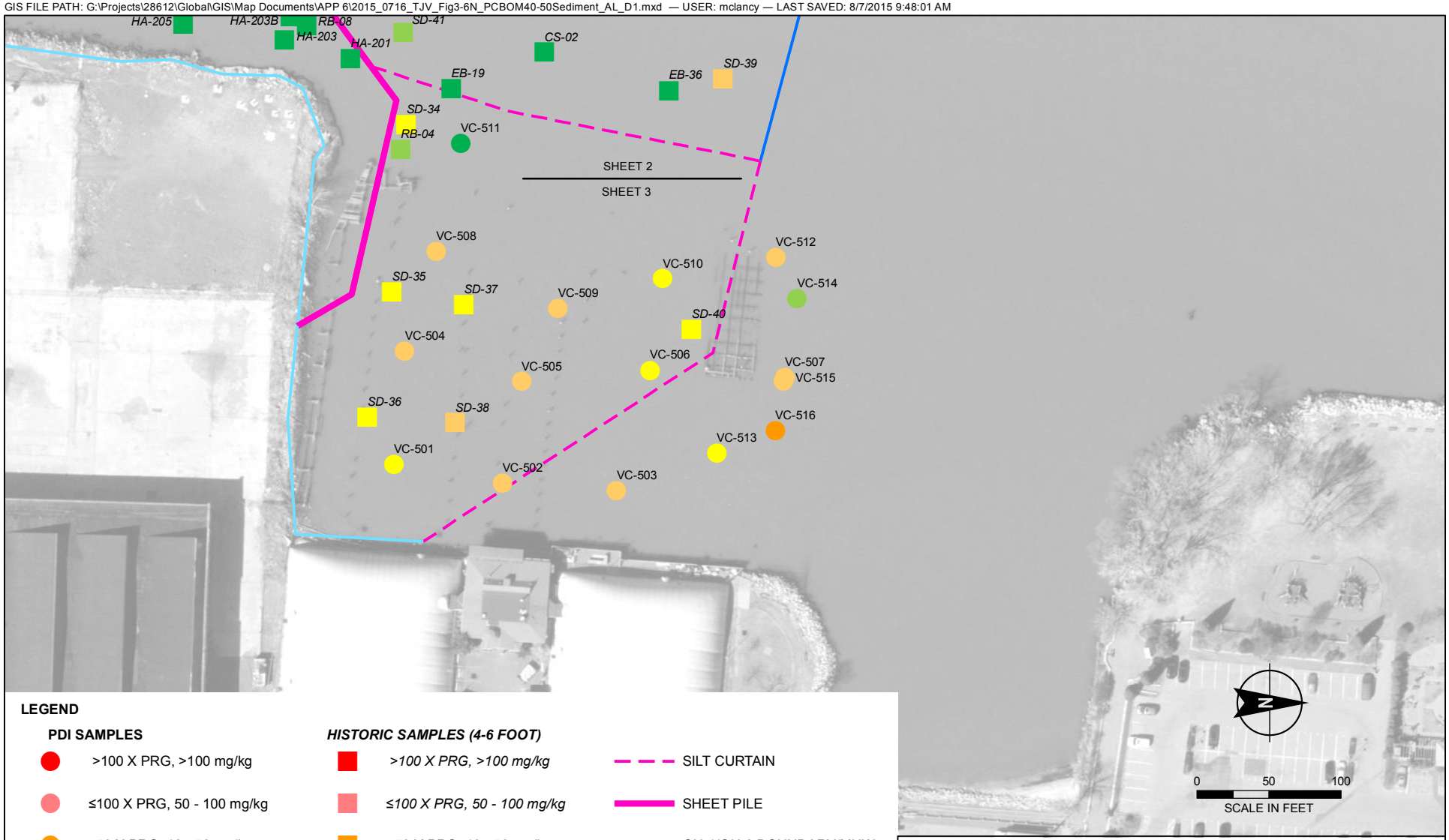
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 4 TO 5 FOOT

AUGUST 2015

FIGURE 3.6N
SHEET 2 OF 3

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6N_PCBOM40-50Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/7/2015 9:48:01 AM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 4 TO 5 FOOT

FIGURE 3.6N
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-08
EB-38
EB-07
GB-17
GB-14
EB-10
EB-13
CS-47
CS-45
EB-30
EB-12
GB-16
EB-24
GB-13
EB-11
EB-27
CS-28
GB-12
EB-28
VC-422
GB-15
CS-31
SHEET 1
SHEET 2
EB-03
VC-421
VC-420
VC-419
VC-418
EB-26
VC-417
VC-416
EB-31
VC-415
VC-414
CS-35
VC-413
VC-412
VC-411
VC-410
VC-409
VC-408
CS-32
VC-407
VC-406
VC-405
VC-404
VC-403
VC-605
CS-26
VC-604
VC-603
SD-49
SD-48

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 5 TO 6 FOOT

FIGURE 3.6O
SHEET 1 OF 3

AUGUST 2015

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EB-38
EB-13
EB-14
EB-01
EB-15
EB-29
EB-17
EB-16
GB-03
EB-18
CS-24
EB-23
RB-14
SD-46
EB-22
CS-21
SD-47
SD-45
CS-20
CS-26
SD-48
SD-43
RB-02
RB-20
RB-07
RB-15
SD-50
SD-52
SD-53
CS-11
SD-42
SD-44
EB-21
RB-21
RB-12
SD-41
CS-02
EB-19
EB-36
SD-39
SD-34
RB-04
SD-37
SD-40
VC-405
VC-404
VC-403
VC-402
VC-401
VC-604
VC-603
VC-602
VC-601
VC-343
VC-347
VC-342
VC-329
VC-328
VC-326
VC-346
VC-327
VC-340
VC-339
VC-341
VC-317
VC-338
VC-364
VC-318
VC-337
VC-310
VC-336
VC-335
VC-306
VC-303
VC-334
VC-309
VC-304
VC-305
VC-363
VC-362
VC-315
VC-313
VC-311
VC-316
VC-314
VC-511
VC-508
VC-509
VC-510
VC-512
VC-514
VC-506
VC-505
VC-515
VC-507
HA-219
HA-218
HA-217
HA-223
HA-221
HA-216
HA-215
HA-211
HA-209
HA-206
HA-205
HA-203B
HA-203
HA-201
RB-42
RB-13
RB-05
RB-01
RB-03
RB-06
RB-08
SHEET 1
SHEET 2
SHEET 2
SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

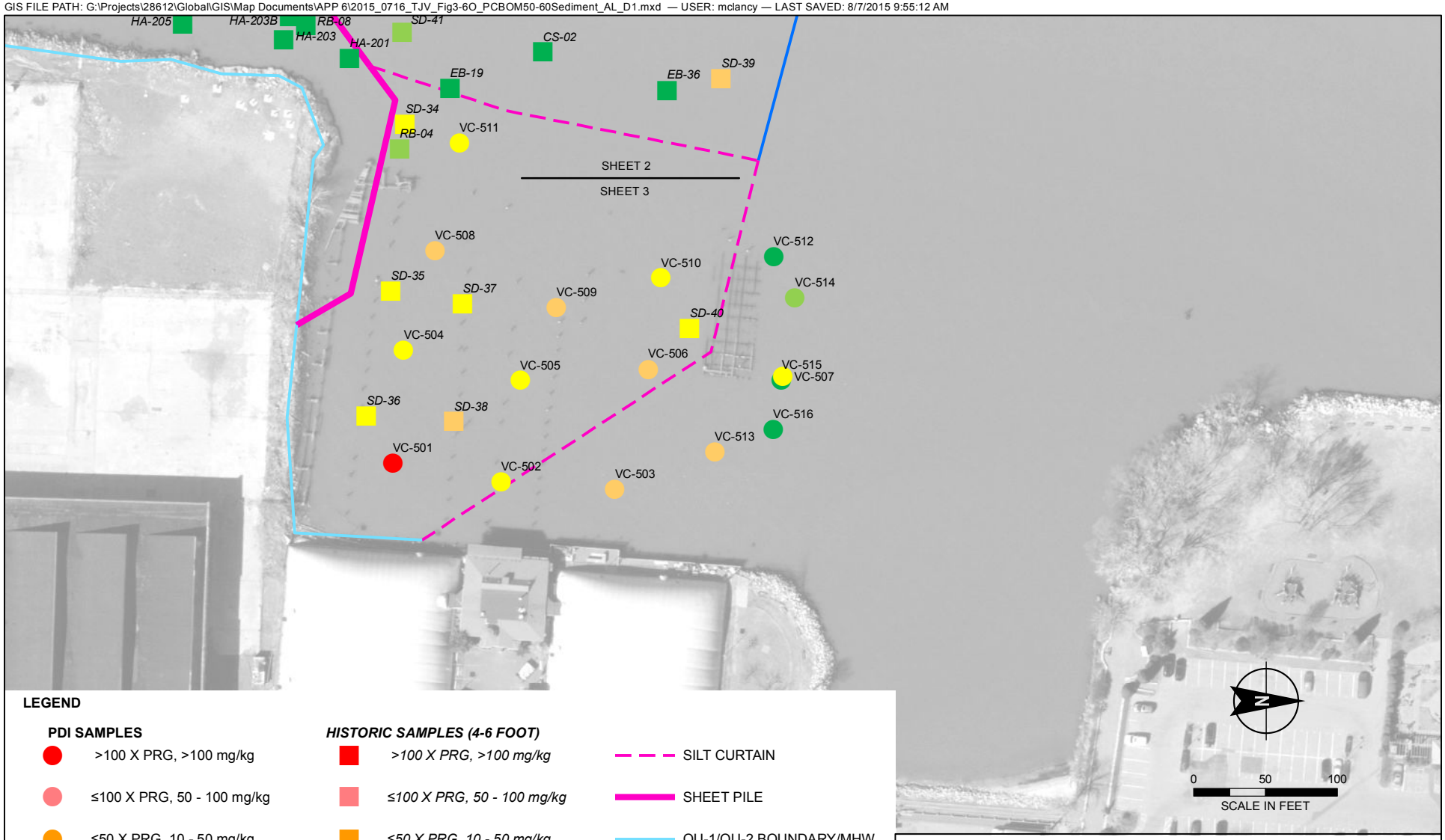
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 5 TO 6 FOOT

FIGURE 3.6O
SHEET 2 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6O_PCBOM50-60Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/7/2015 9:55:12 AM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 5 TO 6 FOOT

FIGURE 3.6O
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-07
GB-17
GB-14
EB-30
EB-38
EB-13
GB-16
EB-24
GB-13
EB-12
EB-27
GB-12
EB-28
VC-422
GB-15
VC-421
VC-420
VC-419
VC-418
EB-26
VC-417
VC-416
EB-31
VC-415
VC-414
EB-25
VC-413
VC-412
VC-411
EB-03
VC-410
VC-409
VC-408
VC-407
VC-406
VC-405
VC-404
VC-403
VC-605
VC-604
VC-603
SD-48
SD-49
SHEET 1
SHEET 2

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (6-8 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 6 TO 8 FOOT

AUGUST 2015

FIGURE 3.6P
SHEET 1 OF 3

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6P_PCBNS60-80Sediment_BL_D1.mxd — USER: mclancy — LAST SAVED: 8/7/2015 10:14:40 AM

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EB-38
EB-13
EB-14
EB-01
EB-15
GB-10
EB-23
SD-46
EB-29
EB-16
GB-04
GB-03
EB-18
RB-17
RB-18
RB-14
RB-19
RB-16
RB-15
VC-329
VC-328
RB-42
VC-326
VC-342
VC-346
VC-327
SD-44
VC-317
VC-318
VC-338
VC-315
VC-316
SD-42
EB-21
RB-12
VC-309
SD-53
VC-306
VC-304
RB-11
SD-52
RB-27
SD-50
RB-20
RB-07
SD-43
RB-43
HA-219
HA-218
RB-13
SD-43
RB-02
RB-02
RB-10
HA-206
HA-217
RB-05
HA-211
RB-01
HA-209
HA-205
RB-03
HA-203B
RB-06
RB-08
HA-203
RB-08
HA-201
SD-41
VC-405
VC-404
VC-403
VC-402
VC-401
SD-47
HA-223
SD-45
HA-221
HA-216
HA-215
VC-604
SD-48
VC-603
VC-602
VC-601
RB-09
EB-19
SD-34
RB-04
VC-511
EB-36
SD-39
SHEET 1
SHEET 2
SHEET 2
SHEET 3
VC-508
SD-37
VC-509
VC-510
VC-512
VC-514
SD-40
VC-505
VC-506
VC-507
VC-515

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (6-8 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

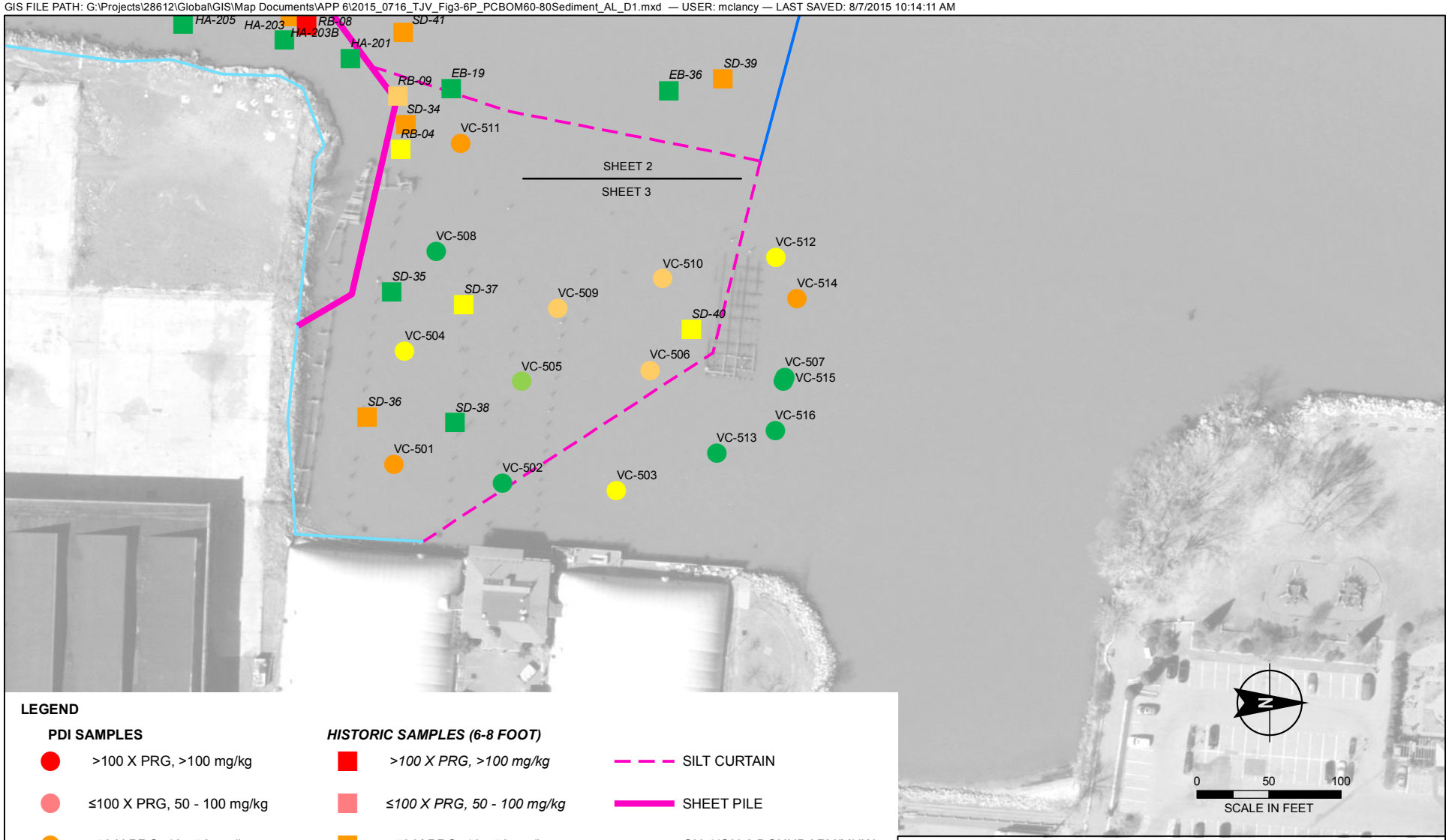
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - 6 TO 8 FOOT

AUGUST 2015

FIGURE 3.6P
SHEET 2 OF 3

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6P_PCBOM60-80Sediment_AL_D1.mxd — USER: mclancy — LAST SAVED: 8/7/2015 10:14:11 AM



LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (6-8 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - 6 TO 8 FOOT

FIGURE 3.6P
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-08
EB-38
EB-07
GB-17
GB-14
EB-10
EB-13
CS-47
CS-37
CS-42
CS-45
EB-30
SHEET 2
SHEET 1
CS-29
GB-16
CS-41
CS-36
EB-24
GB-13
EB-02
CS-46
CS-44
CS-28
GB-12
SD-62B
SD-63B
SD-63C
CS-48
VC-422
SD-60B
SD-60C
SD-60A
CS-31
SD-62A
SD-65A
EB-03
VC-421
VC-420
VC-419
SD-67A
SD-65C
CS-27
SD-69A
VC-418
VC-417
CS-35
EB-25
CS-32
BS-07
CS-43
SD03-CS
SD-69B
CS-40
VC-416
EB-31
VC-415
VC-414
VC-413
VC-412
SD-61B
SD-61C
VC-411
VC-409
BS-05
VC-408
VC-407
SD-01
SD-68A
SD-68B
SD-68C
CS-33
SD-61A
VC-410
SD-66A
SD-66B
CS-30
VC-406
VC-405
VC-404
VC-403
CS-34
SD-02
SD-64C
SD-64B
SD-64A
BS-06
CS-39
VC-605
CS-26
VC-705
VC-604
VC-603
VC-704
VC-702
CS-38
VC-701
SD-03
VC-703

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6Q
SHEET 1 OF 3

AUGUST 2015

EB-38
CS-17
EB-17
CS-06
EB-13
EB-14
GB-11
SHEET 2
SHEET 1
EB-15
CS-16
CS-14
CS-13
EB-16
EB-01
GB-10
CS-19
CS-05
EB-18
CS-10
CS-15
CS-12
CS-04
CS-24
SD02-CS
SD01-CS
CS-18
SD05-CS
CS-11
CS-09
SD04-CS
CS-03
GB-09
CS-23
BS-02
CS-22
CS-21
EB-22
VC-405
VC-404
VC-403
VC-402
VC-401
CS-08
CS-20
BS-03
SD-04
BS-04
CS-02
CS-26
EB-19
EB-36
VC-604
VC-603
CS-25
VC-602
VC-601
VC-511
SD-03
BS-01
SHEET 2
SHEET 3
VC-508
VC-512
VC-510
VC-514
VC-509
CS-01
VC-506
VC-507
VC-515
VC-505

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6Q
SHEET 2 OF 3

AUGUST 2015

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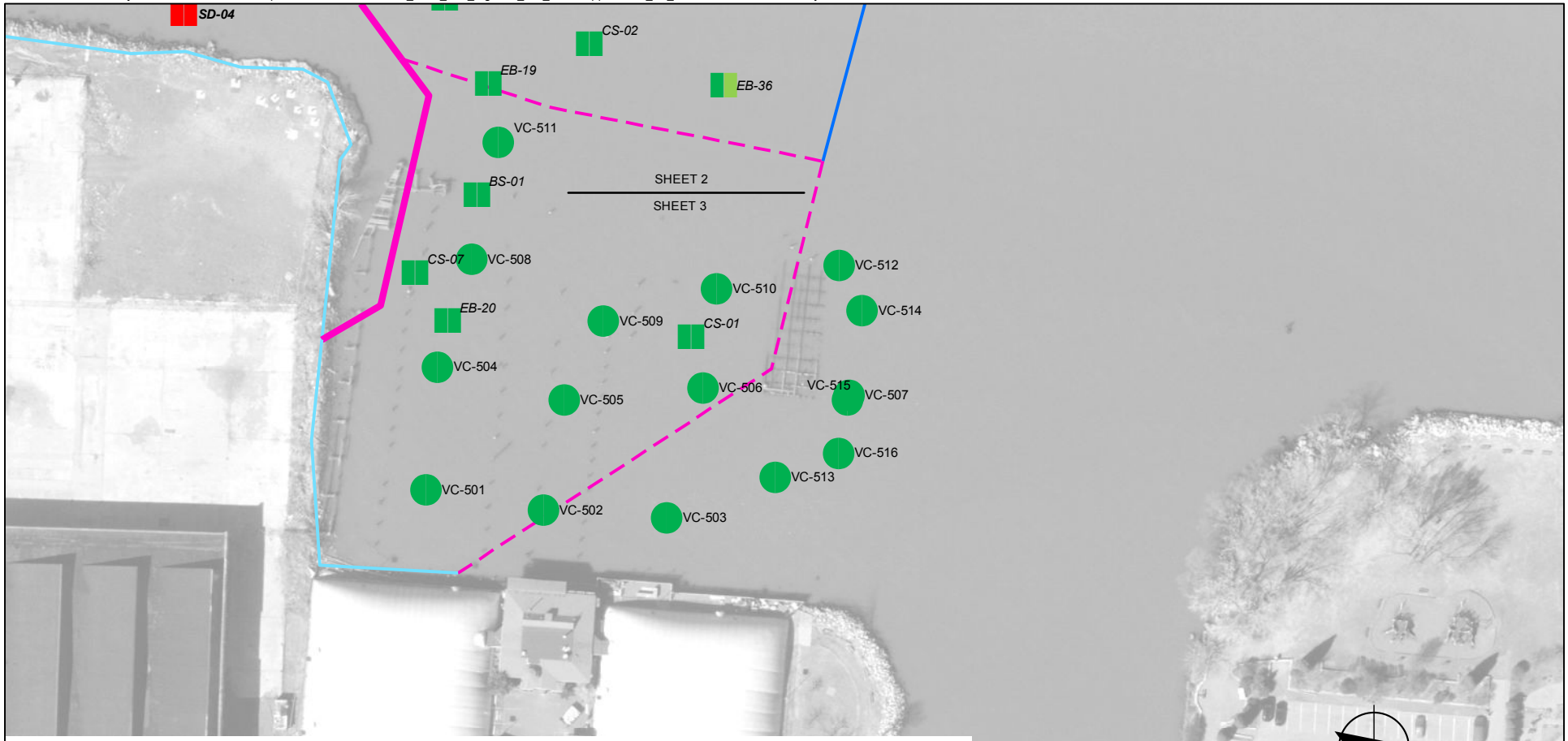


LEGEND

PDI HISTORIC

- BACKGROUND (PRG)
- ≤1.25 X PRG
- ≤1.5 X PRG
- ≤2 X PRG
- ≤5 X PRG
- ≤10 X PRG
- >10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

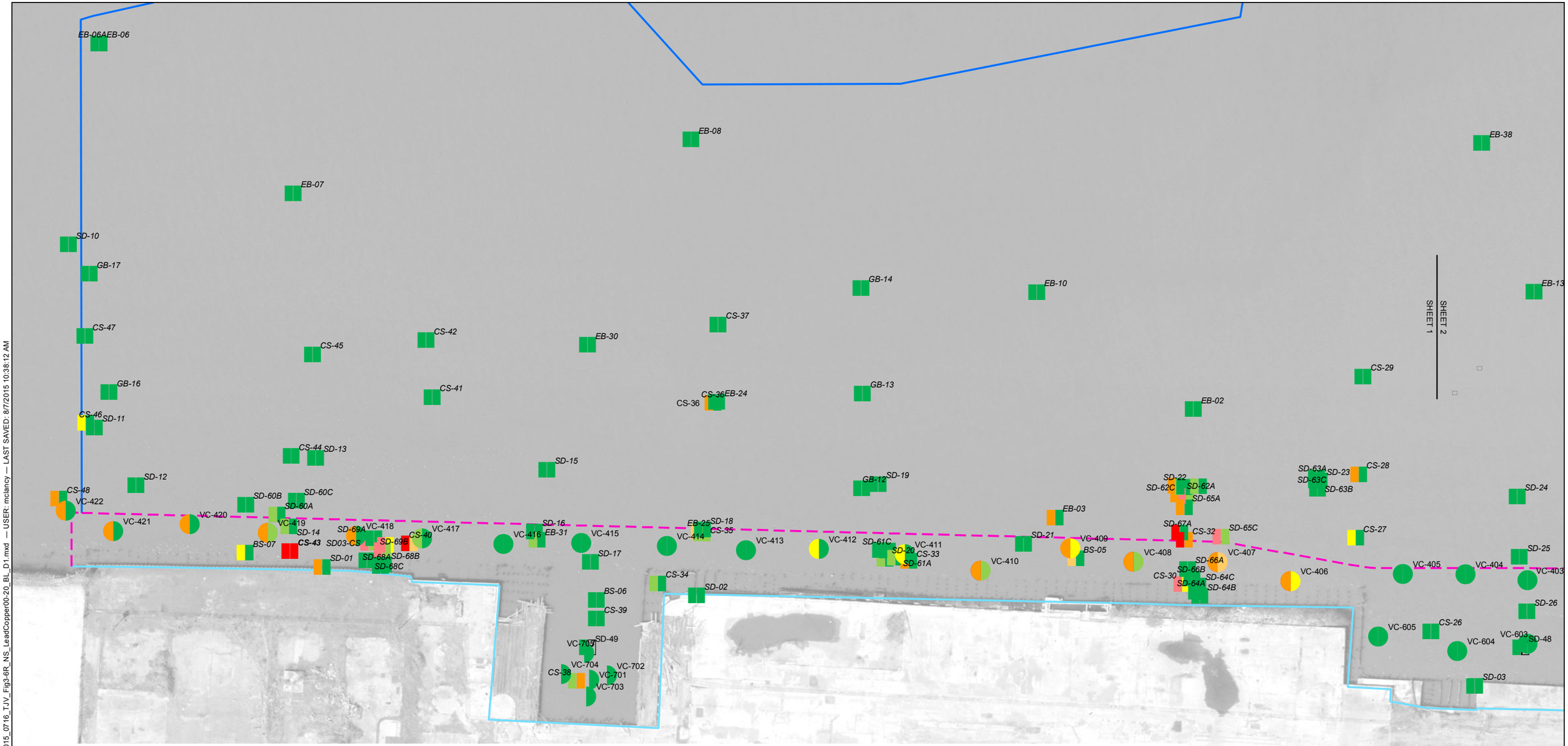
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - SURFACE TO 0.5 FOOT

FIGURE 3.6Q
SHEET 3 OF 3

AUGUST 2015



LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - SURFACE TO 2 FOOT

FIGURE 3.6R
SHEET 1 OF 3

AUGUST 2015

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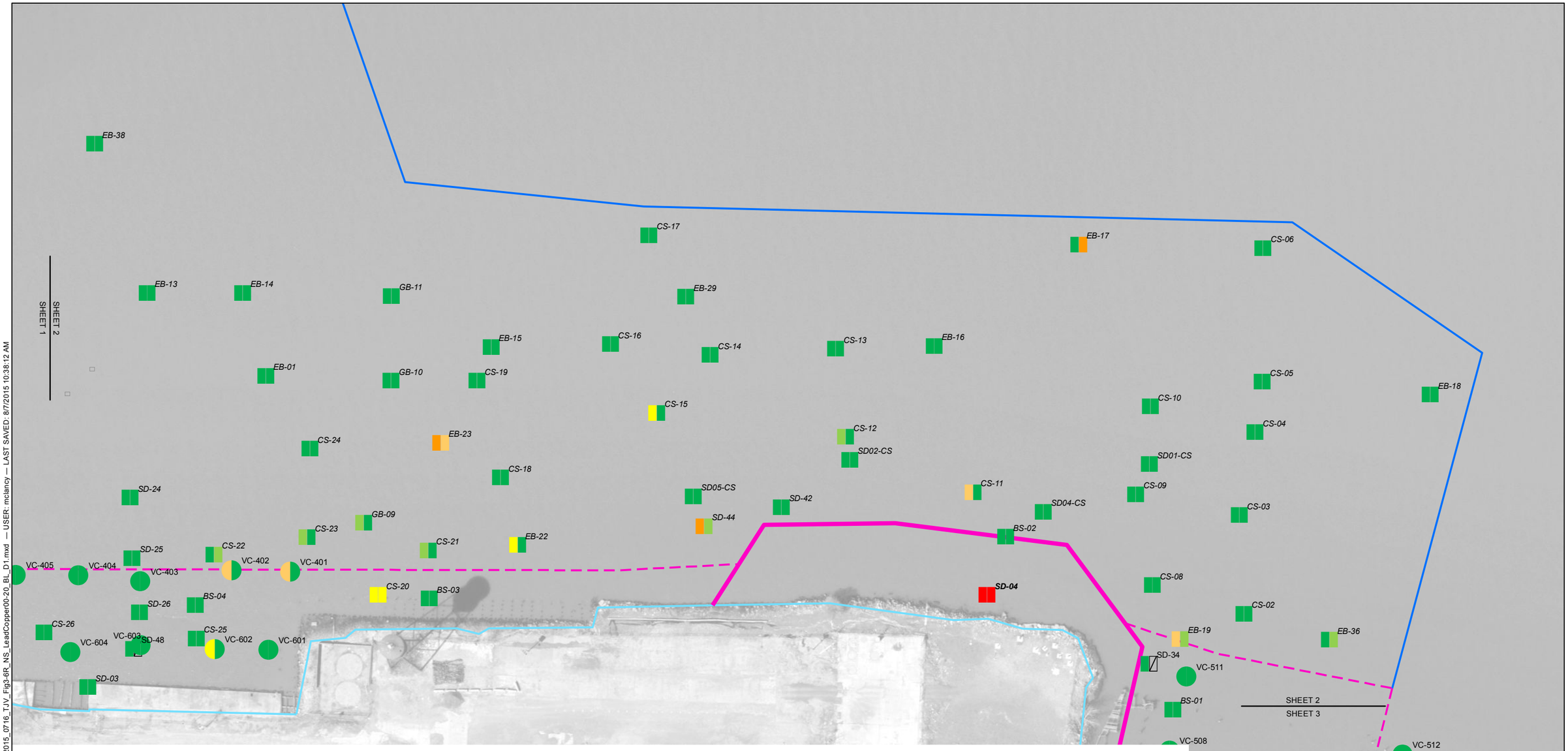

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

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≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - SURFACE TO 2 FOOT

FIGURE 3.6R
SHEET 2 OF 3

AUGUST 2015

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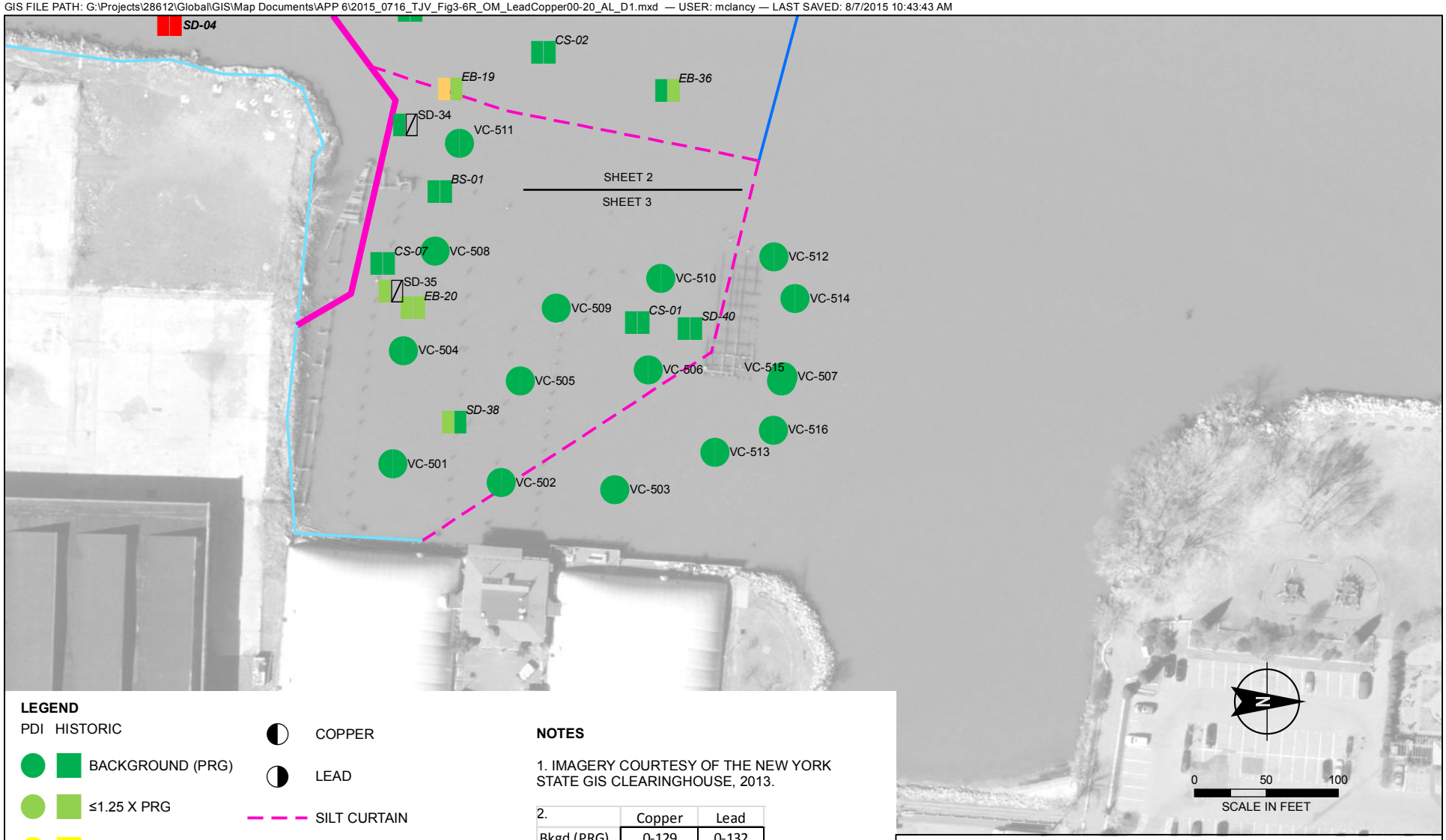

LEGEND

PDI HISTORIC

- BACKGROUND (PRG)
- ≤1.25 X PRG
- ≤1.5 X PRG
- ≤2 X PRG
- ≤5 X PRG
- ≤10 X PRG
- >10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

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≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - SURFACE TO 2 FOOT

FIGURE 3.6R
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-08
EB-38
EB-07
GB-17
GB-14
EB-10
EB-13
CS-37
CS-47
CS-42
CS-45
EB-30
SHEET 2
SHEET 1
GB-16
EB-24
CS-36
GB-13
EB-11
EB-02
CS-46
CS-44
CS-28
GB-12
CS-48
VC-422
CS-31
EB-03
VC-421
VC-420
VC-419
VC-418
VC-417
VC-416
EB-31
VC-415
CS-35
EB-25
VC-414
VC-413
VC-412
VC-411
VC-410
VC-409
VC-408
VC-407
CS-43
CS-33
CS-32
CS-27
CS-30
VC-406
VC-405
VC-404
VC-403
CS-39
VC-605
CS-26
SD-49
VC-705
VC-604
VC-603
SD-48
VC-704
VC-701
CS-38
VC-702
VC-703

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

NOTES

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≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 2 TO 4 FOOT

AUGUST 2015

FIGURE 3.6S
SHEET 1 OF 3

EB-38
EB-13
EB-14
GB-11
EB-15
CS-16
CS-14
EB-16
EB-17
CS-06
EB-01
GB-10
CS-19
EB-18
CS-15
CS-24
EB-23
CS-12
CS-18
CS-11
CS-09
SD-42
CS-03
GB-09
SD-44
CS-23
CS-22
CS-21
EB-22
VC-405
VC-404
VC-403
VC-402
VC-401
CS-20
CS-08
CS-02
CS-26
VC-604
VC-603
SD-48
VC-602
VC-601
EB-19
EB-36
SD-34
VC-511
SHEET 1
SHEET 2
SHEET 2
SHEET 3
VC-508
VC-512
VC-510
VC-514
VC-509
SD-40
VC-505
VC-506
VC-507
VC-515

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

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	Copper	Lead
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>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 2 TO 4 FOOT

AUGUST 2015

FIGURE 3.6S
SHEET 2 OF 3

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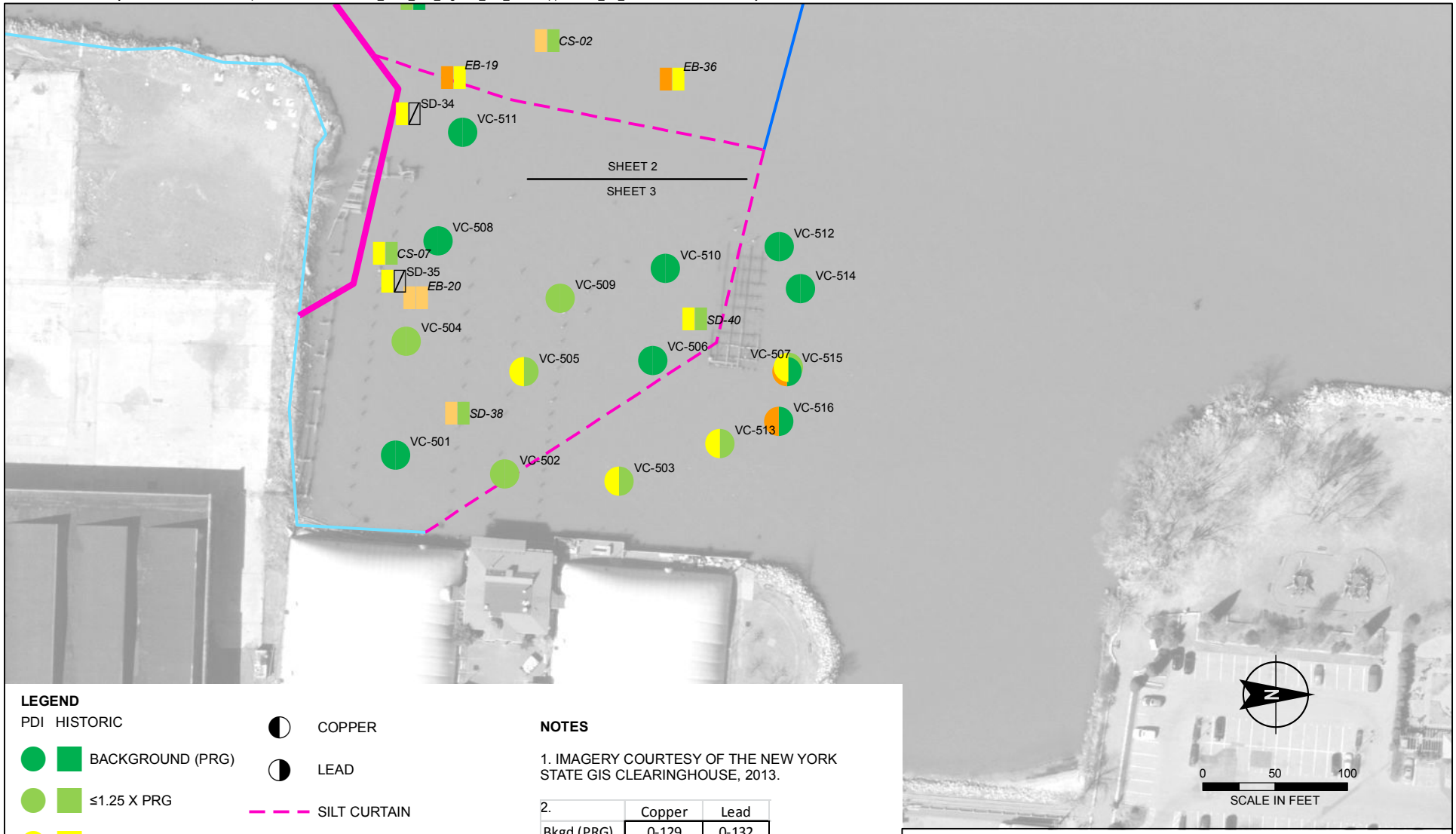

LEGEND

PDI HISTORIC

- BACKGROUND (PRG)
- ≤1.25 X PRG
- ≤1.5 X PRG
- ≤2 X PRG
- ≤5 X PRG
- ≤10 X PRG
- >10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

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	Copper	Lead
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≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

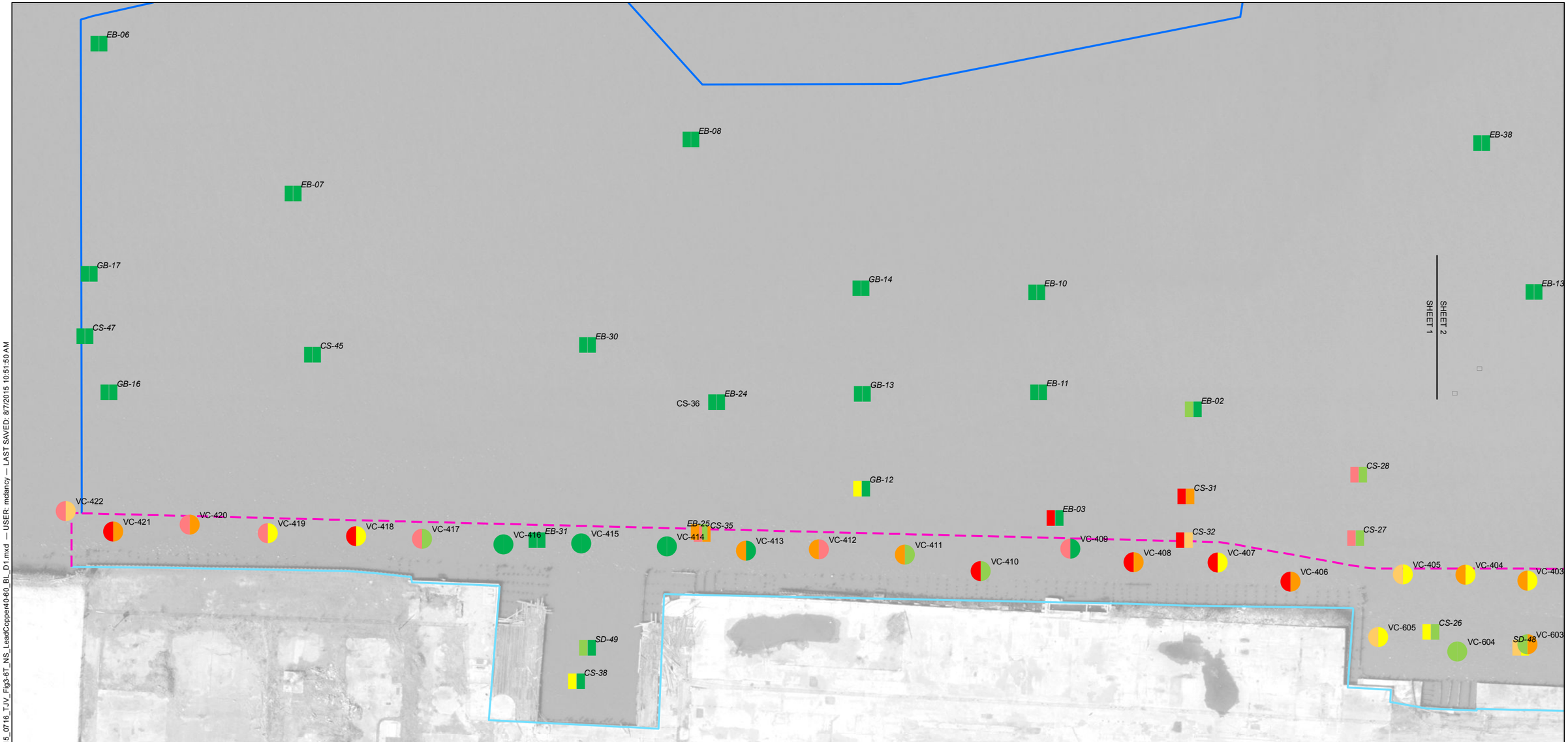
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 2 TO 4 FOOT

FIGURE 3.6S
SHEET 3 OF 3

AUGUST 2015



LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

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≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 4 TO 6 FOOT

FIGURE 3.6T
SHEET 1 OF 3

AUGUST 2015

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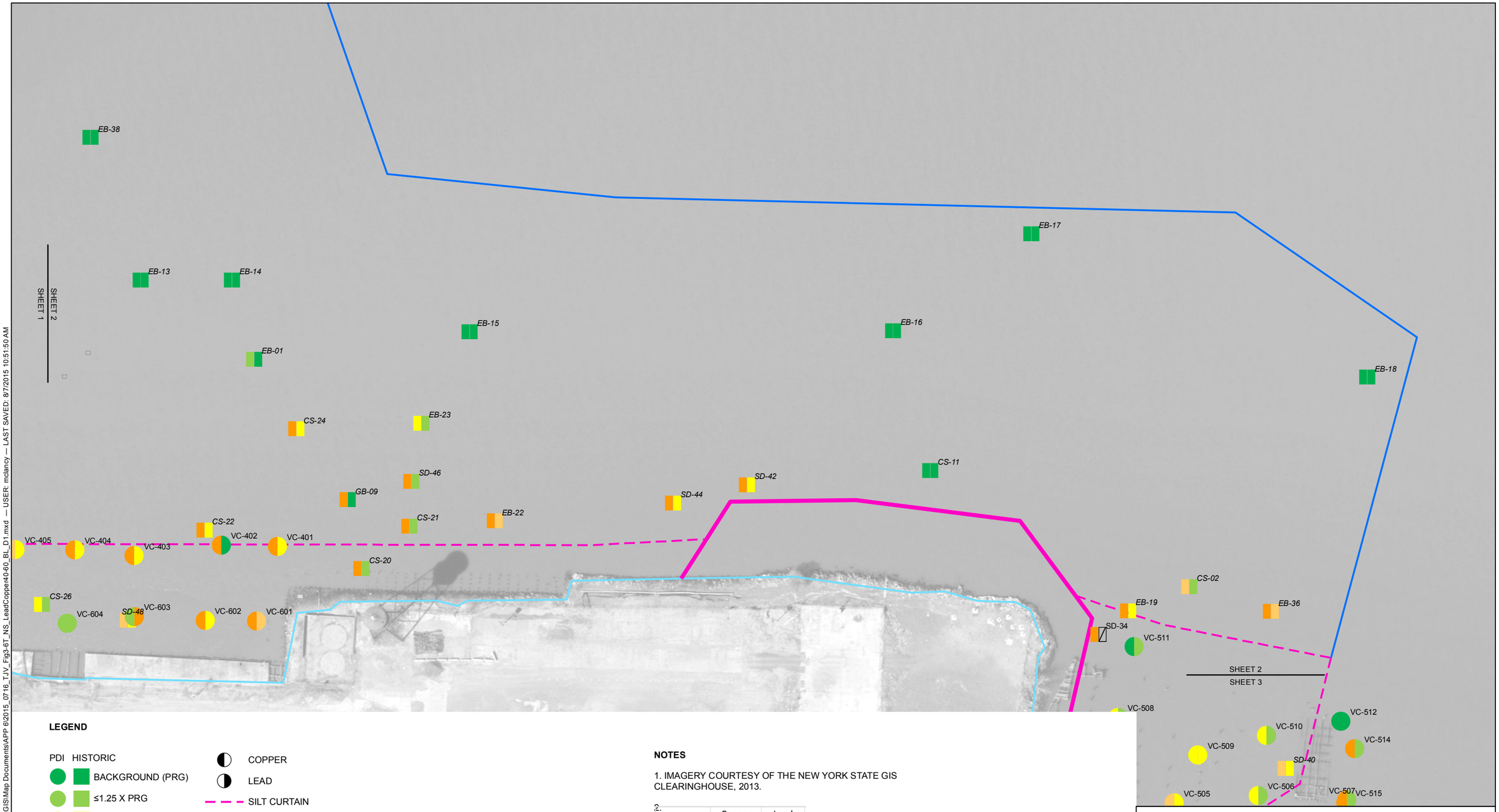

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

NOTES

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≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 4 TO 6 FOOT

FIGURE 3.6T
SHEET 2 OF 3

AUGUST 2015

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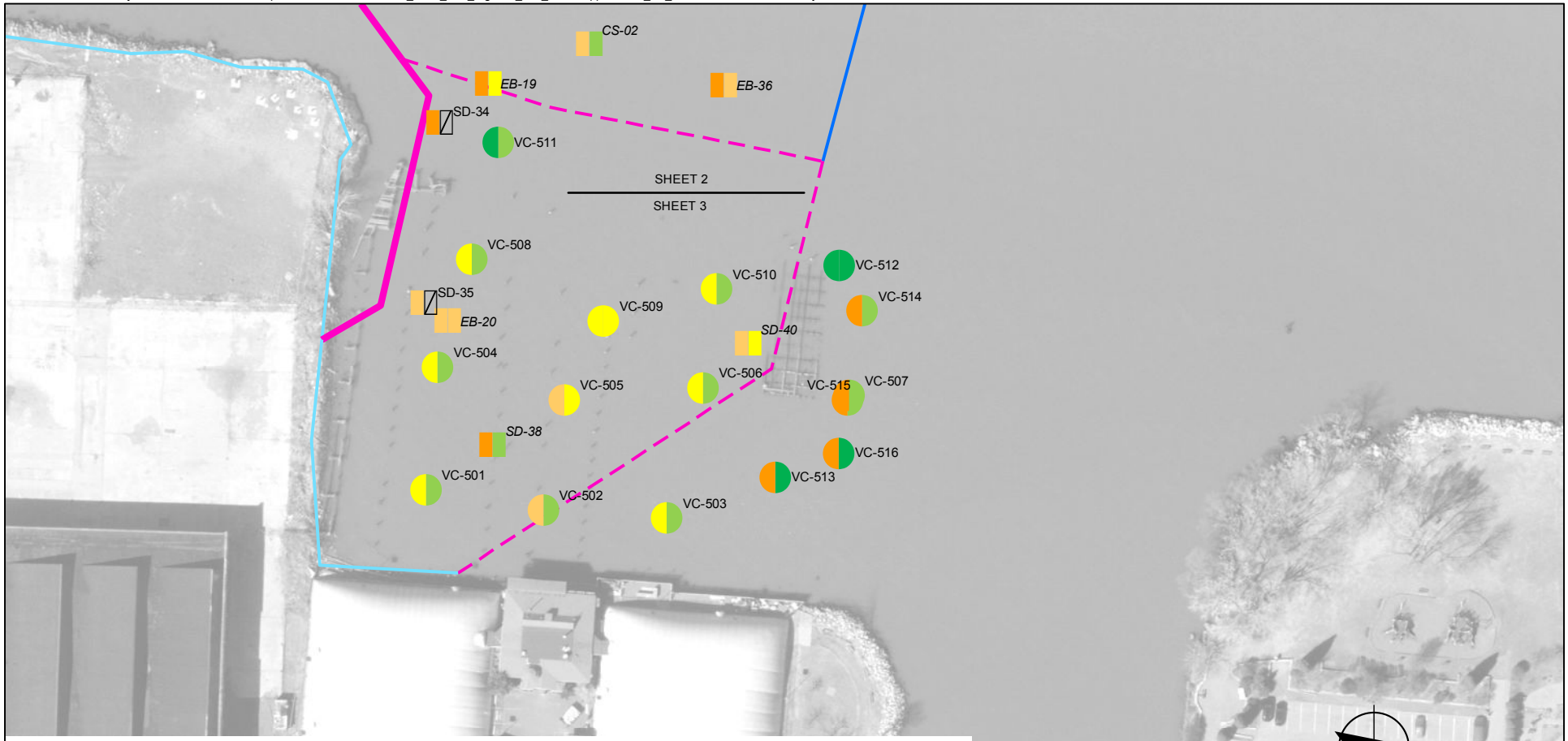

LEGEND

PDI HISTORIC

- BACKGROUND (PRG)
- ≤1.25 X PRG
- ≤1.5 X PRG
- ≤2 X PRG
- ≤5 X PRG
- ≤10 X PRG
- >10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
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HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 4 TO 6 FOOT

FIGURE 3.6T
SHEET 3 OF 3

AUGUST 2015

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
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>10 X PRG	>1,290	>1,320

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 6 TO 8 FOOT

AUGUST 2015

FIGURE 3.6U
SHEET 1 OF 3

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EB-13
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EB-18
EB-23
SD-46
GB-09
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SD-44
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VC-401
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SD-48
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VC-602
VC-601
EB-19
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SD-34
VC-511
VC-508
VC-512
VC-510
VC-514
VC-509
SD-40
VC-505
VC-506
VC-507
VC-515

SHEET 1
SHEET 2
SHEET 2
SHEET 3

LEGEND

PDI	HISTORIC	
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

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N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 6 TO 8 FOOT

FIGURE 3.6U
SHEET 2 OF 3

AUGUST 2015

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LEGEND

PDI HISTORIC

- BACKGROUND (PRG)
- ≤1.25 X PRG
- ≤1.5 X PRG
- ≤2 X PRG
- ≤5 X PRG
- ≤10 X PRG
- >10 X PRG

- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
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HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI LEAD AND COPPER RESULTS - 6 TO 8 FOOT

FIGURE 3.6U
SHEET 3 OF 3

AUGUST 2015

LEGEND

- PD2-GR-009 — DESIGNATION AND APPROXIMATE LOCATION OF GEOTECHNICAL TEST BORING DRILLED IN THE RIVER DURING PRE-DESIGN INVESTIGATION IN 2014.
- PD2-GL-001 — DESIGNATION AND APPROXIMATE LOCATION OF GEOTECHNICAL TEST BORING DRILLED ON LAND DURING PRE-DESIGN INVESTIGATION IN 2013.
- PD2-TP-2 — DESIGNATION AND APPROXIMATE LOCATION OF GEOTECHNICAL TEST PIT EXCAVATED DURING PRE-DESIGN INVESTIGATION IN 2014.
- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- CONCEPTUAL LOCATION OF NORTHWEST BULKHEAD EXTENSION WALL. ALIGNMENT SHOWN IS APPROXIMATE ONLY AND SUBJECT TO CHANGE.

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
3. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
4. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
5. THE BATHYMETRY CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

W S N E

0 100 200 300 400

SCALE IN FEET

DRAFT

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

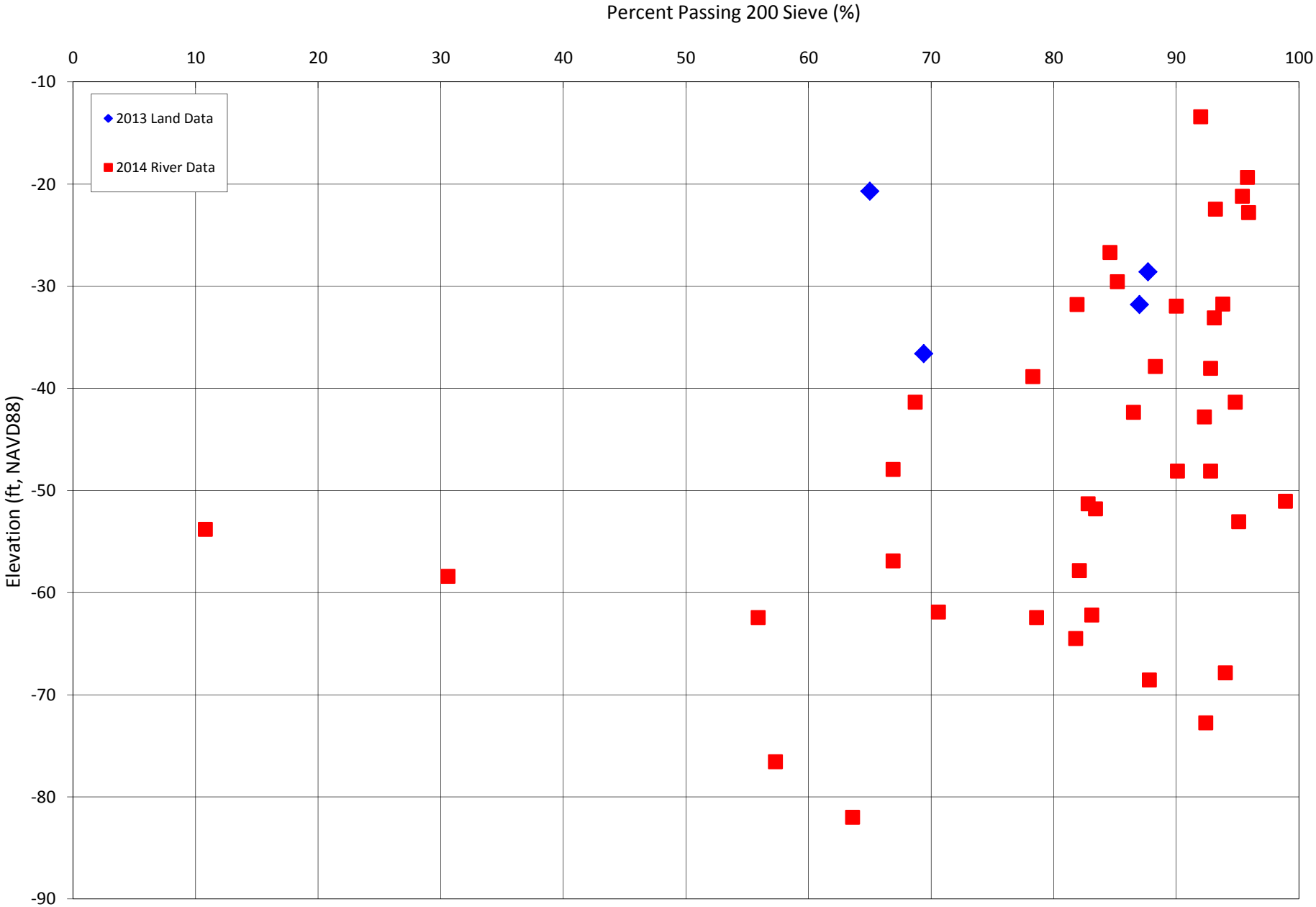
LOCATION PLAN - GEOTECHNICAL BORINGS AND TEST PITS

SCALE: AS SHOWN
JULY 2015

FIGURE 3.7A

1 River Street
Hastings-on-Hudson, New York

FIGURE 3.7B
PERCENT FINES IN MARINE SILT STRATUM VERSUS ELEVATION



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.
Prepared by Haley & Aldrich
Printed on 8/7/2015

1 River Street
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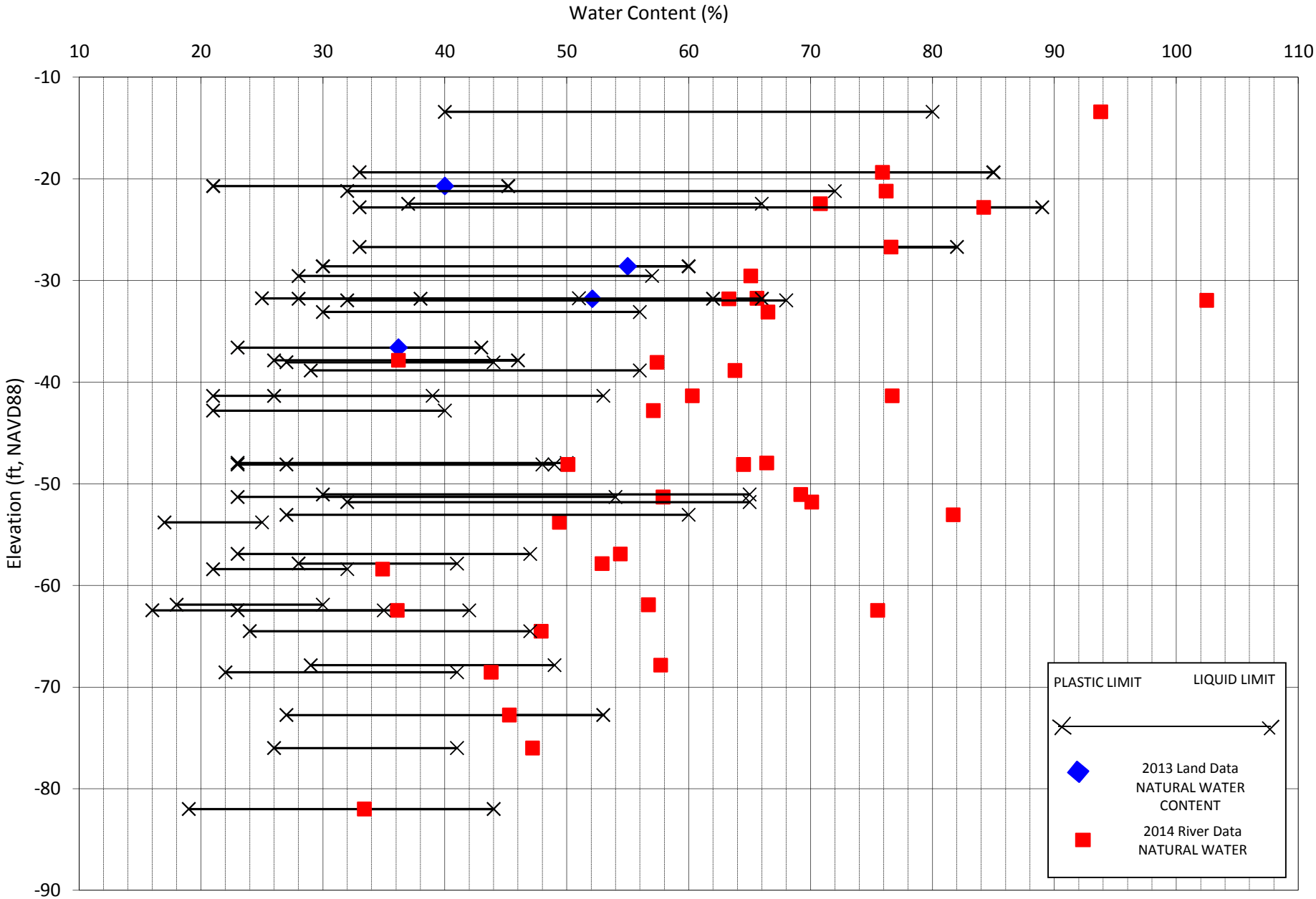
FIGURE 3.7C
ATTERBERG LIMITS VERSUS ELEVATION IN MARINE SILT STRATUM



G:\28612\329 - 2014 PD2-GR borings\Lab Test Data\For 2015 PDI Data Report\2015-0701-HAI-Hastings-Geotechnical Laboratory Testing Results Plots from 2013-2014 Explorations-D4.xls

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FIGURE 3.7D
PLASTICITY INDEX VERSUS ELEVATION IN MARINE SILT STRATUM
and CORRESPONDING BURMISTER CLASSIFICATION

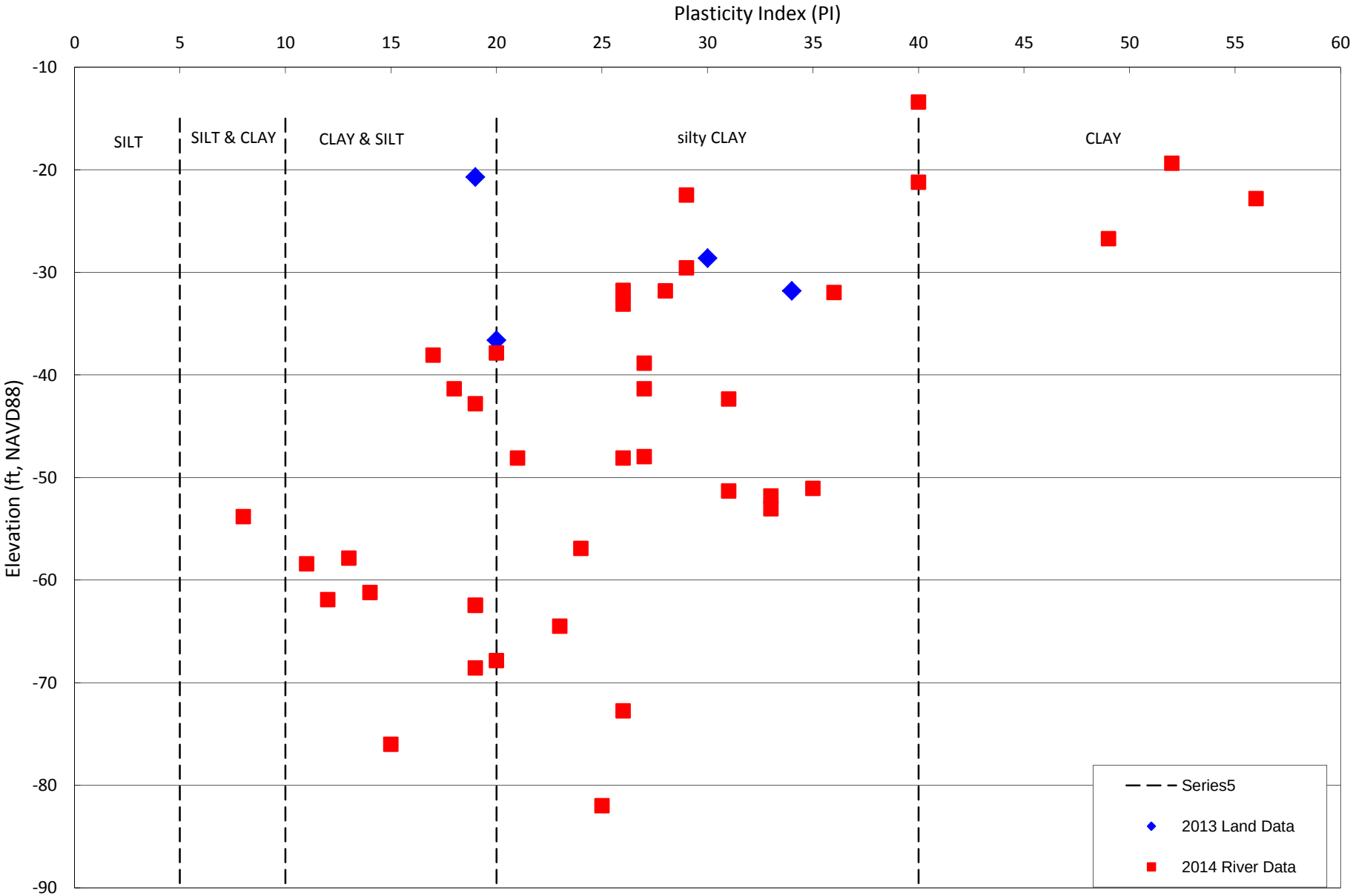

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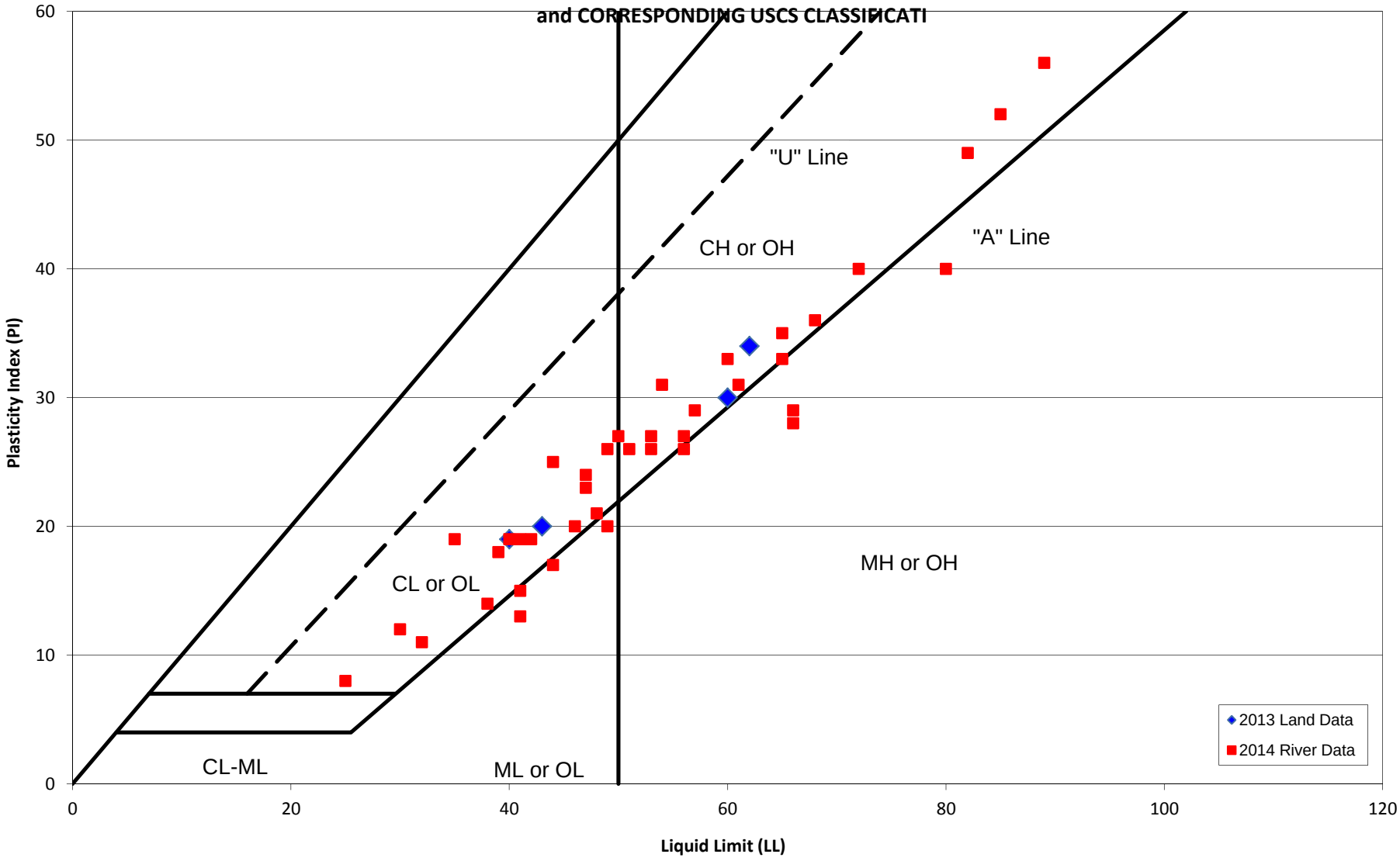
FIGURE 3.7E
PLASTICITY INDEX VERSUS LIQUID LIMIT IN MARINE SILT STRATUM



1 River Street
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FIGURE 3.7F
LIQUIDITY INDEX VERSUS ELEVATION IN MARINE SILT STRATUM

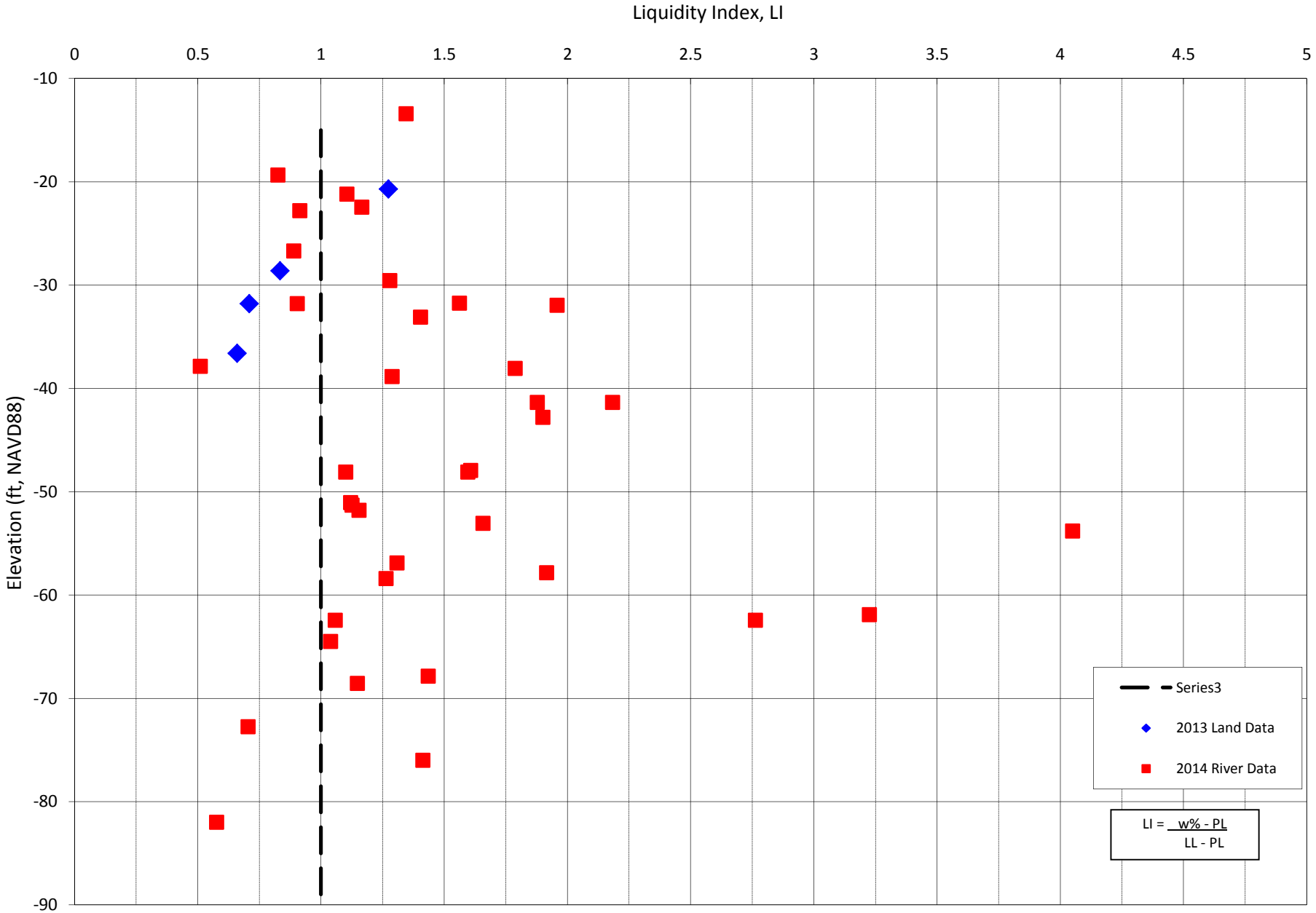

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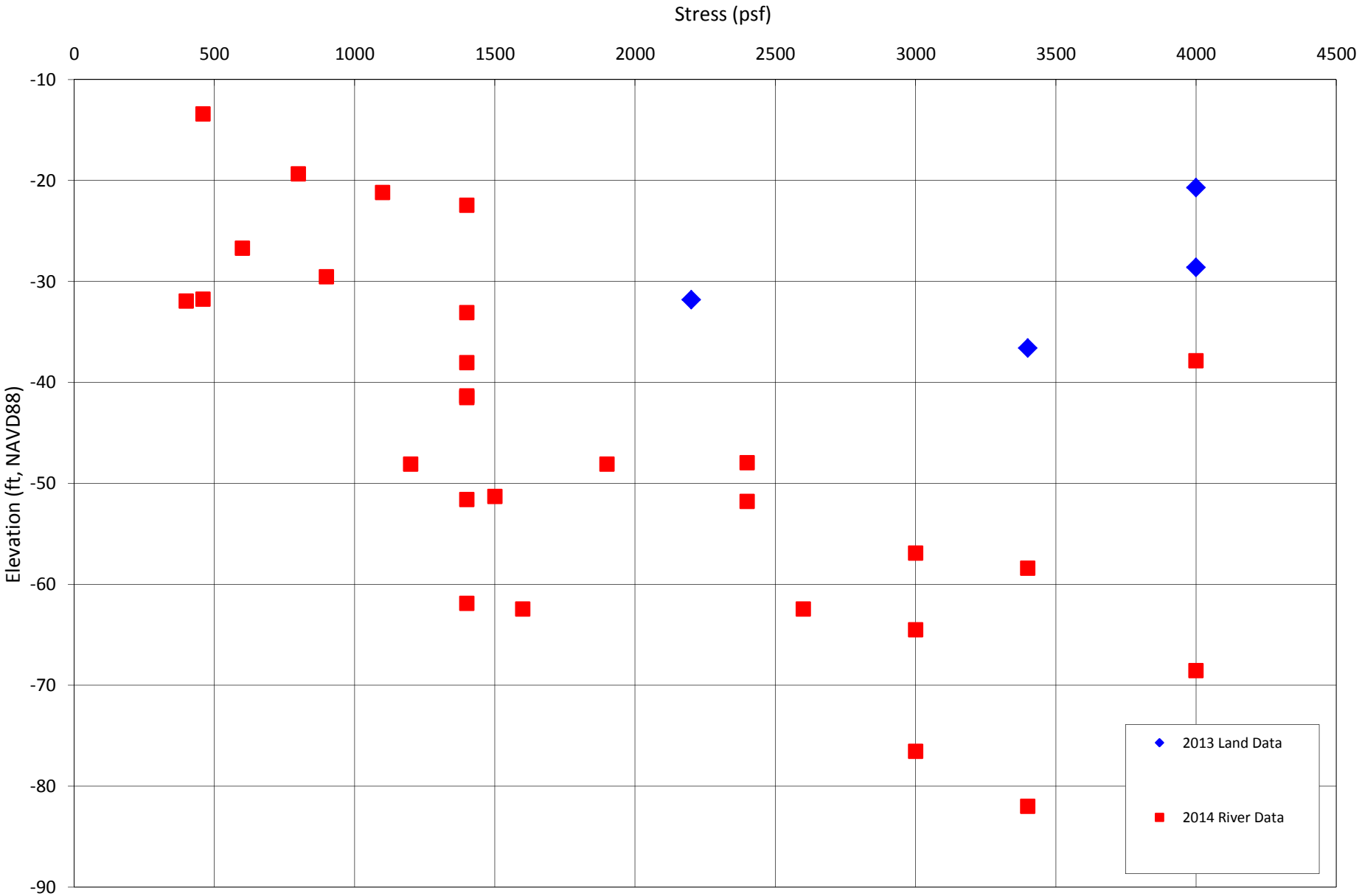
FIGURE 3.7G
PRECONSOLIDATION PRESSURE VERSUS ELEVATION IN MARINE SILT STRATUM



G:\28612\329 - 2014 PD2-GR borings\Lab Test Data\For 2015 PDI Data Report\2015-0701-HAI-Hastings-Geotechnical Laboratory Testing Results Plots from 2013-2014 Explorations-D4.xls
.
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FIGURE 3.7H
COMPRESSION RATIO VERSUS ELEVATION IN MARINE SILT STRATUM

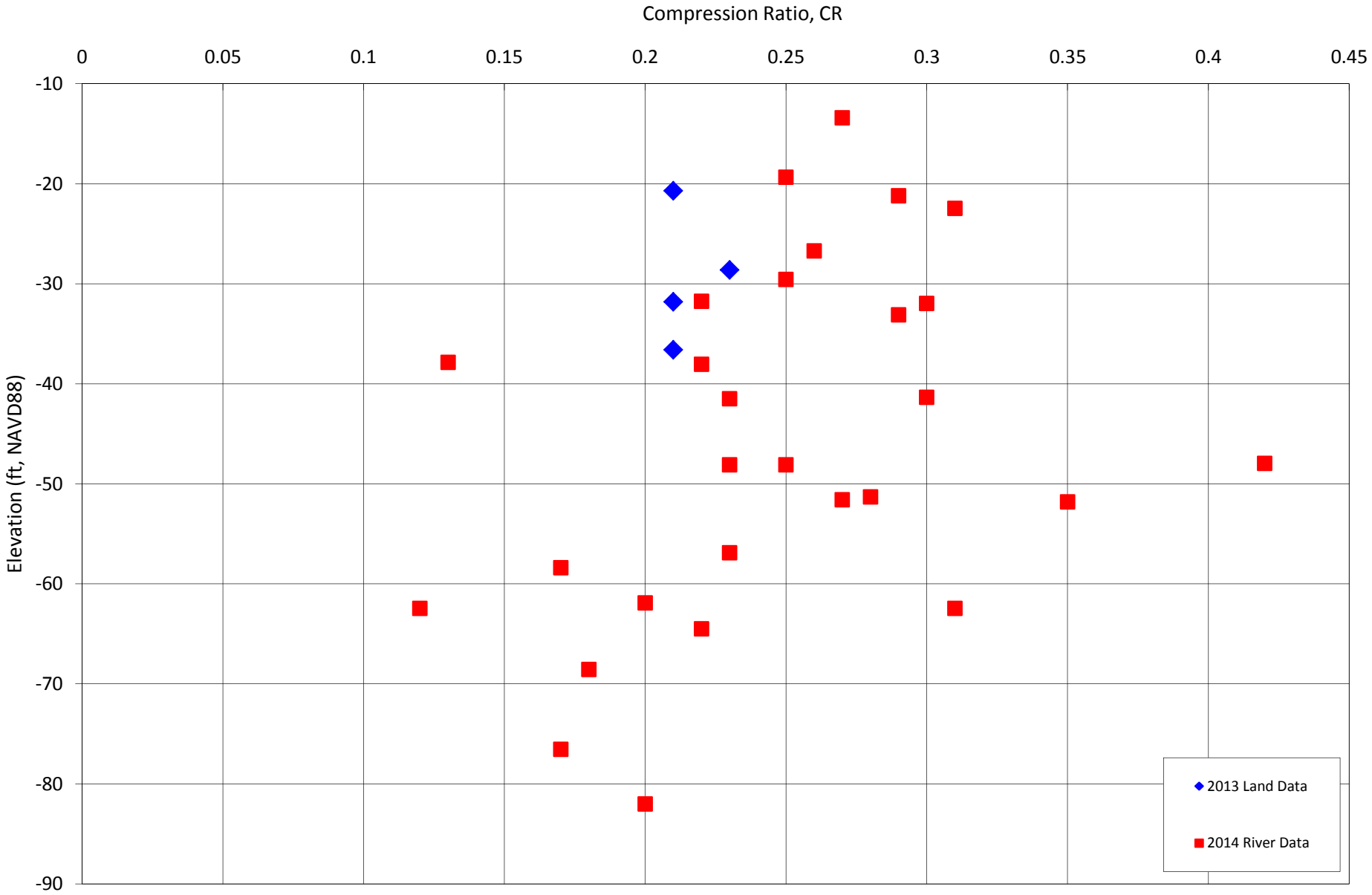
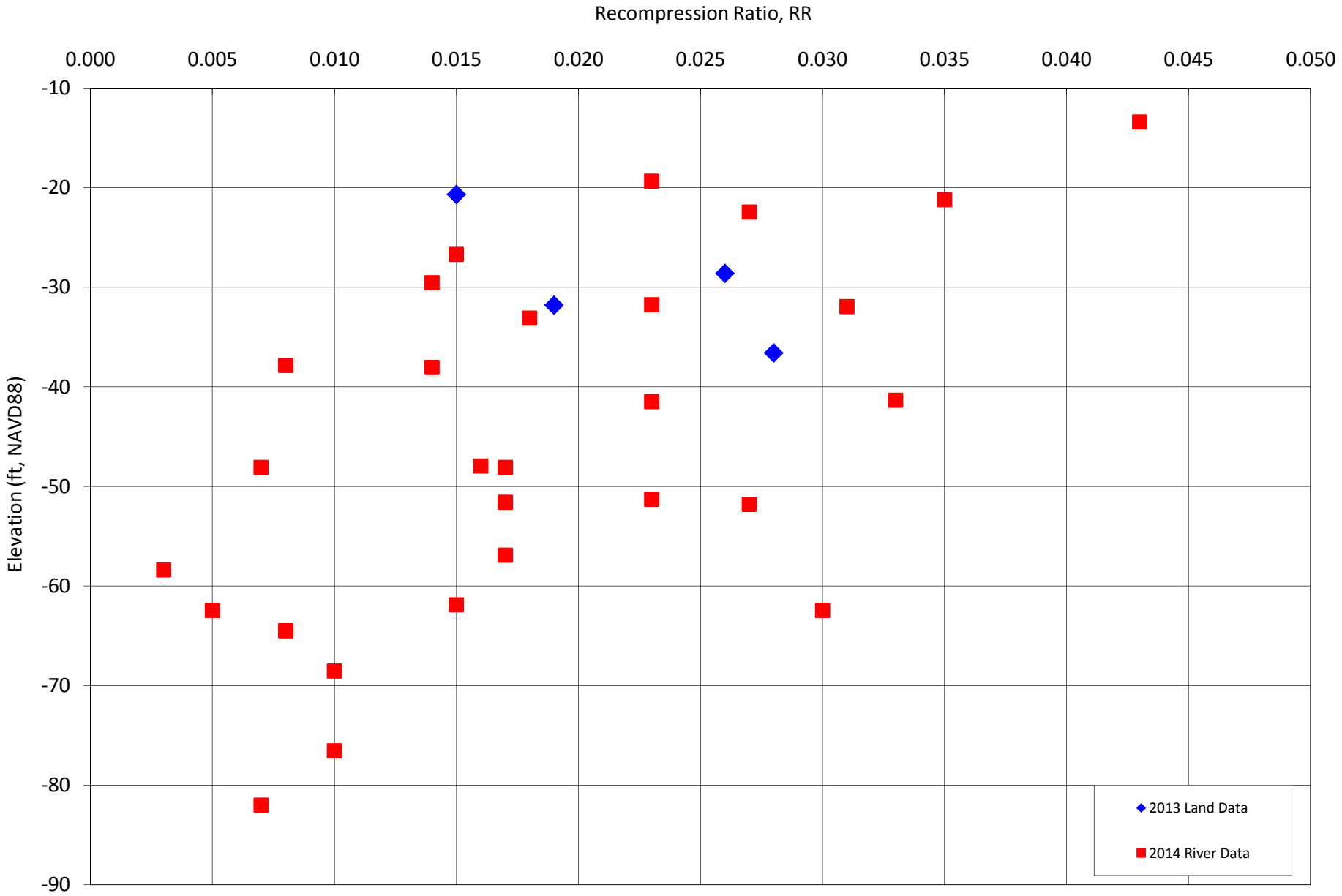


FIGURE 3.7I
RECOMPRESSION RATIO VERSUS ELEVATION IN MARINE SILT STRATUM



1 River Street
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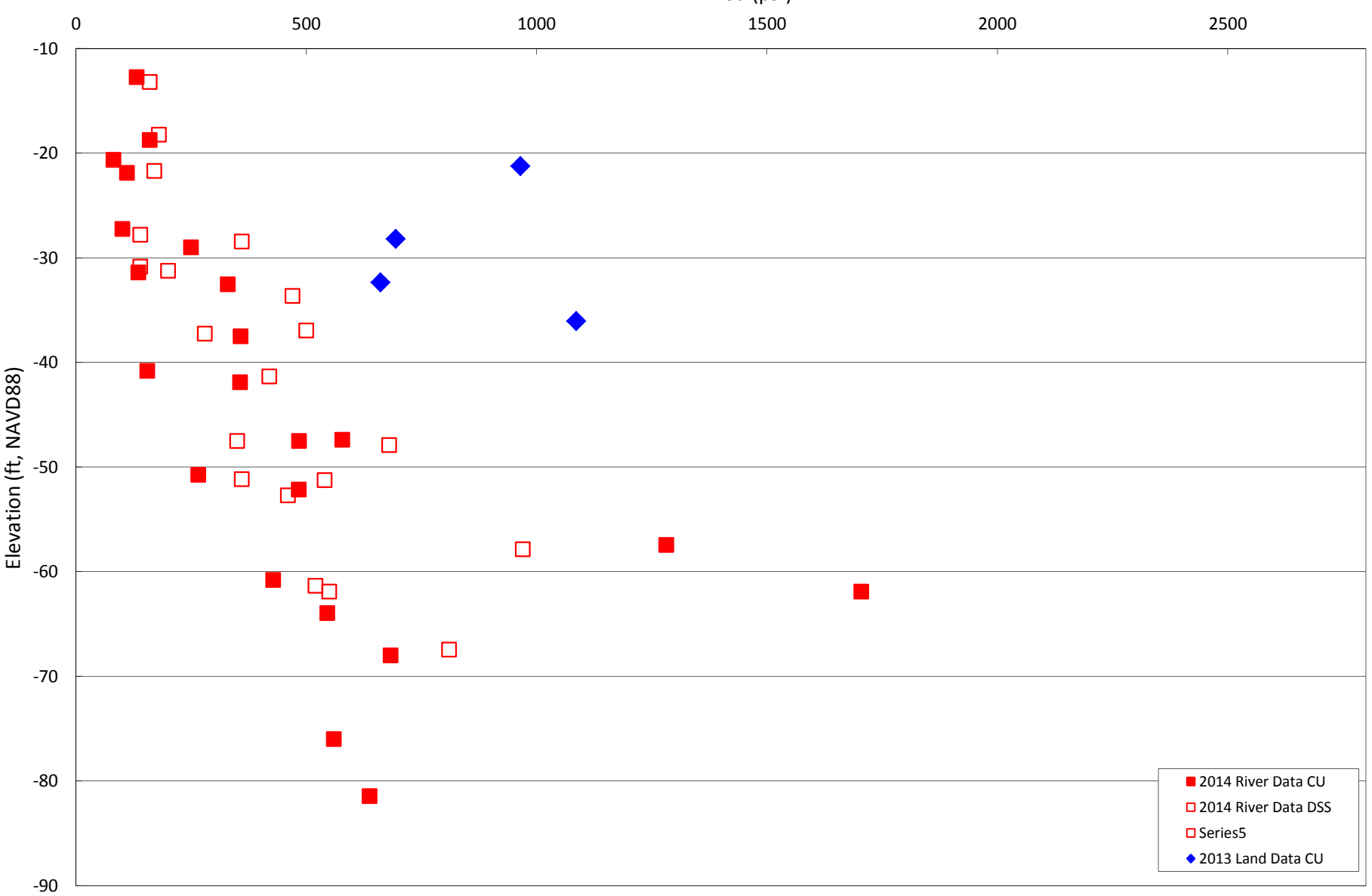
FIGURE 3.7J
UNDRAINED SHEAR STRENGTH VERSUS ELEVATION IN MARINE SILT STRATUM
FROM TRIAXIAL CONSOLIDATED UNDRAINED (CU) OR DIRECT SIMPLE SHEAR (DSS)



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.
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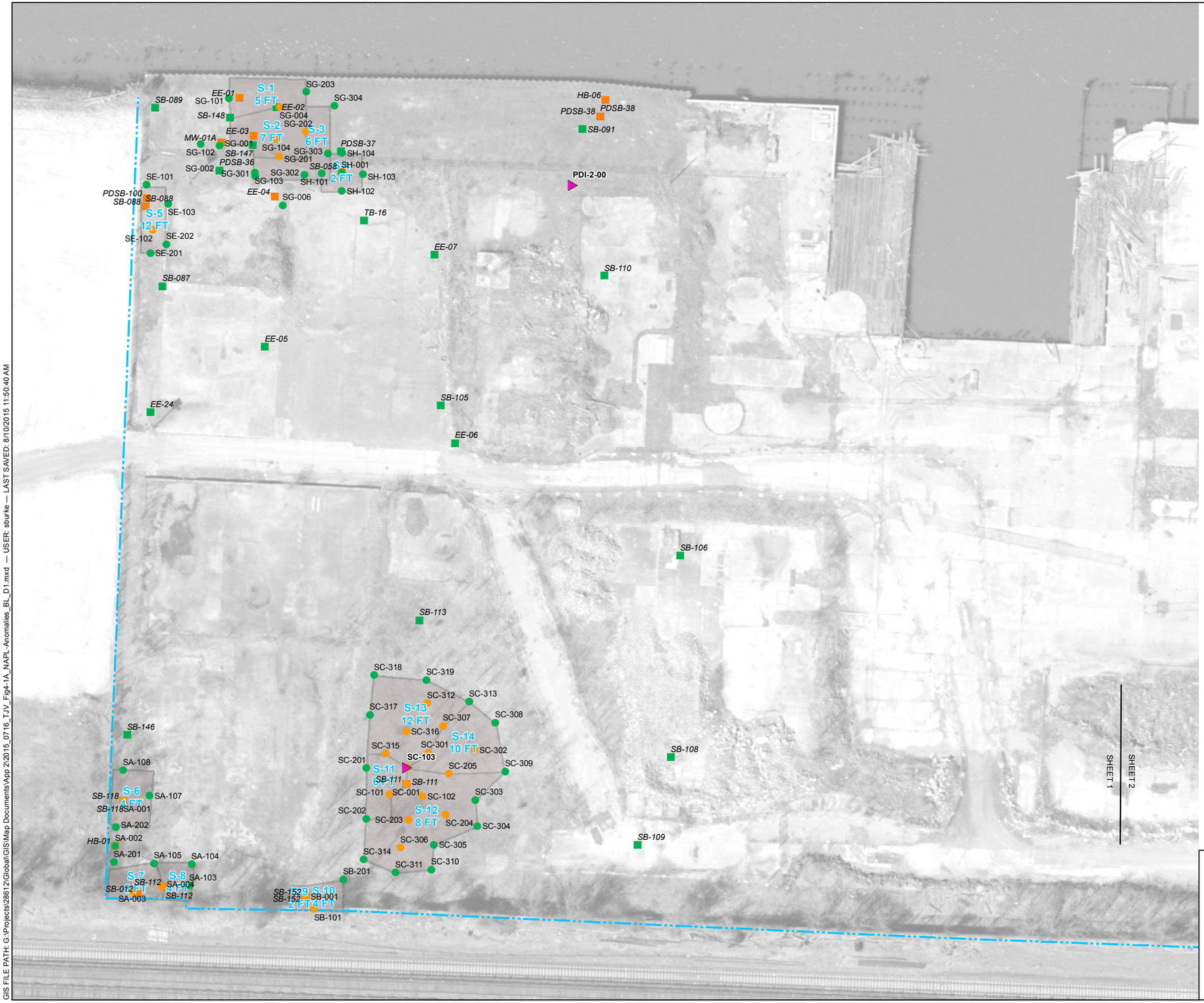

LEGEND

- LNAPL OBSERVATION

PDI SAMPLE (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLE (MAX 0-12

- *> 10 mg/kg*
- *0-10 mg/kg*

- PROPERTY LIMITS
- REMOVAL

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

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LNAPL OBSERVATIONS AND REMOVAL AREAS

AUGUST 2015

FIGURE 4.1A
SHEET 1 OF 4

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EE-19
SB-095B
SS-229
SS-228
SS-221
SS-230
SS-231
PDI2-PDMW-22S-06
PDI2-PDMW-22S-03
PDMW-22S-03
PDI2-PDMW-22S-05
PDI2-PDMW-22S-01
SS-222
SM-201
PDMW-22S-04
PDMW-22S
PDI2-PDMW-22S-08
SS-223
SM-203
PDI2-PDMW-22S-02C
SS-214
SS-215
S-16
6 FT
SM-204
S-17
SM-102
SB-095A
SB-095A
SS-213
SS-216
SM-101
SS-227
SS-207
SS-201
SS-224
SM-202
SS-220
S-15
12 FT
SS-101
SS-202
SS-107
SS-212
SS-206
SS-104
PDI2-17-01
SS-102
PDI2-17-02
SS-106
SS-103
SS-105
SS-203
SS-219
SS-211
SS-205
SS-204
S-20
8 FT
SS-217
S-18
8 FT
SS-210
SS-209
S-19
12 FT
SS-208
SL-201
SL-103
SS-226
SS-218
SS-225
SL-203
PDSB-106
SL-101
4 FT
SL-202
SL-102
SB-104
SB-101
SB-100
SHEET 1
SHEET 2
SHEET 2
SHEET 3

LEGEND

- LNAPL OBSERVATION

PDI SAMPLE (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLE (MAX 0-12

- *> 10 mg/kg*
- *0-10 mg/kg*
- PROPERTY LIMITS
- REMOVAL

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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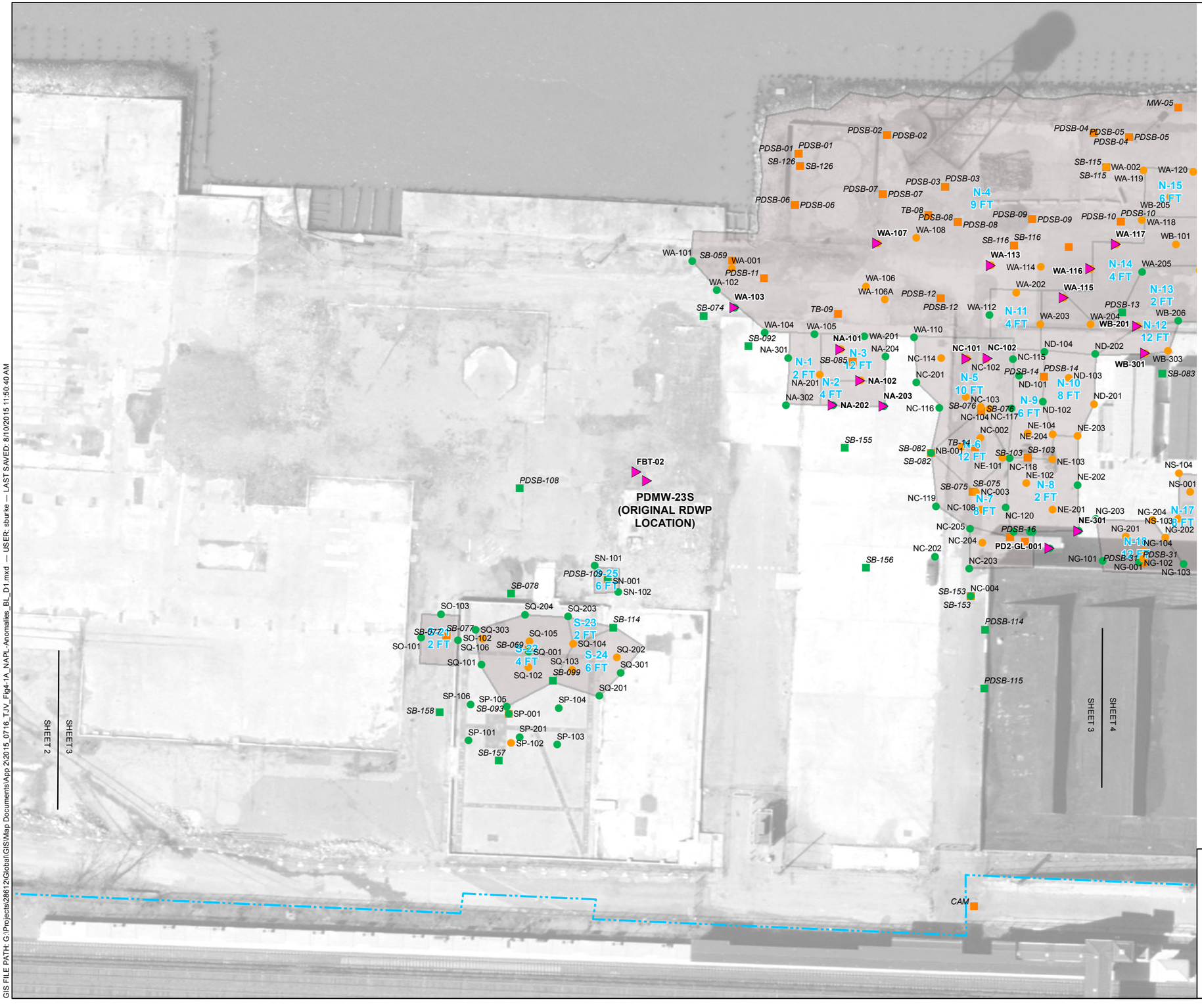
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

LNAPL OBSERVATIONS AND REMOVAL AREAS

AUGUST 2015

FIGURE 4.1A
SHEET 2 OF 4



LEGEND

- LNAPL OBSERVATION

PDI SAMPLE (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLE (MAX 0-12

- *> 10 mg/kg*
- *0-10 mg/kg*
- PROPERTY LIMITS
- REMOVAL

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

HALEY ALDRICH

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LNAPL OBSERVATIONS AND REMOVAL AREAS

AUGUST 2015

FIGURE 4.1A
SHEET 3 OF 4

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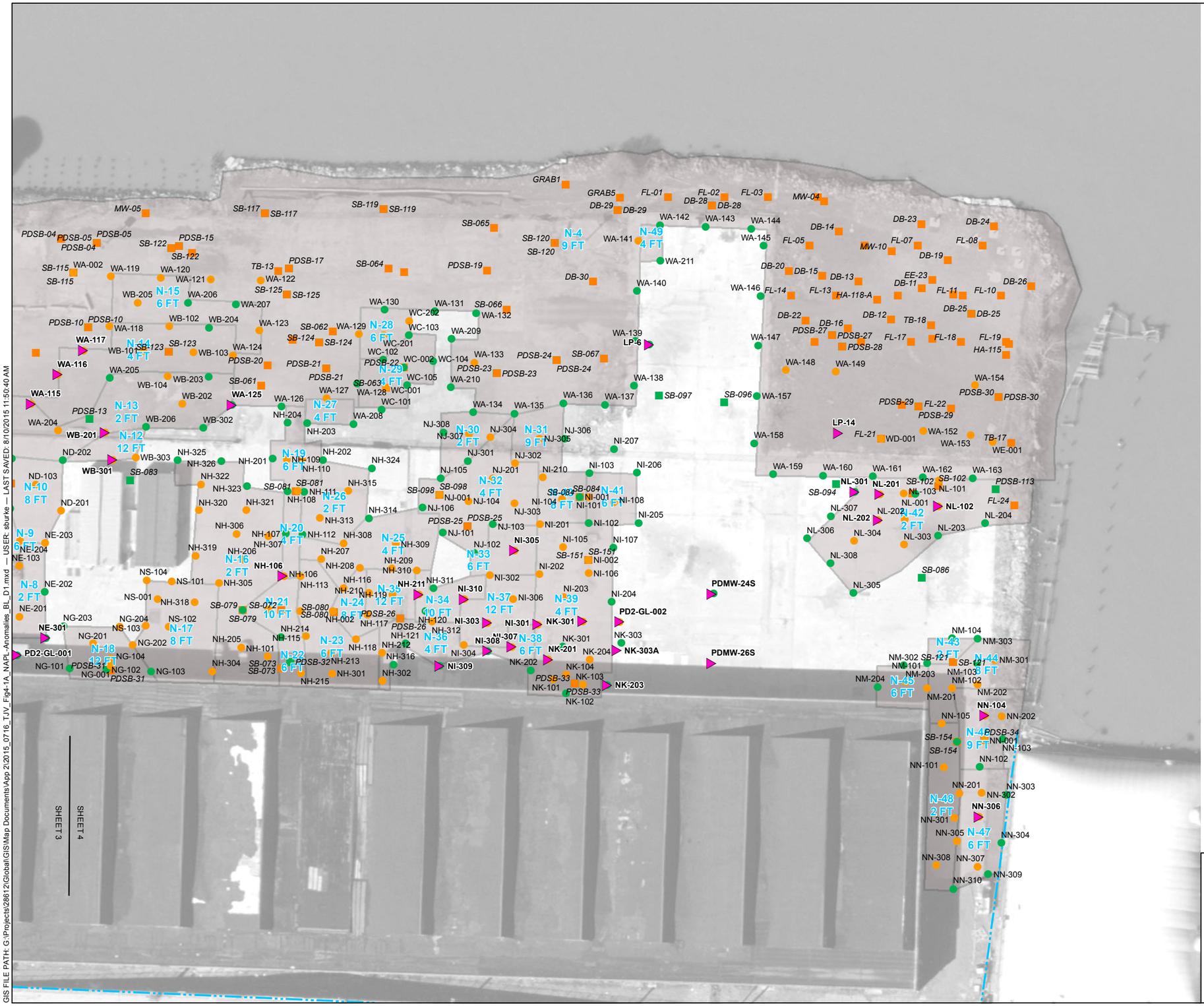

LEGEND

- LNAPL OBSERVATION

PDI SAMPLE (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLE (MAX 0-12

- *> 10 mg/kg*
- *0-10 mg/kg*

PROPERTY LIMITS

REMOVAL

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

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1 RIVER STREET
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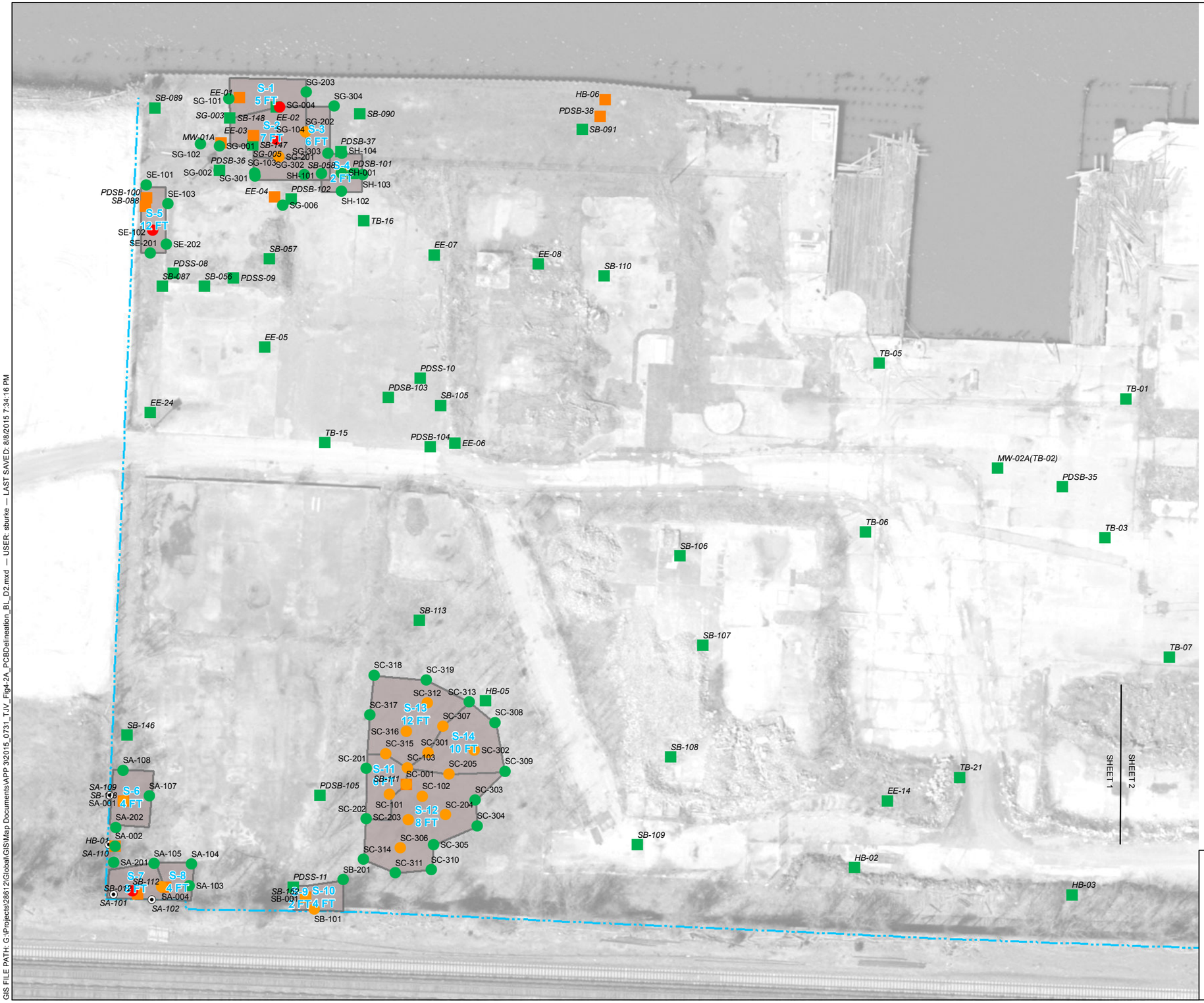
LNAPL OBSERVATIONS AND REMOVAL AREAS

FIGURE 4.1A
SHEET 4 OF 4

AUGUST 2015



LEGEND

PDI SAMPLES (MAX 0-12 FT)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

REMOVAL AREA

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

HALEY ALDRICH

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1 RIVER STREET
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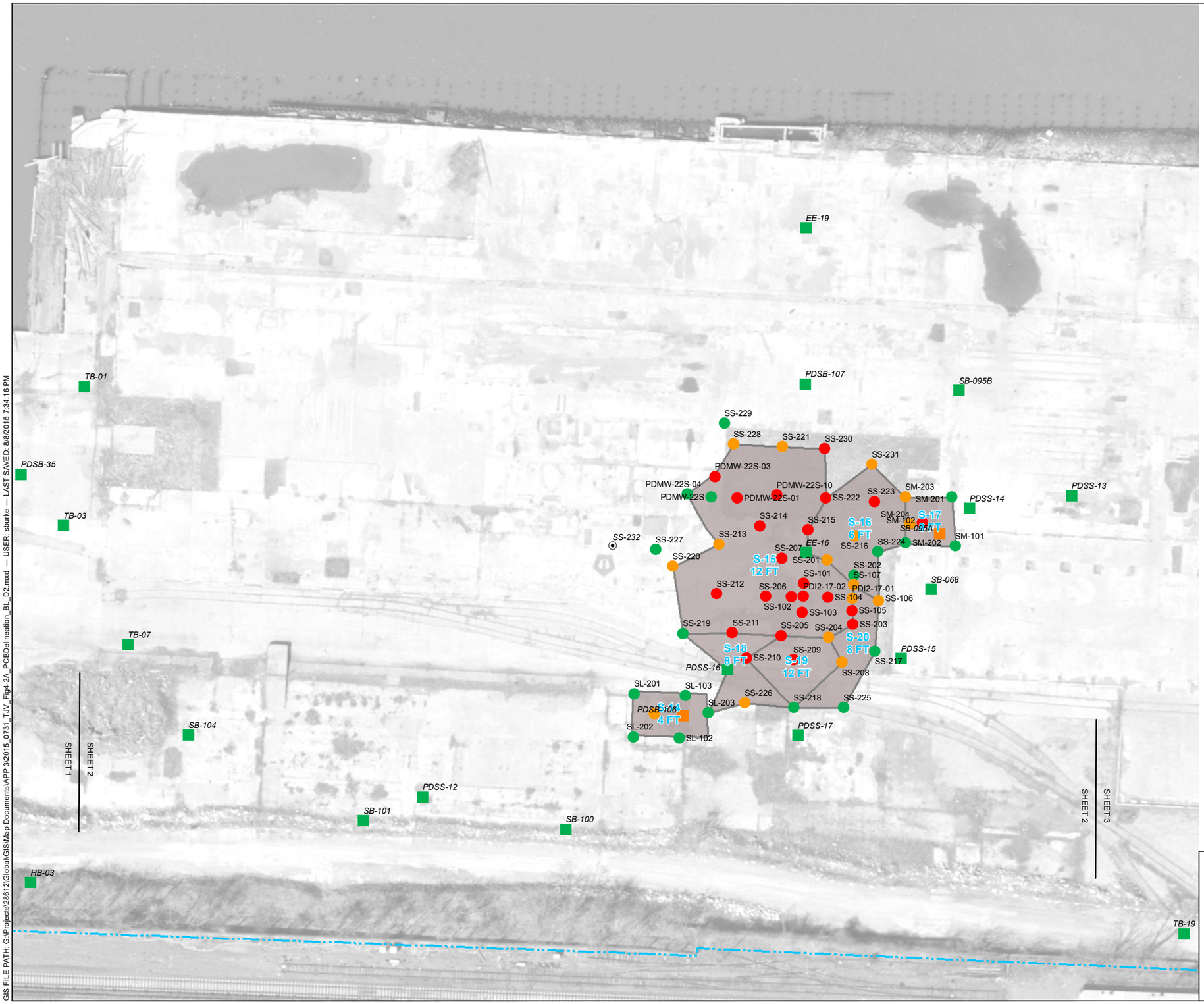
SOIL REMOVAL EVALUATION FOR PCB EXCAVATION DELINEATION

FIGURE 4.2A
SHEET 1 OF 4

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\20150731_TJV_Fig4-2A_PCBDelineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:34:16 PM



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LEGEND

PDI SAMPLES (MAX 0-12 FT)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

REMOVAL AREA

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

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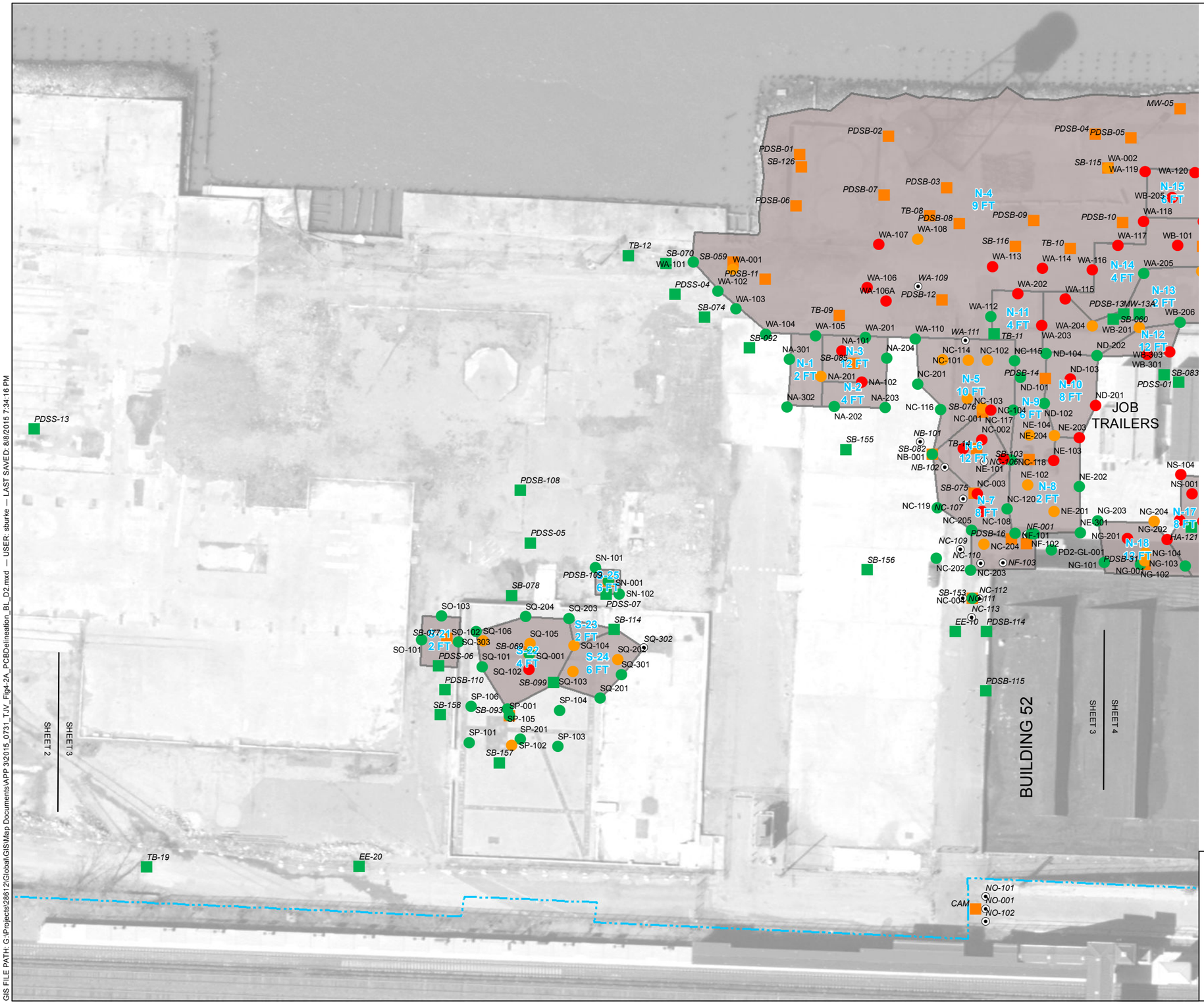
HASTINGS-ON-HUDSON, NEW YORK

SOIL REMOVAL EVALUATION FOR PCB EXCAVATION DELINEATION

FIGURE 4.2A
SHEET 2 OF 4

AUGUST 2015



LEGEND

PDI SAMPLES (MAX 0-12 FT)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

REMOVAL AREA

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SOIL REMOVAL EVALUATION FOR PCB EXCAVATION DELINEATION

FIGURE 4.2A
SHEET 3 OF 4

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2A_PCBDelineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:34:16 PM

JOB TRAILERS

BUILDING 52

SHEET 3

SHEET 4

PDMW-24S

LEGEND

PDI SAMPLES (MAX 0-12 FT)

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES (MAX 0-12 FT)

- >10 mg/kg
- 0-10 mg/kg

REMOVAL AREA

PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

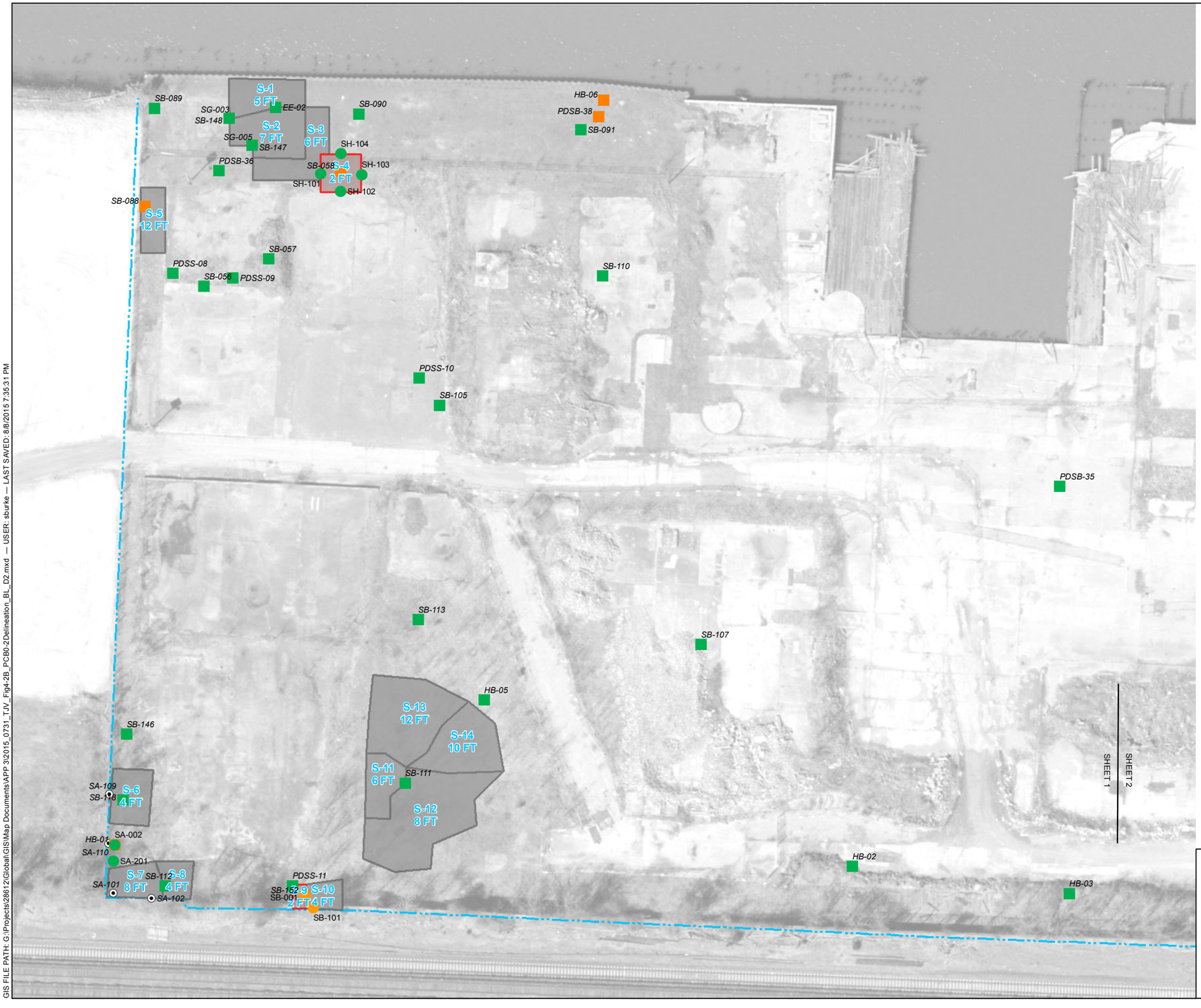
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SOIL REMOVAL EVALUATION FOR PCB EXCAVATION DELINEATION

FIGURE 4.2A
SHEET 4 OF 4

AUGUST 2015



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION SURFACE TO 2 FOOT

AUGUST 2015

FIGURE 4.2B
SHEET 1 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2B_PCB0-2Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:35:31 PM

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PDSB-35
SS-232
SB-104
SB-101
SB-100
HB-03
PDSS-12
PDSS-13
PDSS-14
PDSS-15
PDSS-16
PDSS-17
SM-203
SM-201
SM-102
SB-054
SM-202
SM-101
S-17
S-16
6 FT
S-15
12 FT
S-18
8 FT
S-19
12 FT
S-20
8 FT
S-14
4 FT
PDI2-17-01
SB-068
SHEET 1
SHEET 2
SHEET 2
SHEET 3

LEGEND

PDI SAMPLES
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES
- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION SURFACE TO 2 FOOT

AUGUST 2015

FIGURE 4.2B
SHEET 2 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2B_PCB0-2Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:35:31 PM by sburke

PDSS-13
PDSS-04
PDSS-05
PDSS-06
PDSS-07
SB-070
SB-059
SB-074
SB-092
SB-155
SB-078
SB-077
SB-069
SB-099
SB-158
SB-093
SB-157
SB-126
SB-085
SB-076
SB-082
SB-075
SB-115
SB-116
SB-114
SB-060
SB-083
SB-156
SB-153
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PDSB-16
PDSB-31
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PDSB-115
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WA-114
WA-116
WA-117
WA-118
WA-119
WA-120
WA-202
WA-203
WA-204
WA-115
MW-13A
WB-101
WB-201
WB-206
WB-301
NA-101
NA-102
NA-201
NA-301
NA-302
NB-101
NB-102
NC-101
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NC-103
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NC-109
NC-110
NC-111
NC-112
NC-113
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NC-204
NC-205
NE-101
NE-102
NE-103
NE-104
NE-201
NE-202
NE-203
NE-204
NE-301
NF-001
NF-103
NF-202
NO-101
NO-001
NO-102
SO-101
SO-102
SO-103
SO-302
SQ-101
SQ-102
SQ-103
SQ-104
SQ-105
SQ-106
SQ-202
SQ-203
SQ-204
SP-001
SP-101
SP-102
SP-103
SP-104
SP-105
SP-106
SP-201
N-1 2 FT
N-2 4 FT
N-3 12 FT
N-4 9 FT
N-5 10 FT
N-6 12 FT
N-7 8 FT
N-8 2 FT
N-9 6 FT
N-10 8 FT
N-11 HZN
N-12 12 FT
N-13 2 FT
N-14 HZN
N-15 6 FT
N-17 8 FT
N-18 13 FT
S-21 2 FT
S-22 HZN
S-23 2 FT
S-24 6 FT
S-25 6 FT
JOB TRAILERS
BUILDING 52
SHEET 2
SHEET 3
SHEET 3
SHEET 4

LEGEND

PDI SAMPLES
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES
- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION SURFACE TO 2 FOOT

FIGURE 4.2B
SHEET 3 OF 4

AUGUST 2015

LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg
- NO RESULT

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
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NOTES

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0 50 100
SCALE IN FEET

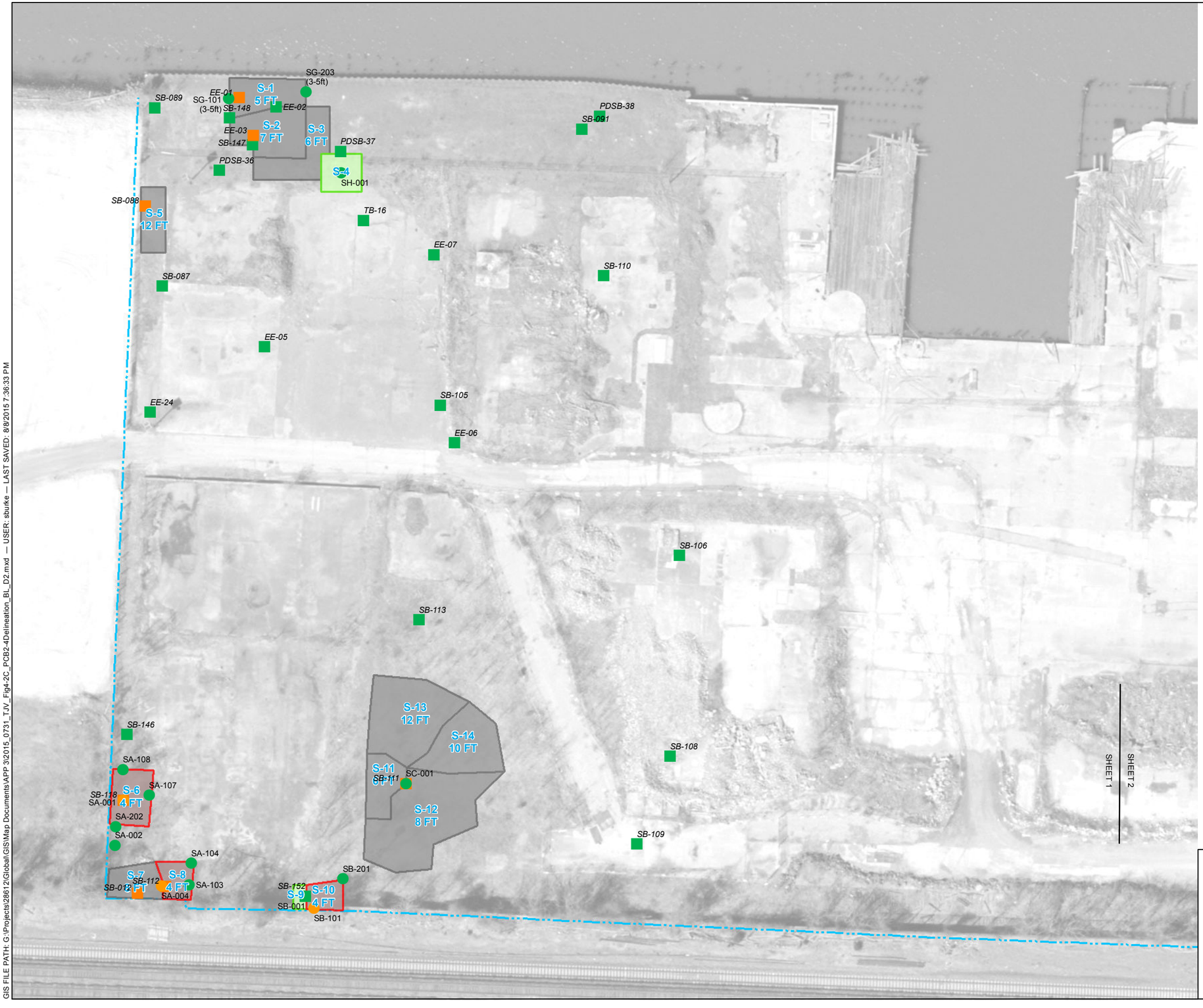
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION SURFACE TO 2 FOOT

FIGURE 4.2B
SHEET 4 OF 4

AUGUST 2015



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

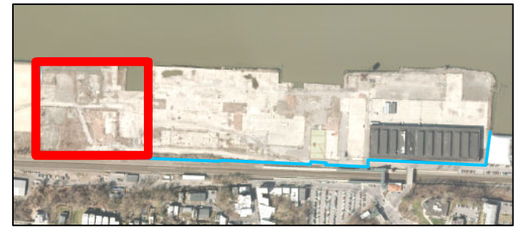
HISTORIC SAMPLES

- *>10 mg/kg*
- *0-10 mg/kg*

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.



0 50 100
SCALE IN FEET

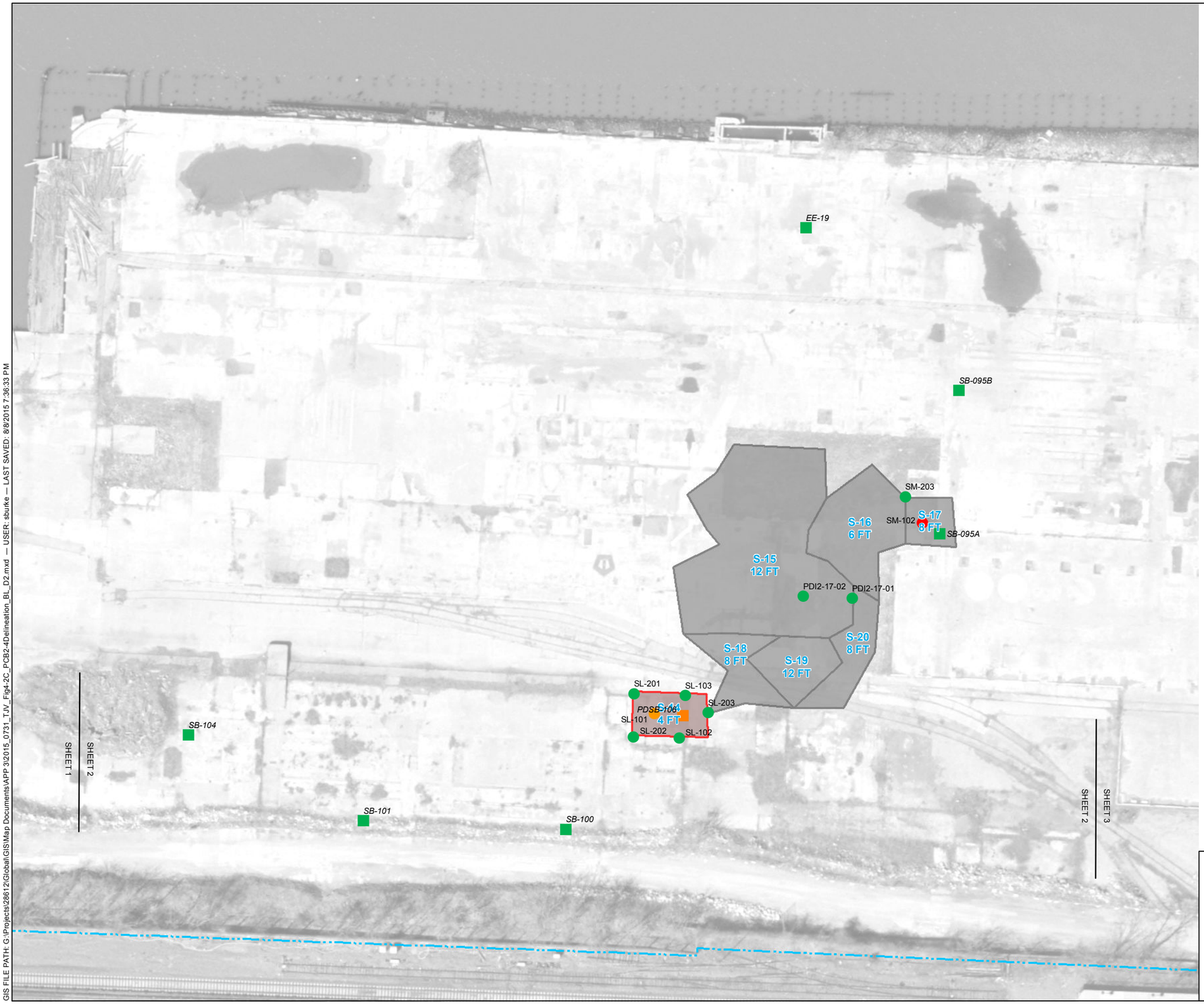
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 2-4 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2C
SHEET 1 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- *>10 mg/kg*
- *0-10 mg/kg*

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 2-4 FOOT INTERVAL

FIGURE 4.2C
SHEET 2 OF 4

AUGUST 2015

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PDSB-01
SB-126
PDSB-02
PDSB-03
PDSB-04
PDSB-05
PDSB-06
PDSB-07
PDSB-08
PDSB-09
PDSB-10
PDSB-11
PDSB-12
PDSB-13
PDSB-14
PDSB-16
PDSB-31
PDSB-108
PDSB-109
PDSB-114
PDSB-115
SB-074
SB-076
SB-078
SB-082
SB-083
SB-085
SB-092
SB-099
SB-103
SB-114
SB-115
SB-116
SB-153
SB-155
SB-156
SB-157
SB-158
CAM
WA-002
WA-115
WA-116
WA-117
WA-118
WA-119
WA-120
WA-202
WA-203
WA-204
WA-205
WB-101
WB-201
WB-301
WB-303
NA-102
NA-201
NA-202
NA-203
NC-004
NC-204
NE-101
NE-102
NE-103
NE-104
NE-201
NE-202
SN-101
SN-102
SP-001
SP-101
SP-102
SP-103
SP-105
SQ-001
SQ-101
SQ-102
SQ-103
SQ-104
SQ-105
SQ-106
SQ-203
SQ-204
SQ-303
N-1 12 FT
N-2 4 FT
N-3 12 FT
N-4 9 FT
N-5 10 FT
N-6 12 FT
N-7 8 FT
N-8 12 FT
N-9 6 FT
N-10 8 FT
N-11 4 FT
N-12 12 FT
N-13 12 FT
N-14 4 FT
N-15 6 FT
N-17 8 FT
N-18 12 FT
S-21 4 FT
S-22 4 FT
S-23 6 FT
S-24 6 FT
S-25 HZN
SHEET 2
SHEET 3
SHEET 3
SHEET 4

LEGEND

PDI SAMPLES
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES
- *>10 mg/kg*
- *0-10 mg/kg*

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 2-4 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2C
SHEET 3 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2C_PCB2-4Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:36:33 PM

SHEET 3

SHEET 4

LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- *>10 mg/kg*
- *0-10 mg/kg*

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

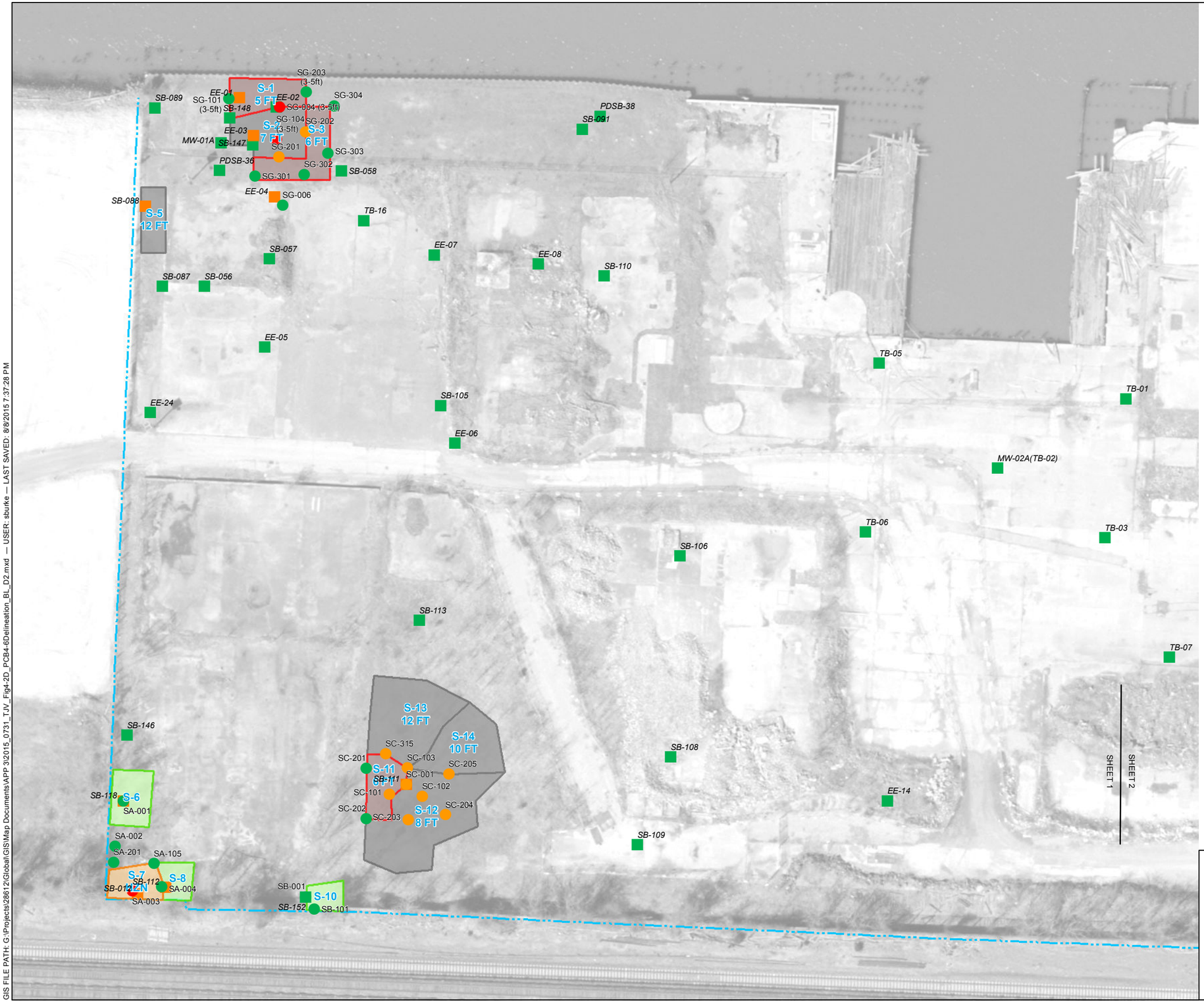
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 2-4 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2C
SHEET 4 OF 4



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LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

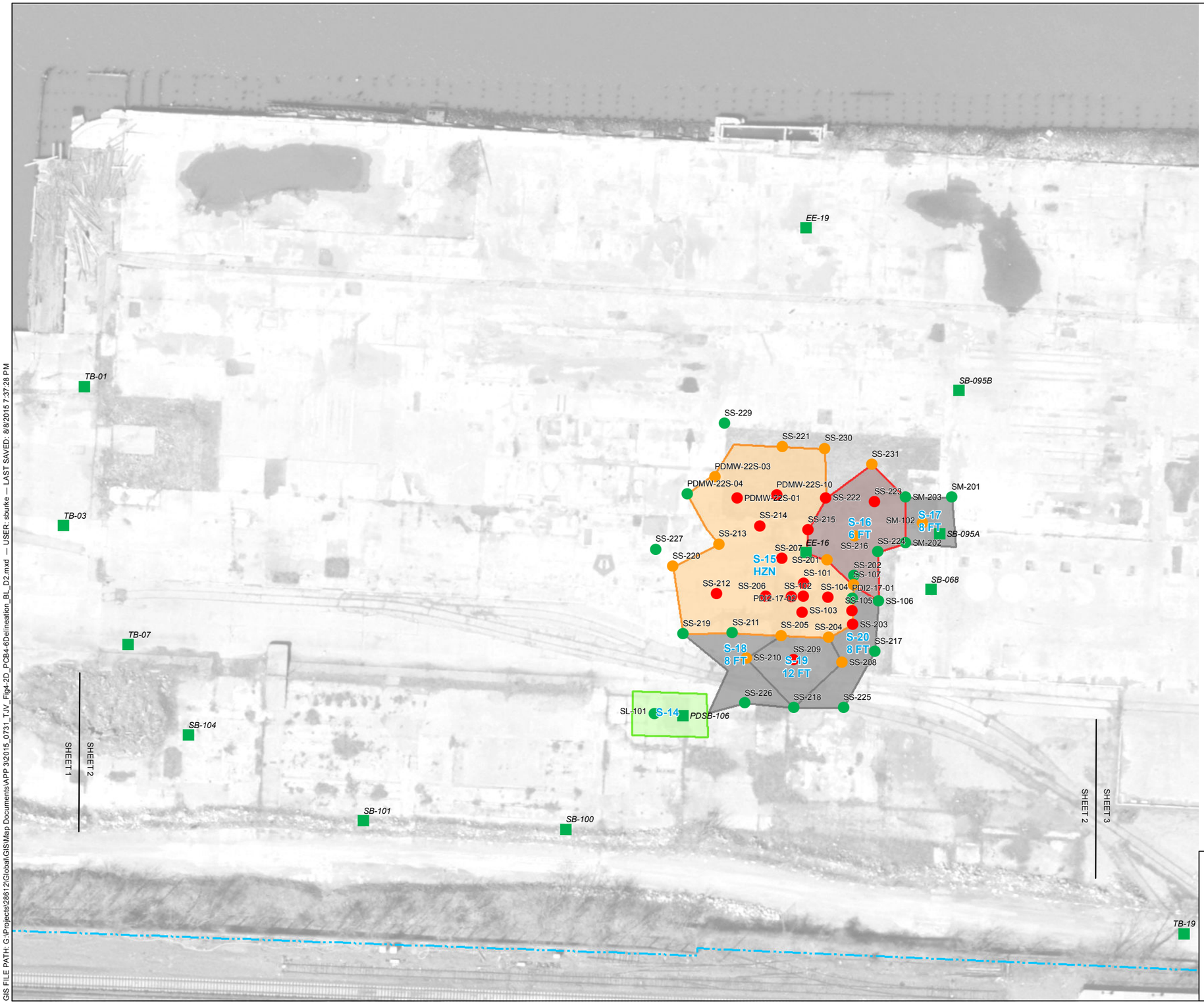
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 4-6 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2D
SHEET 1 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

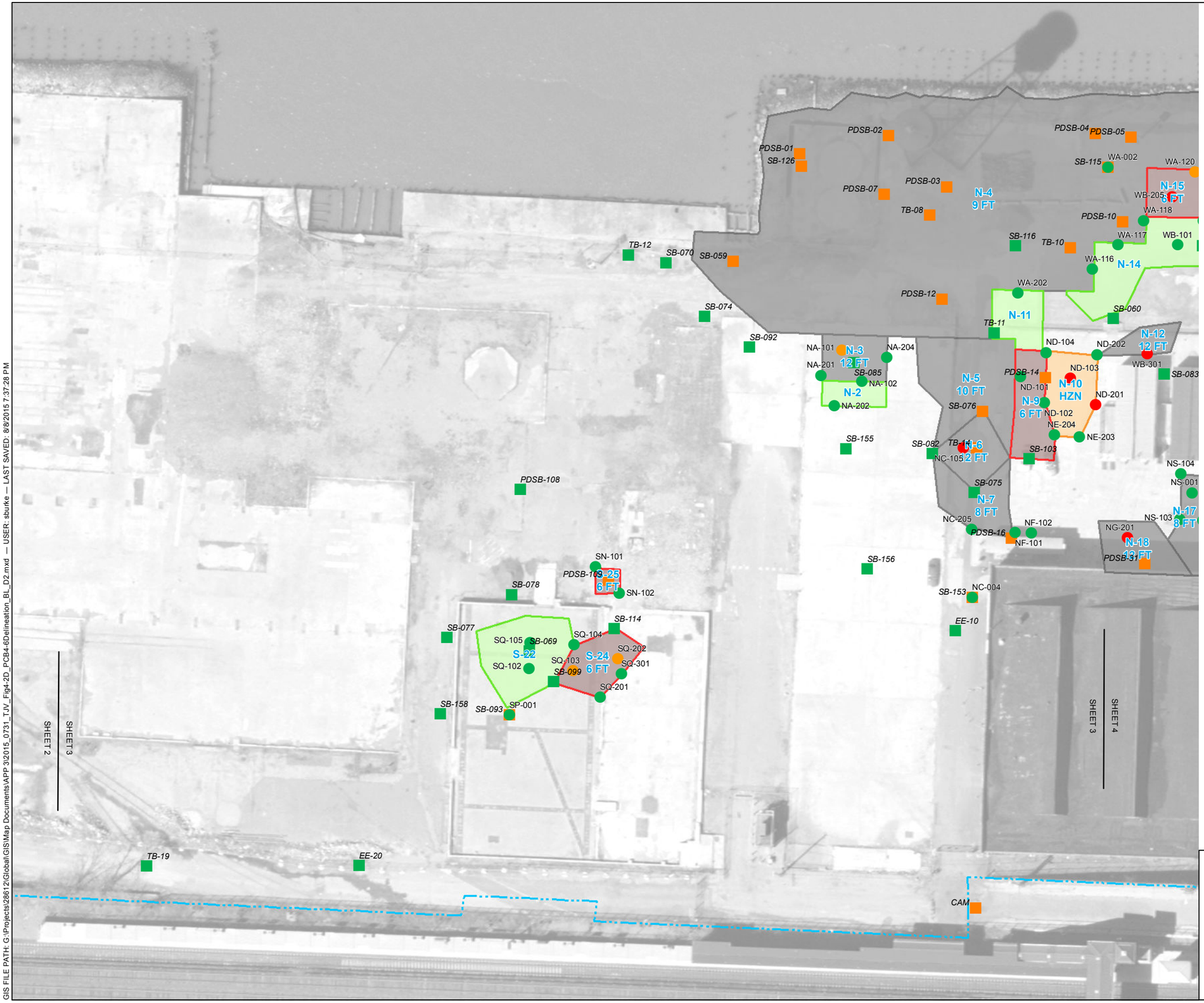
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 4-6 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2D
SHEET 2 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

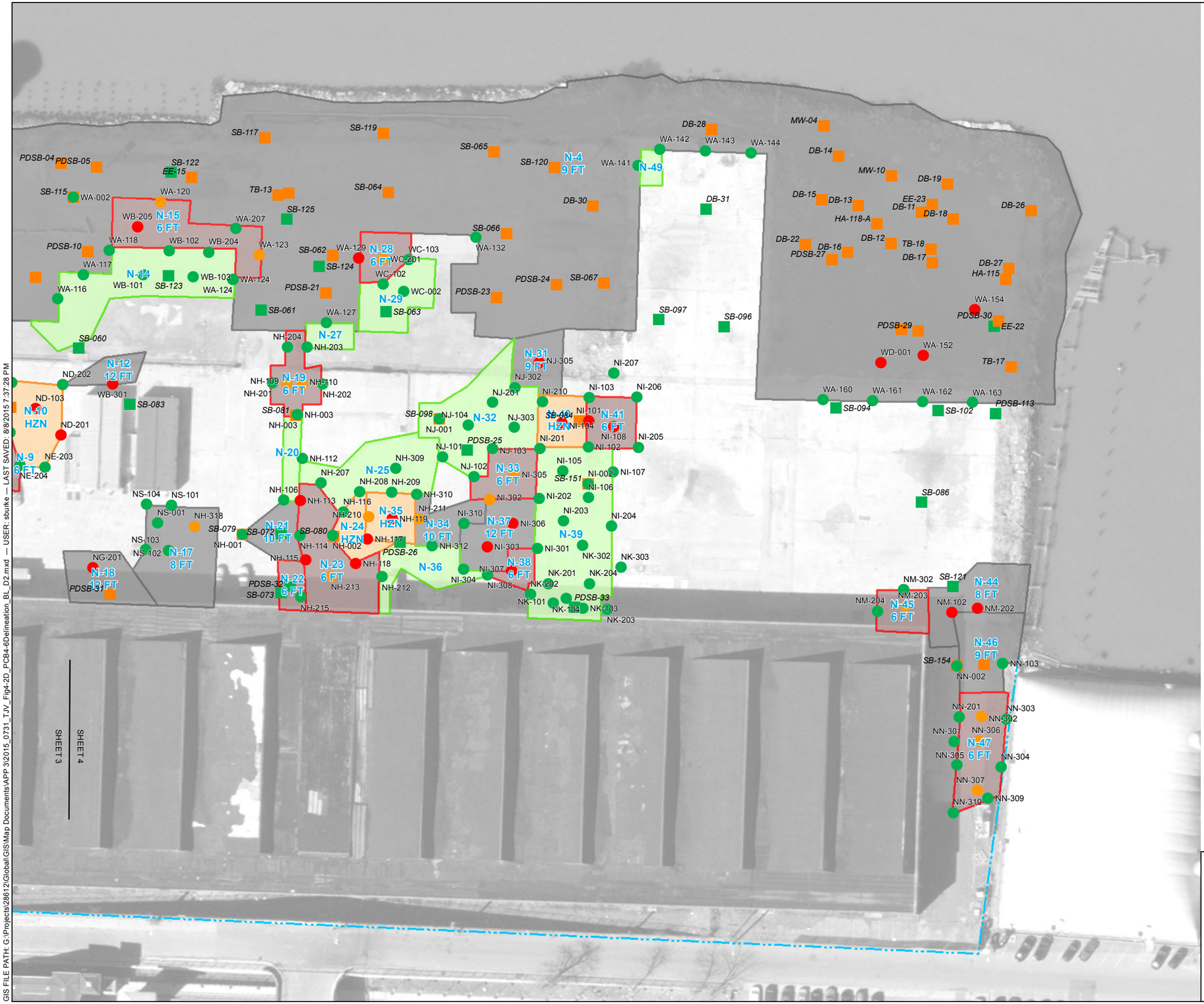
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 4-6 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2D
SHEET 3 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

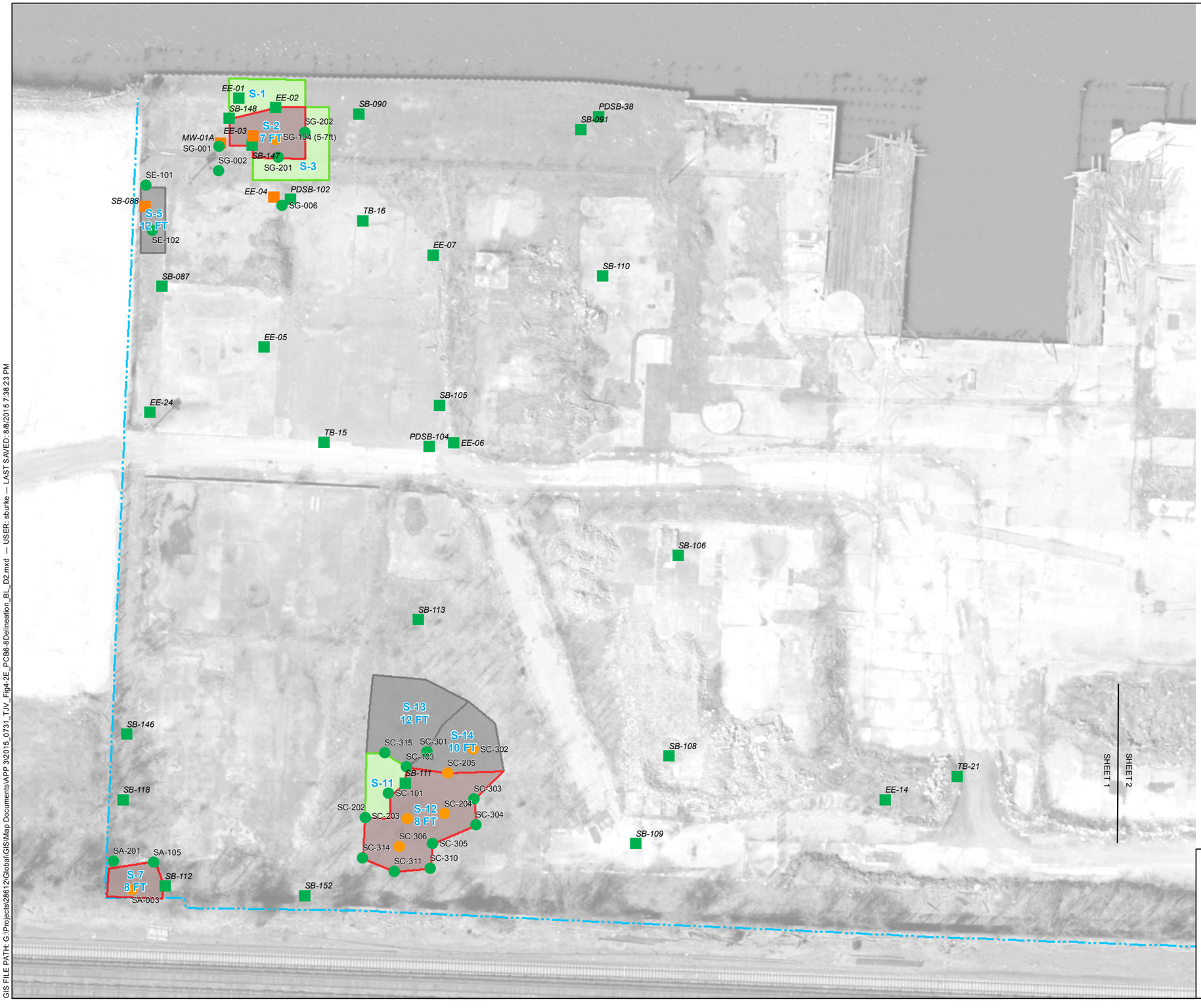
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 4-6 FOOT INTERVAL

FIGURE 4.2D
SHEET 4 OF 4

AUGUST 2015



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LEGEND

PDI SAMPLES		HISTORIC SAMPLES	
●	>50 mg/kg	■	>10 mg/kg
●	10-50 mg/kg	■	0-10 mg/kg
●	0-10 mg/kg		

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

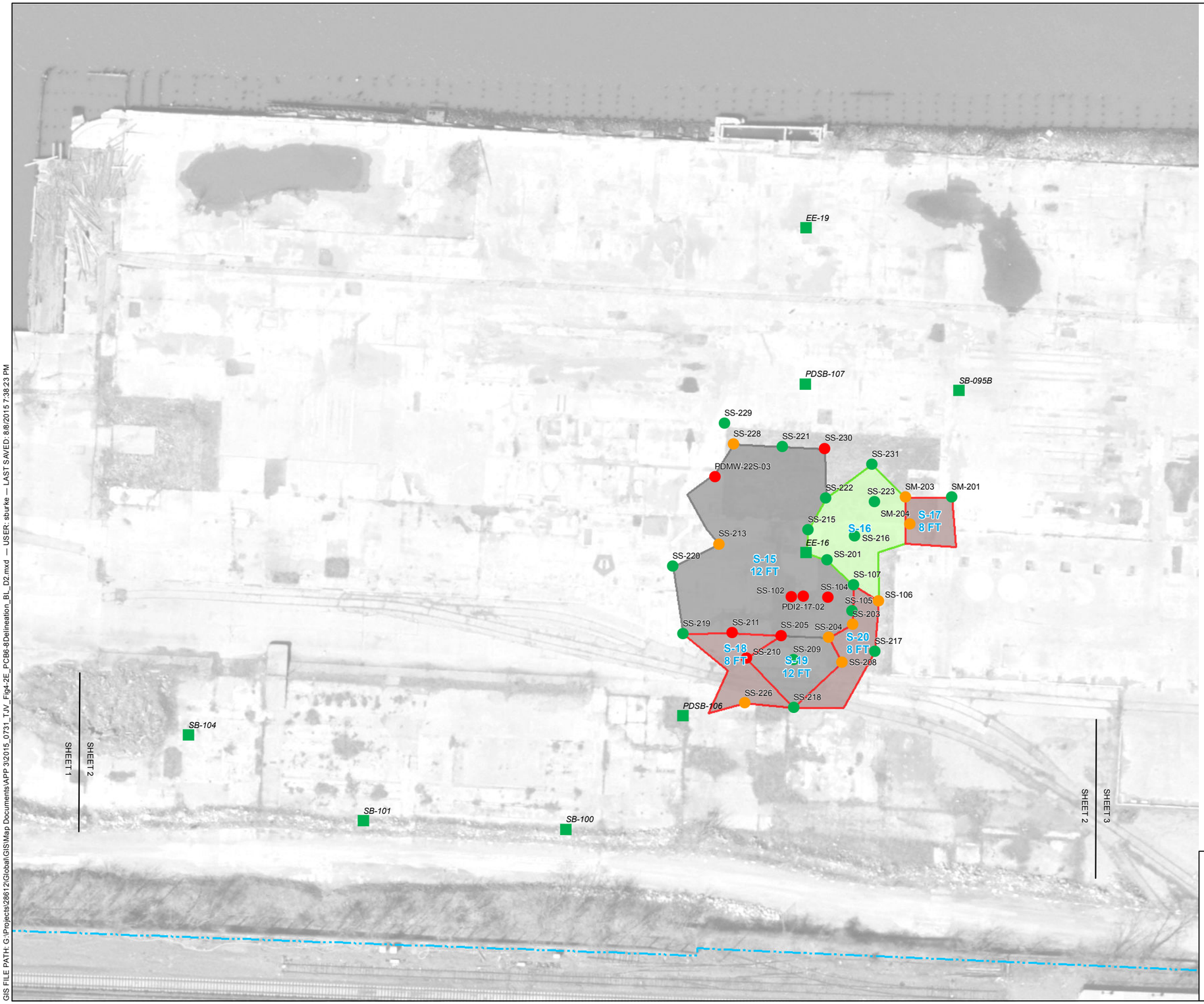
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 6-8 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2E
SHEET 1 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

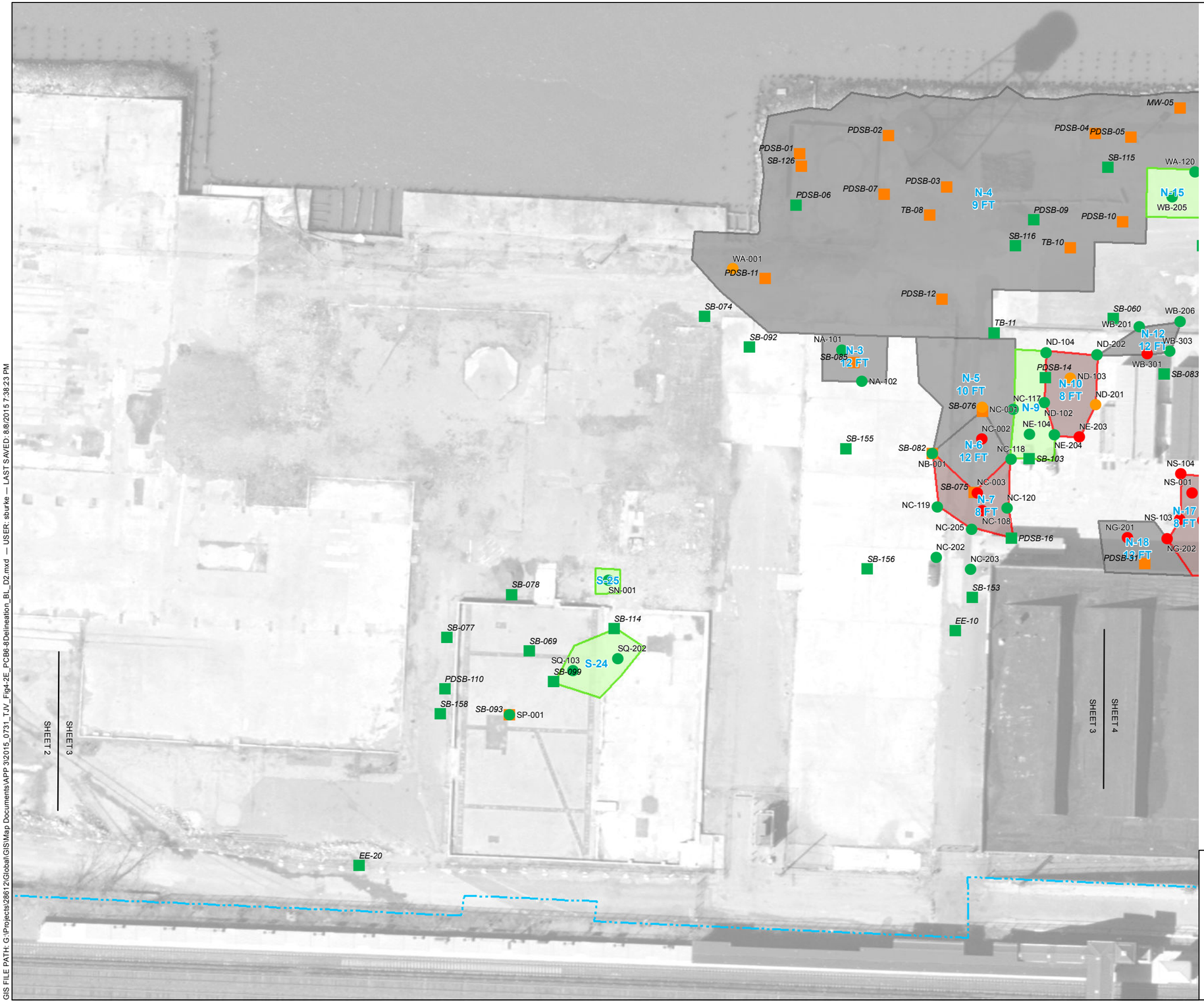
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 6-8 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2E
SHEET 2 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2E_PCB6-8Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:38:23 PM



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100

SCALE IN FEET

HALEY ALDRICH

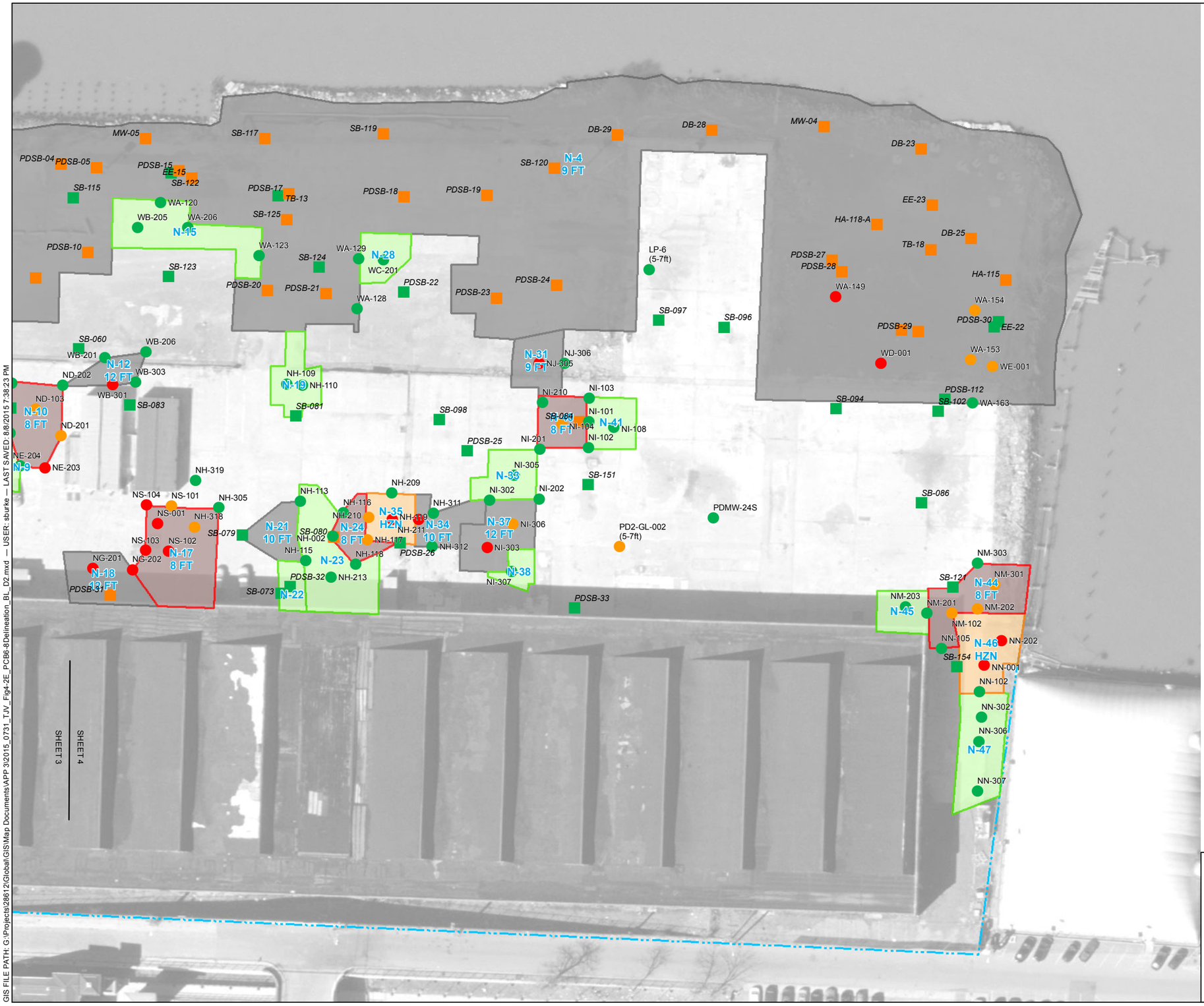
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 6-8 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2E
SHEET 3 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2E_PCB6-8Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:38:23 PM



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 6-8 FOOT INTERVAL

FIGURE 4.2E
SHEET 4 OF 4

AUGUST 2015

EE-01
EE-02
SB-148
EE-03
S-2
SG-104 (7-9ft)
MW-01A
SG-001
SG-102 (7-9ft)
SB-147
SG-002
SG-103
SB-090
PDSB-38
SB-091
EE-04
PDSB-102
SB-088
S-5 12 FT
EE-07
EE-08
SB-110
SB-087
EE-05
EE-24
SB-105
PDSB-104
EE-06
MW-02A(TB-02)
SB-106
SB-113
SC-318
SC-319
SC-312
SC-313
SC-317
S-13 12 FT
SC-307
SC-308
SC-316
SC-301
S-14 10 FT
SC-302
SC-103
SC-205
SC-309
SB-111
SB-146
SB-108
SB-118
SC-203
SC-204
S-12
SC-306
SB-109
S-7
SA-003
SB-112
SB-152
SHEET 1
SHEET 2

LEGEND

PDI SAMPLES
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES
- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

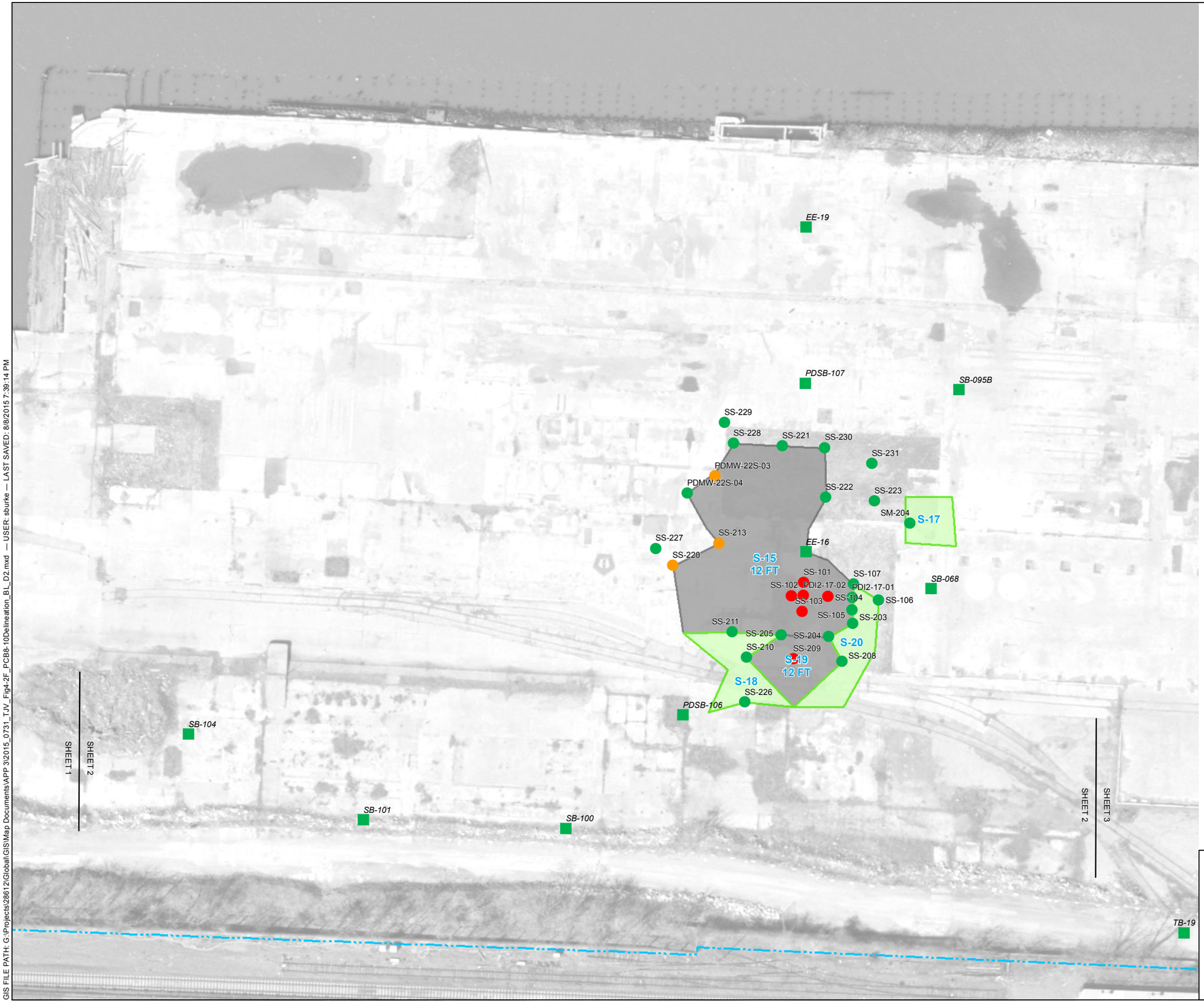
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 8-10 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2F
SHEET 1 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 8-10 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2F
SHEET 2 OF 4

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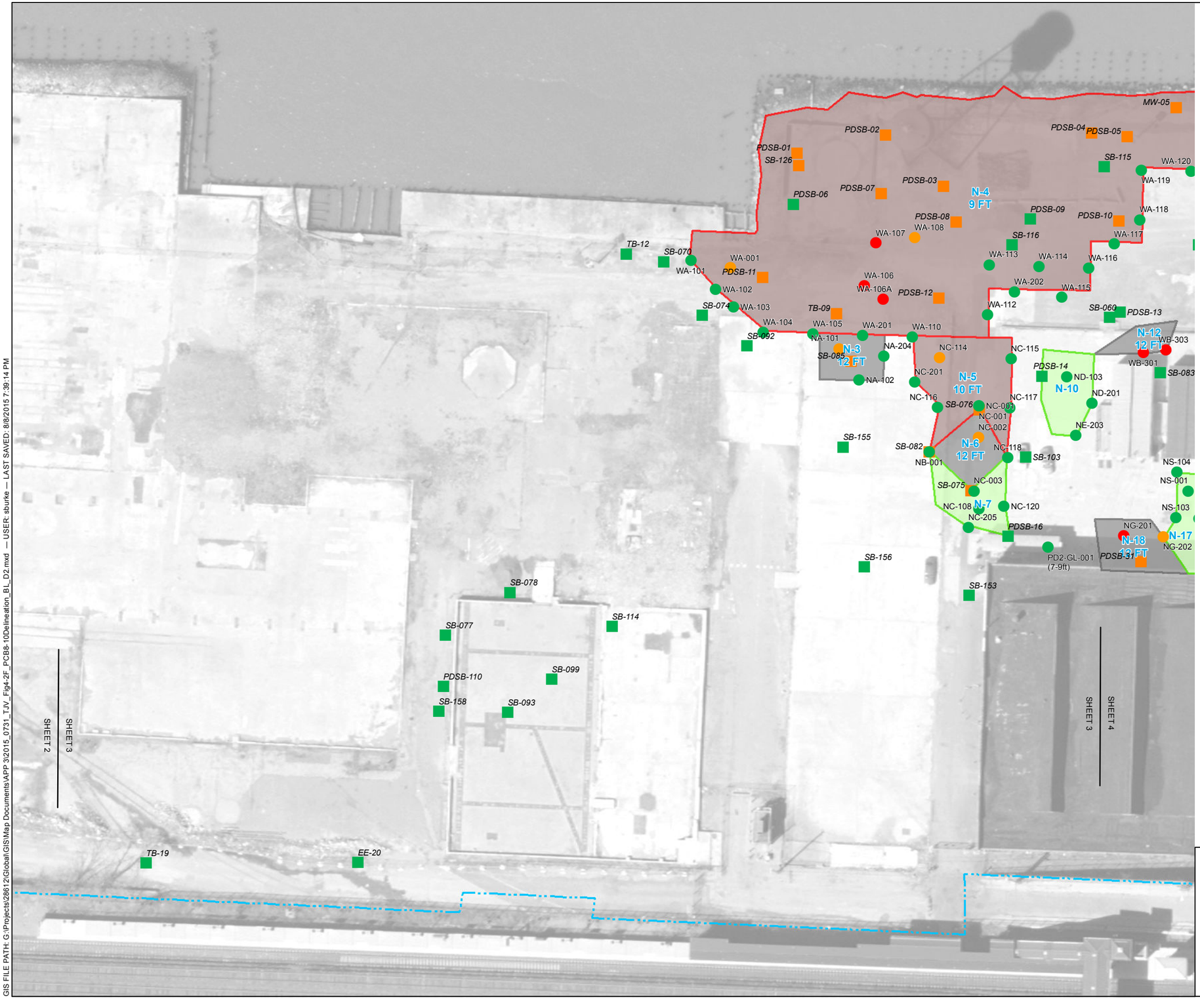


LEGEND

PDI SAMPLES
- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES
- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

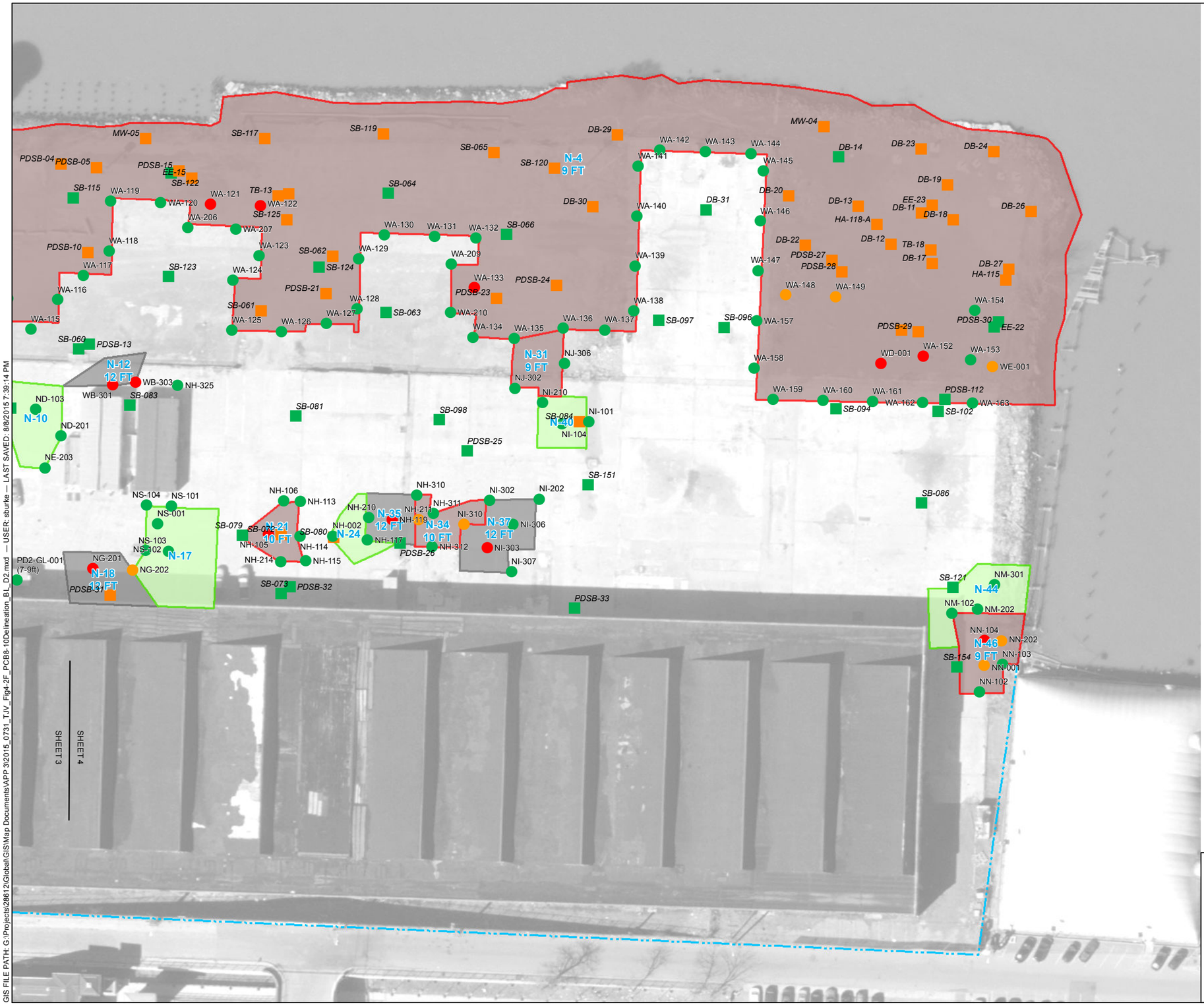
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 8-10 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2F
SHEET 3 OF 4



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LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

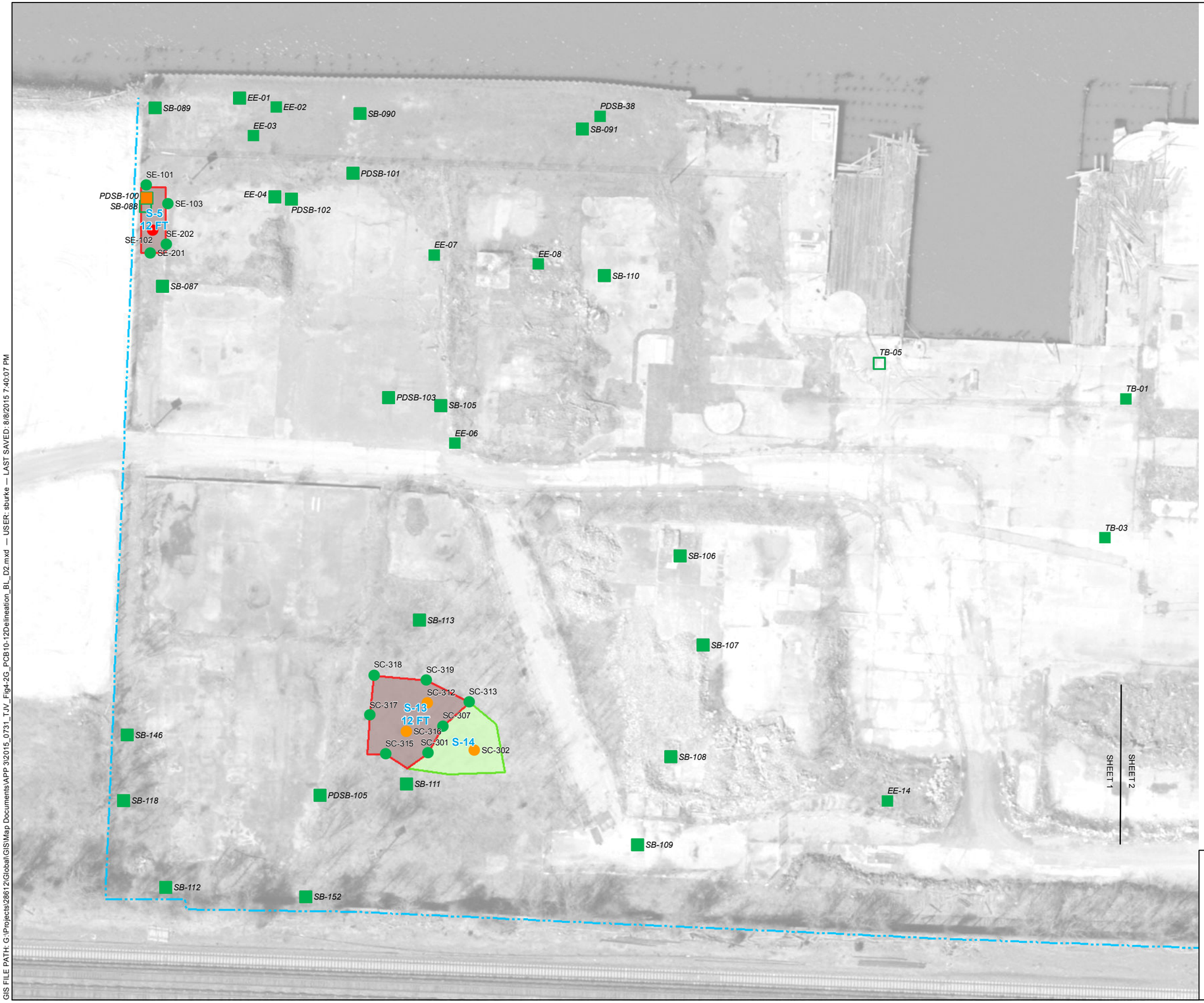
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 8-10 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2F
SHEET 4 OF 4



LEGEND

PDI SAMPLES	HISTORIC SAMPLES
>50 mg/kg	>10 mg/kg
10-50 mg/kg	0-10 mg/kg
0-10 mg/kg	>10 mg/kg (>12 foot)
	0-10 mg/kg (>12 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

HALEY ALDRICH

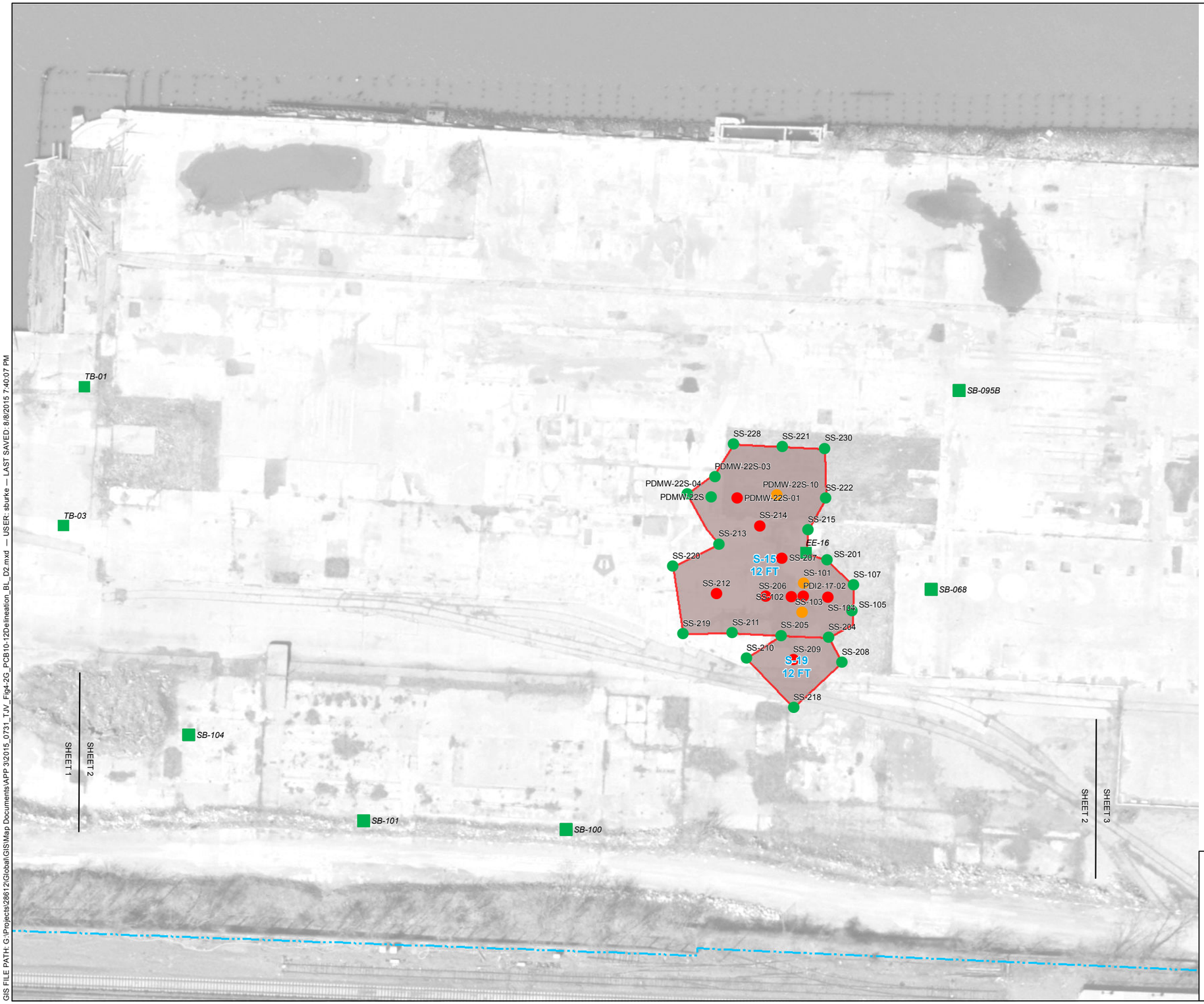
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 10-12 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2G
SHEET 1 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2G_PCB10-12Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:40:07 PM



LEGEND

PDI SAMPLES	HISTORIC SAMPLES
>50 mg/kg	>10 mg/kg
10-50 mg/kg	0-10 mg/kg
0-10 mg/kg	>10 mg/kg (>12 foot)
	0-10 mg/kg (>12 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

HALEY ALDRICH

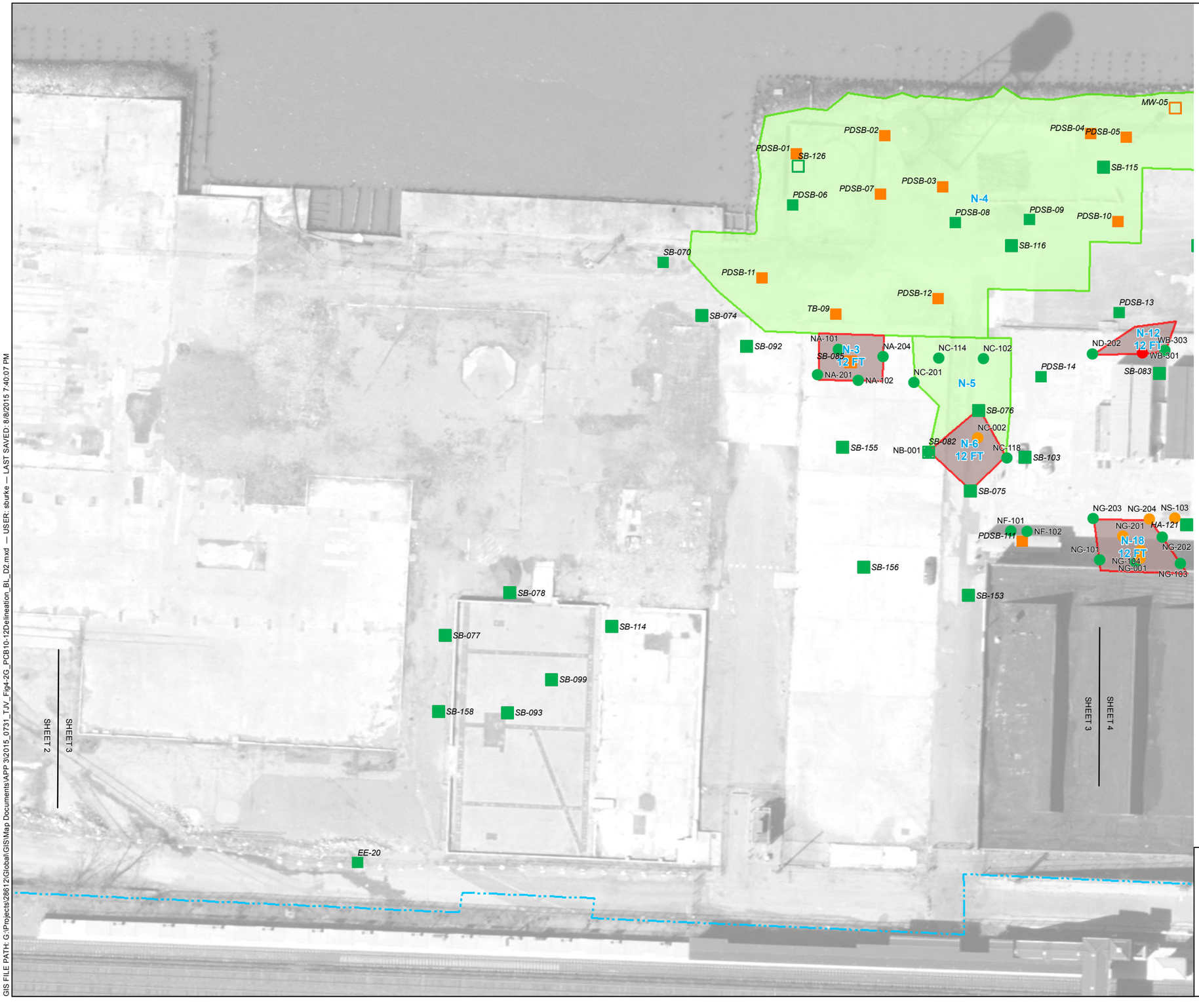
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 10-12 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2G
SHEET 2 OF 4

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 3\2015_0731_TJV_Fig4-2G_PCB10-12Delineation_BL_D2.mxd — USER: sburke — LAST SAVED: 8/8/2015 7:40:07 PM



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg
- >10 mg/kg (>12 foot)
- 0-10 mg/kg (>12 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 10-12 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2G
SHEET 3 OF 4

MW-05 SB-117 SB-119 DB-29 DB-28 MW-04 DB-14 DB-23 DB-24 MW-10 DB-19 DB-20 DB-15 DB-13 DB-11 DB-18 DB-26 SB-159 HA-118-A DB-22 DB-16 DB-12 HA-117 DB-25 DB-17 DB-27 HA-117-A HA-115 HA-116 EE-22 SB-096 SB-097 SB-094 SB-102 PDSB-112 SB-086 SB-121 NN-104 N-46 NN-202 SB-154 NN-001

PDSB-04 PDSB-05 PDSB-15 SB-122 EE-15 TB-13 SB-115 SB-125 PDSB-10 SB-123 PDSB-20 PDSB-21 SB-124 PDSB-23 PDSB-24 SB-067 SB-120 N-4 DB-30 DB-31 PDSB-13 N-12 12 FT ND-202 WB-303 WB-301 SB-083 SB-081 SB-098 SB-084 NI-001 PDSB-25 N-31 SB-151

NH-209 NH-210 N-35 12 FT NH-211 NH-119 N-34 NI-310 N-37 12 FT NI-306 NI-301 NI-303 NI-304 NI-307 PDSB-26 SB-079 SB-072 N-21 NH-105 SB-080 SB-073

NG-203 NG-204 HA-121 NG-201 NS-103 NG-202 N-18 12 FT NG-104 NG-101 NG-102 NG-001 NG-103

SHEET 3 SHEET 4

LEGEND

PDI SAMPLES	HISTORIC SAMPLES
>50 mg/kg	>10 mg/kg
10-50 mg/kg	0-10 mg/kg
0-10 mg/kg	>10 mg/kg (>12 foot)
	0-10 mg/kg (>12 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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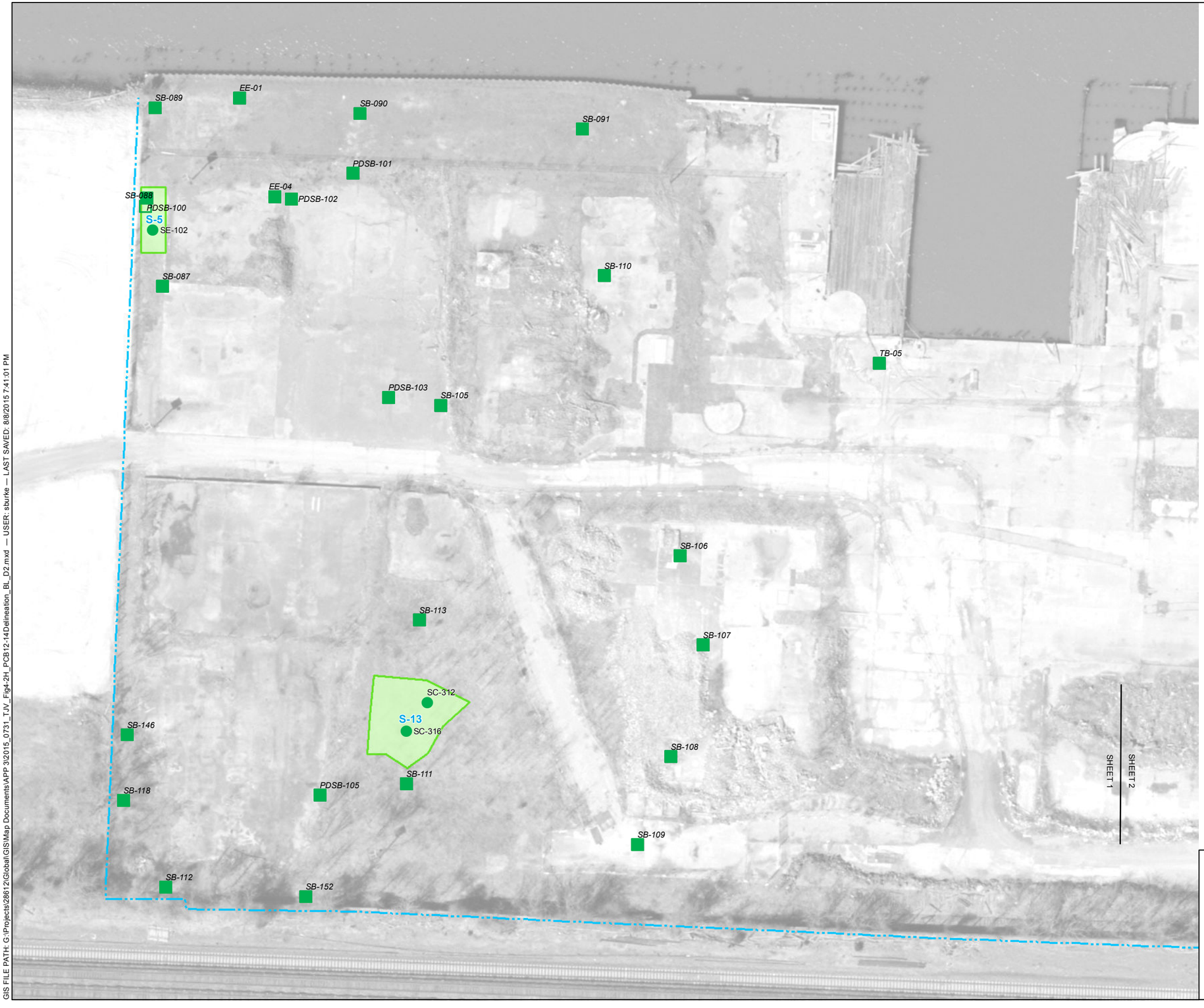
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 10-12 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2G
SHEET 4 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg
- >10 mg/kg (>14 foot)
- 0-10 mg/kg (>14 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

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ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 12-14 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2H
SHEET 1 OF 4

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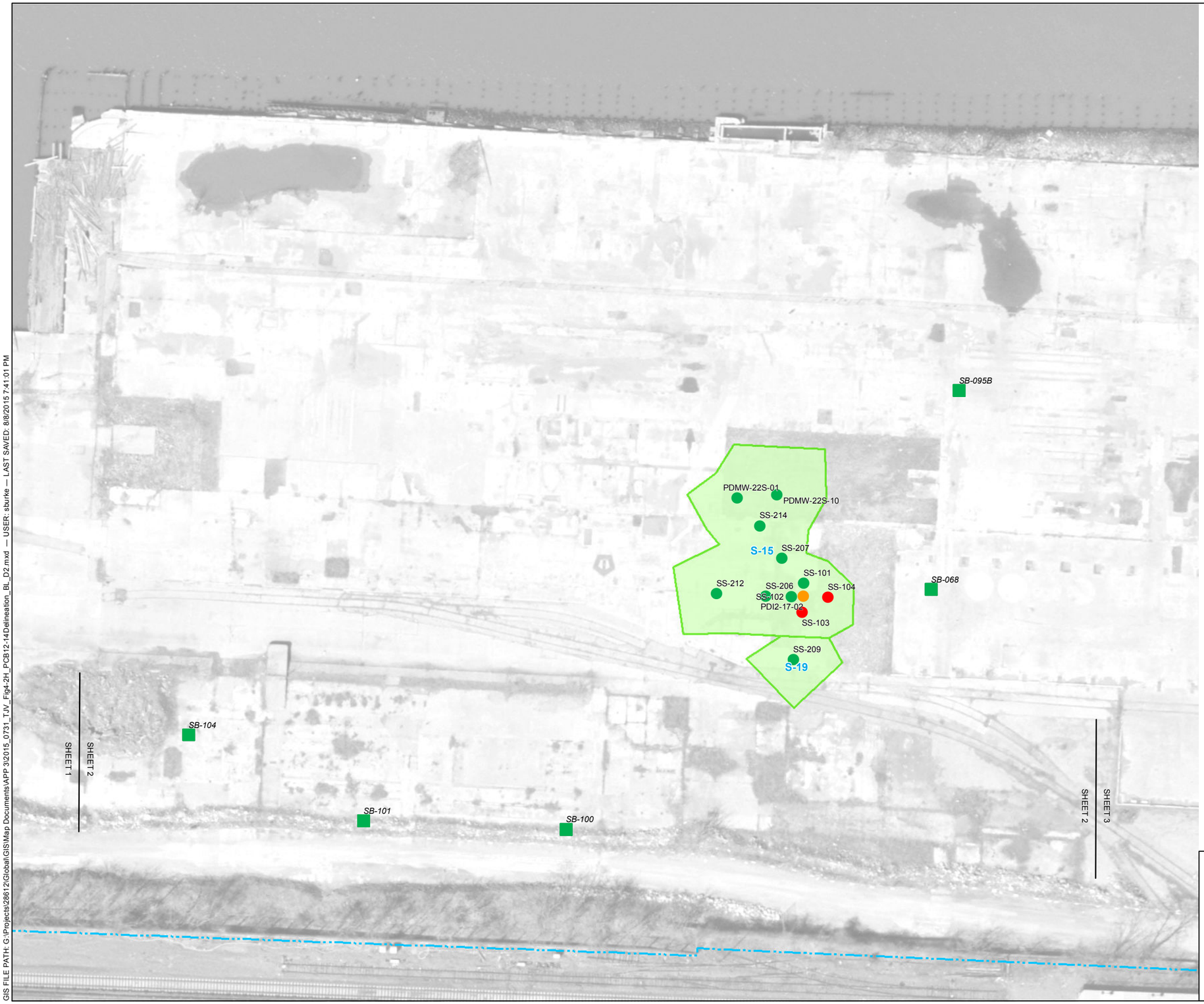

LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg
- >10 mg/kg (>14 foot)
- 0-10 mg/kg (>14 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

0 50 100
SCALE IN FEET

HALEY ALDRICH

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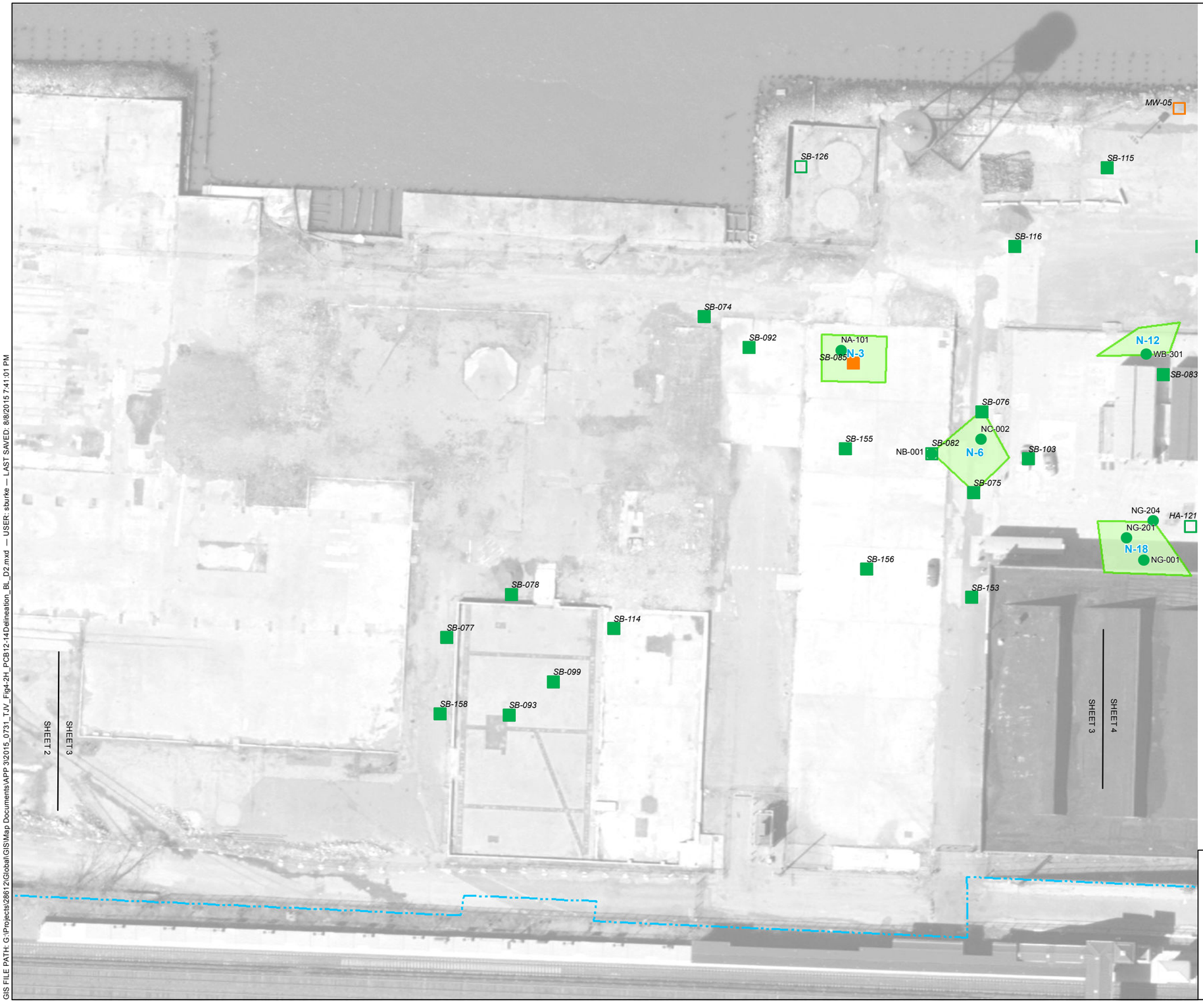
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 12-14 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2H
SHEET 2 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg
- >10 mg/kg (>14 foot)
- 0-10 mg/kg (>14 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

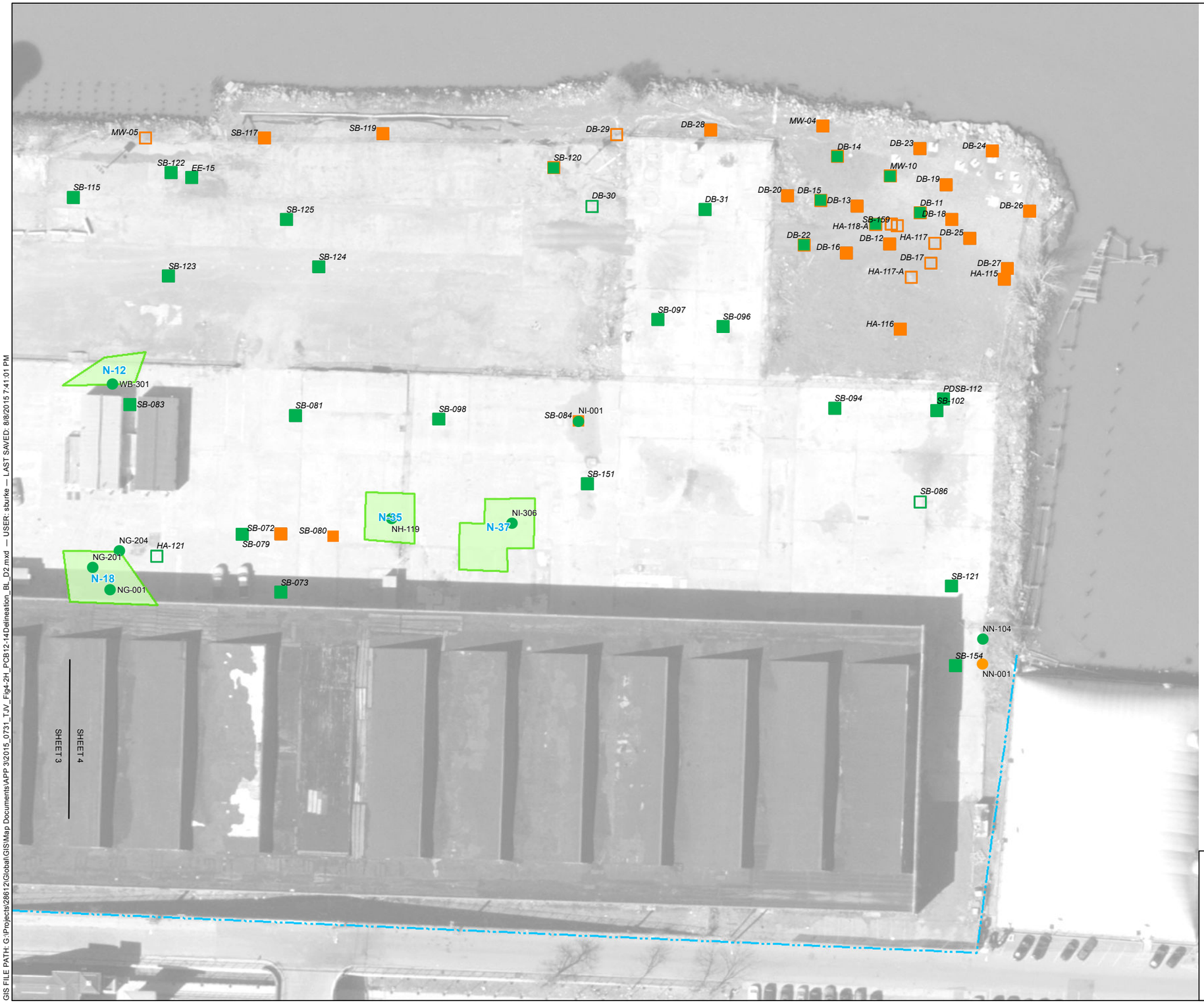
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 12-14 FOOT INTERVAL

AUGUST 2015

FIGURE 4.2H
SHEET 3 OF 4



LEGEND

PDI SAMPLES

- >50 mg/kg
- 10-50 mg/kg
- 0-10 mg/kg

HISTORIC SAMPLES

- >10 mg/kg
- 0-10 mg/kg
- >10 mg/kg (>14 foot)
- 0-10 mg/kg (>14 foot)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- INTERVAL WITH HORIZON
- REMOVAL IS DEEPER THAN INTERVAL SHOWN
- PROPERTY LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION 12-14 FOOT INTERVAL

FIGURE 4.2H
SHEET 4 OF 4

AUGUST 2015

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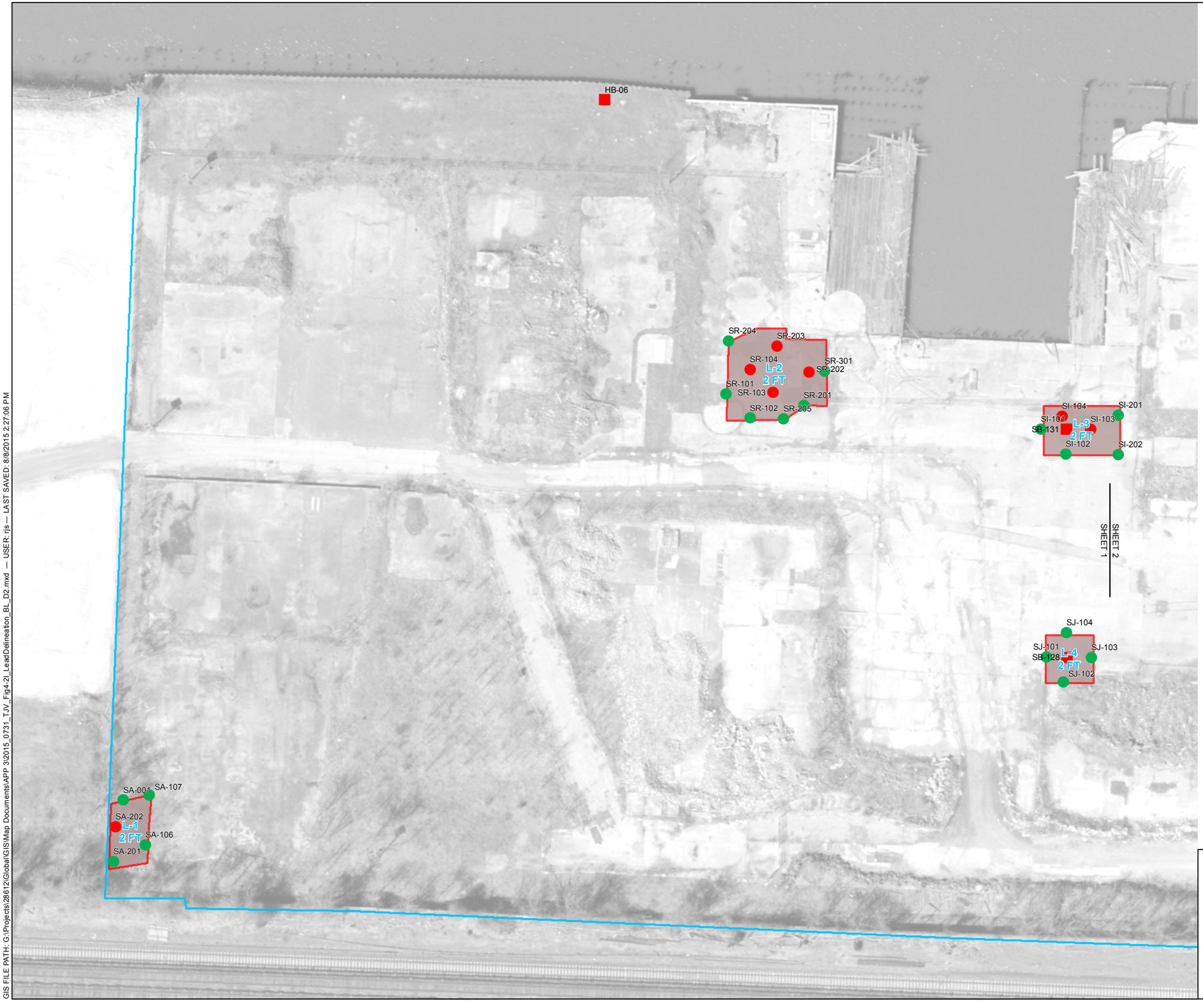

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LEGEND

PDI SAMPLES (0-2 FT)

- 0-1,000 mg/kg
- >1,000 mg/kg

HISTORIC SAMPLES

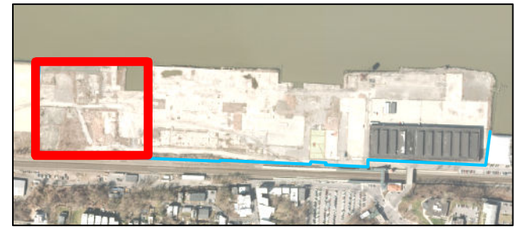
- *LEAD HOTSPOT*

PROPERTY LIMITS

LEAD REMOVAL AREA

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.



N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION LEAD HOTSPOTS

AUGUST 2015

FIGURE 4.2I

SHEET 1 OF 2

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LEGEND

PDI SAMPLES (0-2 FT)

- 0-1,000 mg/kg
- >1,000 mg/kg

HISTORIC SAMPLES

- *LEAD HOTSPOT*

PROPERTY LIMITS

LEAD REMOVAL AREA

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 50 100

SCALE IN FEET

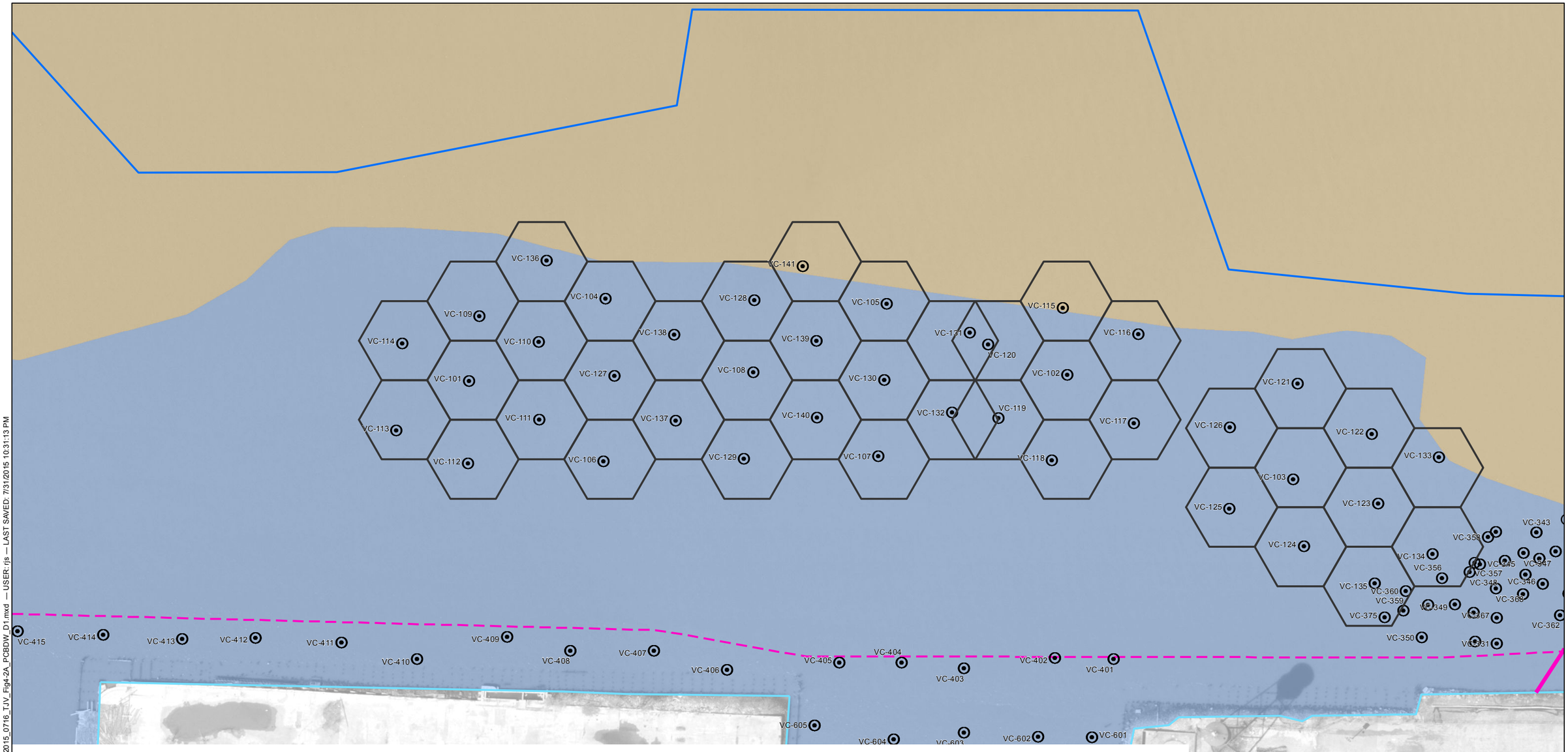
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

ON-SHORE INVESTIGATION - EXCAVATION DELINEATION LEAD HOTSPOTS

AUGUST 2015

FIGURE 4.2I
SHEET 2 OF 2



LEGEND

- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- PDI SAMPLE LOCATION
- DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

RIVER ENVIRONMENT DEPOSITION/DYNAMIC AREAS WITH PDI SAMPLE LOCATIONS

JULY 2015

FIGURE 4.3A

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VC-344 0-4 FT Cover
VC-347 0-4 FT Cover
VC-329 0-3 FT Cover
VC-328 0-5 FT Cover
VC-345 0-2 FT Removal
VC-346 0-5 FT Cover
VC-327 0-3 FT Removal
VC-363 0-4 FT Cover
VC-322 0-2 FT Removal
VC-321 0-2 FT Removal
VC-339 0-3 FT Removal
VC-361 0-2 FT Removal
VC-341 0-5 FT Cover
VC-317 0-4 FT Cover
VC-318 0-3 FT Removal
VC-315 0-3 FT Cover
VC-316 0-3 FT Removal
VC-370 0-3 FT Cover
VC-311 0-5 FT Cover
VC-337 0-2 FT Removal
VC-312 0-3 FT Removal
VC-309 0-6 FT Removal
VC-307 0-2 FT Removal
VC-308 0-2 FT Removal
VC-336 0-2 FT Removal
VC-306 0-6 FT Removal
VC-304 0-3 FT Removal
VC-305 0-5 FT Removal
VC-303 0-3 FT Removal
VC-301 0-6 FT Removal
VC-302 0-4 FT Removal
VC-359 0-3 FT Removal
VC-355 0-4 FT Removal
VC-349 0-3 FT Cover
VC-332 0-4 FT Removal
VC-330 0-4 FT Removal
VC-122
VC-123
VC-133
VC-103C
VC-134
VC-135
VC-379
VC-377
VC-356
VC-357
VC-348
VC-358
VC-343
VC-372
VC-325
VC-353
VC-352
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VC-334
VC-376
VC-360
VC-378
VC-375
VC-367
VC-362
VC-314
VC-350
VC-383
VC-331
VC-333
VC-380
VC-381
VC-382
EB-29
EB-16
EB-21
EB-22
CS-16
CS-14
CS-13
CS-15
CS-18
CS-05
CS-10
CS-04
CS-11
CS-09
CS-03
CS-08
CS-02
RB-17
RB-18
RB-19
RB-16
RB-42
RB-22
RB-27
RB-07
RB-15
RB-02
RB-20
RB-03
RB-06
RB-08
RB-04
RB-30
RB-40
RB-13
RB-05
RB-01
RB-36
SD02-CS
SD02-GB
SD-42
SD05-CS
SD-44
SD-43
SD-45
SD05-GB
SD-50
SD04-GB
SD-04
SD-41
SD01-CS
SD01-GB
SD04-CS
BS-02
HA-219
HA-218
HA-217
HA-211
HA-209
HA-206
HA-205
HA-203B
HA-203
HA-201
HA-221
HA-216
HA-215
VC-1
VC-2A
VC-2B
VC-3
VC-4
EB-19
RB-09
SD-34
VC-511
GB-04

LEGEND

PDI SAMPLES (MAX 0-6 FT)

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (MAX 0-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- SHALLOW REMOVAL (2 FT)
- DEEPER REMOVAL (UP TO 6 FT)
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION OVERVIEW

AUGUST 2015

FIGURE 4.4A

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\Evaluation\2015_0715_TJV_Fig4-4A_PCB0-6NWAreaOverview_BL_D1.mxd — USER: tvogler — LAST SAVED: 8/10/2015 11:38:04 AM

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EB-29 GB-04 CS-16 VC-122 CS-14 CS-13 EB-16 VC-133 VC-353 VC-103C VC-352 VC-351 CS-05 RB-18 RB-17 VC-321 VC-354 VC-323 CS-10 CS-15 VC-123 VC-325 RB-14 VC-322 CS-04 VC-372 CS-12 VC-320 VC-319 RB-19 VC-344 VC-358 VC-343 VC-324 VC-365 VC-340 VC-339 VC-361 SD01-CS CS-18 VC-134 SD02-CS VC-373 VC-374 RB-16 VC-347 VC-342 VC-357 VC-345 VC-329 VC-328 VC-369 VC-366 SD01-GB VC-379 VC-377 VC-348 VC-364 VC-341 VC-318 VC-338 VC-313 VC-337 CS-11 VC-336 CS-09 VC-135 VC-356 RB-42 VC-326 SD05-CS VC-346 VC-317 SD02-GB VC-370 VC-306 VC-335 VC-368 VC-376 VC-360 VC-327 VC-363 RB-21 VC-315 SD-42 VC-309 VC-307 SD-53 VC-303 VC-334 VC-355 VC-316 VC-311 VC-371 RB-23 VC-304 SD04-CS CS-03 VC-359 VC-349 VC-332 VC-314 RB-22 VC-312 VC-308 VC-305 RB-11 VC-378 VC-375 VC-362 RB-12 BS-02 SD-52 VC-302 RB-27 VC-367 VC-301 SD-50 EB-22 RB-07 SD-43 RB-02 VC-350 RB-40 VC-333 VC-330 VC-331 RB-43 RB-20 RB-15 SD-45 HA-219 HA-218 SD04-GB RB-13 SD05-GB RB-05 RB-01 RB-06 CS-08 HA-216 SD-04 RB-08 SD-41 RB-36 CS-02 VC-1 EB-19 RB-09 VC-2A VC-2B SD-34 VC-3 VC-511 RB-04 RB-30 VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION SURFACE TO 2 FOOT

AUGUST 2015

FIGURE 4.4B

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 2 TO 3 FOOT

AUGUST 2015

FIGURE 4.4C

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LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- INTERVAL BELOW REMOVAL
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 3 TO 4 FOOT

AUGUST 2015

FIGURE 4.4D

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EB-29
EB-16
VC-122
VC-133
VC-103C
VC-123
VC-353
VC-352
VC-351
VC-354
VC-323
VC-321
VC-325
RB-14
VC-322
VC-372
VC-319
VC-320
VC-344
VC-358
VC-343
VC-324
VC-365
VC-340
VC-339
VC-361
VC-347
VC-342
VC-134
VC-357
VC-345
VC-329
VC-328
VC-369
VC-373
VC-374
VC-379
VC-364
VC-341
VC-317
VC-318
VC-338
VC-366
VC-377
VC-348
VC-313
VC-337
CS-11
VC-336
VC-356
VC-326
RB-42
VC-346
VC-368
VC-363
VC-315
RB-21
VC-335
VC-135
VC-306
VC-303
VC-376
VC-360
VC-327
SD-42
VC-370
VC-309
VC-307
VC-334
VC-355
VC-316
VC-311
SD-53
VC-371
VC-304
VC-349
VC-359
VC-332
EB-21
RB-12
VC-312
VC-305
VC-308
VC-378
VC-375
VC-367
SD-44
VC-362
VC-314
SD-52
VC-302
EB-22
SD-43
RB-02
RB-07
VC-350
VC-301
SD-50
VC-333
VC-330
VC-331
RB-20
RB-15
SD-45
HA-219
HA-218
RB-13
HA-217
HA-211
HA-206
HA-221
HA-216
HA-215
RB-05
RB-01
HA-209
RB-03
RB-06
HA-203B
HA-205
RB-08
SD-41
HA-203
HA-201
CS-02
VC-1
EB-19
VC-2A
VC-2B
SD-34
VC-3
VC-511
RB-04
VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 4 TO 5 FOOT

AUGUST 2015

FIGURE 4.4E

EB-29
EB-16
VC-122
VC-133
VC-103C
VC-123
VC-353
VC-352
VC-351
VC-354
VC-323
VC-321
VC-325
RB-14
VC-322
VC-372
VC-319
VC-320
VC-344
VC-358
VC-343
VC-324
VC-365
VC-340
VC-339
VC-361
VC-347
VC-342
VC-328
VC-329
VC-369
VC-373
VC-374
VC-134
VC-357
VC-345
VC-348
VC-364
VC-341
VC-318
VC-317
VC-338
VC-366
VC-379
VC-377
VC-356
VC-313
VC-337
CS-11
VC-336
VC-135
VC-326
RB-42
VC-346
VC-368
VC-315
VC-370
VC-309
VC-307
VC-335
VC-376
VC-360
VC-327
VC-363
SD-42
RB-21
VC-316
VC-371
SD-53
VC-303
VC-334
VC-355
VC-349
VC-311
RB-12
VC-312
VC-304
VC-305
VC-359
EB-21
VC-314
VC-308
VC-332
SD-44
VC-362
VC-367
SD-52
VC-302
VC-378
VC-375
VC-301
SD-50
RB-07
EB-22
SD-43
RB-02
VC-350
VC-333
VC-330
VC-331
RB-20
RB-15
SD-45
HA-219
HA-218
RB-13
HA-217
HA-211
HA-206
HA-221
HA-216
HA-215
RB-05
RB-01
HA-209
RB-03
RB-06
HA-203B
HA-205
RB-08
SD-41
HA-203
CS-02
HA-201
VC-1
EB-19
VC-2A
VC-2B
SD-34
VC-3
VC-511
RB-04
VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 5 TO 6 FOOT

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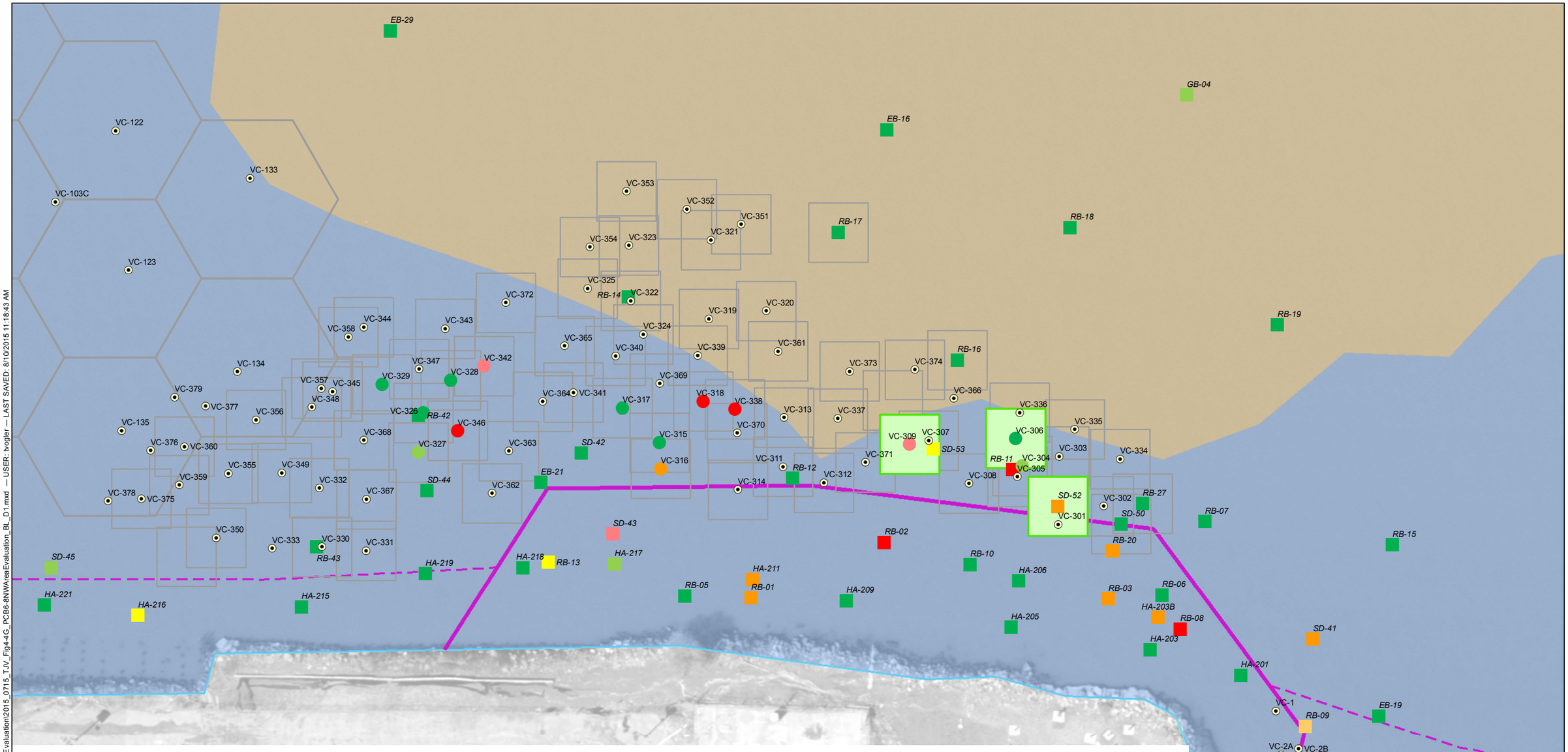
FIGURE 4.4F



LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (6-10 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 6 TO 8 FOOT

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FIGURE 4.4G

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LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (0-2 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION SURFACE TO 2 FOOT

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FIGURE 4.4B

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100

SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 2 TO 3 FOOT

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FIGURE 4.4C

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EB-29
GB-04
CS-16
VC-122
EB-16
CS-14
VC-133
VC-103C
VC-353
VC-352
VC-351
RB-17
RB-18
VC-354
VC-323
VC-321
VC-123
CS-15
VC-325
RB-14
VC-322
CS-12
VC-319
VC-320
VC-372
RB-19
VC-344
VC-358
VC-343
VC-324
VC-365
VC-339
VC-340
VC-361
RB-16
VC-134
VC-373
VC-374
CS-18
VC-379
VC-377
VC-357
VC-345
VC-329
VC-347
VC-328
VC-342
VC-369
VC-366
VC-348
VC-341
VC-364
VC-318
VC-338
VC-317
VC-313
VC-337
CS-11
VC-336
CS-09
VC-356
VC-326
RB-42
VC-346
VC-135
VC-368
VC-306
VC-335
VC-376
VC-360
VC-327
VC-363
SD-42
RB-21
VC-315
VC-370
VC-309
VC-307
VC-303
VC-334
CS-03
VC-355
VC-349
VC-316
VC-311
SD-53
VC-371
VC-304
VC-359
VC-332
RB-12
VC-312
VC-308
VC-305
VC-378
VC-375
VC-367
VC-362
VC-314
SD-52
VC-302
RB-27
VC-301
SD-50
EB-22
SD-43
VC-350
RB-20
RB-15
VC-333
VC-330
RB-43
VC-331
RB-40
SD-45
HA-219
HA-218
RB-03
HA-216
CS-08
SD-41
CS-02
RB-36
VC-1
EB-19
VC-2A
VC-2B
SD-34
VC-3
VC-511
RB-30
VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (2-4 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- INTERVAL BELOW REMOVAL
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 3 TO 4 FOOT

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FIGURE 4.4D

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LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

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NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 4 TO 5 FOOT

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FIGURE 4.4E

EB-29 EB-16 VC-122 VC-133 VC-103C VC-123 VC-353 VC-352 VC-351 VC-321 VC-354 VC-323 VC-325 RB-14 VC-322 VC-372 VC-319 VC-320 VC-324 VC-344 VC-343 VC-558 VC-365 VC-340 VC-339 VC-361 VC-134 VC-347 VC-342 VC-328 VC-341 VC-364 VC-369 VC-318 VC-373 VC-374 VC-366 VC-379 VC-377 VC-357 VC-345 VC-329 VC-348 VC-326 RB-42 VC-346 VC-317 VC-338 VC-313 VC-337 CS-11 VC-336 VC-135 VC-356 VC-368 VC-327 VC-363 SD-42 RB-21 VC-315 VC-370 VC-307 SD-53 VC-309 VC-306 VC-335 VC-376 VC-360 VC-316 VC-311 RB-12 VC-371 VC-303 VC-334 VC-304 VC-305 VC-355 VC-349 VC-359 VC-378 VC-375 VC-332 VC-367 SD-44 VC-362 EB-21 VC-314 VC-312 VC-308 SD-52 VC-302 EB-22 VC-350 SD-43 RB-02 SD-50 RB-07 VC-301 RB-20 RB-15 VC-333 VC-330 VC-331 SD-45 HA-219 HA-218 RB-13 HA-217 HA-211 HA-206 HA-221 HA-216 HA-215 RB-05 RB-01 HA-209 RB-03 RB-06 HA-203B RB-08 HA-205 SD-41 HA-203 CS-02 HA-201 VC-1 EB-19 VC-2A VC-2B SD-34 VC-3 VC-511 RB-04 VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (4-6 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)
- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

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HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 5 TO 6 FOOT

AUGUST 2015

FIGURE 4.4F

EB-29 GB-04 EB-16 VC-122 VC-133 VC-103C VC-353 VC-352 VC-351 RB-17 RB-18 VC-354 VC-323 VC-321 VC-123 VC-325 RB-14 VC-322 VC-372 VC-319 VC-320 RB-19 VC-344 VC-343 VC-558 VC-324 VC-365 VC-340 VC-339 VC-361 RB-16 VC-134 VC-347 VC-342 VC-373 VC-374 VC-357 VC-345 VC-329 VC-328 VC-369 VC-341 VC-366 VC-379 VC-377 VC-348 VC-364 VC-318 VC-317 VC-338 VC-336 VC-356 VC-313 VC-337 VC-326 RB-42 VC-346 VC-307 VC-335 VC-135 VC-368 VC-370 VC-309 SD-53 VC-306 VC-376 VC-360 VC-315 VC-303 VC-334 VC-327 SD-42 VC-363 VC-371 VC-316 VC-311 RB-12 RB-11 VC-304 VC-355 VC-349 VC-312 VC-305 VC-359 EB-21 VC-308 VC-378 VC-375 SD-44 VC-362 VC-314 SD-52 VC-302 RB-27 VC-332 VC-367 VC-301 SD-50 RB-07 SD-43 RB-02 VC-350 VC-333 VC-330 RB-43 VC-331 RB-20 RB-15 SD-45 HA-219 HA-218 RB-13 HA-217 RB-10 HA-206 HA-211 RB-05 RB-01 HA-209 RB-03 RB-06 HA-221 HA-216 HA-215 HA-203B RB-08 HA-205 SD-41 HA-203 HA-201 VC-1 EB-19 RB-09 VC-2A VC-2B SD-34 VC-3 VC-511 RB-04 VC-4

LEGEND

PDI SAMPLES

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- >100 X PRG, >100 mg/kg

HISTORIC SAMPLES (6-10 FOOT)

- *BACKGROUND (PRG), 0-1 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *>100 X PRG, >100 mg/kg*

- NO RESULT
- SAMPLE GRID
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- DEPOSITION
- DYNAMIC (DEPOSITION/EROSION)

- INTERVAL BELOW REMOVAL
- INTERVAL AT BOTTOM OF REMOVAL
- >50 MG/KG WITH MIN. 3 FT OF COVER SEDIMENT
- REMOVAL IS DEEPER THAN INTERVAL SHOWN

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.
2. SEDIMENT MAP FROM HUDSON RIVER ESTUARY SEDIMENT ENVIRONMENT MAP, NYS DEC, 2006.

N

0 50 100
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NORTHWEST AREA SEDIMENT REMOVAL EVALUATION 6 TO 8 FOOT

AUGUST 2015

FIGURE 4.4G

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EB-06
EB-06A
EB-07
EB-08
EB-09
EB-38
GB-17
GB-14
CS-47
CS-37
CS-42
CS-45
EB-30
GB-16
CS-41
GB-13
CS-36
EB-24
CS-46
CS-44
EB-27
GB-12
CS-48
EB-28
VC-422
GB-15
RB-24
VC-421
RB-25
VC-420
RB-26
VC-419
VC-418
SD03-CS
SD03-GB
EB-26
VC-417
CS-40
6 FT
BS-07
CS-43
SD-01
RB-33
RB-31
RB-32
VC-416
EB-31
VC-415
CS-35
EB-25
VC-414
VC-413
VC-412
VC-411
CS-33
VC-410
VC-409
BS-05
EB-03
CS-31
CS-32
CS-30
VC-408
VC-407
VC-406
6 FT
CS-28
CS-27
VC-405
VC-404
VC-403
CS-34
SD-02
BS-06
CS-39
SD-49
VC-705
VC-704
VC-701
VC-702
CS-38
VC-703
4 FT
VC-605
CS-26
VC-604
VC-603
SD-48
SD-03
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-120
VC-138
VC-139
VC-114
VC-110
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
VC-132
VC-119
VC-113
VC-111
VC-137
VC-140
VC-112
EB-11
VC-106
VC-129
CS-29
EB-12
VC-107
EB-02
SHEET 1
SHEET 2

LEGEND

PDI	HISTORIC	PCBS
		BACKGROUND (PRG), 0-1 mg/kg
		≤2 X PRG, 1-2 mg/kg
		≤5 X PRG, 2-5 mg/kg
		≤10 X PRG, 5-10 mg/kg
		≤50 X PRG, 10-50 mg/kg
		≤100 X PRG, 50-100 mg/kg
		>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

- PCB
- COPPER
- LEAD
- REMOVAL AREA
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
<1.25 X PRG	129-161	132-165
<1.5 X PRG	161-194	165-198
<2 X PRG	194-258	198-264
<5 X PRG	258-645	264-660
<10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - SEDIMENT REMOVAL EVALUATION - SURFACE TO 6 FOOT

FIGURE 4.4H
SHEET 1 OF 3

AUGUST 2015

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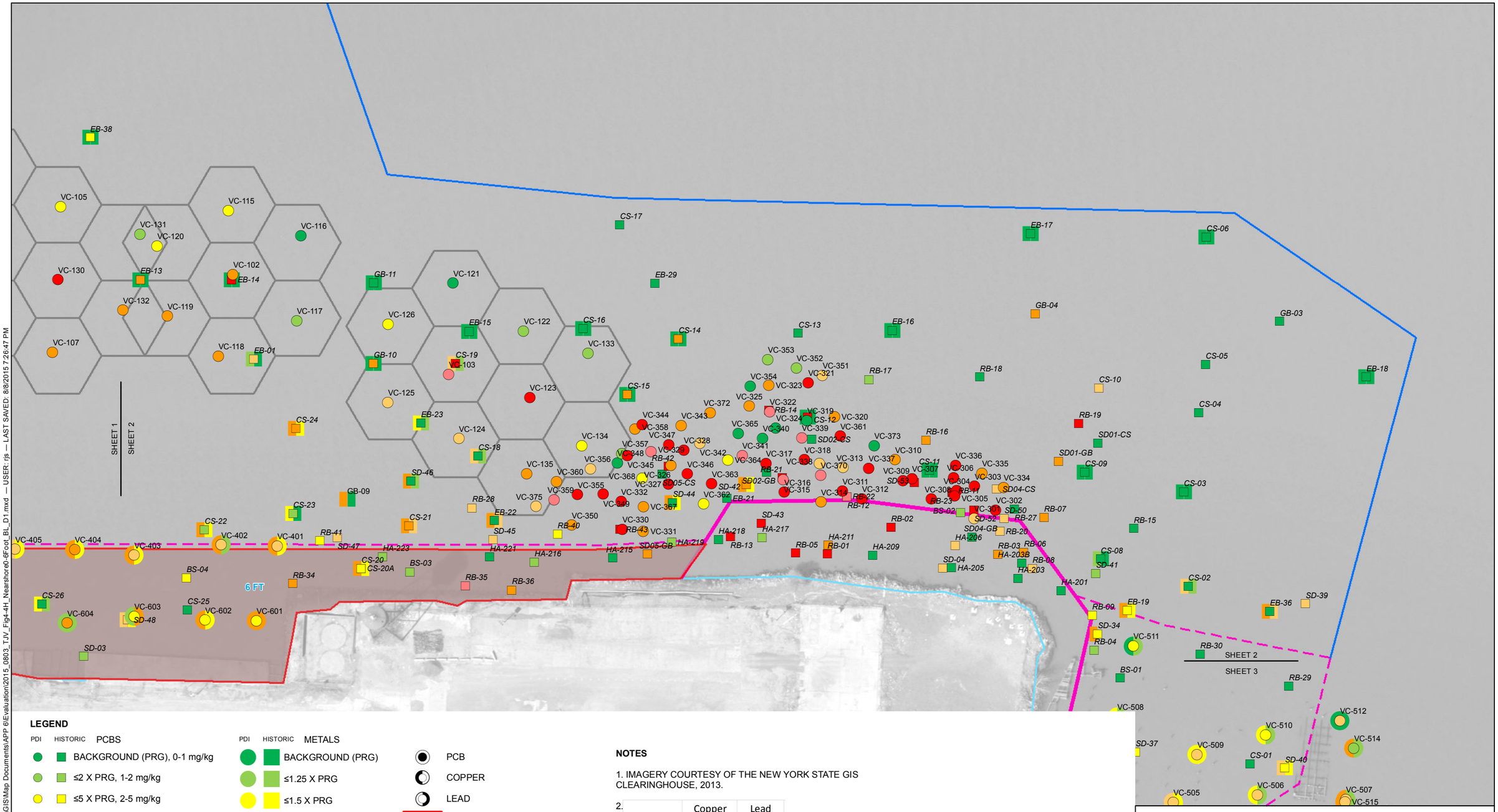


LEGEND

PDI	HISTORIC	PCBS
●	■	BACKGROUND (PRG), 0-1 mg/kg
●	■	≤2 X PRG, 1-2 mg/kg
●	■	≤5 X PRG, 2-5 mg/kg
●	■	≤10 X PRG, 5-10 mg/kg
●	■	≤50 X PRG, 10-50 mg/kg
●	■	≤100 X PRG, 50-100 mg/kg
●	■	>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
●	■	BACKGROUND (PRG)
●	■	≤1.25 X PRG
●	■	≤1.5 X PRG
●	■	≤2 X PRG
●	■	≤5 X PRG
●	■	≤10 X PRG
●	■	>10 X PRG

- PCB
- COPPER
- LEAD
- REMOVAL AREA
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
<1.25 X PRG	129-161	132-165
<1.5 X PRG	161-194	165-198
<2 X PRG	194-258	198-264
<5 X PRG	258-645	264-660
<10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

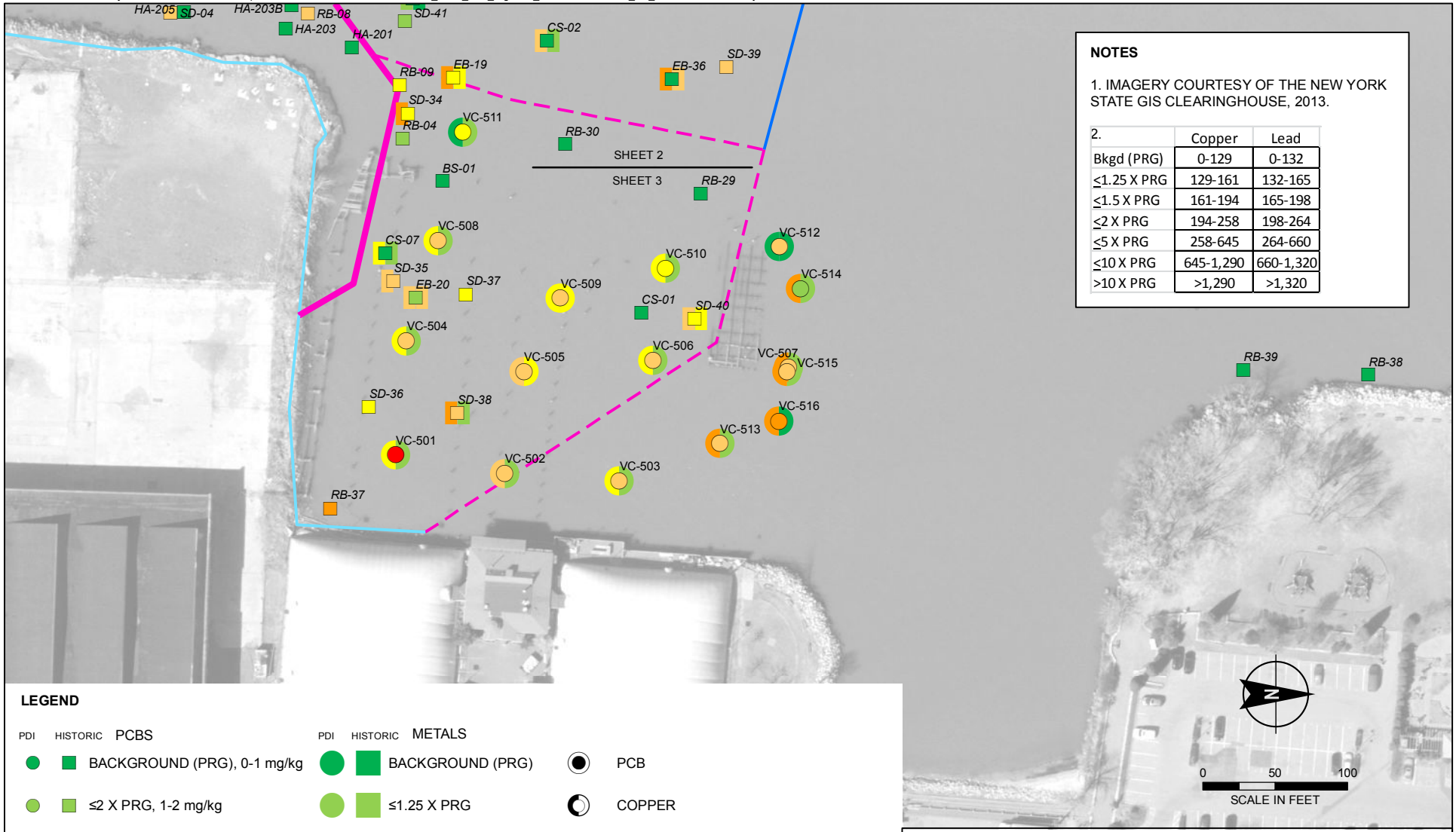
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - SEDIMENT REMOVAL EVALUATION - SURFACE TO 6 FOOT

FIGURE 4.4H
SHEET 2 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\Evaluation\2015_0803_TJV_Fig4-4H_Nearshore0-6Foot_AL_D1.mxd — USER: rjs — LAST SAVED: 8/7/2015 11:33:42 AM



NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

LEGEND

PDI	HISTORIC	PCBS
		BACKGROUND (PRG), 0-1 mg/kg
		≤2 X PRG, 1-2 mg/kg
		≤5 X PRG, 2-5 mg/kg
		≤10 X PRG, 5-10 mg/kg
		≤50 X PRG, 10-50 mg/kg
		≤100 X PRG, 50-100 mg/kg
		>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

PCB
COPPER
LEAD
SILT CURTAIN
SHEET PILE
OU-1/OU-2 BOUNDARY/MHW
OU-2 LIMITS

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - SEDIMENT REMOVAL EVALUATION - SURFACE TO 6 FOOT

FIGURE 4.4H
SHEET 3 OF 3

AUGUST 2015

EB-06
EB-07
GB-17
GB-14
EB-30
EB-13
EB-38
EB-11
EB-12
EB-02
GB-16
EB-24
GB-13
EB-27
GB-12
EB-28
GB-15
VC-422
VC-421
VC-420
VC-419
VC-418
EB-26
VC-417
VC-416
EB-31
VC-415
VC-414
EB-25
VC-413
VC-412
VC-411
VC-410
EB-03
VC-409
VC-408
VC-407
VC-406
VC-405
VC-404
VC-403
VC-605
VC-604
VC-603
SD-49
SD-48
SHEET 1
SHEET 2

LEGEND

PDI	HISTORIC	PCBS
		BACKGROUND (PRG), 0-1 mg/kg
		≤2 X PRG, 1-2 mg/kg
		≤5 X PRG, 2-5 mg/kg
		≤10 X PRG, 5-10 mg/kg
		≤50 X PRG, 10-50 mg/kg
		≤100 X PRG, 50-100 mg/kg
		>100 X PRG, >100 mg/kg

PDI	HISTORIC	METALS
		BACKGROUND (PRG)
		≤1.25 X PRG
		≤1.5 X PRG
		≤2 X PRG
		≤5 X PRG
		≤10 X PRG
		>10 X PRG

- PCB
- COPPER
- LEAD
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
<1.25 X PRG	129-161	132-165
<1.5 X PRG	161-194	165-198
<2 X PRG	194-258	198-264
<5 X PRG	258-645	264-660
<10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200
SCALE IN FEET

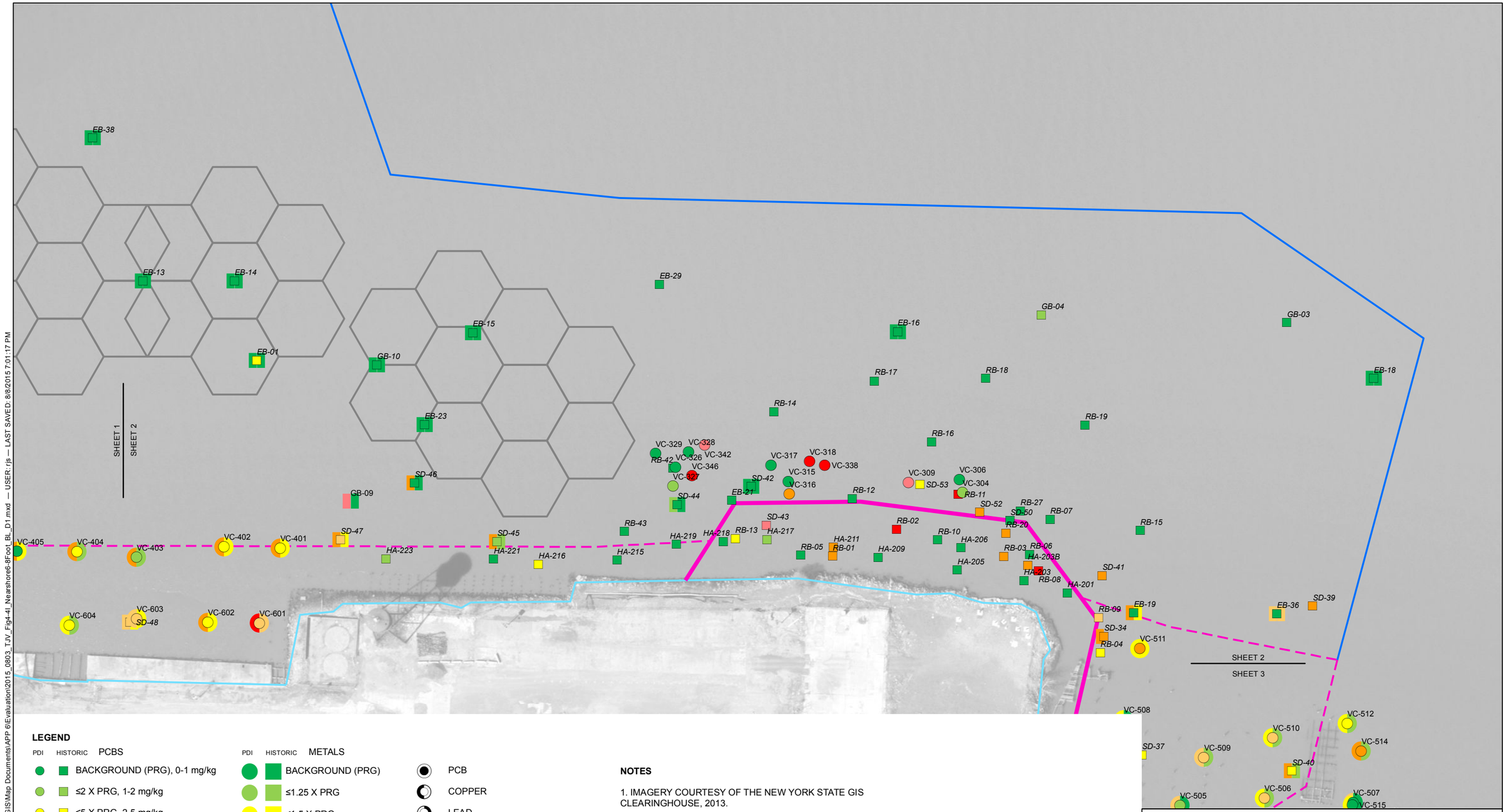
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB, COPPER AND LEAD RESULTS - 6 TO 8 FOOT

FIGURE 4.4I
SHEET 1 OF 3

AUGUST 2015



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LEGEND

PCBS

PDI	HISTORIC	
●	■	BACKGROUND (PRG), 0-1 mg/kg
●	■	≤2 X PRG, 1-2 mg/kg
●	■	≤5 X PRG, 2-5 mg/kg
●	■	≤10 X PRG, 5-10 mg/kg
●	■	≤50 X PRG, 10-50 mg/kg
●	■	≤100 X PRG, 50-100 mg/kg
●	■	>100 X PRG, >100 mg/kg

METALS

PDI	HISTORIC	
●	■	BACKGROUND (PRG)
●	■	≤1.25 X PRG
●	■	≤1.5 X PRG
●	■	≤2 X PRG
●	■	≤5 X PRG
●	■	≤10 X PRG
●	■	>10 X PRG

- PCB
- COPPER
- LEAD
- DEEPWATER DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
<1.25 X PRG	129-161	132-165
<1.5 X PRG	161-194	165-198
<2 X PRG	194-258	198-264
<5 X PRG	258-645	264-660
<10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB, COPPER AND LEAD RESULTS - 6 TO 8 FOOT

FIGURE 4.4I
SHEET 2 OF 3

AUGUST 2015

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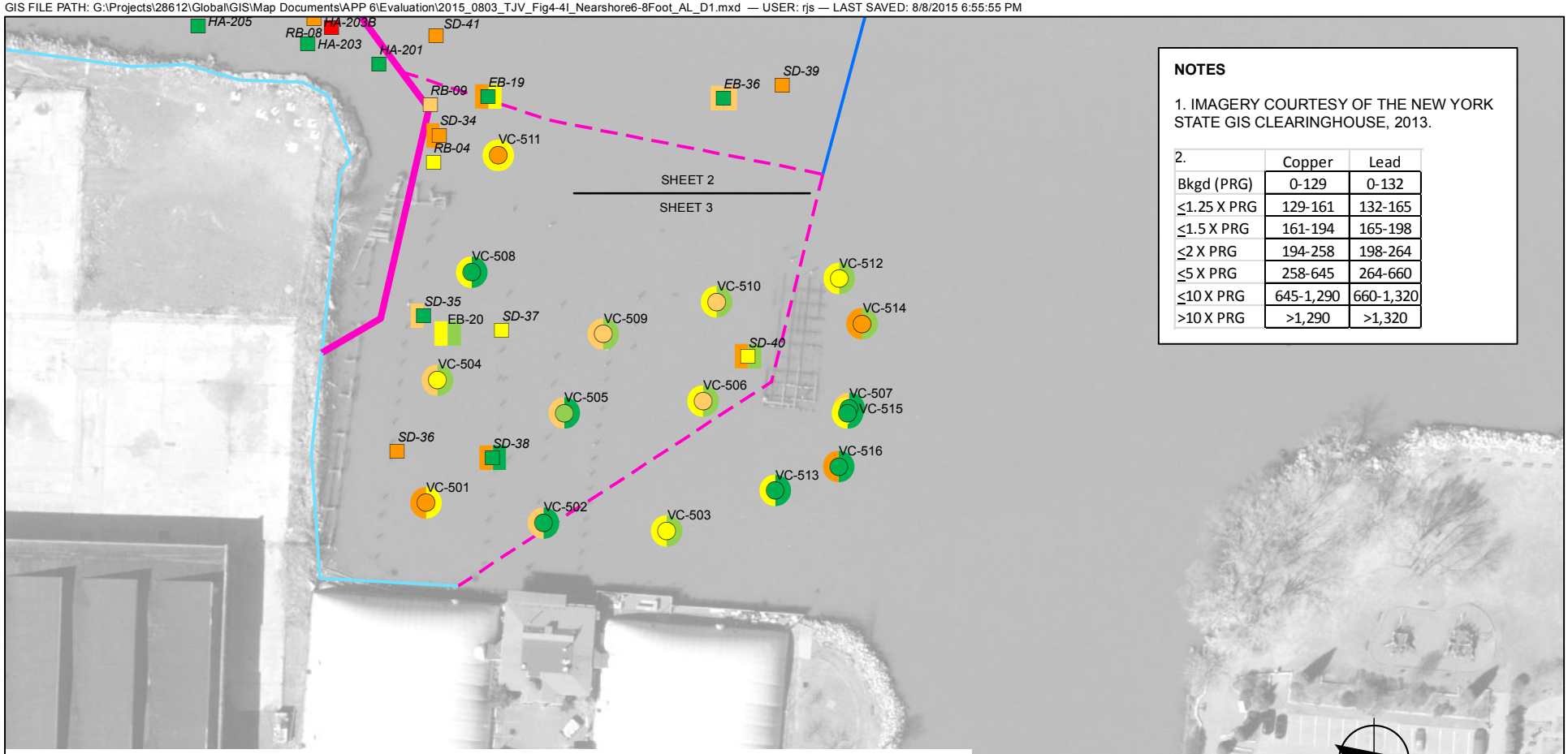


NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

2.

	Copper	Lead
Bkgd (PRG)	0-129	0-132
≤1.25 X PRG	129-161	132-165
≤1.5 X PRG	161-194	165-198
≤2 X PRG	194-258	198-264
≤5 X PRG	258-645	264-660
≤10 X PRG	645-1,290	660-1,320
>10 X PRG	>1,290	>1,320

LEGEND

PDI HISTORIC PCBS

- BACKGROUND (PRG), 0-1 mg/kg
- ≤2 X PRG, 1-2 mg/kg
- ≤5 X PRG, 2-5 mg/kg
- ≤10 X PRG, 5-10 mg/kg
- ≤50 X PRG, 10-50 mg/kg
- ≤100 X PRG, 50-100 mg/kg
- >100 X PRG, >100 mg/kg

PDI HISTORIC METALS

- BACKGROUND (PRG)
- ≤1.25 X PRG
- ≤1.5 X PRG
- ≤2 X PRG
- ≤5 X PRG
- ≤10 X PRG
- >10 X PRG

- PCB
- COPPER
- LEAD
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

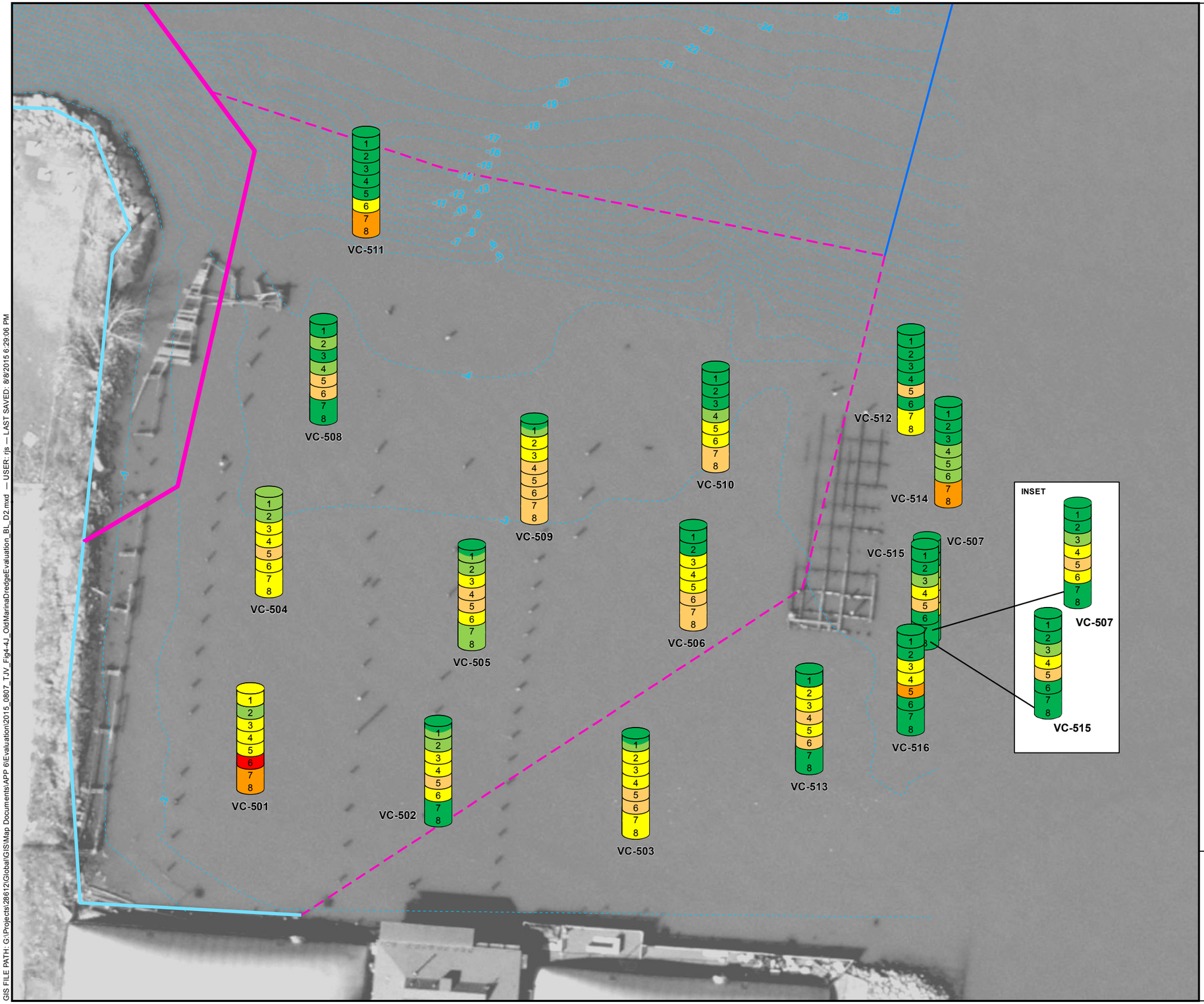
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB, COPPER AND LEAD RESULTS - 6 TO 8 FOOT

FIGURE 4.4I
SHEET 3 OF 3

AUGUST 2015



LEGEND

- 0 - 1 mg/kg
- 1 - 2 mg/kg
- 2 - 5 mg/kg
- 5 - 10 mg/kg
- 10 - 50 mg/kg
- 50 - 100 mg/kg
- > 100 mg/kg
- Not Sampled or Not Analized

# INDICATES DEPTH TO BOTTOM OF SAMPLE INTERVAL (E.G. 2 INDICATES 1-2 FT INTERVAL)

LEGEND

- SILT CURTAIN
- POTENTIAL SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS
- Bathymetry

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 40 80
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

OLD MARINA SEDIMENT REMOVAL EVALUATION - PDI PCB RESULTS - SURFACE TO 8 FOOT

AUGUST 2015

FIGURE 4.4J

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ATTACHMENT A

GPR REPORT

ATTACHMENT B

FIELD LOGS

ATTACHMENT C

WELL ABANDONMENT REPORT

HALEY ALDRICH

ATTACHMENT D

LABORATORY REPORTS

ATTACHMENT E

DATA USABILITY REPORTS

ATTACHMENT F

CAMP SUMMARY DATA

HALEY ALDRICH

APPENDIX H

BASELINE DATA REPORT YEAR 1 & 2

HALEY ALDRICH

HALEY ALDRICH

www.haleyaldrich.com

BASELINE DATA REPORT YEAR 1 & 2
FORMER ANACONDA WIRE & CABLE PLANT SITE
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

By **Haley & Aldrich of New York**
Rochester, New York

For **Atlantic Richfield Company**
Naperville, Illinois

File No. 28612-359
October 2015

Haley & Aldrich of New York
200 Town Centre Drive
Suite 2
Rochester, NY 14623
585.359.9000

9 October 2015
File No. 28612

Mr. Rick Mustico
New York State Department Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7014

Subject: Baseline Data Report Year 1 & 2
Former Anaconda Wire and Cable Company
Hastings on Hudson, New York

Dear Mr. Mustico:

Haley & Aldrich of New York (Haley & Aldrich) is pleased to submit this Baseline Data Summary Report, prepared for the Former Anaconda Wire and Cable Company site located at 1 River Street, Hastings on Hudson, New York.

I, Wayne Hardison certify that I am currently a NYS registered professional engineer and that this Baseline Data Summary Report was prepared in accordance with the applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

PROFESSIONAL ENGINEER CERTIFICATION

Signature: Wayne Hardison

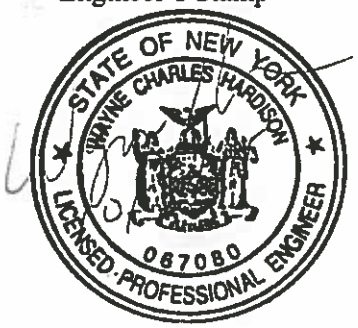
Name: Wayne C. Hardison, P.E.

Title: Vice President

Lic. State/#: NY #067080

Date: 9 October 2015

Engineer's Stamp



Please contact us if you have questions.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Wayne C. Hardison, P.E.
Vice President

c: Atlantic Richfield; Attn.: Paul Johnson

Haley & Aldrich of New York
200 Town Centre Drive
Suite 2
Rochester, NY 14623
585.359.9000

9 October 2015
File No. 28612

Atlantic Richfield Company
150 West Warrenville Road
Naperville, Illinois 60563

Attention: Paul Johnson, P.G.

Subject: Baseline Data Report Year 1 & 2
Former Anaconda Wire & Cable Plant Site

Hastings-on-Hudson, New York
Site No. #3-60-022

Paul:

The attached Baseline Data Report Year 1 & 2 has been prepared for submittal to the New York State Department of Environmental Conservation (NYSDEC) in accordance with DER-10, applicable United States Environmental Protection Agency guidance and the Record of Decision (NYSDEC, 2012) for Operable Unit No. 2 and Amended Record of Decision for Operable Unit No. 1.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Wayne C. Hardison, P.E.
Program Manager

Stephen R. Clough, Ph.D., DABT
Lead Environmental Toxicologist

Enclosures

C:\Users\amora\Desktop\2015_1009_Baseline Data Report_F.docx

Table of Contents

Table of Contents

List of Tables

List of Figures

1. Introduction and Description of Activities

This document, prepared on the behalf of Atlantic Richfield Company (AR), presents the results of activities performed according to the "Baseline Sampling and Analysis Plan" (BSAP) at the Former Anaconda Wire & Cable Company Site (Site # 3-60-022), located on the east shore of the Hudson River at 1 River Street, Hastings-on-Hudson, New York (Figure 1). The BSAP and other work plans were approved by NYSDEC and changes/updates to the program were documented and communicated to NYSDEC to ensure compliance. This document serves as our required submittal of the data and results and an addendum memo for Year 3 will be submitted at a later date to supplement this report.

Baseline activities were conducted offshore for Operable Unit No. 2 (OU-2). The overarching goal of the OU-2 BSAP was to monitor polychlorinated biphenyls (PCBs) and metals (copper, lead and zinc) in sediment, biota, surface water, and porewater to provide a benchmark against which post-construction performance monitoring can be compared in order to determine if there may be any post-remedy trends. The success of any performance monitoring program is dependent on the foundation of the BSAP which states the Remedial Action Objective (RAO) and the Data Quality Objective (DQO) for each environmental media of concern. The baseline conditions presented in this report will serve as the frame of reference against which future post-construction conditions will be compared. The analyses of the different OU-2 media presented here are considered "Year 1". Additional "Year 2" data have been collected to supplement these data and included in this report; the "Year 3" (2015 fish) field program has been completed, however, the analytical data from this event is not yet available.

Baseline activities were also conducted onshore for Operable Unit No. 1 (OU-1). One round of baseline groundwater sampling was completed in August 2014 to monitor shallow groundwater prior to remedial construction and allow for evaluating the long term effectiveness of the remedy. The baseline groundwater sampling program and the 2014 results were reported in the Pre-Design Investigation Data Summary Report submitted to the NYSDEC in August 2015 and included here for reference. The second round of baseline groundwater sampling was completed in September 2015 and the analytical data are not available at this time. The baseline air monitoring program was conducted to determine if PCBs are present in ambient air and, if detected, to establish the concentration of airborne PCBs in the absence of intrusive activities at the site. Air samples were collected from June 2015 through August 2015 as specified in the approved Baseline Air Monitoring Plan submitted to NYSDEC in June 2015.

2. Background

A Baseline Sampling and Analysis Plan (Haley & Aldrich, 2013) was prepared in accordance with DER-10, applicable USEPA guidance and the Record of Decision (NYSDEC, 2012) for OU-2. In March 2012, the NYSDEC issued a Record of Decision (ROD) that calls for removing sediment containing greater than 1 part per million (ppm) or milligram per kilogram (mg/kg) PCBs and metals exceeding background from the nearshore and backwater areas. The ROD indicates that in deepwater areas, where dredging activities cannot be fully contained, the selected remedy removes PCBs in targeted areas at a higher threshold. The ROD stipulates an evaluation of the long-term trends of PCBs and metals in all affected media which requires determination of baseline conditions to establish an empirical benchmark for the evaluation of spatial or temporal trends. In accordance with the DER-10 Technical Guidance (NYSDEC, 2010), baseline monitoring of the Site and reference locations must be completed prior to the start of all construction activities.

Prior to the BSAP, the most recent OU-2 sampling and analysis of environmental media within the Site reach was reported in a study by Llansó and Southerland (2006) where levels of both PCBs and metals in surface sediments obtained within the depositional area were markedly below levels observed in the 2000 Remedial Investigation (Earth Tech, 2000). Since then, various interim remedial measures in OU-1 may have affected near-shore conditions. The data reported here will represent the current 'baseline' conditions prior to any remedial activities in OU-2.

Historical groundwater samples collected from within the Fill Unit were analyzed in both filtered and unfiltered forms to determine the influence of suspended fine particles on contaminant levels. The majority of unfiltered samples contained PCBs at levels that exceed the ambient groundwater standard of 0.09 micrograms per liter (µg/L). Filtered samples contained much lower levels of PCBs, with a maximum detection of 1.0 µg/L. Groundwater samples collected from the Basal Sand Unit did not contain detectable levels of PCBs. Supplemental unfiltered groundwater results using low flow sampling techniques were consistent with previously collected filtered samples with all results less than 1.0 µg/L.

Air monitoring and sampling has previously been collected during building demolition and more recently during ground disturbance associated with the Pre-Design Investigation. PCB concentrations during the Pre-Design Investigation Community Air Monitoring Program were predominantly not detected with detected results below the action level of 0.11 micrograms per cubic meter (µg/m3).

More detailed historical information about the site, remedial investigations, and feasibility studies (e.g. site description and setting, land use, geology, hydrology, nature and extent of contamination, human and environmental risk assessments, etc.) can be found in historical documents for the Site (Earth Tech, 2000; Parsons, 2006; Haley & Aldrich, 2011).

3. Description of Activities

The BSAP collected physical information on habitat (bathymetry and Sediment Profile Imaging), biological information (metrics on biota and benthic macroinvertebrates) and chemical information on four different types of media: surface water, fish/shellfish, surface sediment and porewater. The various parameters measured for these media were not mutually exclusive so the sampling design tasks overlapped somewhat (e.g. sampling of bulk sediment also included sampling for porewater and benthic macroinvertebrates). The daily sampling sequence and timing was scheduled to reduce the potential for cross-contamination between sample locations e.g., work was sequenced to perform sampling downstream to upstream during ebb tide and restricting simultaneous open water activities when collecting surface water samples.

Samples analyzed for PCBs and metals concentrations adjacent to the site are compared to levels measured in media sampled at North (upstream) reference locations and south of OU-2. Consequently, the locations for each media are grouped into three river sections: North Section (reference/background locations), Adjacent Section and South Section (downstream of OU-2 based on predominant flow direction). Discrete sampling included three upstream reference locations north of the Site (Dobbs Ferry Beach, Dobbs Ferry Park and Ardsley-on-Hudson), locations adjacent to the Site (including South Boat Slip, North Boat Slip, Old Marina and Deepwater), and locations south of the Site (immediately south of the Site, adjacent to the Tappan Terminal Site and approximately one-half mile south of the Site). The reach south of the Site is not considered a reference area but will provide information on how the Site affects downstream receptors following construction. The initial field sampling design and strategy selected locations in an attempt to minimize physical variations (e.g. information on bathymetry was used to identify placement of passive fish traps).

As prescribed in the BSAP, Table 1 provides a comprehensive summary of the sample ID's, methods, approximate depths, measurement endpoints and the rationale for each particular location. Table 2 presents, for each environmental media of concern, the number of locations and details addressing the various analytical requirements, as well as commentary specific to each sampling regime. Proposed locations and activities were adjusted based on field conditions. Where changes to the scope were significant, modifications are discussed in Section 4 along with the results.

3.1 BATHYMETRY

The ROD required the characterization of both shoreline and nearshore bathymetry. The DQOs presented in the BSAP included additional resolution of the shoreline and nearshore bathymetry to support the selection of sampling locations for the remaining elements of the BSAP.

The bathymetry survey was completed by Ocean Surveys Inc. who conducted a high resolution multibeam hydrographic survey to document depths, bottom features and mudline elevation as well as laser scanning to document shoreline features (Attachment A). This report was completed in December 2012 under a separate work plan, which was included in the BSAP. Details of the bottom contours assisted in the selection of stations used for sediment sampling and sediment profile imaging. Subsequent bathymetry surveys will not be performed for this program.

3.2 SURFACE WATER

The ROD requires that surface water sampling be conducted in the vicinity of the Site and at reference locations. The data quality objectives for sampling this media were to establish baseline levels of PCBs and metals (copper, zinc, lead). Conventional parameters (dissolved oxygen, pH, temperature, turbidity and total suspended solids (TSS) are also useful parameters that will be used to compare to conditions during the construction and dredging operations. More details on the sampling locations, methods, endpoints and rationale are provided in Table 1.

To date, ten sampling events have been performed with two in 2013 (October and December), seven in 2014 (April – October), and one in 2015 (May). Monthly sampling events during the winter (January – March) were not performed as inclement weather presents open water health and safety concerns (e.g. extreme cold, river ice). Sample locations for surface water are presented in Figure 2. Up to seven surface water samples were collected during each event with a Niskin grab sampler at locations in each of the three river sections (2 upstream, 3 adjacent, 2 downstream) to effectively characterize site-related constituents in the nearshore environment. Samples were collected within a 2 hour interval prior to low tide. This approach ensured that a) the river was moving uniformly downstream to minimize the potential for the Site to impact the upstream reference samples during the collection event and b) the samples reflected any potential contribution of the Site to the river at multiple points. Each sample was a composite of two grab samples collected 2' below the water surface and 2' above the mud line. Extra replicates were obtained once per quarter to address additional volume required for potential congener analysis. All samples were placed on ice and sent to Pace Analytical Laboratory for analysis of Aroclor PCBs, dissolved metals (copper, lead, zinc), TSS, total organic carbon (TOC) and dissolved organic carbon (DOC). More details on the analytical methods and requirements are provided in Table 2.

3.2.1 Water Quality Conventional Parameters

Conventional water quality parameters that support aquatic life were measured at each station (Figure 2). Immediately before obtaining a surface water sample for analytical requirements, dissolved oxygen, temperature, turbidity, pH and salinity were measured at a depth of two feet below the water surface and two feet above the mudline at each location (Figure 2) using a multi-parameter water quality sonde.

3.2.2 Water Quality: Analytical Parameters

For chemical constituents specified in the BSAP, a solid phase extraction method, was used to measure total PCBs from individual surface water samples. The Quality Assurance Project Plan (QAPP) specified Method 3535/8082 with a Practical Quantification Limit (PQL) of 0.050 µg/L and a Method Detection Limit (MDL) of 0.010 µg/L. Individual congener analysis was not completed because all Aroclor analysis during December, June and August were below the limit of detection (non-detect or "ND"). For measurement of copper, lead and zinc (USEPA Method 6010b) the QAPP specified a PQL of 0.005 mg/L and MDLs of less than or equal to 0.002 mg/L.

It was noted that all of the initial PCB samples collected during October of 2013 were observed to be below the detection limit (ND). The sampling protocol was temporarily modified to confirm that the LDPE plastic container used to composite the samplers (Cubitainer) was not biasing the sample low by adsorbing PCBs. For the December 2013 sampling event, the protocol was modified to guide water from

the Niskin sampler directly into the clean 1L glass laboratory bottles. Since PCBs were not detected in this December sampling event, the original procedure was deemed acceptable and used for the remaining events.

3.3 SEDIMENT

The BSAP specified that sediments are to be sampled as a one-time event at locations presented in Figure 3 (three upstream, ten adjacent to the Site and three downstream). Data quality objective(s) are to establish baseline PCB, metals (copper, zinc, lead) and TOC concentrations in surface sediment at upstream, Site and downstream locations to assess post-construction remedy effectiveness (as well as to establish baseline grain size for comparison to conditions after remedial action). More details on the sampling locations, methods, endpoints and rationale are provided in Table 1.

Because collection of sediment was required for other task endpoints, contemporaneous samples were obtained at the same location to provide chemical data (bulk concentrations of metals and PCBs), physical data (grain size and TOC) and biological data (benthic macroinvertebrates). The scientific literature indicates that biota primarily inhabit the top 0 – 6" of the sediment bed. Collection of sediment samples in this depth interval were therefore obtained using a Petite Ponar grab sampler. The sampler was deployed and retrieved using a mechanical winch. Once on board, the sample was placed in a clean bin where the contents were removed and subsequently composited by hand to a consistent color and texture.

Analytical samples were containerized, labeled, stored on ice and shipped to Pace Analytical Laboratory for measurement of total PCBs (as Aroclors) and bulk metals (Cu, Pb, Zn). Aluminum (Al), beryllium (Be) and iron (Fe) were included as matrix metals to potentially help distinguish background metals from site-related constituents of potential environmental concern (COPECs). Other physicochemical parameters measured included grain size and TOC. More details on the analytical methods and requirements are provided in Table 2.

3.4 POREWATER

The ROD requires porewater sampling in the vicinity of the Site and at upstream reference locations to evaluate effects of bioavailable COPECs on macroinvertebrates (or migration into the water column and subsequent bioaccumulation in higher trophic level species). The DQO is to "establish baseline PCB and dissolved metals (copper, zinc, lead) concentrations in porewater at the Site and reference locations". Like sediment, the BSAP specified one sampling event at seven locations (two in the northern section and five adjacent to the Site) for total PCBs as well as metals (copper, zinc and lead). More details on the sampling locations, methods, endpoints and rationale are provided in Table 1.

Porewater was collected at seven locations to document the existing porewater PCB concentrations and, if applicable, to identify the partitioning behavior of PCBs in the biotic zone of the surface sediment. Different Aroclors will partition to sediment according to the degree of chlorination which, in turn, may affect how different types of PCBs move up the food chain.

Nearshore sediment samples were collected at two reference locations in the north and five locations adjacent to the Site. As discussed previously, grab samples were obtained from the 0-6" depth interval (Figure 4). Porewater was extracted via centrifugation. Total PCBs were measured using USEPA Method

8082. Total PCBs and total organic carbon (TOC) were also measured in the bulk sediment as part of the surface sediment analysis. More details on the analytical methods and requirements are provided in Table 2.

3.5 BIOTA

The ROD requires the sampling and analysis of biota in the vicinity of the Site and at reference locations to help determine if the remedy will be successful in reducing the local contribution of potential site-related PCBs to the environment (as measured in fish and shellfish). A reduction in potential site-related PCBs in sediments would theoretically help reduce sediment related impacts to biota via bioaccumulation in the food web. The pertinent DQO is, therefore, to "establish baseline PCB concentrations in local fish and local forage fish at the Site and reference locations for comparison to conditions after remedial action". The structure of pollution-tolerant benthic macroinvertebrates will generally not reflect effects from PCBs, but were sampled as an indicator of the health of the benthic community which, in turn, supports mid- to upper-trophic level fish and shellfish.

Distinguishing between the local and background contributions of PCBs to biota is a fundamental element in the assessment of the disposition of site-related PCBs in fish. Profiles of total PCBs (as Aroclors) were evaluated with regard to the site-specific contribution of PCBs in biota tissue (Section 4.5). Concentrations in edible tissue (crab, American eel, and white perch) were compared to current fish tissue advisory levels. It is also important to note that the *Upper Hudson River PCBs Site (*the former General Electric facility) as well as other upstream locations, contribute to background concentrations. Some of the elements of the baseline monitoring program reflect elements of past studies which collected fish adjacent to the Site. These elements provide continuity in terms of what to expect when interpreting the data. More details on the sampling locations, methods, endpoints and rationale are provided in Table 1.

3.5.1 Fish and Shellfish

The trapping and analysis of fish tissue is a critical piece of information when conducting Performance Monitoring. Measurement of total PCBs and lead in fish and shellfish will establish a benchmark against which post-construction (long-term) monitoring in fish (both dry weight and lipid normalized) will be compared. This program was specified in the BSAP to occur annually for three years (2013; 2014; and 2015). This multiple year sampling event included capturing fish and shellfish within three sections of the river: north (upstream), adjacent (Site) and south (downstream) of the former facility (Figure 5). All years of fish collection have been completed with the analytical results of the 2015 collection scheduled to be completed in early 2016.

The capture of fish and shellfish employed passive methods: gill nets, minnow, Fyke and Box traps, crab pots and eel traps. The species originally targeted for collection and analysis (striped bass, white perch, American eel and blue crab) were organisms that could be ingested by recreational or sustenance fishermen. A scientific collection permit was submitted to, and approved by, the NYSDEC prior to initiation of field sampling. The permit addressed proper protocols in the event that sensitive species (e.g. Atlantic sturgeon) were caught. The size ranges and the total number of the targeted species were limited to ensure the inventory was within acceptable parameters, while minimizing the 'taking' of fish, and that organisms were large enough to meet a minimum mass for analysis of PCBs (e.g. >10 grams). The number of biota samples originally targeted in the BSAP called for 5 fish per species per section.

Subsequent discussions and concurrence with NYSDEC, however, increased the quota for some species. It was understood that sampling would be conducted for a period of up to two weeks for each annual event.

Figure 5 shows the configurations for the location of sampling stations with regard to the deployment of gill nets and/or traps based on the results of the bathymetric survey. Actual locations were adjusted in the field based on activities in the vicinity of the site and professional judgment of the field biologist. In addition to the shallow stations (3 upstream, 5 adjacent, 3 downstream) situated to determine contribution of PCBs from the nearshore, additional stations were positioned in the deeper water to sample biota that may be exposed to deeper sediments (e.g. American eel, hogchoker, blue crab). Non-target species (e.g. grass shrimp, catfish) were collected, frozen and archived for potential use should the quota for target species not be fulfilled at the end of the field program in the current year.

At the time of collection, samples were placed in plastic Ziploc® bags, labeled appropriately (species, , time and location) and placed in a cooler on ice. The coolers were transferred from the boat to a clean logging station where they were sorted, measured (length, weight), observed for lesions, and photographed. Each organism was then wrapped in aluminum foil, placed back in the labelled bag with an internal label, and frozen. Prior to shipping to the laboratory, samples were grouped by species. Chain-of-custody forms were completed and organized separately for each shipment. Fish that were too small to be filleted were analyzed whole. For fish that were dissected in the laboratory into fillet and offal and analyzed separately, whole fish concentrations were recalculated based on the results of the analyses of both tissues. In 2013, small blue crab (e.g. <50 grams) were analyzed whole; larger organisms were selected for analysis of both hepatopancreas and leg muscle tissue. More details on the analytical methods and requirements are provided in Table 2.

Based on discussions with the NYSDEC and their concurrence, some changes were made in the annual inventory and/or quota based on previous analytical results and/or yields of types and numbers of fish.

3.5.2 Benthic Macroinvertebrates

Benthic macroinvertebrates were collected from sediment grab samples to characterize the baseline condition of the benthic community at the Site and reference locations for comparison to conditions after remedial action by analyzing both the numbers and types of organisms. This task supplemented information obtained from Sediment Profiling Imaging (Section 3.5.3) as the condition of the benthic macroinvertebrate community is directly related to the condition of their habitat. For example, if the sediment profile imaging (SPI) shows anoxic conditions, the quality of the benthic community will suffer from lack of oxygen.

Metrics identified from these samples may be reexamined during post-construction monitoring to identify any improvement in the rate of recolonization and status of the benthic community by scoring of successional stages. The macroinvertebrate assemblage documented in the 2000 RI indicated a community that was primarily dominated by relatively pollution-tolerant organisms such as polychaetes, amphipods, crustaceans, and bivalves. In that survey, sample locations were generally limited to the shallower water (<15') which is typically more productive than deeper zones and the RI described no apparent differences in the benthic metrics (e.g. abundance, diversity, biotic indices) between the Site and the reference locations.

Macroinvertebrates were collected at each of the 16 locations (Figure 3) deemed as optimal based on real-time images from the SPI process completed during the habitat characterization (Section 3.5.3). As discussed in the BSAP, sediment grab samples were obtained using a Ponar dredge. Following sampling of sediment for site-related constituents, a separate dredge sample was carefully washed through 0.5 mm sieve. The invertebrates and debris remaining on the sieve were containerized and preserved in a solution of 10% buffered formalin. The samples were labelled both internally and externally and sent to the taxonomy laboratory of Vittor & Associates (Mobile, AL). Following sorting and identification, the metrics calculated to evaluate the quality of each sample included total abundance, total richness, percent dominance and the Shannon-Weiner Diversity Index.

3.5.3 Habitat characterization

The ROD requires the characterization of benthic habitat to establish baseline conditions at the Site and reference locations for comparison to conditions after remedial action. Habitat is defined as the natural home or environment of an animal, plant, or other organism; a robust benthic habitat fosters a healthy invertebrate community that serves a large part of the base of the food web. Selected locations were examined to characterize the condition of the sediment bed *in-situ*, as well as the numbers and types of organisms that comprise the benthic community. The latter were evaluated as part of SPI investigation, which was also supplemented by functional metrics calculated from the benthic grab samples (Section 3.5.2).

The habitat characterization utilized SPI which provides direct visual information about sediment grain size, the demarcation between oxic and anoxic sediments (e.g. the apparent 'redox potential discontinuity'), often the types of organisms present, the presence of debris, the occurrence of methane gas bubbles, and eventually post-remedy information about dredged or capped material and natural recovery processes. The SPI can also help identify the presence or absence of submerged rooted aquatic vegetation. The results of the sediment and macroinvertebrate sampling assist in the validation of observations made at the SPI stations.

SPI is an optical device that works like an upside-down periscope that takes cross-sectional images of the upper 20 centimeter (cm) of the sediment bed. A 10 megapixel digital profile camera is mounted in the center of a frame equipped with a mirror set at a 45 degree angle. The mirror acts as a wedge to penetrate the sediment bed. The camera photographs the upper portion of the sediments typically inhabited by benthic invertebrates.

The SPI investigation areas (Figure 6) included stations adjacent to the site and in reference area. There were 210 proposed locations established on a biased grid system, as shown on Figure 6A and Figure 6B, which focused on the nearshore water depths, where the remedial activities are proposed (some adjacent deepwater locations were also imaged). The "Materials and Methods" section of the Sediment Profile Imaging Report (Attachment B) present a more detailed description for each SPI location that was surveyed in the fall of 2013. Final SPI stations included deepwater and backwater habitats in addition to the nearshore area (Attachment B, Figure 1). The location of each station was recorded using a global positioning system. Station positions were recorded in latitude and longitude to the nearest 0.01 second using the World Geodetic System 84 coordinate system. The accuracy of the horizontal coordinates was within 10 feet.

3.6 GROUNDWATER

The goal of the baseline groundwater sampling program is to sample shallow-screened wells to provide data at both upgradient and down gradient locations across the Site to establish a baseline for groundwater quality prior to remedial construction to evaluate the long term effectiveness of the remedy. To date; two rounds of sampling have occurred in 2014 and 2015.

Baseline groundwater sampling was completed for three upgradient wells and three Site (downgradient) wells during the Pre-Design Investigation (PDI) and then conducted annually thereafter until the beginning of construction as described below. Groundwater wells selected for baseline monitoring are shown on Figure 7. Upgradient Wells include PDMW-16S, PDMW-20S, PDMW-19S, and PDMW-27S and are generally located upgradient of Site wells in areas absent of known impacted soils. Site wells include MW-01A, MW-05, and MW-09 and are generally located down gradient of - or proximate to - PCB and/or lead soil contamination or suspected sources of contamination. Note that groundwater flow is generally east to west.

Groundwater samples were collected using low flow techniques and pH, temperature, conductivity, ORP, dissolved oxygen, and turbidity were all monitored during sampling. Analytical samples were containerized, labeled, stored on ice and shipped to Pace Analytical Laboratory for measurement of total PCBs (as Aroclors) via US EPA Method 8082A and bulk metals (Cu, Pb, Zn) via US EPA Method 6010C.

3.7 AIR MONITORING

The Baseline Air Monitoring Plan submitted to NYSDEC in June 2015 incorporates elements of the NYSDEC approved Pre-Design Investigation Community Air Monitoring Plan (PDI CAMP; Haley & Aldrich, 2013), completed for and implemented during the PDI and acknowledges the resulting data from the associated air monitoring conducted during 2013 and 2014. As noted in the work plan, in 2013 and 2014, “during the PDI CAMP and associated ground disturbance at the Site, all PCB results were well below this [0.11 µg/m3] action level and predominately not detected”.

The Baseline Air Monitoring Plan provided specifications for the placement of an air monitoring station to determine baseline PCB concentrations in ambient air at the Site. The baseline monitoring location is indicated on Figure 8. Monitoring was conducted from 18 June 2015 through 18 August 2015 and each sample was collected over a 24 hour period every six days. Meteorological parameters included wind speed, wind direction, temperature, and relative humidity.

Baseline air samples were collected and analyzed in accordance with EPA Method TO-10A to determine the presence of PCBs. Baseline air samples were collected using a Leland Legacy® programmable sample pump (“SKC pumps”), manufactured by SKC Inc. PCBs were sampled using a 20-mm x 7.6 cm polyurethane foam (PUF) cylinder, fitted under slight compression inside a glass cartridge. Samples were analyzed by Pace Analytical Laboratory using gas chromatographic methodology equivalent to EPA Method TO-10A. Samples were collected using a flow rate of 5 liters per minute for a total sample volume of 7,200 liters. Based on this sample volume, the estimated reporting limit for each Aroclor is 0.014 µg/m^3. The baseline sampling and analysis methodology is therefore sufficient to achieve reporting limits below the comparison concentration of 0.11 µg/m^3.

4. Results

4.1 BATHYMETRY

Ocean Surveys completed a multi-sensor marine geophysical survey that included a high resolution map based on the acquisition of multibeam soundings, shoreline laser scanning, and subbottom profiling data. Water depths ranged from approximately 0 - 50 feet. Besides the obvious armoring of the shoreline (rip rap, pilings, and a sheetpile wall), the riverbed appeared "generally featureless" with soft muds underlain by "gaseous sediments". Several features were observed "that could potentially be problematic to remediation or removal of contaminated sediments", principally a large number of wooden pilings, sunken pier decking, and a "sunken barge approximately 100 feet by 25 feet" north of the northwest corner along the edge of the adjacent Old Marina property. The high resolution maps were also instrumental in identifying stations for the baseline sampling of surface water, porewater, sediment, benthic macroinvertebrates and sediment profiling described in this report.

4.2 SURFACE WATER

There were a total of ten monthly sampling events: two in 2013, seven in 2014 and one in 2015 to complete the program. As discussed previously, months that sampling was not completed were due to open water conditions that were too cold and/or hazardous for sampling as specified in the approved work plan.

4.2.1 Conventional Parameters

Table 3 presents conventional water quality data for ten monthly surface water sampling events. Temperature ranged from 4.7 to 26.2 ^{o}C and, as expected, is warmer during the summer months and appears to be slightly warmer near the surface. Salinity ranged from 0.8 to 17 parts per thousand (ppt) with a median of 6 ppt (open ocean seawater is 35). It was slightly more saline near the bottom than near the surface but, overall, the water in the reach of OU-2 appears to be well mixed during the sampling hours before low tide. The pH of this reach of the lower Hudson is fairly constant, ranging from 7.0 to 8.3 standard units (median 7.8). The turbidity was much more variable, ranging from 90 NTU (nephelometric turbidity units) in May 2015 to 0.4 NTU in April 2014 (median 14 NTU). The levels of dissolved oxygen were normal with all values (5.5 to 14.8 mg/L) greater than NYSDEC's minimum ambient water quality standard of 4.8 mg/L (Class B water) for this reach of the Lower Hudson.

4.2.2 Analytical Parameters

Polychlorinated Biphenyls

Table 4 presents the analytical results for PCBs for the surface water sampling. Total PCBs went undetected in the majority of the surface water samples tested with analytical limits that ranged between 0.010 and 0.018 µg/L. As noted previously, because no detections were observed in the samples from the initial round, surface water was collected directly into individual glass bottles (to test for low sampling bias due to the use of an LDPE polyethylene container). These results also came back ND which confirmed the original sampling protocol was acceptable.

When PCBs were detected (May and August 2014; May 2015), concentrations were generally near the detection limit and, with the exception of one location in August, the Aroclors that were identified are not site specific (e.g. Aroclor 1242 or 1248). Additionally, upstream samples had similar results (2015) or based on a visual review of the chromatograms, presented similar peaks although below the MDL (2014).

PCBs during August were only observed at one location with detections reported as Aroclor 1260. It was noted during this event that there was a potential for contamination due to simultaneous PDI activities upstream (barge relocation). This detection was observed downstream of the activity which likely contaminated the water column with suspended sediment (TSS appeared elevated relative to upstream stations for this date). All other samples were ND for this event.

Other Parameters

Table 4 also presents results for DOC, TOC and total TSS. TOC ranged from 3.4 to 24.6 µg/L (mean = 5.5 µg/L) while the range for DOC was 2.8 to 23.6 (mean = 4.9 µg/L). Both TOC and DOC concentrations were similar during most of the sampling events with the dissolved fraction being only slightly lower than the total. TSS ranged between 6.5 and 113 mg/L with an average concentration of 25 mg/L. The range of concentrations of TSS appeared to be fairly consistent within each sampling event but more variable between surface water sampling events.

Metals

Table 5 presents the analytical results for metals in surface water. Lead was below the detection limit in nearly all samples and never exceeded the NYSDEC water quality criterion (0.008 mg/L) adjacent to the Site. Copper was detected at relatively low levels at all locations with no apparent trend over time or space. When the NYSDEC water quality criterion for copper (0.0056 mg/L) was marginally exceeded, an upstream sample also exceeded or was close to the benchmark. Zinc was also observed at relatively low levels with no apparent trends and never exceeded the NYSDEC water quality criterion (0.066 mg/L) adjacent to the Site.

4.3 SURFACE SEDIMENT

Observations made during the bathymetric survey (Section 4.1) concluded that the majority of the sediment substrate within the study area are soft unconsolidated muds. These remote observations were validated through grain size measurements made on all of the sediments sampled for chemical analysis and evaluation of the benthic community. Attachment C presents these grain size data. The particle size distribution shows that the most of the volume of the samples (>80%) could pass through a No. 200 mesh sieve and therefore could be classified to consist of mainly silts and clays.

Some sediment grabs were unsuccessful due to debris getting caught in the grab sampler. At two locations (SW-001 and SW-009) clusters of oyster shells were caught in the jaws of the grab. Oysters were also caught in the jaws of the grab in the vicinity of SW-001. The organisms caught in the North reach were free of silt, whereas oysters caught at SW-009 were covered with suspended sediment.

Polychlorinated Biphenyls

Table 6 presents the concentrations of Aroclor PCBs and their sum (Total PCBs) for each sediment sample obtained north, adjacent to, and south of the Site. Aroclor 1248 was found north of the site (SS-001 through SS-003) and is not one of the site specific Aroclors. Historically, Aroclor 1260 or Aroclor 1262 are considered to be Site related. Although not strongly informative, congener results for select surface sediment samples are provided in Attachment C.

Metals

All sediment samples (Figure 3) were analyzed for copper, lead and zinc. The results (Table 7) show that, in general, there is very little spatial variability in grain size, levels of total organic carbon (TOC) and metal concentrations. The average values in OU-2 for lead (60 mg/kg) and zinc (144 mg/kg) were not statistically different from values observed in the North or South segments of the Study Area. The average value for copper (84 mg/kg) in OU-2 was statistically greater ($\alpha = 0.05$) than samples taken in the northern segment (47 mg/kg), but the average in the southern segment (60 mg/kg) was not statistically different from the average values for either the North or Adjacent segment. Figure 9, which graphically presents the metals data arranged from upstream (North) to downstream (South), show that, with the exception of copper at SS-009, all of the metals concentrations were below site-specific background concentrations (Haley & Aldrich, 2010).

As discussed in the OU-2 BSAP, beryllium, aluminum, and iron were also analyzed to aid in discerning geochemical relationships with potential sources. As metals often covary with other metals in natural sediments, these more common metals were selected as indicator elements to help distinguish between natural deposits and site-related deposits. For example, if copper and an indicator metal were to correlate in reference sediments, then an unusually high level of copper without corresponding levels in the indicator metal would indicate site-related deposits. Each of these metals was reviewed as a potential indicator as follows.

Beryllium was not detected so it could not be considered as an indicator metal to evaluate geochemical relationships. Aluminum correlated strongly with iron (Figure 10; $r^2 = 0.87$) and both metals correlated with TOC ($r^2 = 0.68$ and 0.80, respectively). Using aluminum as the matrix indicator metal, there was no strong correlation with copper, lead or zinc (Figure 10); a similar conclusion can be reached with iron. Therefore, the relationship between indicator metals and site related metals do not provide useful information for this data set.

4.4 POREWATER

Porewater samples were obtained from discrete grab samples of sediment at seven locations (Figure 4). Samples were immediately chilled and sent to the laboratory for centrifugation to extract porewater. Porewater was analyzed for Aroclors, metals (copper, lead, zinc) and total organic carbon.

Polychlorinated Biphenyls

Table 8 presents Aroclor PCB concentrations measured in porewater that was extracted from sediment using centrifugation. Concentrations of TOC were relatively uniform, ranging between 6.9 and 16.0 mg/L. Only Aroclor 1248 and 1254 were detected at PW-006 located between the north and south boat slips. Aroclor 1260, which is a mixture that is historically associated with site operations, was not detected in any porewater sample. These results appear to indicate that PCBs are strongly bound to the sediment and have little propensity to partition into porewater.

Sediment-porewater partition coefficients for total PCBs (Kd and Koc) were not estimated as only one sample exhibited PCBs above the method detection limit. Because the porewater concentrations of PCBs were essentially below the MDL, the sampling and evaluation of data for this media is complete and the data is sufficient to establish a baseline against which, if necessary, post-construction monitoring data can be compared.

Metals

Table 9 presents concentrations of metals measured in porewater. Copper and lead were below the limit of detection at PW-004 and PW-007. All levels of copper, lead and zinc above the detection limit exceeded their respective surface water quality criteria of 5.6, 8.0 and 66.0 µg/L. The highest level of copper was located at PW-006, while the highest level of lead and zinc were observed at PW-001. Lead and zinc were higher in the North (upstream) than in the Adjacent or South reaches. There was a correlation between lead vs. copper (r^2 =0.37) and lead vs. zinc (r^2 =0.45).

In general, the porewater metals data appear to be highly variable with no clear trend associated with the site.

4.5 BIOTA

As mentioned previously, fish and shellfish were sampled and analyzed to determine the baseline concentrations of site-related constituents in tissue. Measurement of total PCBs and lead in fish and shellfish was performed to establish a benchmark against which post-construction long-term monitoring in fish can be compared. See Table 12 for analytical data of fish and shellfish collected in Year 1 (2013) and Table 13 for analytical data of fish and shellfish collected in Year 2 (2014). Additional analytical data is provided in Attachment C.

Some fish, such as white perch and spot croaker, were evaluated as whole body and thus the results are reported for whole fish. In 2013, American eel and oyster toadfish were filleted and the remaining carcass (the “offal”) was analyzed so that whole body concentrations could be calculated; in 2014, oyster toadfish were analyzed as whole fish. The purpose for doing this is twofold. First, it is important to know the concentration in the fillet as most of the fish advisories are based on human consumption (fillet for fish; leg muscle and possibly hepatopancreas for crab). Secondly, most of the historical data is reported as “whole fish”, so it would be convenient to mathematically ‘reconstruct’ the whole body fish concentration in order to compare the current data to past studies conducted in the Hudson River (NYSDEC, 2002).

Because concentrations of hydrophobic chlorinated compounds often increase with both the size and fat content of different species, the tissue concentrations of PCBs for this report are reported as both bulk levels (total PCBs) and lipid normalized. The lipid normalized concentrations are calculated by dividing the bulk tissue concentration by the fraction of lipid in fish:

$$\frac{\text{Total PCBs detected (in fillet, offal or whole fish) (ppm)}}{\text{Percent lipids (\%) / 100}}$$

4.5.1 Comparison to New York State Department of Health Fish Advisories

The US Food and Drug Administration enforcement criteria and New York State Department of Health (NYSDOH) advisory level for PCBs in edible fish tissue is 2 mg/kg (Loukmas and Skinner, 2005). As can be seen in Figure A (Attachment C), which presents *average* PCB residues in whole body fish, no species (on average) exceeded this tissue concentration criterion. On an individual basis, for edible fish, none of the blue crab tissue (either leg muscle or hepatopancreas), white perch fillet or oyster toadfish fillet exceeded the NYSDOH criterion. For the American eel, approximately one quarter (27 of 103) of the individual fillet concentrations exceeded 2 mg/kg.

For fishing downstream of the Tappan Zee Bridge, the current NYSDOH guidance focused on the types of fish to eat for certain age groups. Based on the data in this report, it appears that the guidance may be conservative with regard to the consumption of blue crab and white perch. American eel is not mentioned so it would fall into the category of "all fish", which recommends an allowance of "up to 4 meals per month". Using the NYSDOH guidelines it can be concluded that a recreational or sustenance fisherman could, with the exception of American eel, consume any of the types of fish caught within the BSAP program study area.

4.5.2 American Eel

For both 2013 and 2014 sampling periods, the yield of American eels was the highest of all of the species sampled within the two week sampling period (N = 103). Table 10 shows the weights of all eel ranged from 44 to 799 grams with an overall mean of 238 grams (~8.5 oz.); the lengths ranged from 30 to 72 centimeters with a mean of 49 cm (~1.5 feet). Figure B-1 shows a scatter plot of weight vs. length for historical Hudson River eel data (provided by the NYSDEC, Attachment C) and individuals caught for this study. The regressions are virtually identical showing that the weight to length relationship for eels caught in 2013/2014 is no different than eels from past studies.

As presented in Table 10, there were 26, 51 and 26 eels caught north, adjacent to, and south of the site. These counts do not reflect the population as a whole as many were returned to the river if a particular station met its quota during the sampling round. For the combined 2013/2014 data, there were no statistical differences in the mean weights for eels caught upstream, adjacent to or downstream of the site (272, 227 and 225 grams, respectively). Similarly, there were no statistical differences in the mean lengths for the north, adjacent and south sections of the study area (53, 48 and 48 cm, respectively).

Polychlorinated Biphenyls

PCB concentrations were measured by Pace Analytical Laboratory for both fillet and offal of the American eel samples. Whole body PCB concentrations were also mathematically reconstructed from both the bulk tissue concentration and the body mass. Because, for each section of the study area, there were no statistical differences between the mean concentrations for eels caught within either the "near" or the "deep" shorelines, the data for these two areas were pooled for the overall statistical analysis. For this analysis, data collected from both 2013 and 2014 were pooled.

Figure C-1 presents histograms of average tissue concentrations for both total and lipid-adjusted PCBs in American eel fillet and whole body (2013 and 2014). Historical average tissue residuals from NYSDEC (data presented in Attachment C) were also plotted for both total and lipid-normalized body burdens. It can be seen that for both total and normalized data, tissue levels are two to three times lower than measured in past studies (1999 – 2011).

For whole body, average total PCBs (Table 11) were 0.99, 2.1 and 0.98 mg/kg for eels caught North, Adjacent to and South of the Site (overall mean for the study area was 1.5 mg/kg). There was a statistically significant difference between the average whole body PCB concentration in eels caught adjacent to the site vs. the average calculated for cohorts caught in both the north and the south reaches.

For fillets, which are relevant to potential human consumption, the average total PCB concentrations were slightly lower with levels of 0.79, 1.99 and 0.74 mg/kg (Table 11). The average fillet tissue concentration of Aroclor 1248 (Table 11) was not statistically different when comparing North vs. Adjacent, but the averages for Aroclor 1254 and 1260 were statistically higher in eel caught within OU-2 vs. those trapped in the North reach (upstream).

Lipid normalized data were in a similar range (~24 – 37 micrograms per kilogram [µg/kg] lipid) for both whole body and fillet (Figure C-1). For lipid-adjusted whole body, average total PCBs were 26, 37 and 30 mg PCB/kg lipid for eels caught North, Adjacent to and South of the Site. For fillets, the respective concentrations were 24, 37 and 29 mg PCB/kg lipid. The average values for the Adjacent reach of OU-2 was statistically higher than the North reach but not when compared to the South. The South reach was not statistically different than the North.

In the scientific literature there are examples where there is a positive relationship between body weight/age and lipid concentration (e.g., Degani *et al*., 1986). Since PCBs are lipid soluble, these chemicals also often correlate with the size of the fish. In this study, although there was a positive relationship between body weight and lipid concentration (Figure D, $r^2 \sim 0.3$) (Attachment C), there was no significant relationship between body weight and total PCBs (Figure E-1, $r^2 = 0.01$) (Attachment C). There was a negative but insignificant relationship with lipid-normalized PCBs (Figure E-1, $r^2 = 0.06$).

Lead

In 2013, lead was below the limit of detection (~0.5 mg/kg) for all fillet samples (N = 50) and was only detected in four out of the fifty offal samples (0.51 – 0.82 mg/kg). Because of the low levels in tissue and the very low frequency of detection, lead was dropped from the list of constituents of concern for the 2014 sampling round.

4.5.3 White Perch

White perch favor brackish waters and are a common inhabitant of this area of the Hudson River. Most perch were caught in the nearshore gill nets although a few were collected in mesh pots. Table 10 shows the weights of all perch ranged from 50 to 260 grams with an overall mean of 104.5 grams (~3.7 oz.); the lengths ranged from 13 to 26 centimeters with a mean of 18.7 cm (~7.4”). Figure B-2 shows a scatter plot of weight vs. length for historical Hudson River white perch data (provided by the NYSDEC, Attachment C) and individuals caught for this study. The regressions are virtually identical showing that the weight to length relationship for perch caught in 2013/2014 is no different than perch from past studies.

As presented in Table 10, there were 15, 26 and 20 perch caught north, adjacent to, and south of the site, respectively. These counts do not reflect the population as a whole as some fish were returned to the river if a particular station met its quota during the sampling round. For the combined 2013/2014 data, there were no statistical differences in the mean weights for white perch caught upstream, adjacent to or downstream of the site (105, 111 and 105 grams, respectively). Similarly, there were no statistical differences in the mean lengths for the north, adjacent and south sections of the study area (18.6, 18.9 and 18.9 cm, respectively).

Polychlorinated Biphenyls

PCB concentrations were measured by Pace Analytical Laboratory principally for whole fish (ten fillet samples were analyzed for purposes other than baseline sampling). Whole body PCB concentrations for these samples were mathematically reconstructed from both the bulk tissue concentrations and the body mass. For this analysis, data collected from both 2013 and 2014 were pooled.

Figure C-2 presents histograms of average tissue concentrations for both total and lipid-adjusted PCBs in whole body white perch (2013 and 2014). Historical average tissue residuals from NYSDEC (data presented in Attachment C) were also plotted for both total and lipid-normalized body burdens. It can be seen that for total PCBs, the data were below the historical average and for lipid normalized data the tissue levels are about two times lower than concentrations measured in past studies (1999 – 2011).

For whole body, average total PCBs (Table 11) were 1.6, 2.5 and 1.8 mg/kg for perch caught North, Adjacent to and South of the Site (overall mean for the study area was 2.1 mg/kg). A statistically significant difference was seen for the average whole body PCB concentration (2013 and 2014 pooled) in perch caught adjacent to the site vs. the average calculated for fish caught in either the north or the south reaches. Interestingly, for the 2013 data alone, there was no statistical difference between tissue concentrations for all three sections of the study area. Although not strongly informative, congener results for select white perch samples are provided in Attachment C.

For fillets, which are relevant to potential human consumption, the average total PCB concentrations were 0.97 and 1.2 mg/kg for the Adjacent and South reaches, respectively (fillets were not analyzed for the North segment).

For lipid-adjusted whole body, average total PCBs were 23.5, 39.1 and 30.3 mg PCB/kg lipid for perch caught North, Adjacent to and South of the Site. A statistically significant difference was seen for the average lipid-adjusted whole body PCB concentration (2013 and 2014 pooled) in perch caught adjacent

to the site vs. the average calculated for fish caught in either the north or the south reaches. Although, as seen in the scientific literature, there was a positive relationship between body weight and lipid concentration (Figure D, $r^2 = 0.2$), there was no significant relationship at the Site between body weight and either total PCBs (Figure E-2, $r^2 = 0.03$) or lipid-normalized PCBs (Figure E-2, $r^2 = 0.01$).

Lead

In 2013, lead was below the limit of detection (~0.5 mg/kg) for all whole body samples (N = 16). Because of the very low levels in tissue and that no samples had any observations above the limit of detection; lead was dropped from the list of constituents of concern for the 2014 sampling round.

4.5.4 Blue Crab

The Hudson River has a robust blue crab population that is fished by both commercial and recreational fisherman. Blue crabs are good swimmers and were therefore caught in both shallow and deep waters. Overall, a total of 75 individuals were targeted to be trapped (2013 and 2014); some crabs (generally larger) had the leg and hepatopancreas tissue analyzed separately, whereas others were processed as whole organisms.

Table 10 shows the weights of all crabs which ranged from 12 to 302 grams with an overall mean of 128 grams (~4.5 oz.); the lengths ranged from 5.5 to 18.5 centimeters with a mean of 13.2 cm (~5.2”). Figure B-3 shows a scatter plot of weight vs. length for historical Hudson River blue crab data (provided by the NYSDEC, Attachment C) and individuals caught for this study. The regressions are virtually identical showing that the weight to length relationship for crabs caught in 2013/2014 is no different than crabs caught from past studies.

As presented in Table 10, there were 27, 27 and 21 crabs caught north, adjacent to, and south of the site. These counts do not reflect the population as a whole as some crabs were returned to the river if a particular station met its quota during the sampling round. For the combined 2013/2014 data, there were no statistical differences in the mean weights for blue crabs caught upstream, adjacent to or downstream of the site (124.4, 130.4 and 112.7 grams, respectively). Similarly, there were no statistical differences in the mean lengths for the north, adjacent and south sections of the study area (13.2, 13.0 and 12.3 cm, respectively).

Polychlorinated Biphenyls

PCB concentrations were measured by Pace Analytical Laboratory from dissected tissues of individual organism as well as whole organisms. Whole body PCB concentrations could not be mathematically reconstructed from dissected organisms. For this analysis, data collected from both 2013 and 2014 were pooled.

Figure C-3 presents histograms of average tissue concentrations for both total and lipid-adjusted PCBs in whole body blue crabs (2013 and 2014). Historical average tissue residuals from NYSDEC (data presented in Attachment C) were also plotted for both total and lipid-normalized body burdens. It can be seen that for total PCBs the data were about eight times below the historical average and for lipid adjusted PCBs, were about four times lower than concentrations measured in past studies (1999 – 2011).

For whole body, average total PCBs (Table 11) were 0.05, 0.11 and 0.08 mg/kg for blue crabs caught North, Adjacent to and South of the Site (the overall mean for the study area was 0.08 mg/kg). The respective lipid adjusted concentrations were 3.5, 6.7 and 4.1 mg PCBs/kg lipid (study area mean was 4.9 mg PCBs/kg lipid). There was no statistical difference between whole body tissue concentrations when comparing all three sections of the study area.

For hepatopancreas, average total PCBs (Table 11) were 0.39, 0.85 and 0.58 mg/kg for blue crabs caught North, Adjacent to and South of the Site; the respective lipid adjusted concentrations were 6.9, 17.3 and 10.2 mg PCBs/kg lipid. Average total PCBs in hepatopancreas tissue adjacent to the site was not statistically different when compared to either the mean concentration in crabs caught upstream (north) or downstream (south) of the study area; lipid-adjusted tissues in OU-2 were also not statistically higher than the mean concentration in crabs caught upstream (north) of the study area.

For the most part, PCBs in leg muscle were infrequently detected (Table 11). The frequency of detection for PCBs in crabs caught in the North, Adjacent and South sections was 2 of 15, 3 of 16 and 1 of 10, respectively. Because of the low detection rate average concentrations were not estimated.

Contrary to what is reported for fish in the scientific literature, there was a weak negative relationship between body weight and lipid concentration (Figure D, $r^2 = 0.17$) and no significant relationship between body weight and either total PCBs (Figure E-3 $r^2 = 0.004$) or lipid-normalized PCBs (Figure E-3, $r^2 = 0.002$).

Lead

In 2013, lead was below the limit of detection (~0.5 mg/kg) for all whole body analyses and all samples of leg muscle. For hepatopancreas, the frequency of detection was only 1 of 17 samples. Because of the fact that lead was so low in all tissues analyzed, the metal was dropped from the list of constituents of concern for the 2014 sampling round.

4.5.5 Oyster Toadfish

Oyster toadfish, although not originally targeted, were caught in abundance and because they are relatively sedentary bottom feeding organisms that "nest", they were targeted as an "indigenous" species. Oyster toadfish were exclusively caught in crab or eel pots. Table 10 shows that the weights of all oyster toadfish ranged from 43 to 473 grams with an overall mean of 254.9 grams (~9 oz.); the lengths ranged from 13 to 31 centimeters with a mean of 23 cm (~9"). Interestingly, for all the years that data has been recorded for historical Hudson River fish studies, there were no records in the NYSDEC database for this species (although anecdotal evidence suggests it is consumed by humans).

As presented in Table 10, there were 17, 23 and 19 oyster toadfish caught north adjacent to, and south of the site. These counts do not reflect the population as a whole as some fish were returned to the river if a particular station met its quota during the sampling round. For the combined 2013/2014 data, there were no statistical differences in the mean weights for oyster toadfish caught upstream, adjacent to or downstream of the site (302.9, 244.4 and 224.5 grams, respectively). Similarly, there were no statistical differences in the mean lengths for the north, adjacent and south sections of the study area (24.5, 23.1 and 21.9 cm, respectively).

Polychlorinated Biphenyls

For the 2013 data, PCB concentrations were measured by Pace Analytical Laboratory principally for fillet and offal. Because the fillets were typically ND or close to the detection limit for PCBs, the decision was made to analyze the 2014 fish as whole body PCB concentrations. Whole body PCB concentrations were mathematically reconstructed from the 2013 data using both the bulk tissue concentrations and the body mass. For this analysis, data collected from both 2013 and 2014 were pooled.

Figure C-4 presents histograms of average tissue concentrations for both total and lipid-adjusted PCBs in whole body oyster toadfish (2013 and 2014). Historical average tissue residuals were not available in the NYSDEC database (Attachment C). It can be seen for total PCBs, the data were slightly higher for the 2014 samples and that, for both years combined, there is no apparent difference in concentrations from samples analyzed north, adjacent and south of the Site. Lipid normalized PCBs are generally the same for both years and all three sample reaches.

For fillet tissue, it is very interesting that 75% of the samples (19 of 25 samples) are below the limit of detection and the remaining 6 samples were close to the practical quantitation limit (0.05 mg/kg). This is an unexpected result given the levels observed in other species and background PCB levels in sediment, especially since this species of fish is a bottom dweller and feeds off benthic organisms such as mollusks, small crabs and benthic invertebrates.

For whole body (including sample data reconstructed from fillet and offal), average total PCBs (Table 11) were 0.18, 0.20 and 0.17 mg/kg for fish caught north, adjacent to and south of the Site (the overall mean for the study area was 0.18 mg/kg). For lipid-adjusted concentrations, the respective whole body values were 19.9, 20.3 and 14.8 mg PCBs/kg lipid. There was no significant difference for these averages when comparing all three sampling areas. For fillet (2013 only), the frequency of detection of PCBs (data not shown) was too low to estimate an average tissue concentration: 1 of 10 in the north, 3 of 14 adjacent and 3 of 11 in the south section. Of the fillets with positive detections, all of the concentrations were relatively low (0.03 – 0.22 mg/kg).

Contrary to what is reported for fish in the scientific literature, there was a weak *negative* relationship between body weight and lipid concentration (Figure D $r^2 = 0.079$) and no significant relationship between body weight and either total PCBs (Figure E-4, $r^2 = 0.0007$) or lipid-normalized PCBs (Figure E-4, $r^2 = 0.12$).

Lead

In 2013, lead was below the limit of detection (~0.5 mg/kg) for all samples of fillet (N = 35). For offal, only 1 of 35 samples was positive for lead. Because of the fact that all samples had very low levels of lead and only one sample was recorded above the limit of detection, lead was dropped from the list of constituents of concern for the 2014 sampling round for this species.

4.5.6 Hogchoker

Hogchoker is a small bottom feeding flatfish that were selected as a target species as they were anticipated to be representative of an indigenous organism. They were not abundant, in terms of yield, although this may have been a function of the selection of fishing gear to protect endangered species

(most were caught in traps or pots). Table 10 shows that the weights of all hogchoker caught ranged from 8 to 29 grams with an overall mean of 18.6 grams (~0.7 oz.); the lengths ranged from 8 to 13 centimeters with a mean of 10.5 cm (~4").

As presented in Table 10, there were 7, 19 and 10 hogchoker caught north adjacent to, and south of the site, respectively. For the combined 2013/2014 data, there were no statistical differences in the mean weights for hogchoker caught upstream, adjacent to or downstream of the site (20.7, 18.0 and 14.7 grams, respectively). Similarly, there were no statistical differences in the mean lengths for the north, adjacent and south sections of the study area (10.9, 10.5 and 9.7 cm, respectively).

Polychlorinated Biphenyls

Data collected from both the 2013 and 2014 sampling events were pooled.

Figure C-5 presents histograms of average tissue concentrations for both total and lipid-adjusted PCBs in whole body hogchoker (2013 and 2014). Historical average tissue residuals from NYSDEC database (presented in Attachment C) were also plotted for both total and lipid-normalized body burdens. It can be seen that total PCBs were about four times lower than measured in past studies (1999 – 2011) but after normalizing for percent lipid, the levels are only slightly lower than in the past.

Average total PCBs (Table 11) were 0.39, 0.25 and 0.36 mg/kg for fish caught north, adjacent to and south of the Site (the overall mean for the study area was 0.34 mg/kg) ; the respective lipid-adjusted concentrations were 33.0, 24.5 and 26.2 mg PCBs/kg lipid. There were no significant differences for these average concentrations when comparing all three sampling areas.

As is often reported in the scientific literature, there was a positive but weak relationship between body weight and lipid concentration (Figure D, r^2 ~ 0.03). There was, however, no relationship between body weight and either total PCBs (Figure E-5 r^2 = 0.00003) and a negative but insignificant relationship with lipid-normalized PCBs (Figure E-5 r^2 = 0.066).

Lead

Lead was below the limit of detection (~0.5 mg/kg) for all whole body samples (N = 12). Because of the very low levels in tissue and no samples had any observations above the limit of detection, lead was dropped from the list of constituents of concern for the 2014 sampling round.

4.5.7 Spot Croaker

Spot croaker, while not a target species, were caught in gill nets during the 2013 sampling event and it was thus decided that this species could be evaluated for further consideration.

As presented in Table 10, there were 3, 5 and 5 spot caught north adjacent to, and south of the site. There were no statistical differences in the mean weights for spot caught upstream, adjacent to or downstream of the site (72.0, 75.6 and 63.8 grams, respectively). Similarly, there were no statistical differences in the mean lengths for the three sections of the study area (16.2, 17.2 and 15.6 cm, respectively). Spot were not caught during the 2014 sampling event and therefore have not been added to the target list.

Polychlorinated Biphenyls

Average total PCBs (Table 11) were 0.57, 0.70 and 0.55 mg/kg for fish caught north, adjacent to and south of the Site (the overall mean for the study area was 0.48 mg/kg); the respective lipid-adjusted concentrations were 8.0, 16.7 and 11.9 mg PCBs/kg lipid. Although there were potentially significant differences between the north and adjacent tissue residue concentrations, caution must be used in drawing a conclusion about site-related effects because the statistical analysis is not robust (only 3 fish were caught in the northern segment of the study area).

Lead

Lead was below the limit of detection (~0.5 mg/kg) for all but one of the whole body samples analyzed (N = 13). Because of the very low levels in tissue and the fact that only one sample had an observation above the limit of detection, lead was dropped from the list of constituents of concern for the 2014 sampling round.

4.5.8 Non-target Species

Limited numbers of non-target species were caught during the 2013 and 2014 sampling events included grass shrimp, channel catfish, largemouth bass and a few small striped bass. At the time, these samples were frozen and archived for potential use. They have since been disposed of in an appropriate manner.

4.5.9 Benthic Macroinvertebrates

Benthic macroinvertebrates were collected from sixteen locations (Figure 3) using a sediment grab sampler. The organisms were placed onto a 0.5 mm screen, washed, preserved in 10% buffered formalin and sent to Vittor and Associates for sorting, identification and development of functional taxonomic metrics that describe both the types and numbers of organisms present. The results were used to supplement a Sediment Profile Imaging survey (Section 4.5.10) and are presented in the Attachment B report entitled "*Sediment Profile Imaging Report: Benthic Habitat Condition Survey at Hastings on Hudson*" (Germano, 2014).

The Germano report (2014) uses advanced statistical ordination tools (nonmetric multidimensional scaling) which allows a visual assessment of the relationship (or a difference) between both SPI and taxonomic measurements made from organisms observed in the grabs obtained at stations upstream, adjacent to or downstream of the Site. The report also presents traditional histograms for comparing functional metrics for macroinvertebrates for the north, adjacent and south reaches of the study area.

The Germano report concluded that both the Site and the Reference stations were very similar and dominated by pollution tolerant organisms. None of the organisms identified in their study could be classified as 'sensitive' to pollution and no organisms listed could be categorized as 'rare, threatened or endangered' species. Their overall conclusion, based on both the evaluation of the sediment substrate and the benthic community, was that "while the species composition has changed slightly in the time that has passed since the initial [2000 RI] investigation, the overall conclusion has not; by traditional benthic metrics alone, there is no real difference between the site or reference stations."

4.5.10 Habitat Characterization

As discussed above and in Section 3.5.2, the habitat characterization utilized Sediment Profile Imaging (SPI) technology which uses an inverted prism and camera to obtain a photograph of the top 20 cm of the sediment bed at discrete locations. This provided direct visual information about sediment grain size, the demarcation between oxic and anoxic sediments (e.g. the apparent 'redox potential discontinuity'), some of the types of organisms present, the presence of debris, and the occurrence of methane gas bubbles. Measurements made on these observations provide state-of-the-art information on the condition of the benthic habitat and sediment bed.

The SPI stations (210 locations) were established on a biased grid system which focused on the nearshore water depths where the remedial activities are proposed (some adjacent deepwater locations were also imaged). The "Materials and Methods" section of the Sediment Profile Imaging Report (Attachment B) present a more detailed description for each SPI location that was surveyed in the fall of 2013.

The habitat characterization generally showed the majority of stations were featureless and composed of fine grained silts and clays (verified by the sediment grabs taken for sediment chemistry, porewater chemistry and benthic invertebrates). For the sediments adjacent to the Site, even though sediment grain size is fairly uniform, short-term sediment disturbance appeared to be related to water depth which, in turn, is most likely affected by ship traffic (either from normal river traffic or offshore activities associated with the land-based operations at the Site). The SPI report concluded that "neither the SPI nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site."

4.6 GROUNDWATER

Baseline groundwater sampling results were originally reported in the Pre-Design Investigation Data Summary Report submitted to the NYSDEC in August 2015. Note that results for the 2015 sampling event are not yet available.

The first yearly groundwater sampling was conducted by Antea in August 2014. Results from PDMW-19S (upgradient well) indicated concentrations of PCBs that exceeded drinking water standards (Table 14). Based on the exceedance at a presumed upgradient location, approval was given by NYSDEC for the 8 October 2014 request to install an additional monitoring well (PDMW-27S) further upgradient in the northeast corner of the site, which was sampled in December 2014. Boring log and well construction details are included in the PDI Data Summary Report (Haley & Aldrich, 2015). Sample results from PDMW-27S also indicated an exceedance of drinking water standards for PCBs. Evaluation of the need for an additional well installation is deferred until after 2015 sampling results can be evaluated and considered in identifying the appropriate action. Groundwater sampling results are summarized on Table 14 and sampling locations are shown on Figure 7. As indicated in the work plan, baseline groundwater sampling will continue annually until the beginning of construction.

4.7 AIR MONITORING

Air monitoring was conducted in accordance with the approved Baseline Air Monitoring Plan. The air monitoring results are summarized below.

Start Collection Date	End Collection Date	Total PCBs Concentration (µg/m^3)	PQL (µg/m^3)
6/18/2015	6/19/2015	ND	0.0134
6/24/2015	6/25/2015	ND	0.0139
6/30/2015	7/1/2015	ND	0.0136
7/6/2015	7/7/2015	ND	0.0135
7/12/2015	7/13/2015	ND	0.0139
7/18/2015	7/19/2015	ND	0.0133
7/24/2015	7/25/2015	ND	0.0130
7/30/2015	7/31/2015	ND	0.0136
8/5/2015	8/6/2015	ND	0.0139
8/11/2015	8/12/2015	ND	0.0136
8/17/2015	8/18/2015	ND	0.0185

Baseline air monitoring was initiated in June and was focused on the warmest months during the year since these months are the most likely to have PCBs detected in air. Average high temperature during the duration sampling program was 85^{o}F, with a range of 71^{o}F to 95^{o}F. Historical averages indicating that the hottest days (July 14th– August 1st) were included in this sampling program with results of ND. Meteorological data in its entirety including wind speed, wind direction, temperature, and relative humidity during sampling is available upon request.

Sample results were reported to NYSDEC during the sampling program. As all samples were non-detect and reporting limits were below comparison concentration of 0.11 µg/m^3, a request for completion of the sampling program was submitted to NYSDEC on 17 August 2015. The request was approved via email notification on August 21, 2015. Air sample results are summarized above and provided in Table 15 and sampling locations are shown on Figure 8.

5. Data Validation

Analytical results for environmental samples collected as part of Baseline were reviewed by Environmental Standards, Inc. (ESI), an independent the data management subcontractor, to determine the data usability in accordance with the procedures outlined in the project specific QAPP.

During the data validation process, the following quality control/quality assurance (QA/QC) criteria were reviewed:

- Sample Data Reporting Format
- Holding Time and Sample Preservation Compliance
- GC/MS Instrument Performance Check (where applicable)
- Initial Calibration and Continuing Calibration Procedures
- Field/Method/Preparation Blank Sample Analysis
- System Monitoring Compound Recoveries (where applicable)
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Internal Standard Recoveries (where applicable)
- Field Duplicate Sample Analysis
- ICP Interference Check Sample Performance (where applicable)
- ICP Serial Dilution Replicate Percent Difference (where applicable)

Below is a brief description of the procedures used in the evaluation and example corrective actions implemented as a result of the assessment. The intent of this summary is to assist the data user with an understanding of the data qualification procedures implemented for their use in the evaluation of the current site conditions.

5.1 SAMPLE DATA REPORTING PROCEDURES

The reported results for each project sample were provided in a NYSDEC Analytical Services Protocol (ASP) Category B deliverables format. The data reporting format was evaluated within each SDG and when found to be non-compliant with the project data quality objectives (DQOs) additional documentation was requested and received from the laboratory as part of the validation process.

5.2 HOLDING TIME AND SAMPLE PRESERVATION COMPLIANCE

Maximum allowable holding times, for each parameter, were measured from the time of sample collection to the time of sample preparation or analysis for each project sample. When a project sample was identified as analyzed after the expiration of the USEPA recommended maximum holding time, the reported sample results were qualified with a “J” as estimated and non-detected parameters were qualified with an “R” as rejected.

5.3 GC/MS INSTRUMENT PERFORMANCE CHECK

GC/MS instrument performance checks were evaluated to ensure proper tuning of the instrument for mass resolution, compound identification, and sensitivity. It was determined that the analysis of the

instrument performance solutions was performed at the beginning of each 12-hour period during which samples or standards were analyzed, and that the instrument performance check met the ion abundance criteria specified by the promulgated USEPA method. In all instances, the GC/MS instrument performance checks for the instruments used in the analysis of project samples fell within method specific criteria without exception.

5.4 INITIAL CALIBRATION AND CONTINUING CALIBRATION PROCEDURES

Instrument calibration procedures for the analysis of project samples were evaluated based on the requirements of the National Functional Guidelines and/or prescribed by the laboratory standard operating procedures (SOPs) when not directly addressed by the guidelines. Generally, the calibration procedures implemented by the laboratory were consistent with USEPA guidance. However, during the analysis of organic parameters by EPA Methods 8260B and 8270C, the continuing calibration acceptance criteria for several target compounds were greater than the EPA guidance criteria of 25 percent difference (%D) from the initial calibration relative response factor (RRF).

In cases where target compounds were detected and reported using a RRF from a non-compliant continuing calibration standard, the result was flagged with a "J" and the reporting limits for non-detect samples were flagged with a "UJ" indicating that the reported values and reporting limits are estimated.

5.5 FIELD/METHOD/PREPARATION BLANK SAMPLE ANALYSES

The presence of target compounds in associated method and/or trip blank samples prepared and analyzed concurrently with the project samples was determined as part of each laboratory sample data package. If target compounds were reported at a concentration greater than the MDL for organic parameter analyses or the instrument detection limit (IDL) for inorganic parameter analyses, the associated sample results were qualified.

In the case of method blank samples for organic parameter analyses, if the target compound detected was identified as a "common laboratory contaminant" by the USEPA Functional Guidelines, an action level of 10 times (10x) the blank contamination level was calculated. For all other parameters an action level of 5 times (5x) the blank contamination level was calculated. In the case of inorganic method blank sample analyses, an action level of 10 times (10X) the blank contamination level was calculated. In accordance with EPA guidance, if the detection of the blank contaminant in the associated project samples was reported at a concentration between the MDL and the action level, the result was flagged with a "U". This data qualification indicates that the parameter was not present in the sample at a concentration greater than the adjusted reporting level.

5.6 SYSTEM MONITORING/SURROGATE COMPOUND RECOVERIES

System monitoring/surrogate compounds were added to each sample prior to analysis of organic parameters by EPA Method 8082 to confirm the efficiency of the sample preparation procedures. The calculated recovery for each surrogate compound was evaluated to confirm the accuracy of the reported results.

Generally, the calculated recovery of these compounds fell within the laboratory specific quality control criteria. In a few instances, sample extracts prepared for the analysis of polychlorinated biphenyls

(PCBs) by EPA Method 8082 required dilution prior to analysis. This dilution procedure was implemented by the laboratory to enable quantification of the detected target analytes within the instrument calibration range. Where applicable, the laboratory qualified the reported results indicating the system monitoring compound recovery could not be calculated due to a sample extract dilution.

In cases where the surrogate recovery fell outside the laboratory acceptance criteria, the results greater than the reporting limit were qualified "J", and the reporting limits for non-detect samples were flagged "UJ", as estimated.

5.7 LABORATORY CONTROL SAMPLES, MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES

Analytical precision and accuracy were evaluated based on the laboratory control (LCS) and matrix spike (MS/MSD) sample analyses performed concurrently with the project samples. For LCS analyses, after the addition of a known amount of each target analyte into laboratory reagent water, the LCS was analyzed to confirm the ability of the analytical system to accurately quantify the target analytes. For MS/MSD samples, after the addition of a known amount of each target analyte to the sample matrix, the MS/MSD samples were analyzed to confirm the ability of the analytical system to identify the target analytes within the sample matrix.

The percent recovery calculated for each target analyte was evaluated for compliance with method specific criteria. Generally the reported recovery of MS and LCS analyses fell within the laboratory QA acceptance criteria. However, if the LCS recovery fell below the acceptance criteria, the result for the non-compliant target analyte from the project samples analyzed concurrently was qualified with a "J" as estimated or "UJ" if reported as non-detect.

5.8 INTERNAL STANDARD (IS) COMPOUND RECOVERIES

Internal Standard (IS) compounds were added to each sample prior to the analysis of organic parameters by EPA Methods 8260B, and 8270C to quantify the amount of the target compounds detected within the sample matrix. The response of each IS compound was confirmed to be within the QA/QC criteria of +100% and – 50% of the corresponding 12 hour continuing calibration verification (CCV) standard. If the IS response fell below the –50% acceptance criteria, the target compound concentrations calculated within this sample were qualified with a "J" as estimated. If the IS response fell to below –90% the corresponding CCV standard, the reported results in the project sample were flagged with an "R" as rejected.

5.9 FIELD DUPLICATE SAMPLE ANALYSIS

Field duplicate samples were collected and analyzed to determine the precision for the sampling and analysis process through calculation of the relative percent difference (RPD) between the original and duplicate sample target analyte concentrations. If the calculated RPD for analytes detected at concentrations greater than five times (5X) the reporting limit exceeded the RPD criteria, the reported results were qualified "J" as estimated.

5.10 ICP INTERFERENCE CHECK SAMPLE PERFORMANCE

The results of the ICP Interference Check Samples analyzed concurrently with the project samples were evaluated versus an acceptance criteria prescribed by USEPA guidance. If the calculated recovery an analyte fell outside these criteria, the analyte result for the project samples analyzed concurrently within the analytical batch was flagged with a “J” as estimated.

5.11 ICP SERIAL DILUTION REPLICATE PERCENT DIFFERENCE (RPD)

The results of the ICP Serial Dilution samples analyzed concurrently with the project samples were evaluated for compliance with the USEPA protocol criteria of less than 10% replicate percent difference (RPD) between the diluted and undiluted sample, if the analyte concentration was greater than fifty times (50X) the method detection limit in the original sample. If an analyte exhibited a serial dilution RPD greater than 10%, the corresponding sample result was qualified with a "J” as estimated.

5.12 VALIDATION COMPLETENESS

Based on DURs provided by ESI to date, data validation has resulted in only minor changes in results or flags. Upon completion of validation, updated tables will be provided to NYSDEC and the EQUIS data base will be uploaded. Any changes to conclusions or interpretations resulting from completion of the validation process will be provided as an addendum. Data Usability Reports were prepared by a third party (Environmental Standards, Inc.) (Attachment D).

6. Summary and Recommendations

6.1 BATHYMETRY

The hydrographic survey is complete (Haley & Aldrich, 2013). It identified several problem areas that need careful attention when the time comes to remediate sediment, principally the location(s) of both broken and in situ wooden pilings and pier debris and the presence of a sunken barge to the north of the northwest corner along the edge of the adjacent Old Marina property.

It is anticipated that any natural changes in the mudline elevations between the most recent bathymetric measurements and the beginning of sediment removal will be insignificant in terms of calculating dredge volumes. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

6.2 SURFACE WATER

Measurement of conventional water quality parameters in the field demonstrated that OU-2 meets the standards promulgated by NYSDEC that ensure the protection of macroinvertebrates, fish and wildlife. Although TOC was, overall, slightly higher than DOC, the differences were so slight that it can be assumed that most of the natural organic matter in the waterbody is in the dissolved form. There appears to be little variability in TSS within any sampling event, but there was variability between sampling events. The measurement of TSS is sufficient to support criteria for use during construction.

Total PCB concentrations in surface water are less than 0.025 µg/L and PCBs were only detected during 3 of the 10 sampling events. None of these events suggest an on-going site specific contribution of PCBs to surface water.

Metals detections were sporadically observed and there appeared to be no trend with regard to concentration versus distance or over time. Lead and Zinc detections never exceeded their respective NYSDEC water quality criterion adjacent to the Site. When copper marginally exceeded the NYSDEC water quality criterion, an upstream sample also exceeded or was close to the benchmark.

Overall, the Site does not contribute any PCBs or metals to surface water for this segment of the Hudson River. The data collected from all the surface water sampling events is sufficient to establish a solid baseline against which future in-stream concentrations, measured as part of the post-monitoring sampling plan, can be compared. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

6.3 SURFACE SEDIMENT

There was no apparent upstream/downstream trend in PCBs in sediment. All but one sample (SS-007) was generally at or below 1 mg/kg and twelve of sixteen samples were below 0.5 mg/kg total PCBs. The distribution of Aroclors is quite variable and perhaps irrelevant based on the results.

Levels of lead and zinc in sediment do not appear, based on the results, to be related to the Site. Only one Site sample (SS-009) was greater than the value calculated as refined background (Figure 7; Haley & Aldrich, 2012).

The relatively low concentrations of PCBs in surficial sediment and the inconsistent Aroclor patterns indicate that additional sediment sampling is not required. Based on the data above the monitoring for PCBs in sediment for the purpose of establishing a baseline is complete. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

Additional surficial sediment sampling was completed during the PDI and a summary of the sediment sampling and associated results can be found in the PDI Data Summary Report (Haley & Aldrich, 2015).

6.4 POREWATER

Only one of six Site porewater samples was positive for PCBs (PW-006) at an analytical limit of less than 0.010 µg/L and the types of Aroclors observed in that sample (1248 and 1254) are not strong indicators of site-related PCBs. Metals were also variable with no consistent trend to indicate site-related sources or impacts.

Given these results, it is recommended that any future porewater sampling be confined to performance monitoring of the sediment cap. Based on these data the monitoring for PCBs in porewater for the purpose of establishing a baseline, against which future data can be compared, is complete. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

6.5 BIOTA

In order to interpret the baseline sampling results from this project, it is help understand the historical context of the river system. NYSDEC has regularly measured PCB levels in fish from the Hudson River. Elevated PCB levels were found in collections of many fish species during the 1970s. During the early program, sampling results indicate that PCB concentrations in fish tissue were highest near Hudson Falls and Ft. Edward. Fish tissue levels in the river (principally black bass, brown bullhead, yellow perch and American eel) dropped quickly in the first three years following cessation of direct manufacturing discharges from upgradient manufacturing plant sites in 1977, but decreased much more slowly thereafter and have remained relatively stable since the early 1980s (USEPA, 2000). In 1996, PCB concentrations averaged 12 ppm for fish in the upper Hudson River and 3 ppm in the lower Hudson River (USEPA, 1996).

A greatly expanded sampling project was undertaken in 1999 which focused on documenting the temporal trends in PCB concentrations in selected species of fish from selected locations along the length of the river from above Glens Falls to New York City (NYSDEC, 1999). The principal objective was "To evaluate the spatial relationships of contaminant concentrations in fish and to relate the results to source conditions, in so far as possible." Although the tables and graphs from this report provide fairly apparent trends in total (and lipid adjusted) PCBs in various fish species, they also present a "species smash" technique in which concentrations of different species of fish are averaged at different mile points along the river. This technique is not, to our knowledge, used in any other fishery report and would not be considered a scientifically robust method because a) different species of fish

bioaccumulate PCBs at different rates and b) the inclusion of "outliers", even within a species/class (as is also evident from data in this report) would markedly bias a data point for a particular location.

The data presented in this report clearly show that levels in fish caught North, Adjacent to and South of OU-2 are below historical levels (Figures C-1 to C-5). Although some species such as American eel and white perch appear to be more elevated adjacent to the Site than those caught in the north segment, the relative levels have significantly improved when compared to values recorded in the NYSDEC fish tissue database (Attachment C).

While data was reviewed separately for Year 1 and Year 2 events as well as for significance of deepwater compared to nearshore where species catch overlapped, the results did not show these analyses to be beneficial in interpreting the results. Therefore the pooled data sets will be evaluated for future reports or memoranda.

6.5.1 American Eel

The American eel (*Anguilla rostrata*) is a catadromous fish that is found on the eastern coast of North America. The eel can live in both freshwater and estuaries and only leaves these habitats to spawn in the Sargasso Sea. After the eggs hatch and develop into 'glass eels', they migrate to North America where they enter freshwater systems and mature into 'yellow eels'. American eels are nocturnal and hide in the mud, sand or gravel close to shore during the day. They feed on invertebrates such as crustaceans, aquatic insects, and small insects. The species is generally in decline over much of its range. Baseline studies such as the Hudson River Eel Project are conducted annually by NYSDEC to collect juvenile population data.

Based on the results presented in this report, the weight vs. length relationships were highly consistent with data obtained from previous monitoring studies and there were no differences between average weights or lengths for eels caught north, adjacent to and south of the site. For both fillets and whole body tissues, lead was below the limit of detection for almost all (2013) samples. Averages for total PCBs were more than two times less than historical levels; lipid-adjusted PCBs were more than four times less than concentrations measured by NYSDEC in the past. Average total PCBs adjacent to the site were statistically higher than average levels in fish caught upstream of OU-2 (north segment).

It is recommended that American eel remain a target species to assist in the determination of the overall trend in PCBs in fish at the site. No changes in sampling design or methodology are required. This species is planned to be trapped again during the 2015 sampling event. The three separate sampling events (2013-2015) are sufficient to establish a solid baseline against which future tissue concentrations, measured as part of the post-monitoring sampling plan, can be compared.

6.5.2 White Perch

White perch (*Morone americana*) is a semi-anadromous species that is found in Atlantic coastal waters from Nova Scotia to South Carolina. The species largely inhabits brackish waters but is also found in marine, estuarine and tidal fresh waters. White perch are bottom-oriented fish that tend to inhabit open waters close to shore and can often swim in large schools. White perch migrate to tidal fresh and slightly brackish waters of its tributaries each spring to spawn.

Based on the results presented in this report, the weight vs. length relationships were highly consistent with data obtained from previous monitoring studies and there were no differences in average weights or lengths for perch caught north, adjacent to and south of the site. Lead was below the limit of detection for almost all (2013) samples. Averages for total PCBs were less than historical levels; lipid-adjusted PCBs were about two times less than concentrations measured by NYSDEC in the past. Average total PCBs adjacent to the site were statistically higher than average levels in fish caught upstream of OU-2 (north segment).

It is recommended that white perch remain a target species to assist in the determination of the overall trend in PCBs in fish at the site. No changes in sampling design or methodology are required. This species is planned to be trapped again during the 2015 sampling event. The three separate sampling events (2013-2015) are sufficient to establish a solid baseline against which future tissue concentrations, measured as part of the post-monitoring sampling plan, can be compared.

6.5.3 Blue Crab

The Atlantic blue crab (*Callinectes sapidus*) is native to the western Atlantic Ocean from Nova Scotia to Argentina and is known to inhabit the entire Hudson River Estuary. This decapod crustacean is a bottom-dweller commonly found in shallow waters during warm weather and hibernates in deeper waters in the winter. There is some literary based evidence for habitat partitioning by blue crabs in terms of sex, size and molt stage. Crab move upstream into freshwater to mate and after mating occurs, female crabs return to higher salinity waters to release their eggs. Note that in 2004 the NYSDEC began a blue crab tagging program in the Hudson River to gain data on seasonal movements of the blue crab.

Based on the results presented in this report, the weight vs. length relationships were highly consistent with data obtained from previous monitoring studies (Attachment C) and there were no differences in average weights or lengths for blue crabs caught north, adjacent to and south of the site. Lead was below the limit of detection for all whole body and leg muscle (2013) samples and only one of thirteen hepatopancreas was positive for this metal. Total PCBs for whole body were more than eight times below the historical average; lipid adjusted PCBs were more than four times lower than concentrations measured in past studies (1999 – 2011). For whole body tissue, there was no statistical difference in average total PCBs adjacent to the site vs. the average for those caught upstream (north) of OU-2. For hepatopancreas, average total PCBs and lipid adjusted PCBs adjacent to the site were not statistically different than average levels in fish caught upstream of OU-2 (north segment).

It is recommended that blue crab remain a target species to assist in the determination of the overall trend in PCBs in fish at the site. No changes in sampling design or methodology are required. This species is planned to be trapped again during the 2015 sampling event. The three separate sampling events (2013-2015) are sufficient to establish a solid baseline against which future tissue concentrations, measured as part of the post-monitoring sampling plan, can be compared.

6.5.4 Oyster Toadfish

The oyster toadfish (*Opsanus tau*) is native to Atlantic coastal waters from Massachusetts to Florida. The bottom-dwelling fish is a year-round inhabitant of rocky bottoms, reefs, and wrecks in shallow, inshore waters. The species remains in shallow waters for spawning and the male protects the eggs

until the young hatch. The oyster toadfish is a hardy species; it needs little food to survive, can survive out of water for extended periods, and can tolerate polluted waters.

Based on the results presented in this report, there were no apparent differences in average weights or lengths for toadfish caught north, adjacent to and south of the site. Lead was below the limit of detection for all fillet samples and all but one of the offal samples (2013). An interesting result for this species of fish, which is a bottom dweller and feeder, is that the fillet tissue had only trace levels of PCBs in its tissue. The lipid-normalized values were also low relative to the other species of fish. Calculated whole body averages for total and lipid-adjusted PCBs in tissues of toadfish caught adjacent to the site were not statistically different than average levels in fish caught upstream or downstream of OU-2 (north and south segment).

While oyster toadfish remains a target species to potentially assist in the determination of the overall trend in PCBs in fish at the site, monitoring was not required for the Year 3 event. The initial two sampling events (2013-2014) were sufficient to establish a solid baseline against which future tissue concentrations, measured as part of the post-monitoring sampling plan, can be compared. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

6.5.5 Hogchoker

The hogchoker (*Trinectes maculatus*) is a flatfish found off the Atlantic coast of North America, from Massachusetts Bay to the Atlantic coast of Panama. The hogchoker prefers sandy, silty or muddy bottoms of brackish waters in bays and estuaries. The fish spawn in the summer in marine coastal waters and estuaries. Larva and juveniles migrate upstream into freshwater and prefer tidal freshwater and seagrass beds around creek mouths.

For this species of fish, there are no historical allometric data against which the weight vs. length measurements can be compared. Based on the results presented in this report, comparisons of average weights and lengths showed no apparent differences between fish caught north, adjacent to and south of the site. Lead was below the limit of detection for all samples tested. Also, there were no significant differences between average total PCB concentrations when comparing all three sampling areas.

While hogchoker remains a target species to potentially assist in the determination of the overall trend in PCBs in fish at the site, monitoring was not required for the Year 3 event. The initial two sampling events (2013-2014) were sufficient to establish a solid baseline against which future tissue concentrations, measured as part of the post-monitoring sampling plan, will be compared. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

6.5.6 Other Species

In 2013, spot croaker was caught and tissues were analyzed for lead and PCBs so that it could be evaluated for further consideration as a potential target forage fish. Like other fish, lead was below the detection limit (only observed in one sample). Levels of PCBs were similar to other fish but only three fish were obtained in the North reach despite the extensive placement of gill nets. Spot were not caught during the 2014 sampling event and therefore have not been added to the target list.

Other forage fish, such as mummichog, Atlantic silverside and young-of-year (YOY) striped bass were either not collected or collected in sufficient numbers to allow for analysis in either 2013 or 2014 despite efforts to collect them. Collection of forage fish will be attempted again during the 2015 sampling event.

Other non-target species that were caught but not analyzed because of two few specimens and/or too little mass to analyze include largemouth bass, channel catfish, white catfish and grass shrimp.

6.5.7 Benthic Macroinvertebrates

The metrics used to define the abundance and diversity of the benthic community for OU-2 and the interpretation of that data showed the same general conclusions that were reached in the 2000 RI (EarthTech, 2000): both the Site and the Reference stations were very similar and dominated by pollution tolerant organisms (amphipods, small molluscs and worms). None of the organisms identified in their study could be classified as 'sensitive' to pollution and no 'rare, threatened or endangered' species were present. Although the species composition has changed slightly since 2000, the overall conclusion - that there are no apparent differences between the Site and reference stations - is the same. Based on traditional functional metrics, the monitoring of biota for the purpose of establishing a baseline is complete.

6.5.8 Habitat Characterization

The SPI study was a comprehensive evaluation of the infaunal benthic habitat that consisted of over 210 individual stations along transects that spanned over three miles of shoreline. Overall, the SPI showed featureless muds composed of fine grained silts and clays. The visual changes in the demarcations between oxygenated and reduced muds revealed that the sediment disturbance appeared to be related to water depth which, in turn, is most likely affected by regular ship traffic. The study concluded that "neither the SPI nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site." Based on the comprehensive SPI survey, the monitoring of biota for the purpose of establishing a baseline is complete. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

6.5.9 Bioaccumulation

As discussed in the BSAP, biota-sediment accumulation factors (BSAFs) can often assist in helping to identify the dynamics of PCB uptake into resident fish (ITRC, 2010; USACE, 2015; Wong *et al*., 2001). A BSAF is simply the ratio of PCBs in fish to PCBs in sediment. The concentration of the former (mg/kg) is normalized to lipid (tissue fraction) and the latter (mg/kg) is normalized to TOC (sediment fraction). Because the "average" concentrations of lipid and TOC in fish and sediment are, respectively, 5% and 2%, the "typical" BSAF is expected to be approximately 2.5 (0.05/0.02) if PCBs are truly in "equilibrium" between fish and sediment.

The following table presents the average BSAFs calculated from individual sediment (PCB/TOC) and fish (PCB/fraction lipid) samples:

Reach	Biota-Sediment Accumulation Factors		
	American Eel	White Perch	Blue Crab
North	3.8	4.0	0.8
Adjacent	0.7	0.6	0.3
South	2.0	1.9	0.6

The results show that the BSAFs for all reaches are in the general range for PCB BSAFs reported in the scientific literature (Wong *et al.*, 2001). For each species, the range of BSAFs for the Adjacent reach (0.3 – 0.7) are consistently lower than the BSAFs for the northern reach (0.8 – 4.0) and southern reach (0.6 – 2.0). One reason for this may be due to the fact that TOC levels were, on average, higher in sediments adjacent to the site than the average levels observed north and south of the site. Alternatively, these BSAFs may be an indication that the site may not be a significant factor in terms of sediment contributing PCBs to the body burden of fish inhabiting the adjacent reach.

6.6 GROUNDWATER

Results from PDMW-19S and PDMW-27S (upgradient wells) indicated concentrations of PCBs exceeding drinking water standards. Evaluation of the need for additional well installation is deferred to the future so that additional yearly sampling can be considered in identifying the appropriate action.

The work was performed in compliance with procedures described in the Remedial Design Work Plan. Based on the results of this investigation, the objectives of the program were met. As indicated in the work plan, baseline groundwater sampling will continue after the PDI annually until the beginning of construction. Results for future events in 2015 and beyond will be included in future submittals.

6.7 AIR MONITORING

Baseline air monitoring program was conducted from 18 June 2015 through 18 August 2015, in accordance with the approved Baseline Air Monitoring Plan. All samples were non-detect and reporting limits were below comparison concentration of 0.11 µg/m^3. NYSDEC approved the completion of the baseline air monitoring program on August 21, 2015 via email notification. Therefore work plan objectives have been met and no additional pre-construction sampling is required.

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Table 1
Baseline Sampling and Analysis Plan: Sampling Locations, Methods, Endpoints and Rationale
Former Anaconda Wire and Cable Company Site
Hastings-on-Hudson, NY

Sampling Location	Medium/Matrix	Sample Location ID Number	Sampling Method	Depth (units)	Measurement[1] Endpoints	Location Rationale
OU-2: North of Site (Reference)	Surface water	B1-SW-001, B1-SW-002	Grab (e.g. Niskin)	Composite of 25%, 50% and 75 % of total depth	PCBs; Dissolved Cu, Pb, Zn; TSS; TOC, DOC, DO, pH, temp., conductivity, turbidity	Characterize baseline levels of analytes in reference surface water upstream of OU-2.
	Biota (fish & shellfish)	B1-BT-01A thru B1-BT-01E	Passive Nets; Traps	2 - 40'	Pb, PCBs (Aroclors & Congeners); %lipid	Characterize baseline levels of analytes in reference fish upstream of OU-2.
	Habitat	B1-SP-001 thru B1-SP-003	Sediment Profile Imaging	0 - 8"	Substrate type, RPD, gas & feeding voids, macroinvertebrates, SAV	Characterize condition of habitat upstream of OU-2.
	Surficial Sediment	B1-SS-001 thru B1-SS-004	Grab (e.g. Ponar)	0 - 6"	PCBs, Al, Be, Fe, Cu, Pb, Zn; TOC; grain size	Characterize baseline levels of analytes in reference sediment upstream of OU-2.
	Biota (macroinvertebrates)	B1-MC-001 thru B1-MC-004 (Coincident with B1-SS samples)	Grab & Sieve (e.g. Ponar)	0 - 6"	Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Characterize baseline condition of reference benthic macroinvertebrate community upstream of OU-2.
	Porewater	B1-PW-001 thru B1-PW-002	Grab & Centrifuge	0 - 6"	Total PCBs; TOC, DOC; Cu, Pb, Zn	Characterize PCBs in reference porewater upstream of OU-2.
OU-2: Adjacent to Site (Vicinity)	Surface water	B1-SW-003, B1-SW-004 and B1-SW-007	Grab (e.g. Niskin)	Composite of 25%, 50% and 75 % of total depth	PCBs; Dissolved Cu, Pb, Zn; TSS; TOC, DOC, DO, pH, temp., conductivity, turbidity	Characterize baseline levels of analytes within OU-2.
	Biota (fish & shellfish)	B1-BT-02A thru B1-BT-02H	Passive Nets; Traps	2 - 40'	Pb, PCBs (Aroclors & Congeners); %lipid	Characterize baseline levels of analytes in fish caught within OU-2.
	Habitat	All locations sampled and numbered sequentially B1-SP-XXX (including B1-SS-005 thru B1-SS-011; B1-SS-101; B1-SS-102)	Sediment Profile Imaging	0 - 8"	Substrate type, RPD, gas & feeding voids, macroinvertebrates, SAV	Characterize baseline condition of habitat within OU-2.
	Surficial Sediment	B1-SS-005 thru B1-SS-011; B1-SS-101 & 102	Grab (e.g. Ponar)	0 - 6"	PCBs, Al, Be, Fe, Cu, Pb, Zn; TOC; grain size	Characterize baseline levels of analytes in sediment within OU-2.
	Biota (macroinvertebrates)	B1-MC-005 thru B1-MC-011; B1-MC-101 & 102 (Coincident with B1-SS samples)	Grab & Sieve (e.g. Ponar)	0 - 6"	Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Characterize baseline condition of benthic macroinvertebrate community within OU-2.
	Porewater	B1-PW-003 thru B1-PW-007	Grab & Centrifuge	0 - 6"	Total PCBs; TOC, DOC; Cu, Pb, Zn	Characterize baseline levels of PCBs in porewater within OU-2.
OU-2: South of Site	Surface water	B1-SW-005, B1-SW-006	Grab (e.g. Niskin)	Composite of 25%, 50% and 75 % of total depth	PCBs; Dissolved Cu, Pb, Zn; TSS; TOC, DOC, DO, pH, temp., conductivity, turbidity	Characterize baseline levels of analytes downstream of OU-2.
	Biota (fish & shellfish)	B1-BT-03A thru B1-BT-03D	Passive Nets; Traps	2 - 40'	Pb, PCBs (Aroclors & Congeners); %lipid	Characterize baseline levels of analytes in fish caught downstream of OU-2.
	Habitat	B1-SP-012 thru B1-SP-014	Sediment Profile Imaging	0 - 8"	Substrate type, RPD, gas & feeding voids, macroinvertebrates; SAV	Characterize baseline condition of habitat downstream of OU-2.
	Surficial Sediment	B1-SS-012 thru B1-SS-014	Grab (e.g. Ponar)	0 - 6"	PCBs, Al, Be, Fe, Cu, Pb, Zn; TOC; grain size	Characterize baseline levels of analytes in sediment downstream of OU-2.
	Biota (macroinvertebrates)	B1-MC-012 thru B1-MC-014 (Coincident with B1-SS samples)	Grab & Sieve (e.g. Ponar)	0 - 6"	Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Characterize baseline condition of benthic macroinvertebrate community downstream of OU-2.

Notes: TOC = total organic carbon; DOC = dissolved organic carbon; RPD = redox potential discontinuity; DO = Disolved Oxygen; SAV = submerged aquatic vegetation

[1]PCBs as Aroclors; see BSAP text for description of selected samples used to identify site-related congeners

Table 2
Baseline Sampling and Analysis Plan: Sample Summary
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY

Sample Type	Number of Sample Locations	Analytical Requirements	Lab	Container[3] Type	QA/QC Procedures	Notes
Surface Water	7	Dissolved copper, lead and zinc using USEPA Method 6010B	PACE	Varies[3] according to analyte	Field Blank, laboratory duplicate, lab MS/MSD	Samples obtained during ebb tide period. Field measurements for dissolved oxygen, pH, temperature, specific conductivity and turbidity. Samples will be extracted using solid phase extraction disks.
		Aroclor & Congener PCBs - USEPA Method 3545/8082A				
		Total and Dissolved Organic Carbon (TOC) SM 5310				
		TSS using USEPA Method SM 2540D				
		Conventional Parameters using Multiprobe WQ Sonde	Field			
Biota[2] (fish)	17 (5 samples per species per river section: nearshore & deepwater)	Lead using USEPA Method 6010B	PACE	Aluminum foil wrap	Lab MS/MSD	Analysis of filet and offal if the minimum sample mass has been achieved. Congener analysis on selected samples of striped bass w/ elevated PCBs.
		Aroclor & Congener PCBs - USEPA Method 3545/8082A				
		Lipids Analysis using Method 3540C (Soxhlet extraction)				
Biota[2] (shellfish)	17 (5 blue crab per river section: nearshore & deepwater)	Lead using USEPA Method 6010B	PACE	Aluminum foil wrap	Lab MS/MSD	Analysis of whole body if the minimum sample mass has been achieved; composite if minimum mass not reached.
		Aroclor PCBs - USEPA Method 3545/8082A				
		Lipids Analysis using Method 3540C (Soxhlet extraction)				
Habitat Characterization	Approx. 240 (1 image per location)	- Color/Texture of sediment - Depth to Redox Potential Discontinuity - Presence/Absence of Gas and Feeding Voids - Types of Macroinvertebrates; Successional Stage - Report SAV if present	Germano & Associates, Inc.	N/A	Provided in Germano & Associates SOP	Will fulfill DQO of "habitat characterization", which includes substrate type/texture, depth to redox potential, presence of voids, numbers/types of organisms, stage of succession, presence of SAV.
Surficial Sediment	16	Al, Be, Fe, Cu, Pb, Zn - USEPA Method 6010B Total Organic Carbon (TOC) - Lloyd Kahn Method Grain size (sieve analysis) Aroclor & Congener PCBs - USEPA Method 3545/8082A	PACE	4 oz glass jars w/ Teflon septa; PE bags for grain size	Field Blank, laboratory duplicate, lab MS/MSD	Individual grab samples to obtain bulk chemistry; individual grab samples for porewater; individual grab samples for benthic macroinvertebrates.
Biota (macroinvertebrates)	16	Taxonomic Identification: Total Abundance; Taxa Richness; Percent dominance; Diversity Indices	Vittor & Associates, Inc.	1-L HDPE wide mouth container	<5% Taxonomic Disagreement	Macroinvertebrates will be sieved in the field. In the laboratory, they will be visually sorted and identified to the lowest practicable taxon (LPT). Collect nearshore replicates for at least 1 location per river section.
Porewater	7	Aroclor PCBs - USEPA Method 3535/8082A Dissolved copper, lead and zinc - USEPA Method 6010B Total and Dissolved Organic Carbon (TOC) SM 5310	PACE	Varies[3] according to analyte	Laboratory duplicate, lab MS/MSD	Obtained via laboratory centrifugation

Notes:

1. N/A: Not Applicable

2. All fish will be identified, measured (length and weight), and observed for gross abnormalities (log and photograph all external lesions). Each fish will be wrapped in foil and placed in a plastic bag with internal label (pencilled filter paper); do not eviscerate. Bags from one location can be placed in one larger bag provided it is labeled with the contents and location IDs. When sorting, small specimens such as young-of-year fish and invertebrates should be kept alive in water of appropriate temperature (use ice if needed) until each individual sampling event is completed at a given location. Wrap young fish in hexane-rinsed foil and bag. Keep jars on ice in a cooler until placement in a freezer.

3. See QAPP Table 4.2.1

Table 3
Conventional Surface Water Quality Measurements
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY

SAMPLE DATE: 25 OCTOBER 2013

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	10/25/2013	15.1	6.5	7.7	7.7	10.1
SW-001-B	7.5	10/25/2013	15.2	6.6	7.7	7.6	10.0
SW-002-T	2.2	10/25/2013	15.2	6.7	7.7	5.9	10.0
SW-002-B	8.0	10/25/2013	15.1	6.8	7.8	7.7	9.1
SW-003-T	2.0	10/25/2013	15.3	8.0	7.7	8.5	9.4
SW-003-B	8.2	10/25/2013	15.3	8.3	7.7	10.0	8.7
SW-004-T	2.2	10/25/2013	15.2	8.0	7.7	9.8	9.9
SW-004-B	7.8	10/25/2013	15.2	8.1	7.7	9.0	9.5
SW-005-T	2.1	10/25/2013	15.1	8.0	7.7	8.9	9.4
SW-005-B	10.5	10/25/2013	15.2	8.1	7.7	9.5	9.2
SW-006-T	2.1	10/25/2013	15.1	8.2	7.7	10.2	9.6
SW-006-B	8.3	10/25/2013	15.2	8.2	7.7	8.7	8.9

SAMPLE DATE: 12 DECEMBER 2013

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	12/12/2013	6.7	3.7	7.9	37.3	12.2
SW-001-B	9.0	12/12/2013	4.7	3.5	7.7	36.3	12.9
SW-002-T	2.0	12/12/2013	4.9	4.2	7.8	31.0	13.6
SW-002-B	5.0	12/12/2013	4.9	4.2	7.7	33.2	12.6
SW-003-T	2.0	12/12/2013	5.0	4.7	7.8	41.1	13.1
SW-003-B	7.5	12/12/2013	5.1	4.7	7.7	50.9	13.2
SW-004-T	2.0	12/12/2013	5.1	4.6	7.8	62.9	12.6
SW-004-B	7.3	12/12/2013	5.1	4.7	7.8	49.6	13.2
SW-005-T	2.0	12/12/2013	5.1	4.6	7.8	47.6	14.8
SW-005-B	9.2	12/12/2013	5.1	4.7	7.8	51.0	12.8
SW-006-T	2.0	12/12/2013	5.2	4.8	7.8	37.0	13.2
SW-006-B	7.4	12/12/2013	5.2	4.9	7.8	39.3	13.7

SAMPLE DATE: 9 APRIL 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	4/9/2014	5.6	1.1	7.7	7.1	12.1
SW-001-B	10.0	4/9/2014	5.5	1.2	7.7	16.3	12.4
SW-002-T	2.0	4/9/2014	5.9	1.3	7.9	17.9	12.1
SW-002-B	4.9	4/9/2014	5.8	1.3	7.7	18.3	12.3
SW-003-T	2.0	4/9/2014	6.0	1.9	7.9	14.3	12.0
SW-003-B	5.4	4/9/2014	5.9	1.8	8.0	17.1	12.4
SW-004-T	2.0	4/9/2014	6.2	1.6	7.8	18.1	12.4
SW-004-B	6.8	4/9/2014	6.0	1.6	7.9	16.3	12.3
SW-005-T	2.0	4/9/2014	6.0	1.6	7.9	0.4	12.9
SW-005-B	7.4	4/9/2014	6.1	1.6	8.0	0.6	12.2
SW-006-T	2.0	4/9/2014	6.2	2.0	7.9	8.9	12.1
SW-006-B	5.0	4/9/2014	6.1	2.0	7.9	1.5	13.1

SAMPLE DATE: 7 MAY 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.1	5/7/2014	12.2	0.8	7.9	27.0	11.2
SW-001-B	8.3	5/7/2014	12.2	0.8	7.8	29.8	10.4
SW-002-T	2.0	5/7/2014	12.5	1.2	7.8	15.2	11.3
SW-002-B	6.7	5/7/2014	12.4	1.2	7.9	25.4	10.9
SW-003-T	2.1	5/7/2014	12.4	1.3	7.9	25.8	10.5
SW-003-B	6.3	5/7/2014	12.4	1.7	7.9	32.0	10.8
SW-004-T	2.2	5/7/2014	12.4	1.6	7.8	33.3	10.9
SW-004-B	8.4	5/7/2014	12.4	1.7	7.9	37.7	10.5
SW-005-T	2.2	5/7/2014	12.4	1.6	7.8	28.6	11.8
SW-005-B	7.5	5/7/2014	12.3	1.9	7.9	35.5	11.6
SW-006-T	2.1	5/7/2014	12.4	2.1	7.9	20.0	11.7
SW-006-B	5.8	5/7/2014	12.1	3.4	7.9	25.9	10.6
SW-007-T	2.0	5/7/2014	12.3	1.0	8.0	25.5	12.3
SW-007-B	22.0	5/7/2014	10.6	16.2	7.8	32.4	9.0

[1]For Sample IDs, the "T" represents the top ((2' from surface) measurement and thg "B" represents the bottom (2' from mudline) measurement.

Table 3
Conventional Surface Water Quality Measurements
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY

SAMPLE DATE: 9 JUNE 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.2	6/9/2014	21.3	4.4	8.3	3.4	10.2
SW-001-B	8.8	6/9/2014	21.1	6.0	7.9	10.1	10.3
SW-002-T	2.1	6/9/2014	21.1	5.7	8.1	8.9	10.5
SW-002-B	8.1	6/9/2014	21.0	5.9	8.1	11.1	10.7
SW-003-T	2.0	6/9/2014	21.1	5.9	8.2	11.8	10.6
SW-003-B	9.5	6/9/2014	20.6	8.2	8.0	26.5	10.3
SW-004-T	2.0	6/9/2014	21.1	5.7	8.3	11.9	10.9
SW-004-B	7.8	6/9/2014	20.9	6.5	8.1	17.6	10.6
SW-005-T	2.0	6/9/2014	21.1	6.0	8.2	10.6	10.7
SW-005-B	10.5	6/9/2014	20.9	6.4	8.2	21.7	10.8
SW-006-T	2.0	6/9/2014	20.7	7.3	8.1	14.5	10.1
SW-006-B	7.0	6/9/2014	20.8	6.9	8.1	15.1	10.7

SAMPLE DATE: 8 JULY 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.3	7/8/2014	25.4	3.0	7.9	5.7	9.3
SW-001-B	8.3	7/8/2014	25.1	3.6	7.7	6.9	8.6
SW-002-T	2.0	7/8/2014	25.4	3.6	7.9	6.5	8.8
SW-002-B	8.0	7/8/2014	25.4	3.8	7.9	9.8	8.8
SW-003-T	2.0	7/8/2014	25.4	3.9	7.9	10.3	9.0
SW-003-B	10.0	7/8/2014	24.9	5.9	7.7	20.1	8.6
SW-004-T	2.0	7/8/2014	25.4	4.0	7.9	8.0	8.9
SW-004-B	9.5	7/8/2014	25.4	4.2	7.9	15.3	9.0
SW-005-T	2.0	7/8/2014	25.4	4.0	7.9	17.1	9.1
SW-005-B	8.5	7/8/2014	25.4	4.1	7.9	15.6	9.0
SW-006-T	2.0	7/8/2014	25.5	4.2	8.0	8.6	9.0
SW-006-B	7.0	7/8/2014	24.2	4.9	7.8	11.3	9.0

SAMPLE DATE: 8 AUGUST 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	8/8/2014	26.0	4.7	7.2	5.7	7.7
SW-001-B	7.5	8/8/2014	25.8	5.3	7.0	6.4	7.3
SW-002-T	2.0	8/8/2014	26.0	5.3	7.2	5.0	7.8
SW-002-B	7.0	8/8/2014	25.8	5.5	7.2	12.6	7.6
SW-003-T	2.0	8/8/2014	25.6	6.7	7.2	23.5	7.4
SW-003-B	6.5	8/8/2014	25.6	6.4	7.2	16.2	7.8
SW-004-T	2.0	8/8/2014	25.8	6.2	7.2	18.8	7.6
SW-004-B	6.0	8/8/2014	25.7	6.4	7.2	26.3	7.5
SW-005-T	2.0	8/8/2014	26.1	5.5	7.3	9.3	7.8
SW-005-B	9.0	8/8/2014	25.8	6.2	7.2	14.7	7.7
SW-006-T	2.0	8/8/2014	25.8	6.2	7.2	9.2	7.7
SW-006-B	8.0	8/8/2014	25.7	6.6	7.2	11.0	7.7
SW-007-T	2.0	8/8/2014	26.2	4.9	7.3	5.0	8.1
SW-007-B	25.0	8/8/2014	23.4	15.3	7.0	16.4	5.5

[1]For Sample IDs, the "T" represents the top ((2' from surface) measurement and thg "B" represents the bottom (2' from mudline) measurement.

Table 3
Conventional Surface Water Quality Measurements
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY

SAMPLE DATE: 3 SEPTEMBER 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	9/4/2014	25.7	6.9	7.9	7.4	8.5
SW-001-B	7.3	9/4/2014	25.3	7.1	7.4	7.4	8.2
SW-002-T	2.0	9/4/2014	25.6	7.5	7.8	7.6	8.1
SW-002-B	4.2	9/4/2014	25.6	7.6	7.8	8.0	8.2
SW-003-T	2.0	9/4/2014	25.6	7.6	7.8	8.7	8.3
SW-003-B	13.1	9/4/2014	25.2	9.7	7.7	31.5	7.7
SW-004-T	2.0	9/4/2014	25.6	7.8	7.8	16.9	8.2
SW-004-B	7.1	9/4/2014	25.6	7.8	7.8	14.0	7.9
SW-005-T	2.0	9/4/2014	25.7	7.7	7.8	9.9	8.0
SW-005-B	8.0	9/4/2014	25.6	8.0	7.8	14.0	8.0
SW-006-T	2.0	9/4/2014	25.7	7.7	7.7	10.4	8.0
SW-006-B	7.5	9/4/2014	25.5	8.3	7.8	13.5	7.9

SAMPLE DATE: 3 OCTOBER 2014

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	10/3/2014	20.4	11.3	7.4	3.7	7.5
SW-001-B	8.4	10/3/2014	20.4	11.7	7.4	5.6	7.7
SW-002-T	2.0	10/3/2014	20.4	11.1	7.4	5.1	7.6
SW-002-B	7.0	10/3/2014	20.3	11.5	7.4	9.3	7.3
SW-003-T	2.0	10/3/2014	20.5	11.4	7.4	8.9	8.1
SW-003-B	8.3	10/3/2014	20.5	13.9	7.4	15.2	7.2
SW-004-T	2.0	10/3/2014	20.6	11.8	7.3	10.6	8.0
SW-004-B	7.7	10/3/2014	20.5	12.6	7.3	14.3	7.7
SW-005-T	2.0	10/3/2014	20.6	11.9	7.3	9.4	7.5
SW-005-B	9.3	10/3/2014	20.5	12.5	7.4	10.8	7.6
SW-006-T	2.0	10/3/2014	20.6	12.2	7.3	7.1	7.8
SW-006-B	6.3	10/3/2014	20.6	12.4	7.4	8.3	7.5
SW-007-T	2.0	10/3/2014	20.4	11.3	7.4	8.3	7.7
SW-007-B	26.0	10/3/2014	20.6	17.0	7.3	29.0	6.4

SAMPLE DATE: 12 MAY 2015

Sample ID[1]	Depth (ft)	Date	Temp (°C)	Salinity (ppt)	pH (s.u.)	Turbidity (NTU)	DO (mg/L)
SW-001-T	2.0	5/12/2015	19.4	6.5	7.8	18.6	9.0
SW-001-B	9.6	5/12/2015	17.5	6.7	7.8	21.1	9.1
SW-002-T	2.1	5/12/2015	19.3	2.3	7.4	21.4	9.8
SW-002-B	8.4	5/12/2015	17.3	6.7	7.8	23.4	9.2
SW-003-T	2.0	5/12/2015	16.9	7.5	7.8	4.3	10.1
SW-003-B	9.6	5/12/2015	16.7	7.9	7.9	42.8	9.2
SW-004-T	2.0	5/12/2015	16.9	7.5	7.8	35.8	9.3
SW-004-B	8.0	5/12/2015	16.8	7.7	7.9	49.4	9.2
SW-005-T	2.0	5/12/2015	17.0	7.5	7.8	12.8	9.3
SW-005-B	9.6	5/12/2015	16.5	8.3	7.8	60.9	9.1
SW-006-T	1.9	5/12/2015	16.9	7.7	7.8	20.9	9.3
SW-006-B	10.9	5/12/2015	16.1	8.8	7.8	50.3	9.2
SW-007-T	2.2	5/12/2015	17.1	7.1	7.8	19.9	9.5
SW-007-B	27.9	5/12/2015	14.4	11.0	7.8	90.3	8.9

[1]For Sample IDs, the "T" represents the top ((2' from surface) measurement and thg "B" represents the bottom (2' from mudline) measurement.

TABLE 4
Analytical Summary of PCBs in Surface Water
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Sample Type	Date	Sample Depth	Total PCBs (ug/L)	Aroclor-1242 ug/L	Aroclor 1248 (ug/L)	Aroclor-1260 (ug/L)	DOC (mg/L)	TOC (mg/L)	TSS (mg/L)
SW-001	N	10/25/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**20.6**	**20.4**	**6.9**
SW-002	N	10/25/2013	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**3.9**	**6.5**
SW-003	N	10/25/2013	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.6**	**3.7**	**7.6**
SW-003 (dup)	FD	10/25/2013	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.1**	**4.1**	**6.6**
SW-004	N	10/25/2013	2 - 7.8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**6.6**	**6.8**	**8.5**
SW-005	N	10/25/2013	2.1 - 10.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**7.0**	**7.4**	**7.4**
SW-006	N	10/25/2013	2 - 8.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**4.0**	**6.5**
SW-001	N	12/12/2013	2 - 9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.7**	**3.9**	**38.6**
SW-002	N	12/12/2013	2 - 5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**6.3**	**7.2**	**32.4**
SW-003	N	12/12/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.8**	**5.3**	**44.2**
SW-003 (dup)	FD	12/12/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.8**	**5.4**	**66.6**
SW-004	N	12/12/2013	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.6**	**4.4**	**57.8**
SW-005	N	12/12/2013	2 - 9.2 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.4**	**4.8**	**45.6**
SW-006	N	12/12/2013	2 - 7.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**23.6**	**24.6**	**40.5**
SW-001	N	4/9/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**4.1**	**13.7**
SW-002	N	4/9/2014	2 - 4.9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**17.6**
SW-003	N	4/9/2014	2 - 5.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.6**	**12.6**
SW-003 (dup)	FD	4/9/2014	2 - 5.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**14.8**
SW-004	N	4/9/2014	2 - 6.8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**8.3**	**8.7**	**15.9**
SW-005	N	4/9/2014	2 - 7.4 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**5.7**	**6.1**	**14.9**
SW-006	N	4/9/2014	2 - 5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**6.7**	**7.3**	**12.3**
SW-001	N	5/7/2014	2.1 - 8.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.5**	**3.5**	**21.3**
SW-002	N	5/7/2014	2 - 6.7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.6**	**4.8**	**24.1**
SW-003	N	5/7/2014	2.1 - 6.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**8.0**	**8.1**	**25.9**
SW-003 (dup)	FD	5/7/2014	2.1 - 6.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**8.0**	**8.2**	**23.7**
SW-004	N	5/7/2014	2.2 - 8.4 (ft)	**0.0211 J**	ND(0.0186)	**0.0211 J**	ND(0.0186)	**10.3**	**10.5**	**30.0**
SW-005	N	5/7/2014	2.2 - 7.5 (ft)	**0.019 J**	ND(0.0186)	**0.019 J**	ND(0.0186)	**3.5**	**3.6**	**33.4**
SW-006	N	5/7/2014	2.1 - 5.8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.7**	**3.9**	**25.4**
SW-007	N	5/7/2014	2 - 22 (ft)	**0.0199 J**	ND(0.0186)	**0.0199 J**	ND(0.0186)	**3.2**	**3.6**	**39.6**
SW-001	N	6/9/2014	2.2 - 8.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.3**	**10.1**	**12.2**
SW-002	N	6/9/2014	2.1 - 8.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**4.6**	**11.7**
SW-003	N	6/9/2014	2 - 9.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.4**	**4.4**	**23.2**
SW-003 (dup)	FD	6/9/2014	2 - 9.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.4**	**4.4**	**20.6**
SW-004	N	6/9/2014	2 - 7.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**13.3**	**13.7**	**20.2**
SW-005	N	6/9/2014	2 - 10.5 (ft)	ND(0.0186)	ND(0.01)	ND(0.0186)	ND(0.0186)	**3.9**	**5.4**	**21.3**
SW-006	N	6/9/2014	2 - 7 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**4.7**	**21.2**
SW-001	N	7/8/2014	2.3 - 8.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**3.9**	**12.0**
SW-002	N	7/8/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**3.9**	**13.9**
SW-003	N	7/8/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.1**	**29.4**
SW-003 (dup)	FD	7/8/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.2**	**25.5**
SW-004	N	7/8/2014	2 - 9.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**4.3**	**18.3**
SW-005	N	7/8/2014	2 - 8.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.4**	**22.7**
SW-006	N	7/8/2014	2 - 7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.4**	**19.5**
SW-001	N	8/5/2014	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.4**	**12.6**
SW-002	N	8/5/2014	2 - 7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**13.5**
SW-003	N	8/5/2014	2 - 6.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**4.8**	**12.0**
SW-003 (dup)	FD	8/5/2014	2 - 6.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**4.8**	**10.5**
SW-004	N	8/5/2014	2 - 6 (ft)	**0.0193 J**	ND(0.0186)	ND(0.0186)	**0.0193 J**	**3.2**	**4.7**	**24.0**
SW-005	N	8/5/2014	2 - 9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.5**	**4.4**	**21.5**
SW-006	N	8/5/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**12.2**	**13.9**	**16.5**
SW-007	N	8/5/2014	2 - 25 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.0**	**3.4**	**16.0**

1. Results in bold are above the MDL. Aroclor 1216, 1221, 1232, 1242, 1254, 1262 and 1268 were not detected.

2. ND - Not detected above reporting limit; J - Estimated value; TOC, Total Organic Carbon; DOC, Dissolved Organic Carbon; TSS, Total Suspended Solids

TABLE 4
Analytical Summary of PCBs in Surface Water
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Sample Type	Date	Sample Depth	Total PCBs (ug/L)	Aroclor-1242 ug/L	Aroclor 1248 (ug/L)	Aroclor-1260 (ug/L)	DOC (mg/L)	TOC (mg/L)	TSS (mg/L)
SW-001	N	9/4/2014	2 - 7.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.8**	**9.8**
SW-002	N	9/4/2014	2 - 4.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**3.8**	**9.2**
SW-003	N	9/4/2014	2 - 13.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.7**	**4.0**	**9.4**
SW-003 (dup)	FD	9/4/2014	2 - 13.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**4.3**	**13.4**
SW-004	N	9/4/2014	2 - 7.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**4.0**	**16.8**
SW-005	N	9/4/2014	2 - 8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**3.9**	**6.7**
SW-006	N	9/4/2014	2 - 7.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**4.0**	**4.3**	**10.1**
SW-001	N	10/3/2014	2 - 7.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.7**	**14.4**
SW-002	N	10/3/2014	2.2 - 8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**3.6**	**15.3**
SW-003	N	10/3/2014	2 - 8.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**6.4**	**6.8**	**42.1**
SW-003 (dup)	FD	10/3/2014	2 - 8.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**6.4**	**6.8**	**38.9**
SW-004	N	10/3/2014	2.2 - 7.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.9**	**21.0**
SW-005	N	10/3/2014	2.1 - 8.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.7**	**4.4**	**19.1**
SW-006	N	10/3/2014	2.1 - 8.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**4.1**	**4.1**	**16.9**
SW-007	N	10/3/2014	-	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**4.1**	**32.4**
SW-001	N	5/12/2015	2 - 9.6 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.2**	**3.4**	**18.0**
SW-002	N	5/12/2015	2.1 - 8.4 (ft)	**0.0132**	**0.0132**	ND(0.01)	ND(0.01)	**3.0**	**3.9**	**46.0**
SW-003	N	5/12/2015	2 - 9.6 (ft)	**0.0229**	**0.0229**	ND(0.01)	ND(0.01)	**2.8**	**3.9**	**48.0**
SW-003 (dup)	FD	5/12/2015	2 - 9.6 (ft)	**0.0153**	**0.0153**	ND(0.01)	ND(0.01)	**2.9**	**3.8**	**52.4**
SW-004	N	5/12/2015	2 - 8 (ft)	**0.0193**	**0.0193**	ND(0.01)	ND(0.01)	**2.9**	**3.6**	**55.0**
SW-005	N	5/12/2015	2 - 9.6 (ft)	**0.0208**	**0.0208**	ND(0.01)	ND(0.01)	**2.9**	**4.2**	**85.9**
SW-006	N	5/12/2015	1.9 - 10.9 (ft)	**0.0152**	**0.0152**	ND(0.01)	ND(0.01)	**2.9**	**4.2**	**54.4**
SW-007	N	5/12/2015	2.2 - 27.9 (ft)	**0.0245**	**0.0245**	ND(0.01)	ND(0.01)	**2.8**	**4.6**	**113.0**

1. Results in bold are above the MDL. Aroclor 1216, 1221, 1232, 1242, 1254, 1262 and 1268 were not detected.

2. ND - Not detected above reporting limit; J - Estimated value; TOC, Total Organic Carbon; DOC, Dissolved Organic Carbon; TSS, Total Suspended Solids

TABLE 5
Summary of Surface Water Analytical Results: Metals
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Sample Type	Date	Sample Depth	Copper (mg/L)	Lead (mg/L)	Zinc (mg/L)
SW-001	N	10/25/2013	2 - 7.5 (ft)	**0.0553**	**0.0177 J**	**0.104**
SW-002	N	10/25/2013	2 - 8 (ft)	**0.00674 J**	ND(0.00754)	**0.00187 J**
SW-003	N	10/25/2013	2 - 8 (ft)	**0.00487 J**	ND(0.00754)	**0.00182 J**
SW-003 (dup)	FD	10/25/2013	2 - 8 (ft)	**0.00603 J**	ND(0.00754)	**0.00151 J**
SW-004	N	10/25/2013	2 - 7.8 (ft)	**0.00627 J**	ND(0.00754)	ND(0.00127)
SW-005	N	10/25/2013	2.1 - 10.5 (ft)	**0.00738 J**	ND(0.00754)	**0.00138 J**
SW-006	N	10/25/2013	2 - 8.5 (ft)	**0.00608 J**	ND(0.00754)	**0.00132 J**
SW-001	N	12/12/2013	2 - 9 (ft)	**0.00628**	ND(0.00151)	**0.00354 J**
SW-002	N	12/12/2013	2 - 5 (ft)	**0.00513**	ND(0.00151)	**0.0029 J**
SW-003	N	12/12/2013	2 - 7.5 (ft)	**0.00499 J**	ND(0.00151)	**0.00386 J**
SW-003 (dup)	FD	12/12/2013	2 - 7.5 (ft)	**0.00463 J**	ND(0.00151)	**0.00301 J**
SW-004	N	12/12/2013	2 - 7.5 (ft)	**0.00646**	ND(0.00151)	**0.00336 J**
SW-005	N	12/12/2013	2 - 9.2 (ft)	**0.00713**	ND(0.00151)	**0.00332 J**
SW-006	N	12/12/2013	2 - 7.4 (ft)	**0.00803**	ND(0.00151)	**0.00428 J**
SW-001	N	4/9/2014	2 - 10 (ft)	**0.00115 J**	ND(0.00151)	**0.00264 J**
SW-002	N	4/9/2014	2 - 4.9 (ft)	**0.000716 J**	ND(0.00151)	**0.00122 J**
SW-003	N	4/9/2014	2 - 5.4 (ft)	**0.00226 J**	ND(0.00151)	**0.00135 J**
SW-003 (dup)	FD	4/9/2014	2 - 5.4 (ft)	**0.00111 J**	ND(0.00151)	**0.00219 J**
SW-004	N	4/9/2014	2 - 6.8 (ft)	**0.00115 J**	ND(0.00151)	**0.00159 J**
SW-005	N	4/9/2014	2 - 7.4 (ft)	**0.0023 J**	ND(0.00151)	**0.00147 J**
SW-006	N	4/9/2014	2 - 5 (ft)	**0.00144 J**	ND(0.00151)	**0.00102 J**
SW-001	N	5/7/2014	2.1 - 8.3 (ft)	**0.00261 J**	ND(0.00151)	**0.00171 J**
SW-002	N	5/7/2014	2 - 6.7 (ft)	**0.00229 J**	ND(0.00151)	**0.00168 J**
SW-003	N	5/7/2014	2.1 - 6.3 (ft)	**0.00257 J**	ND(0.00151)	**0.0013 J**
SW-003 (dup)	FD	5/7/2014	2.1 - 6.3 (ft)	**0.00253 J**	ND(0.00151)	**0.00149 J**
SW-004	N	5/7/2014	2.2 - 8.4 (ft)	**0.00209 J**	ND(0.00151)	**0.00124 J**
SW-005	N	5/7/2014	2.2 - 7.5 (ft)	**0.00263 J**	ND(0.00151)	**0.0018 J**
SW-006	N	5/7/2014	2.1 - 5.8 (ft)	**0.00253 J**	ND(0.00151)	**0.00141 J**
SW-007	N	5/7/2014	2 - 22 (ft)	**0.00249 J**	ND(0.00151)	**0.00246 J**
SW-001	N	6/9/2014	2.2 - 8.8 (ft)	**0.00325 J**	ND(0.00194)	ND(0.00145)
SW-002	N	6/9/2014	2.1 - 8.1 (ft)	**0.00319 J**	ND(0.00194)	ND(0.00145)
SW-003	N	6/9/2014	2 - 9.5 (ft)	**0.00398 J**	ND(0.00194)	ND(0.00145)
SW-003 (dup)	FD	6/9/2014	2 - 9.5 (ft)	**0.00498 J**	**0.00237 J**	**0.0016 J**
SW-004	N	6/9/2014	2 - 7.8 (ft)	**0.00362 J**	ND(0.00194)	ND(0.00145)
SW-005	N	6/9/2014	2 - 10.5 (ft)	**0.00396 J**	ND(0.00194)	ND(0.00145)
SW-006	N	6/9/2014	2 - 7 (ft)	**0.00371 J**	ND(0.00194)	ND(0.00145)

1. Results in bold were reported above the MDL. Shaded cells exceeded NYSDEC AWQC.
2. ND - Not detected above reporting limit (MDL).
   J - Estimated value

TABLE 5
Summary of Surface Water Analytical Results: Metals
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Sample Type	Date	Sample Depth	Copper (mg/L)	Lead (mg/L)	Zinc (mg/L)
SW-001	N	7/8/2014	2.3 - 8.3 (ft)	**0.00437 J**	ND(0.00194)	ND(0.00145)
SW-002	N	7/8/2014	2 - 8 (ft)	**0.00445 J**	ND(0.00194)	**0.00237 J**
SW-003	N	7/8/2014	2 - 10 (ft)	**0.00431 J**	ND(0.00194)	**0.00214 J**
SW-003 (dup)	FD	7/8/2014	2 - 10 (ft)	**0.00465 J**	ND(0.00194)	**0.00199 J**
SW-004	N	7/8/2014	2 - 9.5 (ft)	**0.0044 J**	ND(0.00194)	ND(0.00145)
SW-005	N	7/8/2014	2 - 8.5 (ft)	**0.004 J**	ND(0.00194)	**0.00154 J**
SW-006	N	7/8/2014	2 - 7 (ft)	**0.00421 J**	ND(0.00194)	ND(0.00145)
SW-001	N	8/5/2014	2 - 7.5 (ft)	**0.00561**	ND(0.00194)	**0.00146 J**
SW-002	N	8/5/2014	2 - 7 (ft)	**0.0052**	ND(0.00194)	ND(0.00145)
SW-003	N	8/5/2014	2 - 6.5 (ft)	**0.00509**	ND(0.00194)	**0.00148 J**
SW-003 (dup)	FD	8/5/2014	2 - 6.5 (ft)	**0.00514**	ND(0.00194)	ND(0.00145)
SW-004	N	8/5/2014	2 - 6 (ft)	**0.00541**	ND(0.00194)	ND(0.00145)
SW-005	N	8/5/2014	2 - 9 (ft)	**0.00488 J**	ND(0.00194)	ND(0.00145)
SW-006	N	8/5/2014	2 - 8 (ft)	**0.005 J**	ND(0.00194)	ND(0.00145)
SW-007	N	8/5/2014	2 - 25 (ft)	**0.00533**	ND(0.00194)	**0.00182 J**
SW-001	N	9/4/2014	2 - 7.3 (ft)	**0.0041 J**	ND(0.00194)	**0.00228 J**
SW-002	N	9/4/2014	2 - 4.2 (ft)	**0.00372 J**	ND(0.00194)	**0.0117**
SW-003	N	9/4/2014	2 - 13.1 (ft)	**0.00439 J**	ND(0.00194)	ND(0.00145)
SW-003 (dup)	FD	9/4/2014	2 - 13.1 (ft)	**0.00389 J**	ND(0.00194)	**0.0105**
SW-004	N	9/4/2014	2 - 7.1 (ft)	**0.00403 J**	ND(0.00194)	**0.00287 J**
SW-005	N	9/4/2014	2 - 8 (ft)	**0.00399 J**	ND(0.00194)	**0.00147 J**
SW-006	N	9/4/2014	2 - 7.5 (ft)	**0.00408 J**	ND(0.00194)	ND(0.00145)
SW-001	N	10/3/2014	2 - 7.5 (ft)	**0.00524**	ND(0.00194)	**0.00571**
SW-002	N	10/3/2014	2.2 - 8 (ft)	**0.00465 J**	ND(0.00194)	**0.00395 J**
SW-003	N	10/3/2014	2 - 8.2 (ft)	**0.00528**	ND(0.00194)	**0.00577**
SW-003 (dup)	FD	10/3/2014	2 - 8.2 (ft)	**0.00512**	ND(0.00194)	**0.0062**
SW-004	N	10/3/2014	2.2 - 7.8 (ft)	**0.00479 J**	ND(0.00194)	**0.00525**
SW-005	N	10/3/2014	2.1 - 8.3 (ft)	**0.00659**	ND(0.00194)	**0.00489 J**
SW-006	N	10/3/2014	2.1 - 8.3 (ft)	**0.00529**	ND(0.00194)	**0.00433 J**
SW-007	N	10/3/2014	-	**0.00504**	ND(0.00194)	**0.00435 J**
SW-001	N	5/12/2015	2 - 9.6 (ft)	**0.0015**	**0.002**	**0.00114**
SW-002	N	5/12/2015	2.1 - 8.4 (ft)	**0.0012**	**0.0015**	**0.0136**
SW-003	N	5/12/2015	2 - 9.6 (ft)	**0.0018**	**0.0017**	**0.0119**
SW-003 (dup)	FD	5/12/2015	2 - 9.6 (ft)	ND(0.0007)	**0.002**	**0.0077**
SW-004	N	5/12/2015	2 - 8 (ft)	ND(0.0007)	**0.0023**	**0.0036**
SW-005	N	5/12/2015	2 - 9.6 (ft)	ND(0.0007)	**0.0022**	**0.0064**
SW-006	N	5/12/2015	1.9 - 10.9 (ft)	**0.0010**	**0.0017**	**0.0092**
SW-007	N	5/12/2015	2.2 - 27.9 (ft)	**0.0010**	**0.0016**	**0.0207**

1. Results in bold were reported above the MDL. Shaded cells exceeded NYSDEC AWQC.
2. ND - Not detected above reporting limit (MDL).
   J - Estimated value

TABLE 6
Analytical Summary of PCBs in Sediment[1]
Former Anaconda Wire and Cable Site
1 River Street
Hastings-on-Hudson, NY

Location[2]	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs	TOC
B1-SS-001	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.219 AE**	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.219**	**2.2**
B1-SS-002	ND(0.121)	ND(0.121)	ND(0.121)	ND(0.121)	**0.271 AE**	ND(0.121)	ND(0.121)	ND(0.121)	ND(0.121)	**0.271**	**2.8**
B1-SS-003	ND(0.113)	ND(0.113)	ND(0.113)	ND(0.113)	**0.243 AE**	ND(0.113)	ND(0.113)	ND(0.113)	ND(0.113)	**0.243**	**2.4**
B1-SS-004	ND(0.129)	ND(0.129)	ND(0.129)	**0.408 AD**	ND(0.129)	ND(0.129)	ND(0.129)	ND(0.129)	ND(0.129)	**0.408**	**2.7**
B1-SS-005	ND(0.115)	ND(0.115)	ND(0.115)	**0.33 AD**	ND(0.115)	ND(0.115)	ND(0.115)	**0.151 AH**	ND(0.115)	**0.481**	**2.8**
B1-SS-006	ND(0.142)	ND(0.142)	ND(0.142)	**0.451 AD**	ND(0.142)	ND(0.142)	ND(0.142)	ND(0.142)	ND(0.142)	**0.451**	**3.5**
B1-SS-007(FD)	ND(0.243)	ND(0.243)	ND(0.243)	ND(0.243)	**0.625 AE**	**1.05 AF**	ND(0.243)	**1.29 AH**	ND(0.243)	**2.965**	**2.9**
B1-SS-007	ND(0.127)	ND(0.127)	ND(0.127)	ND(0.127)	**2.01 AE**	**0.972 AF**	ND(0.127)	**1.04 AH**	ND(0.127)	**4.022**	**2.6**
B1-SS-101	ND(0.108)	ND(0.108)	ND(0.108)	**0.452 AD**	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.452**	**2.1**
B1-SS-008	ND(0.124)	ND(0.124)	ND(0.124)	ND(0.124)	**0.287 AE**	ND(0.124)	ND(0.124)	ND(0.124)	ND(0.124)	**0.287**	**2.7**
B1-SS-009	ND(0.0816)	ND(0.0816)	ND(0.0816)	ND(0.0816)	ND(0.0816)	**0.356 AF**	ND(0.0816)	**0.759 AH**	ND(0.0816)	**1.115**	**1.6**
B1-SS-102	ND(0.106)	ND(0.106)	ND(0.106)	**0.328 AD**	ND(0.106)	ND(0.106)	ND(0.106)	ND(0.106)	ND(0.106)	**0.328**	**2.2**
B1-SS-010	ND(0.118)	ND(0.118)	ND(0.118)	ND(0.118)	**0.253 AE**	**0.133 AF**	ND(0.118)	**0.171 AH**	ND(0.118)	**0.557**	**2.2**
B1-SS-011	ND(0.105)	ND(0.105)	ND(0.105)	ND(0.105)	**0.227 AE**	**0.133 AF**	ND(0.105)	**0.779 AH**	ND(0.105)	**1.139**	**2.3**
B1-SS-012	ND(0.123)	ND(0.123)	ND(0.123)	ND(0.123)	**0.265 AE**	**0.161 AF**	ND(0.123)	ND(0.123)	ND(0.123)	**0.426**	**2.9**
B1-SS-013	ND(0.108)	ND(0.108)	ND(0.108)	ND(0.108)	**0.26 AE**	**0.112 AF**	ND(0.108)	ND(0.108)	ND(0.108)	**0.372**	**2.3**
B1-SS-014	ND(0.187)	ND(0.187)	ND(0.187)	ND(0.187)	**0.245 AE**	ND(0.187)	ND(0.187)	ND(0.187)	ND(0.187)	**0.245**	**1.7**

Notes:
1. All sample results expressed as mg/kg; Total Organic Carbon (TOC) expressed as percent. Results in **bold** above the detection limit. FD = Field Duplicate
2. Samples B1-SS-001 through -003 are upstream of the Site; -004 through -102 are adjacent to the Site; -012 through -014 are downstream of the Site.
3. ND - Not detected above reporting limit
   AD - Aroclor 1242 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
   AE - Aroclor 1248 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
   AF - Aroclor 1254 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
   AH - Aroclor 1262 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.

TABLE 7
Analytical Summary of Metals in Sediment[1]
Former Anaconda Wire and Cable Site
1 River Street
Hastings-on-Hudson, NY

Location	Aluminum	Beryllium	Iron	Copper	Lead	Zinc	TOC	Grain Size (% Silt and Clay)
B1-SS-001	**15200**	ND(0.907)	**28100**	**44.5**	**69.8**	**128**	**2.2**	**92.0**
B1-SS-002	**16900**	ND(0.986)	**32000**	**51.3**	**53.1**	**147**	**2.8**	**98.9**
B1-SS-003	**14200**	ND(0.913)	**27200**	**45.4**	**46.2**	**127**	**2.4**	**96.4**
B1-SS-004	**14300**	ND(0.995)	**30600**	**71.9**	**66.3**	**158**	**2.7**	**96.4**
B1-SS-005	**13200**	ND(0.948)	**27300**	**46.6**	**46.4**	**127**	**2.8**	**97.3**
B1-SS-006	**16000**	ND(1.13)	**32900**	**57.5**	**61.8**	**156**	**3.5**	**98.0**
B1-SS-007(FD)	**13300**	ND(1.01)	**26200**	**55.5**	**59.4**	**133**	**2.9**	**--**
B1-SS-007	**15800**	ND(1.04)	**30600**	**105.0**	**91.1**	**185**	**2.6**	**93.8**
B1-SS-008	**15900**	ND(0.997)	**31200**	**57.0**	**56.5**	**151**	**2.7**	**93.2**
B1-SS-009	**9960**	ND(0.666)	**21500**	**240.0**	**59.2**	**152**	**1.6**	**80.9**
B1-SS-010	**14600**	ND(0.924)	**28200**	**89.8**	**51.0**	**135**	**2.2**	**98.6**
B1-SS-011	**12900**	ND(0.879)	**25900**	**109.0**	**71.1**	**132**	**2.3**	**88.4**
B1-SS-101	**13200**	ND(0.91)	**27800**	**45.2**	**48.5**	**128**	**2.1**	**92.5**
B1-SS-102	**12800**	ND(0.879)	**26900**	**41.7**	**46.4**	**123**	**2.2**	**93.5**
B1-SS-012	**16800**	ND(1.01)	**31900**	**72.6**	**100.0**	**156**	**2.9**	**93.7**
B1-SS-013	**13900**	ND(0.881)	**27200**	**50.9**	**53.4**	**133**	**2.3**	**96.0**
B1-SS-014	**13000**	ND(0.763)	**24300**	**57.6**	**58.0**	**137**	**1.7**	**93.5**
North (mean)	15433	ND	29100	47	56	134	2.5	96
Adjacent (mean)	13815	ND	28100	84	60	144	2.5	93
South (mean)	14567	ND	27800	60	70	142	2.3	94

Notes:

1. All sample results expressed as mg/kg; Total Organic Carbon (TOC) expressed as percent. Results in **bold** above the detection limit. FD = Field Duplicate
2. Samples B1-SS-001 through -003 are upstream of the Site; -004 through -102 are adjacent to the Site; -012 through -014 are downstream of the Site.
3. ND - Not detected above reporting limit

TABLE 8
ANALYTICAL SUMMARY OF PCBs IN POREWATER[1]
FORMER ANACONDA WIRE & CABLE SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Location[2]	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs	TOC
PW-001 (SS-001)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.2**
PW-002 (SS-003)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.6**
PW-003 (SS-005)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	**8.67**
PW-004 (SS-006)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	**16.0**
PW-005 (SS-007)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**8.15**
PW-006 (SS-009)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0063)	**0.0139**	**0.0157**	ND(0.0063)	ND(0.0063)	ND(0.0063)	**0.0296**	**8.64**
PW-007 (SS-011)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	**6.86**

Notes:

1. All sample results expressed as ug/L; TOC expressed as mg/L. Results in **bold** above the detection limit.
2. SamplesPW-001 and -002 are upstream of the Site; samples PW-003 through -007 are adjacent to the Site.
3. ND - Not detected above reporting limit

TABLE 9
ANALYTICAL SUMMARY OF METALS IN POREWATER[1]
FORMER ANACONDA WIRE & CABLE SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Location	Copper	Lead	Zinc	Total Organic Carbon
PW-001 (SS-001)	**0.011**	**0.109**	**0.721**	**10.2**
PW-002 (SS-003)	**0.0249**	**0.101**	**0.492**	**10.6**
PW-003 (SS-005)	**0.00835**	**0.0274**	**0.403**	**8.67**
PW-004 (SS-006)	ND(0.005)	ND(0.005)	**0.382**	**16.0**
PW-005 (SS-007)	**0.0314**	**0.0565**	**0.188**	**8.15**
PW-006 (SS-009)	**0.0651**	**0.102**	**0.478**	**8.64**
PW-007 (SS-011)	ND(0.005)	**0.00716**	**0.256**	**6.86**

Notes:
1. All sample results expressed as mg/L; Results in **bold** above the detection limit.
2. Samples PW-001 and -002 are upstream of the Site; samples PW-003 through -007 are adjacent to the Site.
3. ND - Not detected above reporting limit
4. Shaded cells are above the NYSDEC marine surface water quality criterion of 5.6, 8.0 and 66 ug/L for copper, lead and zinc, respectively.

TABLE 10

Descriptive Statistics for Fish Field Measurements: Weight and Length
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Target Species	Variable	Location	Total Number	Minimum	Maximum	Mean	Standard Deviation	Coefficient of Variation
American eel	Weight	North	26	96	724	272.4	141.6	0.52
		Adjacent	51	52	656	226.8	145.2	0.64
		South	26	44	799	225.1	171.3	0.761
	Length	North	26	41	71.5	52.7	6.928	0.132
		Adjacent	51	29.5	68	48.0	8.75	0.182
		South	26	30.5	70	48.3	8.979	0.186
White perch	Weight	North	15	51	162	104.9	31.22	0.297
		Adjacent	26	50	260	110.8	43.53	0.393
		South	20	53	160	104.7	31.97	0.305
	Length	North	15	14	22	18.6	2.166	0.117
		Adjacent	26	13	26	18.9	2.655	0.14
		South	20	15.5	22	18.9	1.798	0.0952
Blue crab	Weight	North	27	24	224	124.4	55.56	0.447
		Adjacent	27	12	302	130.4	67.24	0.516
		South	21	25	286	112.7	64.38	0.571
	Length	North	27	7	18	13.2	2.462	0.187
		Adjacent	27	5.5	18.5	13.0	2.823	0.218
		South	21	7	18.5	12.3	2.691	0.219
Oyster toadfish	Weight	North	17	157	473	302.9	94.8	0.313
		Adjacent	23	124	425	244.4	85.38	0.349
		South	19	43	470	224.5	99.23	0.442
	Length	North	17	20	31	24.5	2.913	0.119
		Adjacent	23	18.3	28	23.1	2.855	0.124
		South	19	13	28.5	21.9	3.562	0.163
Hogchoker	Weight	North	7	15	29	20.7	4.786	0.231
		Adjacent	19	9	28	18.0	4.91	0.273
		South	10	8	26	14.7	5.926	0.403
	Length	North	7	10	12	10.9	0.607	0.0556
		Adjacent	19	9	12	10.5	0.872	0.0829
		South	10	8	13	9.7	1.418	0.146
Spot[1]	Weight	North	3	57	80	72.0	13	0.181
		Adjacent	5	53	87	75.6	13.83	0.183
		South	5	61	69	63.8	3.347	0.0525
	Length	North	3	15	17	16.2	1.041	0.0644
		Adjacent	5	15	19	17.2	1.525	0.0887
		South	5	15	16	15.6	0.439	0.0282

[1]Spot croaker was only captured during the 2013 field sampling season.

TABLE 11
Descriptive Statistics for PCBs in Fish Tissue
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Species	Process	Reach	Number of Detects	Number of Results	Detection Frequency	Minimum Detected Concentrations (mg/kg)	Maximum Detected Concentrations (mg/kg)	Mean of All Samples[1] (mg/kg)	Standard Deviation	Coefficient of Variation	Standard Error
American eel	Whole Body[3]	North	26	26	100%	0.34	2.48	0.99	0.53	0.53	0.10
		Adjacent	51	51	100%	0.44	6.10	2.09	1.26	0.60	0.18
		South	26	26	100%	0.21	2.18	0.99	0.48	0.48	0.09
		All Locations	103	103	100%	0.21	6.10	1.53	1.10	0.72	0.11
	Fillet	North	26	26	100%	0.11	2.76	0.79	0.64	0.82	0.13
		Adjacent	51	51	100%	0.29	5.58	2.00	1.21	0.61	0.17
		South	25	26	96%	0.11	2.32	0.79	0.63	0.79	0.12
		All Locations	102	103	99%	0.11	5.58	1.39	1.13	0.82	0.11
White perch	Whole Body[3]	North	15	15	100%	0.73	2.56	1.58	0.51	0.32	0.13
		Adjacent	26	26	100%	0.83	7.93	2.51	1.53	0.61	0.30
		South	20	20	100%	0.88	3.00	1.81	0.64	0.36	0.14
		All Locations	61	61	100%	0.73	7.93	2.05	1.15	0.56	0.15
Blue crab	Whole Body	North	8	11	73%	0.03	0.07	0.04	0.02	0.44	0.01
		Adjacent	10	10	100%	0.04	0.44	0.11	0.12	1.07	0.04
		South	10	11	91%	0.04	0.11	0.07	0.02	0.34	0.01
		All Locations	28	32	88%	0.03	0.44	0.07	0.07	0.96	0.01
	Hepatopancreas	North	14	15	93%	0.07	0.91	0.38	0.24	0.63	0.06
		Adjacent	14	16	88%	0.12	3.72	0.85	0.89	1.05	0.22
		South	10	10	100%	0.20	1.06	0.58	0.28	0.48	0.09
		All Locations	38	41	93%	0.07	3.72	0.61	0.63	1.02	0.10
Oyster toadfish	Whole Body[3]	North	17	17	100%	0.03	0.41	0.18	0.09	0.53	0.02
		Adjacent	22	23	96%	0.02	1.07	0.19	0.22	1.16	0.05
		South	19	19	100%	0.03	0.31	0.17	0.09	0.53	0.02
		All Locations	58	59	98%	0.02	1.07	0.18	0.15	0.86	0.02
Hogchoker	Whole Body	North	7	7	100%	0.15	0.65	0.39	0.18	0.47	0.07
		Adjacent	15	17	88%	0.03	0.66	0.25	0.20	0.80	0.05
		South	7	8	88%	0.10	0.96	0.36	0.28	0.79	0.10
		All Locations	29	32	91%	0.03	0.96	0.31	0.23	0.74	0.04
Spot Croaker[2]	Whole Body	North	3	3	100%	0.39	0.71	0.57	0.17	0.29	0.10
		Adjacent	5	5	100%	0.35	1.31	0.70	0.43	0.61	0.19
		South	5	5	100%	0.23	0.77	0.55	0.22	0.40	0.10
		All Locations	13	13	100%	0.23	1.31	0.61	0.29	0.48	0.08

Notes:
1. One-half of detection limit of samples with non-detect results were used in calculating the mean.
2. Spot croacker was only captured during the 2013 field sampling season
3. For some samples, whole body concentrations were determined from samples processed as fillet and offal.

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	(FILLET) Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	(OFFAL) Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	WHOLE BODY - **CALCULATED Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**						**North**						**North**				
AMEL-BT01B-004	1B	9/20/13	American Eel	215	50.3	-	ND	0.585	84.2	0.142	100%	24.27	ND	0.857	97.6	0.5338	72%	62.29	ND	0.73	0.35	77%	48.20
AMEL-BT01C-001	1C	9/19/13	American Eel	219	48	-	ND	2.81	104.8	0.4318	63%	15.37	ND	2.98	97.8	0.4193	61%	14.07	ND	2.89	0.43	62%	14.72
AMEL-BT01B-005	1B	9/23/13	American Eel	225	50	-	ND	5.29	113.6	1.345	46%	25.43	ND	6.37	93.2	1.575	43%	24.73	ND	5.78	1.45	45%	25.08
AMEL-BT01B-006	1B	9/23/13	American Eel	256	53	-	ND	1.51	128	0.114	100%	7.55	ND	4.19	110.7	0.743	67%	17.73	ND	2.75	0.41	72%	14.74
AMEL-BT01A-002	1A	9/20/13	American Eel	360	56.5	-	ND	3.37	169.7	0.806	63%	23.92	ND	6.73	149.1	1.406	61%	20.89	ND	4.94	1.09	62%	21.99
AMEL-BT01A-003	1A	9/20/13	American Eel	724	71.5	-	ND	15.7	343.3	2.758	41%	17.57	ND	16.5	301.7	2.294	41%	13.90	ND	16.07	2.54	41%	15.81
North - Deep							**North - Deep**						**North - Deep**						**North - Deep**				
AMEL-BT01D-004	1D	9/20/13	American Eel	232	49.5	-	ND	0.91	81.5	0.2315	79%	25.44	ND	5.16	108.1	2.018	65%	39.11	ND	3.33	1.25	66%	37.50
AMEL-BT01D-005	1D	9/20/13	American Eel	246	58	-	ND	1.37	71.6	0.899	58%	65.62	ND	3.21	132.5	2.16	53%	67.29	ND	2.56	1.72	54%	66.98
AMEL-BT01E-002	1E	9/20/13	American Eel	308	54.5	-	ND	2.33	132.8	1.095	51%	47.00	ND	5.9	140.6	2.583	50%	43.78	ND	4.17	1.86	50%	44.65
AMEL-BT01E-003	1E	9/20/13	American Eel	395	58.5	-	ND	2.28	153.8	0.614	61%	26.93	ND	4.12	178.4	1.126	61%	27.33	ND	3.27	0.89	61%	27.20
AMEL-BT01E-001	1E	9/20/13	American Eel	603.5	67.5	-	ND	17.3	266.4	2.119	48%	12.25	ND	12.1	274.1	1.09	47%	9.01	ND	14.66	1.60	48%	10.89
Adjacent							**Adjacent**						**Adjacent**						**Adjacent**				
AMEL-BT02B-004	2B	9/18/13	American Eel	52	29.5	-	ND	1.42	13.6	0.2891	82%	20.36	ND	2.23	27.5	0.5254	81%	23.56	ND	1.96	0.45	81%	22.79
AMEL-BT02C-009	2C	9/25/13	American Eel	82	36.5	-	ND	3.23	29.7	0.676	55%	20.93	ND	4.27	45.3	1.09	57%	25.53	ND	3.86	0.93	56%	24.00
AMEL-BT02D-007	2D	9/23/13	American Eel	96	40.5	-	ND	3.17	42.3	0.898	73%	28.33	ND	4.15	48.9	1.18	73%	28.43	ND	3.70	1.05	73%	28.39
AMEL-BT02E-002	2E	9/18/13	American Eel	120	41	-	ND	4.32	48	4.93	60%	114.12	ND	6.67	65.5	6.79	59%	101.80	ND	5.68	6.00	59%	105.76
AMEL-BT02C-010	2C	9/25/13	American Eel	155	47	-	ND	6.05	53.6	2.613	70%	43.19	ND	4.97	86.9	2.044	68%	41.13	ND	5.38	2.26	69%	42.01
AMEL-BT02B-008	2B	9/24/13	American Eel	217	49	-	ND	1.18	96.9*	1.86	100%	157.63	ND	3.63	110.9	4.71	100%	129.75	ND	2.49	3.38	100%	135.92
AMEL-BT02D-011	2D	9/25/13	American Eel	260	49.6	-	ND	15.2	115.3	2.883	59%	18.97	ND	12.2	125.9	2.053	58%	16.83	ND	13.63	2.45	59%	17.97
AMEL-BT02E-001	2E	9/18/13	American Eel	418	61	-	ND	4.94	168.4	3.229	86%	65.36	ND	6.69	200.2	4.264	87%	63.74	ND	5.89	3.79	87%	64.36
AMEL-BT02A-006	2A	9/18/13	American Eel	534	66.5	-	ND	14.5	229.7	2.869	45%	19.79	ND	11.7	243.1	2.216	46%	18.94	ND	13.06	2.53	45%	19.40
AMEL-BT02C-003	2C	9/18/13	American Eel	563	60	-	ND	13.3	267.8	2.319	80%	17.44	ND	8.71	252.2	1.47	76%	16.88	ND	11.07	1.91	78%	17.22
AMEL-BT02B-005	2B	9/18/13	American Eel	656	66	-	ND	3.43	281.7	0.795	74%	23.18	ND	8.02	316.9	1.905	75%	23.75	ND	5.86	1.38	75%	23.59
Adjacent - Deep							**Adjacent - Deep**						**Adjacent - Deep**						**Adjacent - Deep**				
AMEL-BT02H-016	2H	9/26/13	American Eel	91	37.5	-	ND	10.4	43.5	3.075	47%	29.57	ND	4.7	41.6	1.229	46%	26.15	ND	7.61	2.17	46%	28.54
AMEL-BT02G-013	2G	9/25/13	American Eel	94	41	-	ND	3.48	29.3	4.294	81%	123.39	1.12	5.5	55.6	6.827	80%	124.13	0.73	4.80	5.95	80%	123.94
AMEL-BT02F-008	2F	9/25/13	American Eel	98	39.5	-	ND	1.38	46.1	0.5489	55%	39.78	ND	3.56	43.8	1.418	53%	39.83	ND	2.44	0.97	54%	39.82
AMEL-BT02G-012	2G	9/25/13	American Eel	99	40.2	-	ND	2.25	28.1	0.818	62%	36.36	ND	5.12	63.2	2.17	63%	42.38	ND	4.24	1.75	63%	41.40
AMEL-BT02G-005	2G	9/19/13	American Eel	104.5	39	-	ND	6.81	42	1.282	63%	18.83	ND	4.2	43.1	0.688	62%	16.38	ND	5.49	0.98	63%	17.88
AMEL-BT02G-011	2G	9/25/13	American Eel	113	40.3	-	ND	2.28	41.6	0.335	54%	14.69	ND	5.44	62.2	0.833	52%	15.31	ND	4.17	0.63	53%	15.18
AMEL-BT02F-007	2F	9/25/13	American Eel	114	40.8	-	ND	3.31	46	0.856	53%	25.86	ND	5.23	56.7	1.314	51%	25.12	ND	4.37	1.11	52%	25.37
AMEL-BT02F-006	2F	9/25/13	American Eel	115	44.5	-	ND	4.42	55.3	1.962	45%	44.39	ND	4.66	54.3	2.046	44%	43.91	ND	4.54	2.00	45%	44.14
AMEL-BT02G-010	2G	9/25/13	American Eel	125	42.3	-	ND	8.07	37.7	5.582	54%	69.17	ND	13.9	72.2	7.22	54%	51.94	ND	11.90	6.66	54%	55.95
AMEL-BT02H-015	2H	9/25/13	American Eel	129	43.5	-	ND	4.52	62.6	0.795	47%	17.59	ND	4.76	57.5	0.776	46%	16.30	ND	4.63	0.79	47%	16.96
AMEL-BT02H-014	2H	9/25/13	American Eel	131	39.5	-	ND	15.3	40.9	3.814	51%	24.93	0.815	11.2	71.7	2.359	51%	21.06	0.52	12.69	2.89	51%	22.76
AMEL-BT02F-009	2F	9/25/13	American Eel	150	44.6	-	ND	6.64	68.5	1.558	49%	23.46	ND	7.08	71.6	1.462	47%	20.65	ND	6.86	1.51	48%	21.98
AMEL-BT02G-004	2G	9/19/13	American Eel	178	45.5	-	ND	7.5	54	2.121	65%	28.28	ND	7.09	93	1.753	65%	24.72	ND	7.24	1.89	65%	26.08
AMEL-BT02F-003	2F	9/19/13	American Eel	217	51	-	ND	2.21	66.9	0.425	63%	19.23	ND	4.31	108.7	0.705	59%	16.36	ND	3.51	0.60	60%	17.05
AMEL-BT02H-002	2H	9/18/13	American Eel	226	53	-	ND	5.2	70.8	2.26	60%	43.46	ND	4.72	121.2	1.859	58%	39.39	ND	4.90	2.01	59%	40.98
AMEL-BT02H-001	2H	9/18/13	American Eel	329	54	-	ND	19.9	161.3	2.228	36%	11.20	ND	14.6	134.6	1.542	36%	10.56	ND	17.49	1.92	36%	10.96
South							**South**						**South**						**South**				
AMEL-BT03C-007	3C	9/23/13	American Eel	44	35.5	Mouth/head wound	ND	0.186	12.5	0.115	100%	61.83	ND	0.391	28.4	0.4043	82%	103.40	ND	0.33	0.32	84%	96.20
AMEL-BT03B-006	3B	9/23/13	American Eel	51	30.5	-	ND	2.49	18.4	0.829	60%	33.29	ND	3.33	29.4	1.094	59%	32.85	ND	3.01	0.99	60%	32.99
AMEL-BT03B-001	3B	9/18/13	American Eel	96	33	-	ND	0.322	33.2	0.106	100%	32.92	0.522	1.45	46.3	0.76	84%	52.41	0.30	0.98	0.49	85%	49.74
AMEL-BT03B-002	3B	9/18/13	American Eel	207	48	-	ND	5.86	96.7	1.265	48%	21.59	0.574	4.38	83.4	0.927	48%	21.16	0.27	5.17	1.11	48%	21.42
AMEL-BT03B-004	3B	9/19/13	American Eel	249.5	50.5	-	ND	0.436	88.8	0.131	100%	30.05	ND	2.6	122	1.0411	77%	40.04	ND	1.69	0.66	79%	38.95
AMEL-BT03A-003	3A	9/19/13	American Eel	362	57.5	-	ND	11.2	159.2	2.28	51%	20.36	ND	8.33	180.9	1.566	51%	18.80	ND	9.67	1.90	51%	19.64
AMEL-BT03B-005	3B	9/19/13	American Eel	628	66.5	-	ND	16.9	297.9	2.11	53%	12.49	ND	9.38	274.5	0.997	52%	10.63	ND	13.29	1.58	53%	11.86

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	(FILLET) Lead (ppm)	(FILLET) Lipids (%)	(FILLET) Mass (g)	(FILLET) Total PCBs (ppm)	(FILLET) Aroclor 1260+	(FILLET) PCBs LN (ppm)	(OFFAL) Lead (ppm)	(OFFAL) Lipids (%)	(OFFAL) Mass (g)	(OFFAL) Total PCBs (ppm)	(OFFAL) Aroclor 1260+	(OFFAL) PCBs LN (ppm)	WHOLE BODY - **CALCULATED Lead (ppm)	WHOLE BODY - **CALCULATED Lipids (%)	WHOLE BODY - **CALCULATED Total PCBs (ppm)	WHOLE BODY - **CALCULATED Aroclor 1260+	WHOLE BODY - **CALCULATED PCBs LN (ppm)
South - Deep							**South - Deep**						**South - Deep**						**South - Deep**				
AMEL-BT03D-004	3D	9/20/13	American Eel	112	50.5	-	ND	0.212	22.4	ND	--	ND	ND	0.807	76.2	0.27	100%	33.46	ND	0.67	0.21	100%	31.06
AMEL-BT03D-001	3D	9/19/13	American Eel	164	46.3	-	ND	3.06	62.4	1.127	50%	36.83	ND	4.78	69	1.517	46%	31.74	ND	3.96	1.33	48%	33.60
AMEL-BT03D-002	3D	9/19/13	American Eel	173	45	-	ND	2.24	60.9	0.653	52%	29.15	ND	9.39	77.2	2.68	51%	28.54	ND	6.24	1.79	51%	28.64
AMEL-BT03D-005	3D	9/20/13	American Eel	200	48.8	-	ND	1.44	82.3	0.5329	71%	37.01	ND	3.83	88.9	1.821	71%	47.55	ND	2.68	1.20	71%	44.82
AMEL-BT03D-003	3D	9/19/13	American Eel	483	62.5	-	ND	11.7	221.2	2.317	51%	19.80	ND	11	198.3	2.145	48%	19.50	ND	11.37	2.24	50%	19.66

The fillet will include everything but the head, skin and viscera.
The offal will consist of the remainder of the carcass and will be analyzed separately.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs
* Estimated mass

**Calculated from fillet and offal

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Blue Crab Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Process	Notes	(LEG MUSCLE) Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	(HEPATOPANCREAS) Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North								**North**					**North**					**North**				
BCRAB-BT01C-004	1C	9/19/13	Blue Crab	24/42	7/9	Composite Whole fish	Composite of two specimens											ND	1.23	ND	--	ND
BCRAB-BT01C-003	1C	9/19/13	Blue Crab	55	9	Whole fish	-											ND	2.05	0.0513	100%	2.50
BCRAB-BT01C-005	1C	9/19/13	Blue Crab	75	11	Leg muscle & Hepatopancreas	-	ND	0.792	ND (0.087)	--	ND	ND	14.2	0.537	100%	3.78					
BCRAB-BT01A-003	1A	9/19/13	Blue Crab	130	14	Leg muscle & Hepatopancreas	-	ND	0.99	ND (0.101)	--	ND	ND	11.3	0.273	100%	2.42					
BCRAB-BT01B-001	1B	9/18/13	Blue Crab	164	13.4	Leg muscle & Hepatopancreas	-	ND	0.596	ND	--	ND	ND	11.6	0.912	100%	7.86					
BCRAB-BT01A-002	1A	9/19/13	Blue Crab	205	15	Leg muscle & Hepatopancreas	-	ND	0.786	ND	--	ND	ND	9.09	0.459	100%	5.05					
North - Deep								**North - Deep**					**North - Deep**					**North - Deep**				
BCRAB-BT01E-005	1E	9/23/13	Blue Crab	63	10.5	Leg muscle & Hepatopancreas	Left claw atrophy	Inadequate sample mass for separte analysis										ND	1.24	0.0319	100%	2.57
BCRAB-BT01D-003	1D	9/21/13	Blue Crab	81	14	Leg muscle & Hepatopancreas	Missing right claw	Inadequate sample mass for separte analysis										ND	0.703	0.0271	100%	3.85
BCRAB-BT01D-002	1D	9/21/13	Blue Crab	178	17	Leg muscle & Hepatopancreas	-	ND	0.934	ND	--	ND	ND	15.4	0.6204	67%	4.03					
BCRAB-BT01E-004	1E	9/23/13	Blue Crab	194	14.5	Leg muscle & Hepatopancreas	-	ND	0.702	ND	--	ND	ND	4.82	0.723	100%	15.00					
BCRAB-BT01D-001	1D	9/19/13	Blue Crab	223	18	Leg muscle & Hepatopancreas	Only one claw - cull	ND	0.915	ND	--	ND	ND	2.15	ND (0.401)	--	ND					
Adjacent								**Adjacent**					**Adjacent**					**Adjacent**				
BCRAB-BT02A,B-COMP	2A,B	9/18/13	Blue Crab	25/12	7.3/5.5	Composite Whole fish	Two small crabs (2A and 2B)											ND	2.51	0.0872	100%	3.47
BCRAB-BT02D-006	2D	9/24/13	Blue Crab	53	10.5	Leg muscle & Hepatopancreas	-	ND	0.819	ND (0.334)	--	ND	1.08	11	ND (0.237)	--	ND					
BCRAB-BT02A-005	2A	9/19/13	Blue Crab	62	10	Leg muscle & Hepatopancreas	-	Inadequate sample mass for separte analysis										ND	2.14	0.0845	100%	3.95
BCRAB-BT02D-003	2D	9/18/13	Blue Crab	119	14	Leg muscle & Hepatopancreas	Missing one claw	Inadequate sample mass for separte analysis										ND	0.786	0.0679	100%	8.64
BCRAB-BT02E-010	2E	9/26/13	Blue Crab	130	12.3	Leg muscle & Hepatopancreas	-	ND	0.592	ND	--	ND	ND	11.7	1.27	100%	10.85					
BCRAB-BT02B-008	2B	9/25/13	Blue Crab	162	13.3	Leg muscle & Hepatopancreas	-	ND	0.801	0.0927	100%	11.57	ND	9.85	3.724	63%	37.81					
BCRAB-BT02D-004	2B	9/18/13	Blue Crab	178	14.2	Leg muscle & Hepatopancreas	-	ND	0.479	ND	--	ND	ND	5.04	0.663	100%	13.15					
BCRAB-BT02E-006	2E	9/19/13	Blue Crab	180	15	Leg muscle & Hepatopancreas	-	ND	0.47	0.0413	100%	8.79	ND	1.72	0.522	100%	30.35					
BCRAB-BT02A-002	2A	9/18/13	Blue Crab	211	15	Leg muscle & Hepatopancreas	-	ND	0.463	ND	--	ND	ND	10.8	1.407	58%	13.03					
BCRAB-BT02B-001	2B	9/18/13	Blue Crab	215	16	Leg muscle & Hepatopancreas	-	ND	0.604	0.0276	100%	4.57	ND	5.91	1.85	100%	31.30					
BCRAB-BT02E-009	2E	9/25/13	Blue Crab	302	18.5	Leg muscle & Hepatopancreas	-	ND	0.763	ND	--	ND	ND	5.32	1.19	100%	22.37					
South								**South**					**South**					**South**				
BCRAB-BT03B-004	3B	9/21/13	Blue Crab	25	7	Whole fish	-											ND	2.21	0.0931	66%	4.21
BCRAB-BT03C-003	3C	9/21/13	Blue Crab	48	10	Leg muscle & Hepatopancreas	Missing left claw	Inadequate sample mass for separte analysis										ND	1.39	ND	--	ND
BCRAB-BT03C-002	3C	9/21/13	Blue Crab	51	10	Leg muscle & Hepatopancreas	Both claws missing	Inadequate sample mass for separte analysis										ND	1.3	0.0492	100%	3.78
BCRAB-BT03B-005	3B	9/23/13	Blue Crab	56	9.5	Leg muscle & Hepatopancreas	-	Inadequate sample mass for separte analysis										ND	2.37	0.066	100%	2.78
BCRAB-BT03C-001	3C	9/19/13	Blue Crab	136	13	Leg muscle & Hepatopancreas	Missing one claw	ND	0.865	ND	--	ND	ND	10.3	0.7757	69%	7.53					
South - Deep								**South - Deep**					**South - Deep**					**South - Deep**				
BCRAB-BT03D-001	3D	9/23/13	Blue Crab	286	18.5	Leg muscle & Hepatopancreas	-	ND	0.198	ND	--	ND	ND	3.98	1.06	100%	26.63					

Leg muscle and Hepatopancreas will be analyzed separately on all individuals that are greater than or equal to 3.5" (~9 cm) in width if adequate sample mass is available.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm, except as noted above due to inadequate sample mass
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
White Perch Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**				
WP-BT01C-003	1C	9/23/13	White Perch	51	15.5	-	ND	3.86	1.121	30%	29.04
WP-BT01C-002	1C	9/23/13	White Perch	59	16.5	-	ND	5.14	0.726	26%	14.12
WP-BT01B-005	1B	9/23/13	White Perch	88	18.3	-	ND	5.26	2.191	56%	41.65
WP-BT01B-004	1B	9/23/13	White Perch	97	18.5	-	ND	5.08	1.584	32%	31.18
WP-BT01B-001	1B	9/19/13	White Perch	105	14	-	ND	3.38	1.047	40%	30.98
Adjacent							**Adjacent**				
WP-BT02E-006	2E	9/25/13	White Perch	50	15.5	-	ND	4.75	1.836	25%	38.65
WP-BT02A-003	2A	9/19/13	White Perch	54	15	-	ND	1.41	0.825	46%	58.51
WP-BT02A-005	2A	9/19/13	White Perch	70	16	-	ND	5.4	1.609	32%	29.80
WP-BT02A-001	2A	9/19/13	White Perch	75	17	-	ND	4.02	1.033	50%	25.70
WP-BT02A-004	2A	9/19/13	White Perch	79	17	-	ND	3.41	1.12	35%	32.84
WP-BT02A-002	2A	9/19/13	White Perch	178	23	-	ND	5.61	2.251	51%	40.12
South							**South**				
WP-BT-03B-005	3B	9/21/13	White Perch	53	15.5	-	ND	5.38	1.545	28%	28.72
WP-BT03B-002	3B	9/21/13	White Perch	61	15.6	-	ND	4.39	0.88	24%	20.05
WP-BT03B-003	3B	9/21/13	White Perch	61	16.8	-	ND	3.84	1.327	35%	34.56
WP-BT03B-004	3B	9/21/13	White Perch	67	17	-	ND	5.46	1.118	26%	20.48
WP-BT03C-001	3C	9/21/13	White Perch	119	20	-	ND	3.8	1.801	29%	47.39

Hold an aliquot from the whole fish to allow for potential PCB Congener analysis.

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Oyster Toadfish Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	(FILLET) Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	(OFFAL) Lead (ppm)	Lipids (%)	Mass (g)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)	WHOLE BODY - CALCULATED** Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**						**North**						**North**				
OYTD-BT01B-005	1B	9/20/13	Oyster Toadfish	200	21.5	-	ND	0.273	39.6	ND	--	ND	ND	0.767	118.5	0.127	100%	16.56	ND	0.64	0.10	100%	14.80
OYTD-BT01B-002	1B	9/19/13	Oyster Toadfish	228	22	-	ND	0.0502	46.3	ND	--	ND	ND	0.424	157.6	0.155	100%	36.56	ND	0.34	0.12	100%	35.33
OYTD-BT01A-001	1A	9/19/13	Oyster Toadfish	239	22	-	ND	0.479	47.9	ND	--	ND	ND	1.09	165.8	0.217	100%	19.91	ND	0.95	0.17	100%	17.67
OYTD-BT01A-003	1A	9/20/13	Oyster Toadfish	253	25	-	ND	0.227	32.6	ND	--	ND	ND	0.58	178.3	0.133	100%	22.93	ND	0.53	0.11	100%	21.40
OYTD-BT01A-004	1A	9/20/13	Oyster Toadfish	389	27	-	ND	0.222	66.8	ND	--	ND	ND	0.625	259.2	0.0622	100%	9.95	ND	0.54	0.05	100%	9.12
North - Deep							**North - Deep**						**North - Deep**						**North - Deep**				
OYTD-BT01E-004	1E	9/20/13	Oyster Toadfish	250	22	-	ND	0.354	51.5	ND	--	ND	ND	1.5	136.4	0.4009	74%	26.73	ND	1.19	0.29	74%	24.54
OYTD-BT01E-005	1E	9/21/13	Oyster Toadfish	262	23.5	-	ND	0.277	51.3	ND	--	ND	ND	0.605	177.5	0.0482	100%	7.97	ND	0.53	0.04	100%	7.04
OYTD-BT01D-002	1D	9/19/13	Oyster Toadfish	333	25	-	ND	0.285	74.6	ND	--	ND	ND	0.96	224.7	0.192	100%	20.00	ND	0.79	0.14	100%	18.21
OYTD-BT01D-001	1D	9/19/13	Oyster Toadfish	361	27	-	ND	0.0828	66.9	ND	--	ND	ND	0.601	234.8	0.269	100%	44.76	ND	0.49	0.21	100%	43.07
OYTD-BT01E-003	1E	9/19/13	Oyster Toadfish	473	31	-	ND	0.495	94.5	0.215	100%	43.43	ND	0.405	344.9	0.234	100%	57.78	ND	0.42	0.23	100%	54.18
Adjacent							**Adjacent**						**Adjacent**						**Adjacent**				
OYTD-BT02B-001	2B	9/18/13	Oyster Toadfish	125	18.3	-	ND	0.33	22.7	ND	--	ND	ND	0.818	81.2	0.111	100%	13.57	ND	0.71	0.09	100%	12.19
OYTD-BT02D-004	2D	9/25/13	Oyster Toadfish	140	20	-	ND	0.115	24.4	ND	--	ND	ND	0.688	106	0.0936	100%	13.60	ND	0.58	0.08	100%	13.10
OYTD-BT02E-005	2E	9/26/13	Oyster Toadfish	240	23.5	-	ND	0.18	40	ND	--	ND	ND	0.69	183.6	0.0753	100%	10.91	ND	0.60	0.06	100%	10.33
OYTD-BT02B-002	2B	9/19/13	Oyster Toadfish	363	28	-	ND	0.475	61.5	0.11	100%	23.16	ND	0.292	431.6	0.0656	100%	22.47	ND	0.31	0.07	100%	22.60
OYTD-BT02B-003	2B	9/25/13	Oyster Toadfish	397	27.3	-	ND	0.0642	70.1	ND	--	ND	ND	1.21	297.4	0.301	100%	24.88	ND	0.99	0.24	100%	24.57
Adjacent - Deep							**Adjacent - Deep**						**Adjacent - Deep**						**Adjacent - Deep**				
OYTD-BT02G-004	2G	9/24/13	Oyster Toadfish	170	21.6	-	ND	0.406	32.2	ND	--	ND	ND	0.742	115.8	0.048	100%	6.47	ND	0.67	0.04	100%	5.61
OYTD-BT02F-006	2F	9/25/13	Oyster Toadfish	175	20.5	-	ND	0.113	32.5	ND	--	ND	ND	0.623	127.4	0.0848	100%	13.61	ND	0.52	0.07	100%	13.01
OYTC-BT02H-003	2H	9/23/13	Oyster Toadfish	181	22	-	ND	0.102	42.6	ND	--	ND	ND	0.16	125.3	ND	--	ND	ND	0.15	ND	--	ND
OYTD-BT02G-008	2G	9/25/13	Oyster Toadfish	224	23	-	ND	0.516	43.2	0.0541	100%	10.48	ND	0.821	168.2	0.243	100%	29.60	ND	0.76	0.20	100%	26.94
OYTD-BT02H-009	2H	9/25/13	Oyster Toadfish	253	24	-	ND	0.129	43.6	ND	--	ND	ND	0.42	191.6	0.0426	100%	10.14	ND	0.37	0.03	100%	9.48
OYTD-BT02H-005	2H	9/24/13	Oyster Toadfish	267	24.5	-	ND	0.46	44.5	ND	--	ND	ND	0.503	200	0.0271	100%	5.39	ND	0.50	0.02	100%	4.48
OYTD-BT02G-001	2G	9/21/13	Oyster Toadfish	275	24	-	ND	0.131	51	ND	--	ND	ND	0.352	199.8	0.0508	100%	14.43	ND	0.31	0.04	100%	13.18
OYTD-BT02G-007	2G	9/25/13	Oyster Toadfish	320	28	-	ND	0.0415	42.3	0.025	100%	60.24	ND	0.388	250.7	0.248	100%	63.92	ND	0.34	0.22	100%	63.85
OYTD-BT02G-002	2G	9/21/13	Oyster Toadfish	425	27.5	-	ND	0.0628	82.8	ND	--	ND	ND	0.724	296.8	0.341	100%	47.10	ND	0.58	0.27	100%	45.99
South							**South**						**South**						**South**				
OYTD-BT03A-001	3A	9/19/13	Oyster Toadfish	74	15	-	ND	0.0886	30.2*	ND	--	ND	ND	1.83	40.5	0.3739	68%	20.43	ND	1.09	0.21	68%	19.72
OYTD-BT03C-005	3C	9/20/13	Oyster Toadfish	198	23	-	ND	0.0427	34.3	ND	--	ND	ND	0.466	122.4	0.0446	100%	9.57	ND	0.37	0.03	100%	9.33
OYTD-BT03C-003	3C	9/19/13	Oyster Toadfish	205	22	-	ND	0.447	43	ND	--	ND	ND	1.14	133.2	0.0998	100%	8.75	ND	0.97	0.08	100%	7.77
OYTD-BT03C-004	3C	9/19/13	Oyster Toadfish	222	22	-	ND	0.351	47	ND	--	ND	ND	0.816	155.2	0.3053	89%	37.41	ND	0.71	0.23	89%	33.10
OYTD-BT03C-006	3C	9/21/13	Oyster Toadfish	253	23	-	ND	0.0507	49	ND	--	ND	ND	1.11	170.4	0.1459	80%	13.14	ND	0.87	0.11	80%	12.97
OYTD-BT03B-002	3B	9/19/13	Oyster Toadfish	265	23	-	ND	0.372	49.6	ND	--	ND	ND	0.825	178.8	0.057	100%	6.91	ND	0.73	0.04	100%	6.14
South - Deep							**South - Deep**						**South - Deep**						**South - Deep**				
OYTD-BT03D-003	3D	9/20/13	Oyster Toadfish	140	19.5	-	ND	0.121	27.4	ND	--	ND	ND	1.36	92.5	0.146	100%	10.74	ND	1.08	0.11	100%	10.46
OYTD-BT03D-005	3D	9/23/13	Oyster Toadfish	181	22.3	-	ND	0.324	35.2	0.0343	100%	10.59	ND	0.74	129.8	0.189	100%	25.54	ND	0.65	0.16	100%	23.95
OYTD-BT03D-002	3D	9/20/13	Oyster Toadfish	309	25	-	ND	0.407	49.5	ND	--	ND	ND	0.724	223.5	0.072	100%	9.94	ND	0.67	0.06	100%	8.84
OYTD-BT03D-001	3D	9/18/13	Oyster Toadfish	383	26	-	ND	0.538	64.7	0.0845	100%	15.71	1.11	0.872	285.6	0.331	100%	37.96	0.90	0.81	0.29	100%	35.23
OYTD-BT03D-004	3D	9/23/13	Oyster Toadfish	470	28.5	-	ND	0.522	69.8	0.0576	100%	11.03	ND	0.969	351.3	0.379	100%	39.11	ND	0.89	0.33	100%	36.40

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs
* Estimated mass

**Calculated from fillet and offal

The fillet will initially include everything but the head and viscera. As this species is a "scaleless" fish, homogenization could exclude the skin if initial attempts to include it fail (e.g. the skin is too tough).

The offal will consist of the remainder of the carcass and will be analyzed separately.
Hold an aliquot from the fillets to allow for potential PCB Congener analysis.

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Hogchoker Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North - Deep							**North - Deep**				
HOGCH-BT01D-001	1D	9/23/13	Hogchoker	20	10.5	-	ND	1.47	0.3393	41%	23.08
Adjacent - Deep							**Adjacent - Deep**				
HOGCH-BT02F-003	2F	9/20/13	Hogchoker	9	9	Composite of two samples sent to the lab separately	ND	0.93	0.6235	62%	67.04
HOGCH-BT02F-004	2F	9/20/13	Hogchoker	17	10						
HOGCH-BT02H-009	2H	9/26/13	Hogchoker	14	9.6	-	ND	1.99	0.659	58%	33.12
HOGCH-BT02G-005	2G	9/25/13	Hogchoker	16	9.5	-	ND	2.91	0.3557	43%	12.22
HOGCH-BT02G-007	2G	9/25/13	Hogchoker	17	10.5	-	ND	1.86	0.1542	39%	8.29
HOGCH-BT02H-001	2H	9/19/13	Hogchoker	18	10	-	ND	1.41	0.58	61%	41.13
HOGCH-BT02G-002	2G	9/20/13	Hogchoker	19	10.5	Whiteish area above ventral fin	ND	1.4	0.324	100%	23.14
HOGCH-BT02G-006	2G	9/25/13	Hogchoker	25	11.3	Slight discoloration on dorsal side	ND	2.06	0.2286	38%	11.10
HOGCH-BT02G-008	2G	9/25/13	Hogchoker	28	12	-	ND	1.39	0.1314	43%	9.45
South - Deep							**South - Deep**				
HOGCH-BT03D-001	3D	9/20/13	Hogchoker	8	8	Composite of two samples sent to the lab separately	ND	1.35	0.3937	52%	29.16
HOGCH-BT03D-003	3D	9/25/13	Hogchoker	8	8						
HOGCH-BT03D-004	3D	9/26/13	Hogchoker	16	10	-	ND	2.53	0.3082	24%	12.18
HOGCH-BT03D-002	3D	9/20/13	Hogchoker	17	10	-	ND	1.7	0.2399	44%	14.11

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Spot Croaker Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Notes	WHOLE BODY Lead (ppm)	Lipids (%)	Total PCBs (ppm)	Aroclor 1260+	PCBs LN (ppm)
North							**North**				
SPOT-BT01B-003	1B	9/26/13	Spot	57	15	-	ND	9.63	0.612	21%	6.36
SPOT-BT01C-001	1C	9/24/13	Spot	79	16.5	-	ND	4.64	0.3908	20%	8.42
SPOT-BT01C-002	1C	9/25/13	Spot	80	17	-	ND	7.75	0.713	26%	9.20
Adjacent							**Adjacent**				
SPOT-BT02C-001	2C	9/18/13	Spot	53	15	-	ND	3.83	0.479	32%	12.51
SPOT- BT02A-003	2A	9/24/13	Spot	72	16.5	-	ND	2.54	0.351	29%	13.82
SPOT-BT02C-002	2C	9/19/13	Spot	82	18	-	ND	1.22	0.3752	29%	30.75
SPOT-BT02A-004	2A	9/24/13	Spot	84	17.5	-	0.516	8.81	1.309	32%	14.86
SPOT-BT02D-005	2D	9/24/13	Spot	87	19	-	ND	8.43	0.98	28%	11.63
South							**South**				
SPOT-BT03B-001	3B	9/21/13	Spot	61	15.3	-	ND	4.39	0.456	32%	10.39
SPOT-BT03B-003	3B	9/21/13	Spot	61	15.5	-	ND	4.44	0.768	24%	17.30
SPOT-BT03B-005	3B	9/21/13	Spot	63	16	-	ND	4.27	0.563	25%	13.19
SPOT-BT03B-004	3B	9/21/13	Spot	65	15	-	ND	2.28	0.2277	24%	9.99
SPOT-BT03B-002	3B	9/21/13	Spot	69	16	-	ND	8.38	0.717	22%	8.56

Lead reporting limit is ~0.5 ppm
PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Grass Shrimp Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Process	Notes
North - Deep							
GSHMP-BT01D-001a	1D	9/19/13	Grass Shrimp	11	4-6	Hold/Discard	
GSHMP-BT01D-002	1D	9/20/13	Grass Shrimp	15	2-7	Hold/Discard	
GSHMP-BT01D-001b	1D	9/21/13	Grass Shrimp	23	2-6	Hold/Discard	-
GSHMP-BT01D-001c	1D	9/23/13	Grass Shrimp	29	4-6	Hold/Discard	23 count
GSHMP-BT01E-001	1E	9/23/13	Grass Shrimp	33	3.5-6	Hold/Discard	24 count
Adjacent - Mixed	* Deep						
GSHMP-BT02G-001	*2G	9/20/13	Grass Shrimp	7	4-7	Hold/Discard	
GSHMP-BT02B-001	2B	9/18/13	Grass Shrimp	4.87	4-5	Hold/Discard	
GSHMP-BT02D-001a	2D	9/18/13	Grass Shrimp	14.45	4-6	Hold/Discard	
GSHMP-BT02D-001b	2D	9/24/13	Grass Shrimp	13	3.3-5.5	Hold/Discard	18 count
GSHMP-BT02H-001	*2H	9/23/13	Grass Shrimp	26	3.3-6.3	Hold/Discard	-
GSHMP-BT02D-001c	2D	9/23/13	Grass Shrimp	29	3-6	Hold/Discard	39 count
South - Deep							
GSHMP-BT03D-001a	3D	9/19/13	Grass Shrimp	6	6	Hold/Discard	
GSHMP-BT03D-001b	3D	9/21/13	Grass Shrimp	8	2.5-6.5	Hold/Discard	

TABLE 12
Analytical Summary of PCBs in Biota - Year 1
Miscellaneous Catch Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Species	Weight (g)	Length (cm)	Process	Notes
CHC-BT02F-001	2F	9/25/13	Channel Catfish	428	33	Hold/Discard	-
CHC-BT02A-002	2A	9/19/13	Channel Catfish	619	33	Hold/Discard	-
CHC-BT01E-001	1E	9/26/13	Channel Catfish	673	37.5	Hold/Discard	-
CHC-BT02A-001	2A	9/19/13	Channel Catfish	700	37	Hold/Discard	-
STB-BT02C-COMP	2C	9/18/13	Striped Bass	3.8	7	Hold/Discard	Too small for analysis
STB-BT03C-002	3C	9/24/13	Striped Bass	15	12.3	Hold/Discard	-
STB-BT03C-001	3C	9/23/13	Striped Bass	69	19.3	Hold/Discard	-
LMB-BT02E-001	2E	9/18/13	Large Mouth Bass	105	19.5	Discard	-

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	FILLET Lipids (%)	FILLET Fillet Mass (g)	FILLET Total PCB (ppm)	FILLET Aroclor 1260+	FILLET PCBs LN (ppm)	OFFAL Lipids (%)	OFFAL Offal Mass (g)	OFFAL Total PCB (ppm)	OFFAL Aroclor 1260+	OFFAL PCBs LN (ppm)	WHOLE BODY **CALCULATED Lipids (%)	WHOLE BODY **CALCULATED Total PCB (ppm)	WHOLE BODY **CALCULATED Aroclor 1260+	WHOLE BODY **CALCULATED PCBs LN (ppm)
North									**North**					**North**					**North**			
AMEL-BT01B-002	1B	9/26/14	1023	American eel	156	45.7	Fillet & Offal	-	1.51	84.20	0.41	76%	27.42	2.88	64.50	0.75	67%	25.93	2.10	0.55	71%	26.19
AMEL-BT01A-001	1A	9/19/14	1212	American eel	167	48	Fillet & Offal	-	1.45	83.00	0.64	93%	44.23	2.39	73.10	1.07	92%	44.62	1.89	0.81	92%	42.59
AMEL-BT01B-001	1B	9/17/14	1612	American eel	206	49	Fillet & Offal	-	1.78	110.40	0.27	100%	15.06	3.02	89.00	0.60	82%	20.00	2.33	0.41	88%	17.13
AMEL-BT01C-002	1C	9/18/14	1333	American eel	236	53.5	Fillet & Offal	-	4.26	116.50	1.04	69%	24.51	5.54	112.00	1.18	67%	21.37	4.89	1.10	68%	22.78
AMEL-BT01C-005	1C	9/24/14	1652	American eel	271	55	Fillet & Offal	-	1.77	131.80	0.22	85%	12.18	3.96	127.90	0.71	63%	17.80	2.85	0.45	68%	14.68
AMEL-BT01C-003	1C	9/24/14	1650	American eel	287	56	Fillet & Offal	-	3.53	121.20	0.92	71%	26.09	5.80	151.40	1.54	57%	26.60	4.79	1.22	62%	25.44
AMEL-BT01B-003	1B	9/26/14	1024	American eel	317	51.2	Fillet & Offal	-	16.80	161.00	1.49	53%	8.84	13.20	131.40	1.25	39%	9.49	15.18	1.31	47%	8.66
AMEL-BT01C-001	1C	9/17/14	1616	American eel	327	56	Fillet & Offal	-	0.93	171.50	0.21	100%	22.62	3.80	144.00	0.64	87%	16.95	2.24	0.40	91%	19.61
AMEL-BT01A-002	1A	9/25/14	1114	American eel	415	59.5	Fillet & Offal	-	7.76	233.40	0.87	56%	11.19	9.48	157.50	0.98	57%	10.37	8.45	0.88	57%	10.47
North - Deep									**North - Deep**					**North - Deep**					**North - Deep**			
AMEL-BT01D-003	1D	9/18/14	1337	American eel	96	42.7	Fillet & Offal	-	0.81	47.50	0.25	79%	31.34	1.96	48.20	1.05	78%	53.47	1.39	0.66	78%	42.75
AMEL-BT01D-004	1D	9/18/14	1338	American eel	109	41	Fillet & Offal	-	3.50	50.00	0.76	65%	21.74	4.00	53.90	0.76	65%	18.98	3.76	0.74	65%	19.72
AMEL-BT01D-002	1D	9/18/14	1336	American eel	138	44.8	Fillet & Offal	-	0.90	70.20	0.31	77%	34.97	1.67	63.60	1.04	77%	62.51	1.26	0.66	77%	47.74
AMEL-BT01D-005	1D	9/18/14	1339	American eel	163	47.3	Fillet & Offal	-	0.93	84.50	0.30	82%	31.89	2.77	74.00	1.20	78%	43.14	1.79	0.71	79%	36.59
AMEL-BT01E-002	1E	9/23/14	1612	American eel	198	49.2	Fillet & Offal	-	3.54	91.70	0.70	65%	19.66	7.38	94.30	1.91	52%	25.85	5.49	1.26	55%	21.86
AMEL-BT01E-001	1E	9/19/14	1218	American eel	213	51.5	Fillet & Offal	Head wound	14.60	94.70	1.46	49%	9.99	12.90	103.60	1.23	49%	9.52	13.71	1.27	49%	9.27
Adjacent									**Adjacent**					**Adjacent**					**Adjacent**			
AMEL-BT02A-003	2A	9/26/14	1025	American eel	120	44	Fillet & Offal	-	3.36	66.10	1.49	83%	44.38	5.29	49.30	2.07	73%	39.09	4.18	1.71	78%	41.47
AMEL-BT02A-001	2A	9/25/14	1115	American eel	157	42.6	Fillet & Offal	-	8.61	98.00	1.67	54%	19.35	6.71	53.40	1.21	55%	18.00	7.94	1.48	55%	18.59
AMEL-BT02A-002	2A	9/25/14	1116	American eel	308	54.6	Fillet & Offal	-	14.30	154.10	4.04	79%	28.26	13.40	132.50	3.46	80%	25.82	13.88	3.59	80%	25.83
AMEL-BT02B-001	2B	9/23/14	1154	American eel	108	39.1	Fillet & Offal	-	7.77	61.10	1.78	69%	22.90	8.01	42.30	2.18	60%	27.24	7.87	1.93	65%	24.44
AMEL-BT02B-003	2B	9/23/14	1156	American eel	151	47	Fillet & Offal	-	0.59	73.40	0.36	90%	60.75	1.49	73.20	4.76	85%	319.19	1.04	2.53	85%	188.00
AMEL-BT02B-004	2B	9/23/14	1157	American eel	283	52	Fillet & Offal	-	16.10	146.40	2.54	61%	15.78	11.50	124.90	2.15	47%	18.69	13.98	2.30	55%	16.70
AMEL-BT02C-003	2C	9/16/14	1235	American eel	176	46.7	Fillet & Offal	-	12.00	96.20	2.87	77%	23.92	9.75	77.70	1.86	77%	19.04	10.99	2.42	77%	21.75
AMEL-BT02C-004	2C	9/17/14	1311	American eel	176	49	Fillet & Offal	-	1.11	82.70	0.68	100%	61.62	4.83	88.10	1.89	100%	39.13	3.03	1.30	100%	49.82
AMEL-BT02C-001	2C	9/16/14	1233	American eel	360	58.5	Fillet & Offal	-	9.53	207.30	1.97	81%	20.63	10.30	143.90	1.96	83%	19.01	9.85	1.92	82%	19.57
AMEL-BT02D-002	2D	9/23/14	1202	American eel	136	43.2	Fillet & Offal	-	3.37	54.80	1.56	77%	46.35	6.53	71.90	2.82	67%	43.23	5.16	2.19	70%	42.92
AMEL-BT02D-004	2D	9/24/14	1011	American eel	166	42.1	Fillet & Offal	-	6.24	65.80	2.26	79%	36.19	8.22	89.50	1.93	70%	23.43	7.38	1.97	74%	27.42
AMEL-BT02D-001	2D	9/16/14	1236	American eel	364	57	Fillet & Offal	-	11.70	142.90	2.86	77%	24.45	14.50	216.30	2.08	76%	14.34	13.39	2.38	77%	18.32
AMEL-BT02E-003	2E	9/18/14	1619	American eel	293	46	Fillet & Offal	-	3.49	150.80	1.59	87%	45.53	5.35	129.30	1.78	86%	33.29	4.35	1.63	87%	38.66
AMEL-BT02E-002	2E	9/18/14	1618	American eel	310	55.5	Fillet & Offal	-	2.93	153.40	2.98	91%	101.71	5.24	137.70	5.73	91%	109.43	4.02	4.20	91%	103.23
AMEL-BT02E-005	2E	9/23/14	1208	American eel	358	60.1	Fillet & Offal	-	4.47	159.30	0.79	75%	17.61	5.62	173.80	1.21	59%	21.49	5.07	0.95	65%	18.60
Adjacent - Deep									**Adjacent - Deep**					**Adjacent - Deep**					**Adjacent - Deep**			
AMEL-BT02F-002	2F	9/17/14	1057	American eel	87	38.5	Fillet & Offal	-	1.74	39.30	1.11	81%	63.56	3.13	41.70	1.46	78%	46.74	2.46	1.23	79%	52.44
AMEL-BT02F-001	2F	9/16/14	1231	American eel	169	45.3	Fillet & Offal	-	12.00	84.30	3.22	61%	26.83	10.30	73.00	2.77	61%	26.89	11.21	2.85	61%	25.41
AMEL-BT02F-004	2F	9/17/14	1059	American eel	216	48.5	Fillet & Offal	-	7.06	130.60	1.56	72%	22.04	8.89	84.90	2.06	73%	23.21	7.78	1.75	73%	22.49
AMEL-BT02G-005	2G	9/17/14	1051	American eel	161	43.5	Fillet & Offal	-	6.87	98.90	0.74	60%	10.80	6.99	58.80	0.71	59%	10.14	6.91	0.72	60%	10.38
AMEL-BT02G-004	2G	9/17/14	1050	American eel	209	48	Fillet & Offal	-	12.00	129.20	2.34	50%	19.50	13.40	70.90	1.71	50%	12.78	12.50	2.07	50%	16.74
AMEL-BT02G-003	2G	9/16/14	1230	American eel	487	58.8	Fillet & Offal	-	12.50	270.60	1.97	56%	15.74	12.70	192.60	1.72	57%	13.56	12.58	1.80	57%	14.34
AMEL-BT02H-006	2H	9/17/14	1048	American eel	372	58.7	Fillet & Offal	-	5.57	196.60	2.83	100%	50.81	7.21	169.40	3.43	100%	47.57	6.33	3.08	100%	48.84
AMEL-BT02H-005	2H	9/16/14	1227	American eel	393	59.5	Fillet & Offal	-	11.30	178.70	1.34	64%	11.87	11.60	199.50	1.39	64%	11.94	11.46	1.35	64%	11.74
AMEL-BT02H-003	2H	9/16/14	1225	American eel	539	68	Fillet & Offal	-	10.40	277.60	1.92	73%	18.46	8.41	246.20	1.43	73%	17.00	9.46	1.66	73%	17.46
South									**South**					**South**					**South**			
AMEL-BT03B-005	3B	9/23/14	1418	American eel	137	45.2	Fillet & Offal	-	1.25	64.60	0.24	100%	19.04	4.07	69.10	1.10	78%	26.95	2.71	0.68	81%	23.04
AMEL-BT03C-003	3C	9/18/14	1022	American eel	139	44	Fillet & Offal	-	2.21	55.40	0.93	66%	42.26	3.70	76.20	1.27	65%	34.43	3.07	1.10	65%	36.72
AMEL-BT03B-004	3B	9/19/14	1003	American eel	176	46.6	Fillet & Offal	-	0.38	75.90	0.12	100%	30.89	1.96	90.50	0.78	89%	39.78	1.24	0.46	91%	34.30
AMEL-BT03B-003	3B	9/18/14	1016	American eel	179	46	Fillet & Offal	-	1.24	86.20	0.59	73%	47.42	3.45	88.00	1.56	73%	45.33	2.36	1.07	73%	45.79
AMEL-BT03C-005	3C	9/18/14	1029	American eel	187	48.7	Fillet & Offal	-	1.40	89.10	0.87	72%	62.29	2.80	95.80	1.36	73%	48.64	2.13	1.12	73%	54.98
AMEL-BT03C-001	3C	9/18/14	1020	American eel	234	51.8	Fillet & Offal	-	2.63	120.80	0.48	66%	18.33	5.73	110.50	1.08	66%	18.88	4.11	0.77	66%	18.53
AMEL-BT03A-003	3A	9/17/14	0943	American eel	239	50	Fillet & Offal	-	1.06	120.10	0.53	72%	49.91	3.54	112.60	1.24	68%	35.08	2.26	0.86	69%	42.28
AMEL-BT03A-005	3A	9/24/14	1249	American eel	264	51.6	Fillet & Offal	-	0.93	116.30	0.34	86%	37.07	2.72	128.10	1.24	74%	45.55	1.87	0.77	76%	39.16
AMEL-BT03A-002	3A	9/16/14	1036	American eel	799	69.5	Fillet & Offal	-	13.70	472.60	1.23	59%	8.98	13.80	301.60	1.16	59%	8.42	13.74	1.19	59%	8.64

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
American Eel Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

									FILLET					OFFAL					WHOLE BODY **CALCULATED			
Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	Lipids (%)	Fillet Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Offal Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
South - Deep									South - Deep					South - Deep					South - Deep			
AMEL-BT03D-002	3D	9/16/14	1027	American eel	116	39.2	Fillet & Offal	-	6.39	63.20	0.50	58%	7.84	6.88	48.50	0.54	60%	7.85	6.60	0.51	59%	7.70
AMEL-BT03D-004	3D	9/16/14	1029	American eel	139	50.5	Fillet & Offal	-	2.98	72.40	0.87	63%	29.23	5.04	64.70	1.14	59%	22.66	3.95	1.01	61%	26.34
AMEL-BT03D-003	3D	9/16/14	1028	American eel	147	44	Fillet & Offal	-	4.17	78.00	0.63	73%	14.99	5.84	53.30	0.85	74%	14.50	4.85	0.70	74%	14.46
AMEL-BT03D-001	3D	9/16/14	1026	American eel	153	45	Fillet & Offal	-	6.27	78.90	0.79	68%	12.60	6.60	69.30	0.79	69%	11.95	6.42	0.78	68%	12.11
AMEL-BT03D-005	3D	9/16/14	1030	American eel	173	47	Fillet & Offal	-	5.54	79.00	0.92	80%	16.61	7.72	89.20	1.13	79%	14.57	6.70	1.02	79%	15.35

The fillet will include everything but the head, skin and viscera
The offal will consist of the remainder of the carcass and will be analyzed separately

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

**Calculated from fillet and offal

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Blue Crab Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

									LEG MUSCLE					HEPATOPANCREAS					WHOLE BODY				
Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	Lipids (%)	Leg Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Hepato. Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)	Lipids (%)	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North									**North**					**North**					**North**				
BCRAB-BT01B-003	1B	9/18/14	1332	Blue crab	48	9.5	Whole	-											2.69	44.50	0.07	100%	2.76
BCRAB-BT01C-002	1C	9/17/14	1614	Blue crab	79	12.7	Whole	-											0.81	74.50	0.03	100%	3.92
BCRAB-BT01C-001	1C	9/16/14	1612	Blue crab	101	11.7	Whole	-											1.76	91.30	0.06	100%	3.20
BCRAB-BT01C-003	1C	9/17/14	1615	Blue crab	101	13.7	Leg and Hepat.	-	0.34	8.40	ND (0.123)	-	ND	2.09	14.00	0.10	100%	4.55					
BCRAB-BT01B-005	1B	9/19/14	1214	Blue crab	113	14	Leg and Hepat.	-	0.55	15.90	ND (0.0993)	-	ND	7.28	14.40	0.28	100%	3.90					
BCRAB-BT01C-004	1C	9/18/14	1334	Blue crab	139	13.5	Leg and Hepat.	-	0.34	15.90	ND (0.0605)	-	ND	6.73	20.50	0.51	100%	7.53					
BCRAB-BT01A-003	1A	9/18/14	1330	Blue crab	143	13.3	Whole	Missing 1 left leg											1.57	118.80	0.07	100%	4.28
BCRAB-BT01A-002	1A	9/17/14	1610	Blue crab	145	14.8	Whole	-											0.47	105.70	ND (0.05)	-	ND
BCRAB-BT01B-002	1B	9/18/14	1331	Blue crab	188	13.8	Leg and Hepat.	Missing 1 right leg	0.34	28.50	0.04	100%	11.75	4.86	19.80	0.23	100%	4.79					
BCRAB-BT01A-004	1A	9/19/14	1210	Blue crab	224	15.4	Leg and Hepat.	Missing 1 right leg	0.44	32.10	0.04	100%	8.94	1.88	23.10	0.27	100%	14.31					
North - Deep									**North - Deep**					**North - Deep**					**North - Deep**				
BCRAB-BT01D-002	1D	9/18/14	1341	Blue crab	106	12.8	Whole	Missing 2 right legs											0.67	86.80	ND (0.05)	-	ND
BCRAB-BT01D-005	1D	9/26/14	1028	Blue crab	127	13.4	Whole	Missing 1 leg											1.40	106.00	0.07	100%	5.24
BCRAB-BT01D-001	1D	9/16/14	1610	Blue crab	133	14.7	Leg and Hepat.	-	0.31	9.40	ND (0.0976)	-	ND	5.30	20.90	0.42	100%	7.87					
BCRAB-BT01E-004	1E	9/19/14	1219	Blue crab	136	15.3	Leg and Hepat.	Missing 2 right legs	ND (0.3)	11.70	ND (0.0969)	-	ND	1.14	20.20	0.07	100%	6.11					
BCRAB-BT01E-002	1E	9/17/14	1316	Blue crab	142	13.8	Leg and Hepat.	-	0.59	16.20	ND (0.0654)	-	ND	2.40	18.60	0.21	100%	8.92					
Adjacent									**Adjacent**					**Adjacent**					**Adjacent**				
BCRAB-BT02A-003	2A	9/23/14	1622	Blue crab	99	11.5	Whole	Regrowing right back leg											1.92	91.80	0.06	100%	3.22
BCRAB-BT02A-001	2A	9/23/14	1153	Blue crab	125	14.6	Leg and Hepat.	-	ND (0.3)	12.00	ND (0.0997)	-	ND	0.39	7.00	ND (0.169)		ND					
BCRAB-BT02A-002	2A	9/23/14	1621	Blue crab	129	13.6	Leg and Hepat.	Missing 2 right legs, 1 left leg	0.40	18.40	ND (0.0995)	-	ND	4.33	12.80	0.51	100%	11.73					
BCRAB-BT02B-001	2B	9/23/14	1158	Blue crab	63	10.2	Whole	Juvenile											2.00	52.50	0.44	100%	22.20
BCRAB-BT02C-002	2C	9/18/14	1344	Blue crab	38	9.5	Whole	Juvenile female, missing right pincer											0.87	22.50	0.08	100%	8.85
BCRAB-BT02C-005	2C	9/27/14	0822	Blue crab	190	15.2	Leg and Hepat.	-	0.38	10.00	ND (0.05)	-	ND	2.81	14.90	0.40	100%	14.09					
BCRAB-BT02D-005	2D	9/25/14	1111	Blue crab	99	12.3	Whole	Missing right pincer											2.03	82.50	0.07	100%	3.32
BCRAB-BT02D-001	2D	9/17/14	1041	Blue crab	162	14	Leg and Hepat.	Missing 2 right legs	0.54	15.60	ND (0.069)	-	ND	3.78	22.60	0.42	100%	11.22					
BCRAB-BT02E-003	2E	9/18/14	1621	Blue crab	114	13	Whole	-											1.74	92.00	0.14	100%	7.87
BCRAB-BT02E-005	2E	9/23/14	1205	Blue crab	199	14.8	Leg and Hepat.	-	0.43	9.40	ND (0.05)	-	ND	5.96	15.90	0.52	100%	8.74					
Adjacent - Deep									**Adjacent - Deep**					**Adjacent - Deep**					**Adjacent - Deep**				
BCRAB-BT02F-001	2F	9/18/14	1610	Blue crab	106	13.7	Whole	-											1.10	70.30	0.04	100%	3.48
BCRAB-BT02F-002	2F	9/18/14	1611	Blue crab	158	15	Leg and Hepat.	-	0.46	16.20	ND (0.1)	-	ND	4.35	11.00	0.12	100%	2.83					
BCRAB-BT02G-003	2G	9/27/14	0944	Blue crab	184	15.2	Leg and Hepat.	Missing right pincer, 2 right legs	ND (0.3)	8.50	ND (0.0946)	-	ND	2.80	16.30	0.33	100%	11.82					
BCRAB-BT02H-001	2H	9/18/14	1614	Blue crab	68	10.5	Whole	Missing 3 right legs											2.22	48.20	0.05	100%	2.40
BCRAB-BT02H-002	2H	9/18/14	1615	Blue crab	138	14	Leg and Hepat.	Missing right pincer, 1 left leg	0.64	11.30	ND (0.0982)	-	ND	4.19	13.20	0.50	100%	11.96					
South									**South**					**South**					**South**				
BCRAB-BT03C-006	3C	9/19/14	1222	Blue crab	54	10.6	Whole	Missing right pincer											1.42	44.70	0.04	100%	2.73
BCRAB-BT03B-001	3B	9/18/14	1017	Blue crab	56	9.5	Whole	Juvenile female											2.16	46.10	0.09	100%	4.12
BCRAB-BT03C-001	3C	9/16/14	1033	Blue crab	60	10.2	Whole	-											2.21	56.40	0.08	100%	3.62
BCRAB-BT03C-003	3C	9/18/14	1018	Blue crab	95	14.5	Leg and Hepat.	Soft shell, missing left pincer	ND (0.3)	6.70	ND (0.151)	-	ND	5.38	11.50	0.21	100%	3.96					
BCRAB-BT03A-004	3A	9/23/14	1415	Blue crab	96	11.8	Whole	-											2.03	65.00	0.11	100%	5.52
BCRAB-BT03A-005	3A	9/24/14	1244	Blue crab	122	12.5	Leg and Hepat.	-	0.30	16.30	ND (0.0995)	-	ND	9.04	17.70	0.56	100%	6.16					
BCRAB-BT03B-005	3B	9/23/14	1417	Blue crab	125	12.8	Whole	-											1.77	108.00	0.07	100%	3.99
BCRAB-BT03A-002	3A	9/18/14	1014	Blue crab	134	13.5	Leg and Hepat.	Missing right pincer	0.43	12.60	ND (0.101)	-	ND	6.47	15.90	0.71	100%	10.96					
BCRAB-BT03B-002	3B	9/19/14	1001	Blue crab	140	13.6	Leg and Hepat.	Missing 1 right leg	ND (0.3)	14.80	ND (0.0987)	-	ND	6.22	13.20	0.53	100%	8.47					
BCRAB-BT03B-004	3B	9/23/14	1416	Blue crab	168	15	Leg and Hepat.	Soft shell	0.97	9.90	ND (0.05)	-	ND	5.36	27.70	0.29	100%	5.37					
South - Deep									**South - Deep**					**South - Deep**					**South - Deep**				
BCRAB-BT03D-003	3D	9/19/14	1006	Blue crab	51	9.2	Whole	-											2.03	39.10	0.07	100%	3.50
BCRAB-BT03D-005	3D	9/26/14	1022	Blue crab	118	12.4	Whole	-											1.18	94.50	0.08	100%	7.08
BCRAB-BT03D-001	3D	9/16/14	1031	Blue crab	162	14	Leg and Hepat.	-	0.49	17.40	ND (0.0614)	-	ND	7.33	14.10	0.72	100%	9.88					
BCRAB-BT03D-002	3D	9/18/14	1028	Blue crab	181	14.5	Leg and Hepat.	Missing right pincer, 1 right leg	0.65	18.90	ND (0.05)	-	ND	6.83	26.20	0.20	100%	2.94					
BCRAB-BT03D-004	3D	9/26/14	1021	Blue crab	202	15.5	Leg and Hepat.	-	0.47	17.70	0.0392	100%	8.41	4.63	17.50	0.75	100%	16.11					

Leg muscle and hepatopancreas will be analyzed separately on all individuals that are greater than or equal to 3.5" (~9 cm) in width if adequate sample mass is available.

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
White Perch Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	FILLET* Lipids (%)	FILLET* Fillet Mass (g)	FILLET* Total PCB (ppm)	FILLET* Aroclor 1260+	FILLET* PCBs LN (ppm)	OFFAL Lipids (%)	OFFAL Offal Mass (g)	OFFAL Total PCB (ppm)	OFFAL Aroclor 1260+	OFFAL PCBs LN (ppm)	WHOLE BODY** Lipids (%)	WHOLE BODY** Whole Body Mass (g)	WHOLE BODY** Total PCB (ppm)	WHOLE BODY** Aroclor 1260+	WHOLE BODY** PCBs LN (ppm)
North									**North**					**North**					**North**				
WP-BT01A-007	1A	9/23/14	1619	White perch	85	18.1	Whole	-	-	-	0.97	-	19.43	-	-	-	-	-	8.70	74.30	1.72	21%	19.75
WP-BT01A-008	1A	9/23/14	1620	White perch	88	18.3	Whole	-	-	-	0.82	-	17.72	-	-	-	-	-	8.25	82.30	1.51	22%	18.29
WP-BT01A-005	1A	9/18/14	1329	White perch	95	17.5	Whole	-	-	-	1.58	-	33.49	-	-	-	-	-	8.08	86.10	2.56	31%	31.71
WP-BT01B-001	1B	9/25/14	1530	White perch	98	18.6	Whole	-	-	-	0.96	-	20.06	-	-	-	-	-	8.44	85.70	1.71	22%	20.28
WP-BT01A-002	1A	9/18/14	1326	White perch	113	18.6	Whole	-	-	-	1.01	-	19.86	-	-	-	-	-	8.85	101.90	1.78	26%	20.11
WP-BT01A-006	1A	9/23/14	1618	White perch	118	20	Whole	-	-	-	1.06	-	25.34	-	-	-	-	-	7.44	111.10	1.84	28%	24.77
WP-BT01C-001	1C	9/25/14	1416	White perch	125	20	Whole	-	-	-	1.23	-	27.53	-	-	-	-	-	7.79	111.30	2.08	24%	26.64
WP-BT01A-004	1A	9/18/14	1328	White perch	132	20	Whole	-	-	-	0.80	-	15.23	-	-	-	-	-	9.22	118.30	1.49	27%	16.17
WP-BT01A-001	1A	9/18/14	1325	White perch	158	22	Whole	-	-	-	0.30	-	13.61	-	-	-	-	-	5.38	137.70	0.80	31%	14.80
WP-BT01A-003	1A	9/18/14	1327	White perch	162	21.5	Whole	-	-	-	0.82	-	13.23	-	-	-	-	-	10.50	149.00	1.52	25%	14.47
Adjacent									**Adjacent**					**Adjacent**					**Adjacent**				
WP-BT02A-003	2A	9/23/14	1152	White perch	99	19.2	Whole	-	-	-	1.37	-	32.23	-	-	-	-	-	7.40	85.50	2.27	36%	30.64
WP-BT02A-001	2A	9/23/14	1150	White perch	113	19.8	Whole	-	-	-	3.11	-	60.35	-	-	-	-	-	8.54	101.20	4.66	49%	54.57
WP-BT02A-002	2A	9/23/14	1151	White perch	127	20.4	Whole	-	-	-	2.24	-	48.85	-	-	-	-	-	7.75	115.00	3.47	49%	44.77
WP-BT02A-004	2A	9/23/14	1426	White perch	144	21	Whole	-	-	-	2.41	-	55.99	-	-	-	-	-	7.28	132.00	3.70	53%	50.85
WP-BT02B-001	2B	9/27/14	0947	White perch	99	18.3	Whole	-	-	-	5.48	-	110.30	-	-	-	-	-	8.17	87.50	7.93	58%	97.06
WP-BT02C-005	2C	9/23/14	1627	White perch	78	17.5	Fillet/Offal	-	2.85	35.60	1.38	42%	48.28	9.74	35.20	4.07	42%	41.79	6.28	78.30	2.46	42%	40.74
WP-BT02C-001	2C	9/18/14	1617	White perch	113	20	Whole	-	-	-	3.23	-	79.72	-	-	-	-	-	6.79	106.80	4.82	53%	71.05
WP-BT02C-004	2C	9/23/14	1626	White perch	116	19.3	Whole	-	-	-	0.88	-	22.22	-	-	-	-	-	7.21	101.60	1.60	24%	22.12
WP-BT02C-003	2C	9/23/14	1625	White perch	121	19.4	Whole	-	-	-	1.16	-	24.80	-	-	-	-	-	8.13	106.80	1.98	30%	24.32
WP-BT02C-002	2C	9/23/14	1624	White perch	148	21.4	Whole	-	-	-	1.19	-	28.78	-	-	-	-	-	7.32	138.00	2.03	33%	27.70
WP-BT02D-004	2D	9/24/14	1643	White perch	79	17.5	Fillet/Offal	-	3.16	36.60	0.93	31%	29.40	8.78	38.80	2.73	33%	31.09	6.05	79.40	1.76	32%	28.75
WP-BT02D-005	2D	9/24/14	1644	White perch	81	18	Whole	-	-	-	1.10	-	27.26	-	-	-	-	-	7.18	73.50	1.90	23%	26.41
WP-BT02D-002	2D	9/24/14	1641	White perch	98	19	Whole	-	-	-	1.03	-	41.29	-	-	-	-	-	4.71	87.30	1.81	29%	38.34
WP-BT02D-003	2D	9/24/14	1642	White perch	106	12.7	Whole	Tail not present	-	-	1.07	-	17.43	-	-	-	-	-	10.30	95.50	1.86	32%	18.05
WP-BT02D-001	2D	9/24/14	1640	White perch	260	26	Fillet/Offal	-	3.76	119.70	0.81	32%	21.62	11.30	133.30	2.32	31%	20.52	7.73	259.90	1.56	32%	20.48
WP-BT02E-003	2E	9/25/14	1418	White perch	86	18	Fillet/Offal	-	1.21	36.90	0.47	35%	38.43	5.09	44.50	2.07	37%	40.61	3.33	84.70	1.29	36%	38.08
WP-BT02E-002	2E	9/24/14	1648	White perch	105	19.4	Whole	-	-	-	2.59	-	38.05	-	-	-	-	-	11.10	96.10	3.95	38%	35.59
WP-BT02E-004	2E	9/25/14	1419	White perch	113	19.7	Whole	-	-	-	1.54	-	25.30	-	-	-	-	-	10.10	103.20	2.50	32%	24.74
WP-BT02E-001	2E	9/23/14	1207	White perch	131	21.2	Whole	-	-	-	1.91	-	39.86	-	-	-	-	-	8.12	117.50	3.02	41%	37.13
WP-BT02E-005	2E	9/25/14	1420	White perch	159	22.2	Fillet/Offal	-	4.43	69.00	1.28	34%	28.80	9.82	82.50	2.94	35%	29.94	7.37	158.80	2.08	35%	28.07
South									**South**					**South**					**South**				
WP-BT03A-001	3A	9/24/14	1247	White perch	74	17.3	Fillet/Offal	-	4.23	33.00	1.36	27%	32.25	8.04	37.10	2.59	28%	32.26	6.25	73.60	1.92	28%	30.72
WP-BT03C-005	3C	9/19/14	1504	White perch	82	18.3	Fillet/Offal	-	1.96	41.10	0.65	25%	33.01	5.71	38.80	1.86	25%	32.50	3.78	83.30	1.18	25%	31.43
WP-BT03C-002	3C	9/19/14	1501	White perch	84	18.5	Whole	-	-	-	0.75	-	33.99	-	-	-	-	-	4.41	77.90	1.42	26%	32.13
WP-BT03A-002	3A	9/24/14	1248	White perch	92	18	Fillet/Offal	-	4.59	39.10	1.43	34%	31.20	9.61	45.80	3.17	38%	33.01	7.30	92.10	2.19	37%	29.66
WP-BT03B-002	3B	9/17/14	1619	White perch	104	19.5	Whole	-	-	-	0.55	-	32.21	-	-	-	-	-	3.73	93.70	1.14	22%	30.62
WP-BT03B-003	3B	9/18/14	1622	White perch	105	19.5	Whole	-	-	-	1.61	-	33.13	-	-	-	-	-	8.28	95.70	2.60	26%	31.40
WP-BT03B-005	3B	9/18/14	1624	White perch	109	19	Whole	-	-	-	1.14	-	23.36	-	-	-	-	-	8.45	97.20	1.95	23%	23.09
WP-BT03B-004	3B	9/18/14	1623	White perch	115	19.6	Whole	-	-	-	1.16	-	22.27	-	-	-	-	-	8.94	102.30	1.98	24%	22.16
WP-BT03B-001	3B	9/17/14	1618	White perch	117	20	Whole	-	-	-	1.26	-	40.11	-	-	-	-	-	5.68	101.90	2.12	34%	37.34
WP-BT03C-003	3C	9/19/14	1502	White perch	128	20.5	Whole	-	-	-	1.15	-	30.04	-	-	-	-	-	6.83	115.00	1.97	29%	28.77
WP-BT03A-003	3A	9/24/14	1645	White perch	135	20.4	Whole	-	-	-	0.52	-	12.35	-	-	-	-	-	8.01	122.80	1.10	29%	13.72
WP-BT03A-004	3A	9/24/14	1646	White perch	136	20.3	Whole	-	-	-	1.81	-	33.26	-	-	-	-	-	9.14	121.70	2.88	31%	31.51
WP-BT03C-001	3C	9/19/14	1004	White perch	140	20.5	Whole	-	-	-	1.75	-	31.85	-	-	-	-	-	9.20	127.50	2.79	24%	30.32
WP-BT03A-005	3A	9/25/14	1120	White perch	152	22	Fillet/Offal	-	2.72	60.20	0.67	28%	24.60	7.23	85.60	1.81	31%	25.06	5.37	150.70	1.30	30%	24.06
WP-BT03C-004	3C	9/19/14	1503	White perch	160	21.4	Fillet/Offal	-	4.96	76.20	1.84	26%	37.18	11.30	78.40	4.37	27%	38.67	8.18	160.80	3.00	27%	36.47

Hold an aliquot from the whole fish to allow for potential PCB Congener analysis.
*Fillet concentrations were calculated for samples processed as whole fish.
**Whole fish concentrations were calculated for samples processed as fillet/offal.

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Oyster Toadfish Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	WHOLE BODY Lipids (%)	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North													
OYTD-BT01A-001	1A	9/25/14	1415	Oyster toadfish	157	20	Whole	-	1.23	135.00	0.22	100%	17.64
OYTD-BT01B-001	1B	9/24/14	1647	Oyster toadfish	275	23	Whole	-	1.24	253.40	0.25	74%	20.27
North - Deep													
OYTD-BT01D-002	1D	9/27/14	0824	Oyster toadfish	220	22.6	Whole	-	1.33	194.00	0.18	100%	13.46
OYTD-BT01E-003	1E	9/23/14	1611	Oyster toadfish	276	24.2	Whole	-	1.20	248.50	0.27	100%	22.33
OYTD-BT01D-001	1D	9/23/14	1616	Oyster toadfish	328	24.4	Whole	-	1.38	305.60	0.18	83%	12.91
OYTD-BT01E-001	1E	9/17/14	1313	Oyster toadfish	436	27.3	Whole	-	1.13	410.70	0.41	100%	36.55
OYTD-BT01E-002	1E	9/17/14	1314	Oyster toadfish	470	29	Whole	-	0.94	447.50	0.15	100%	16.13
Adajcent													
OYTD-BT02A-001	2A	9/17/14	1309	Oyster toadfish	244	23.1	Whole	-	1.45	225.80	0.31	100%	21.31
OYTD-BT02D-001	2D	9/23/14	1204	Oyster toadfish	124	18.6	Whole	-	1.78	106.80	1.07	72%	60.11
OYTD-BT02D-002	2D	9/25/14	1118	Oyster toadfish	159	19.2	Whole	-	1.54	134.50	0.38	69%	24.35
OYTD-BT02D-003	2D	9/25/14	1119	Oyster toadfish	258	23.2	Whole	-	1.88	238.00	0.38	80%	20.45
Adajcent - Deep													
OYTD-BT02F-006	2F	9/23/14	1215	Oyster toadfish	184	21.3	Whole	-	0.94	152.50	0.16	100%	16.79
OYTD-BT02F-001	2F	9/16/14	1232	Oyster toadfish	226	22	Whole	-	1.22	213.00	0.31	81%	25.19
OYTD-BT02G-001	2G	9/17/14	1054	Oyster toadfish	312	25.4	Whole	-	0.88	283.20	0.08	100%	9.14
OYTD-BT02G-005	2G	9/27/14	0946	Oyster toadfish	351	25	Whole	-	0.69	316.10	0.08	100%	11.71
OYTD-BT02H-001	2H	9/17/14	1047	Oyster toadfish	208	21.5	Whole	-	1.01	190.40	0.09	100%	8.49
South													
OYTD-BT03A-001	3A	9/25/14	1121	Oyster toadfish	43	12.6	Whole	-	1.56	39.40	0.29	79%	18.78
OYTD-BT03C-002	3C	9/18/14	1025	Oyster toadfish	160	20.7	Whole	-	1.51	142.70	0.21	74%	13.82
OYTD-BT03C-001	3C	9/18/14	1024	Oyster toadfish	326	26.1	Whole	-	1.23	302.80	0.27	100%	21.79
South - Deep													
OYTD-BT03D-001	3D	9/16/14	1032	Oyster toadfish	189	20.5	Whole	-	1.65	168.50	0.17	100%	10.06
OYTD-BT03D-006	3D	9/23/14	1422	Oyster toadfish	206	22.2	Whole	-	1.33	186.60	0.13	100%	9.85
OYTD-BT03D-007	3D	9/26/14	1020	Oyster toadfish	208	22.2	Whole	-	1.15	203.90	0.18	82%	15.30
OYTD-BT03D-004	3D	9/23/14	1420	Oyster toadfish	211	21	Whole	-	1.71	189.10	0.26	60%	15.05
OYTD-BT03D-003	3D	9/19/14	1007	Oyster toadfish	222	21.6	Whole	-	1.54	194.30	0.13	100%	8.70

The fillet will initially include everything but the head and viscera. As this species is a "scaleless" fish, homogenization could exclude the skin if initial attempts to include it fail (e.g. the skin is too tough).
The offal will consist of the remainder of the carcass and will be analyzed separately.
Hold an aliquot from the fillets to allow for potential PCB Congener analysis.

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Hogchoker Data
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes	WHOLE BODY Lipids	Whole Body Mass (g)	Total PCB (ppm)	Aroclor 1260+	PCBs LN (ppm)
North - Deep									**North - Deep**				
HOGCH-BT01E-003	1E	9/23/14	1614	Hogchoker	15	10	Whole	-	0.93	13.30	0.18	35%	19.22
HOGCH-BT01E-004	1E	9/24/14	1240	Hogchoker	17	10.6	Whole	-	0.40	12.60	0.42	60%	105.24
HOGCH-BT01E-007	1E	9/26/14	1440	Hogchoker	19	11	Whole	-	1.28	17.10	0.15	24%	11.41
HOGCH-BT01E-005	1E	9/24/14	1241	Hogchoker	20	10.8	Whole	-	3.67	16.70	0.54	31%	14.77
HOGCH-BT01E-006	1E	9/25/14	1417	Hogchoker	25	11	Whole	-	1.54	20.60	0.65	65%	42.27
HOGCH-BT01D-001	1D	9/27/14	0915	Hogchoker	29	12.3	Whole	-	2.85	25.40	0.43	34%	15.19
Adjacent - Deep									**Adjacent - Deep**				
HOGCH-BT02F-003	2F	9/18/14	1607	Hogchoker	16	10.6	Whole	-	0.61	13.50	0.15	39%	24.72
HOGCH-BT02F-005	2F	9/18/14	1609	Hogchoker	18	11	Whole	-	ND (0.3)	15.10	ND (0.05)	-	ND
HOGCH-BT02F-002	2F	9/17/14	1105	Hogchoker	21	11.5	Whole	-	1.34	16.50	0.20	32%	14.85
HOGCH-BT02G-006	2G	9/26/14	1030	Hogchoker	17	10.6	Whole	-	0.44	14.50	ND (0.05)	-	ND
HOGCH-BT02G-003	2G	9/19/14	1009	Hogchoker	18	10.4	Whole	-	0.96	13.30	0.18	44%	18.40
HOGCH-BT02G-005	2G	9/23/14	1214	Hogchoker	21	11.3	Whole	-	0.62	16.60	0.37	60%	60.42
HOGCH-BT02H-002	2H	9/17/14	1045	Hogchoker	10	9	Whole	Composite	0.64	20.60	0.17	45%	26.07
HOGCH-BT02H-004	2H	9/18/14	1612	Hogchoker	12	10.5							
HOGCH-BT02H-005	2H	9/18/14	1613	Hogchoker	21	11.1	Whole	-	0.41	17.10	0.03	100%	7.26
HOGCH-BT02H-003	2H	9/17/14	1046	Hogchoker	25	11	Whole	-	0.61	18.10	0.06	57%	10.46
South - Deep									**South - Deep**				
HOGCH-BT03D-001	3D	9/17/14	0945	Hogchoker	9	9.2	Whole	Composite	0.44	18.30	0.23	52%	52.36
HOGCH-BT03D-006	3D	9/25/14	1110	Hogchoker	11	9							
HOGCH-BT03D-005	3D	9/23/14	1425	Hogchoker	14	9.5	Whole		1.64	12.90	0.60	23%	36.59
HOGCH-BT03D-004	3D	9/23/14	1424	Hogchoker	17	10.4	Whole	-	0.58	15.00	0.10	66%	17.75
HOGCH-BT03D-003	3D	9/23/14	1423	Hogchoker	21	10.1	Whole	-	4.59	16.30	0.96	25%	21.00
HOGCH-BT03D-002	3D	9/18/14	1027	Hogchoker	26	12.7	Whole	-	0.50	23.20	ND (0.05)	-	ND

PCBs reporting limit is 0.05 ppm
PCBs LN = Lipids Normalized Total PCBs

TABLE 13
Analytical Summary of PCBs in Biota - Year 2
Miscellaneous Catch
Former Anaconda Wire & Cable Site
Hastings-on-Hudson, NY

Parent ID	Location ID	Sample Date	Sample Time	Species	Weight (g)	Length (cm)	Process	Notes
Striped Bass								
STB-BT02A-001	2A	9/23/14	1623	Striped bass	12	10.6	Hold/Discard	-
STB-BT02C-001	2C	9/18/14	1343	Striped bass	9	10.2	Hold/Discard	-
STB-BT02E-001	2E	9/24/14	1649	Striped bass	194	26.5	Hold/Discard	-
STB-BT03B-003	3B	9/23/14	1419	Striped bass	15	11.8	Hold/Discard	-
STB-BT03B-002	3B	9/18/14	1625	Striped bass	36	15	Hold/Discard	-
STB-BT03B-001	3B	9/17/14	1617	Striped bass	86	20.5	Hold/Discard	-
STB-BT03C-001	3C	9/19/14	1221	Striped bass	260	29	Hold/Discard	-
Grass Shrimp								
GRSHMP-BT01D-001	1D	9/23/14	1617	Grass Shrimp	19	-	Hold/Discard	13 count; length range 3.5 to 5.7 cm; eggs present on females
GRSHMP-BT02E-001	2E	9/25/14	1113	Grass Shrimp	9	-	Hold/Discard	10 count; length range 3.7 to 5.8 cm; eggs present on females
White catfish								
WC-BT01B-001	1B	9/17/14	1613	White catfish	540	34	Hold/Discard	-
WC-BT01C-001	1C	9/26/14	1031	White catfish	1059	42.4	Hold/Discard	-

TABLE 14
Analytical Summary of PCBs and Metals in Groundwater
Former Anaconda Wire and Cable Plant Site
Hastings-on-Hudson, New York
October 2015

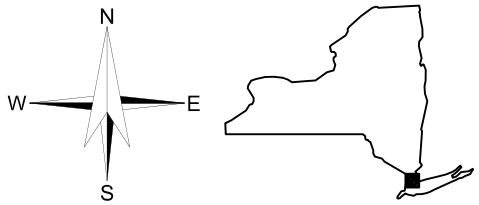
Location	**Standards, Criteria, and Guidance Values (Unfiltered) (ug/L)**	PDMW-16S	PDMW-19S	PDMW-20S	PDMW-27S	MW-01A	MW-05	MW-09	MW-09
Sample Date		08/01/2014	08/04/2014	08/04/2014	12/02/2014	08/05/2014	08/05/2014	08/04/2014	08/04/2014
Sample Type		N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	N, Unfiltered	FD, Unfiltered
Sample Name		0710-080114-1105	0710-080414-1030	0710-080414-1520	0710-120214-1630	0710-080514-0915	0710-080514-1235	0710-080414-1230	0710-080414-0002
Total Metals (ug/L)									
Beryllium	3	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
Copper	200	ND (5)	**22.7**	ND (5)	**43.3**	ND (5)	**6.14**	**177**	**177**
Lead	25	ND (5)	**18.3**	ND (5)	**80.7**	ND (5)	ND (5)	ND (5)	ND (5)
Zinc	2000	ND (5)	**112**	ND (5)	**69.7**	ND (5)	**16.2**	**752**	**752**
PCBs (ug/L)									
Aroclor 1016	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1221	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1232	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1242	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1248	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1254	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1260	-	ND (0.05)	**0.979**	ND (0.05)	ND (0.05)	ND (0.05)	**0.826**	**0.241**	**0.269**
Aroclor 1262	-	ND (0.05)	ND (0.1)	ND (0.05)	**0.652**	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Aroclor 1268	-	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Total PCBs	0.09	ND (0.05)	**0.979**	ND (0.05)	**0.652**	ND (0.05)	**0.826**	**0.241**	**0.269**

Notes:
ND (Not detected above laboratory detection limits)
1. Results in **bold** were detected.
2. Results shaded in grey are above SCG values.

TABLE 15
Analytical Summary of PCBs in Air
Baseline Air Monitoring Program - 2015
Former Anaconda Wire & Cable Plant Site
Hastings-on-Hudson, New York

Sample Date	Sample Time	Sample Type	Aroclor 1248 (ug/m3)	Aroclor 1254 (ug/m3)	Aroclor 1260 (ug/m3)	Aroclor 1262 (ug/m3)	Aroclor 1268 (ug/m3)	Total PCBs (ug/m3)
6/19/2015	16:50	N	ND (0.0134)	ND (0.0134)	ND (0.0134)	ND (0.0134)	ND (0.0134)	ND (0.0134)
6/25/2015	16:00	N	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)
7/1/2015	13:26	N	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)
7/7/2015	13:30	N	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)
7/13/2015	15:40	N	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)
7/19/2015	13:50	N	ND (0.0133)	ND (0.0133)	ND (0.0133)	ND (0.0133)	ND (0.0133)	ND (0.0133)
7/25/2015	12:26	N	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)	ND (0.013)
7/31/2015	15:10	N	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)
8/6/2015	13:40	N	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)	ND (0.0139)
8/12/2015	14:00	N	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)	ND (0.0136)
8/12/2015	14:05	Field Duplicate (8/12/15, 14:00)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)	ND (0.0135)
8/12/2015	14:10	Field Blank	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
8/18/2015	8:30	N	ND (0.0185)	ND (0.0185)	ND (0.0185)	ND (0.0185)	ND (0.0185)	ND (0.0185)

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

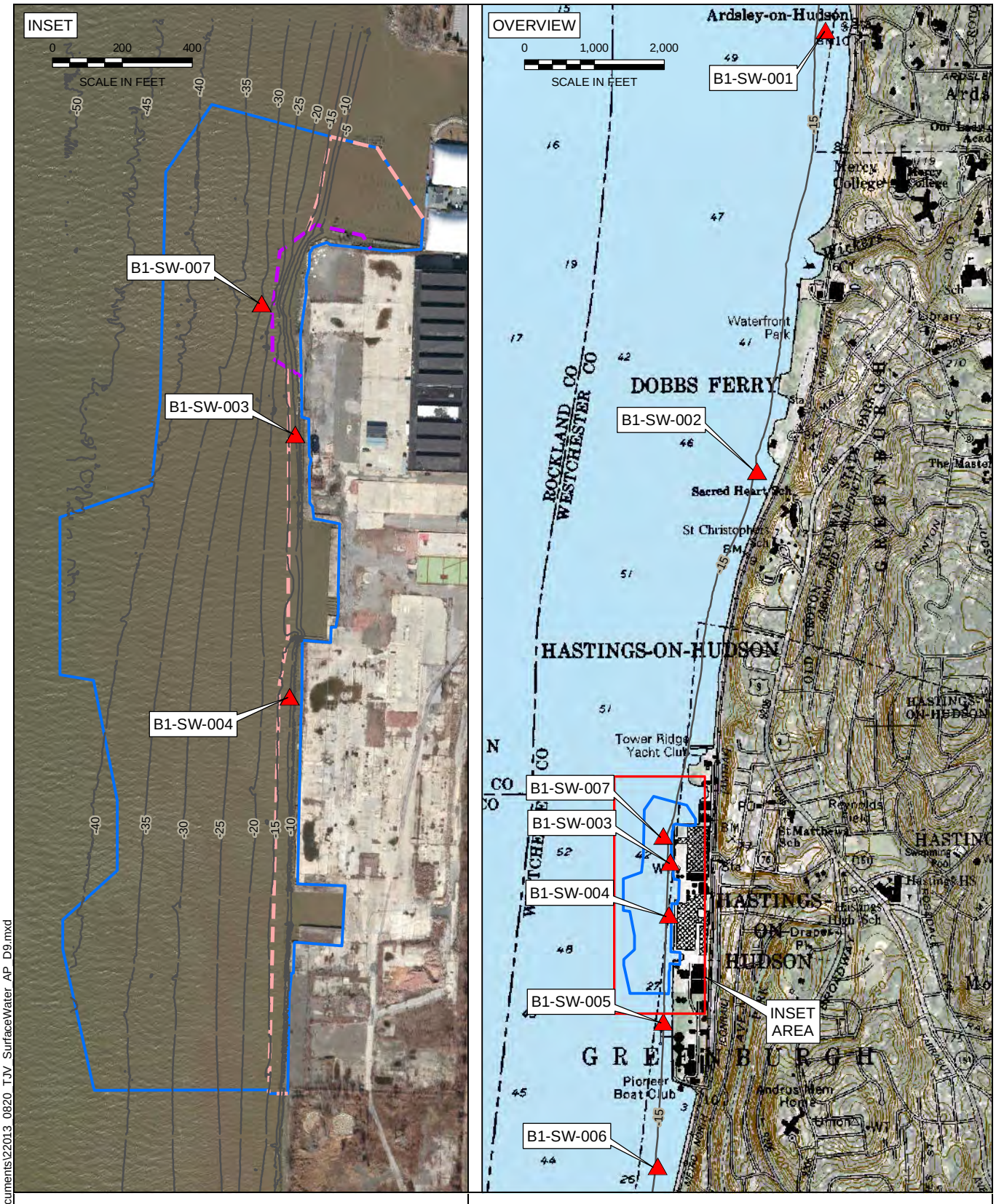
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

SCALE: 1:24000
MAY 2011

FIGURE 1

G:\PROJECTS\28612\250 - RFS\CAD\PLAN VIEWS & SECTIONS\28612-LOCUS_D1.DWG



SURFACE WATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

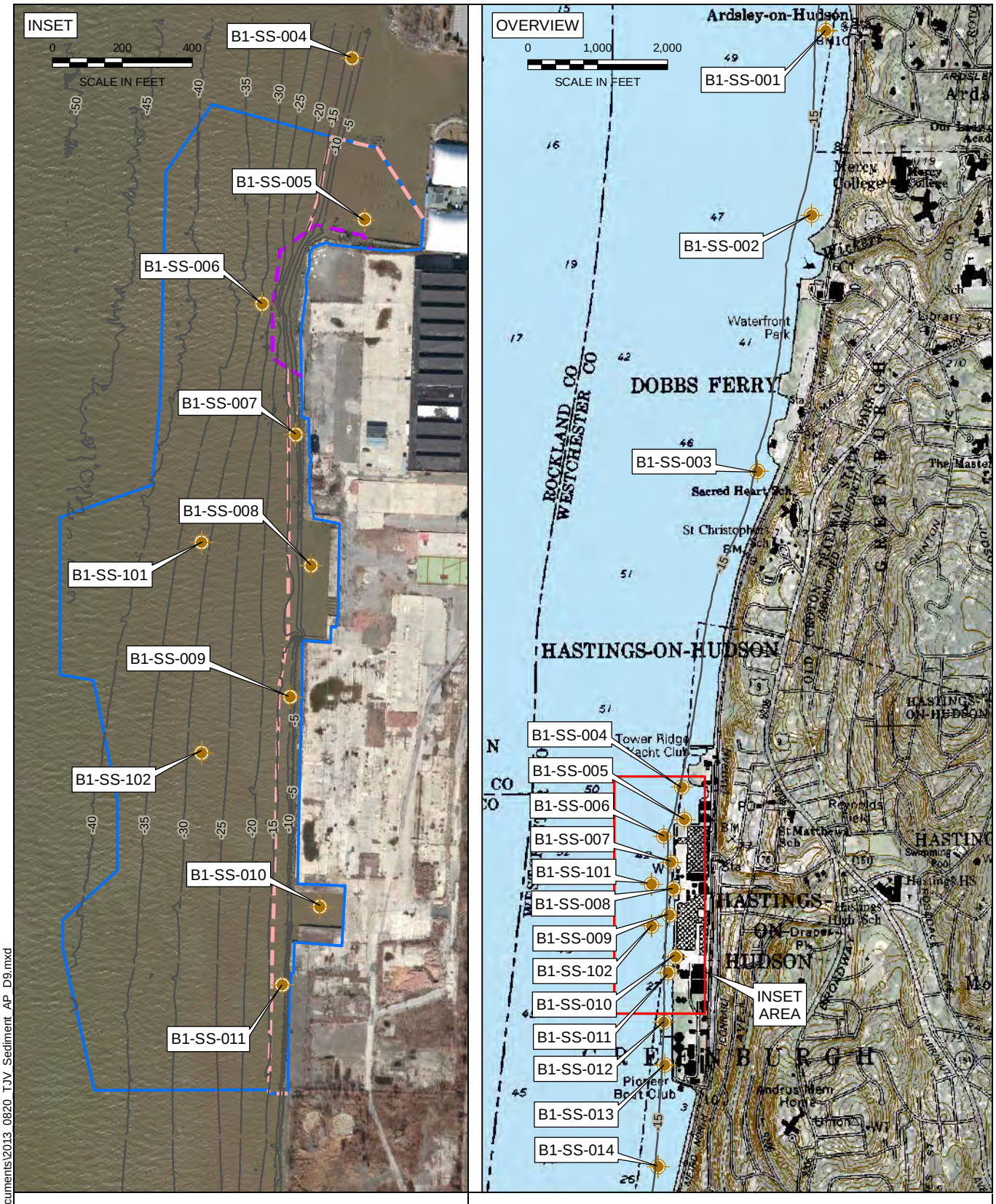
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE WATER

SCALE: AS SHOWN
AUGUST 2013

FIGURE 2

G:\Projects\28612\Global\GIS\Map Documents\12013_0820_TJV_SurfaceWater_AP_D9.mxd



SURFACE SEDIMENT AND MACRO-INVERTEBRATE SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

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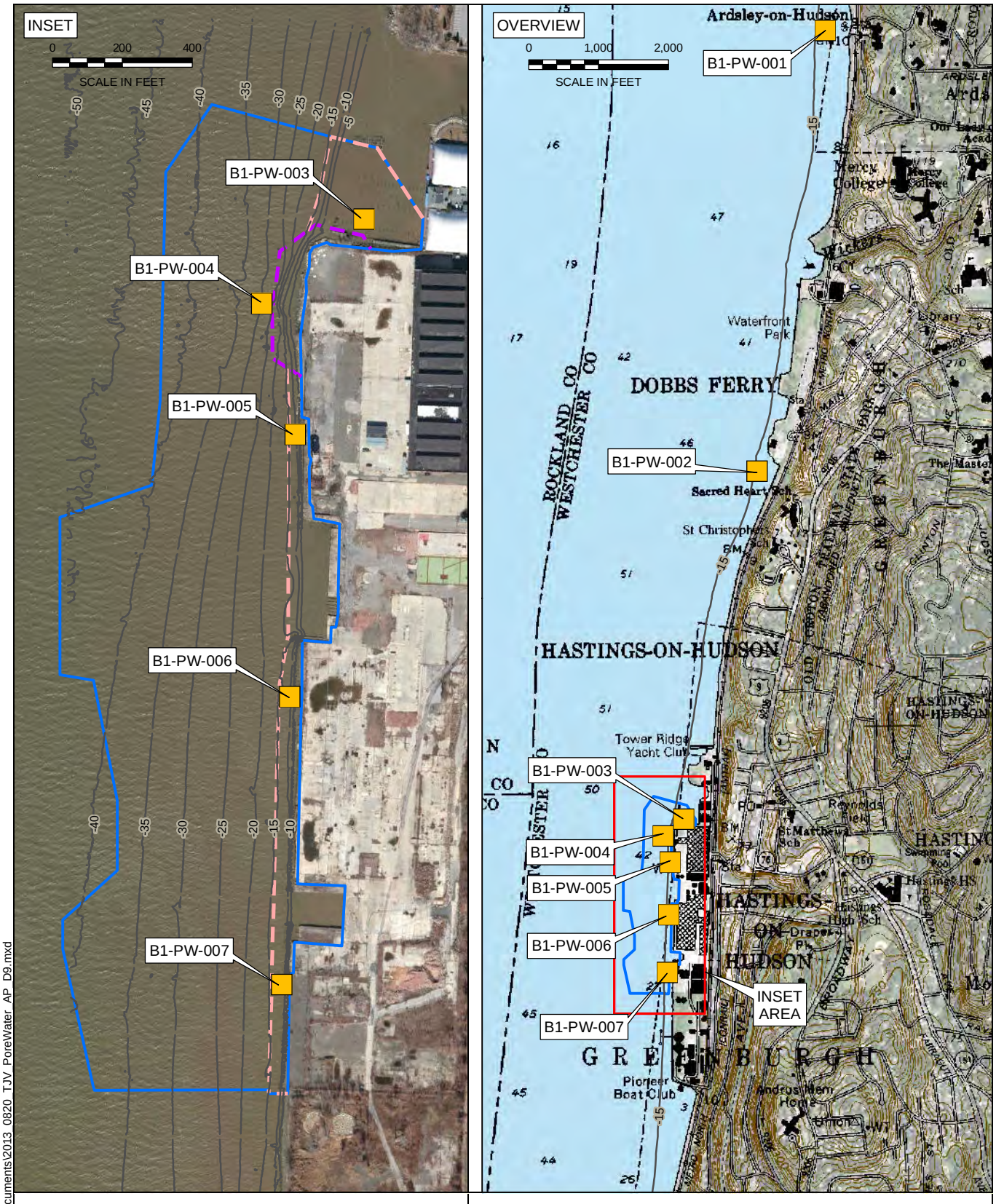
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE SEDIMENT AND MACRO-INVERTEBRATES

SCALE: AS SHOWN
AUGUST 2013

FIGURE 3

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Sediment_AP_D9.mxd



POREWATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

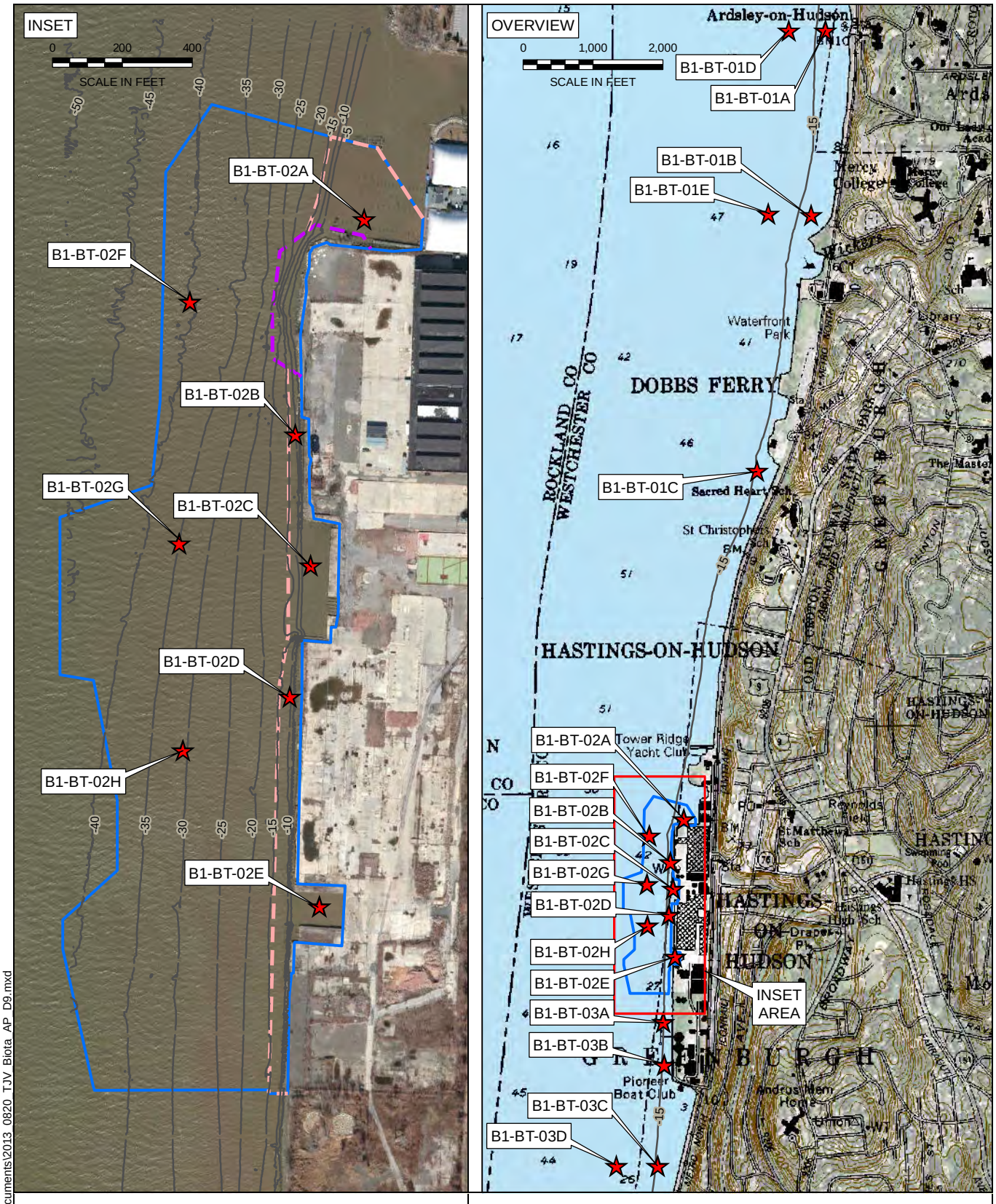
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - POREWATER

SCALE: AS SHOWN
AUGUST 2013

FIGURE 4

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_PoreWater_AP_D9.mxd



FISH AND SHELLFISH SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

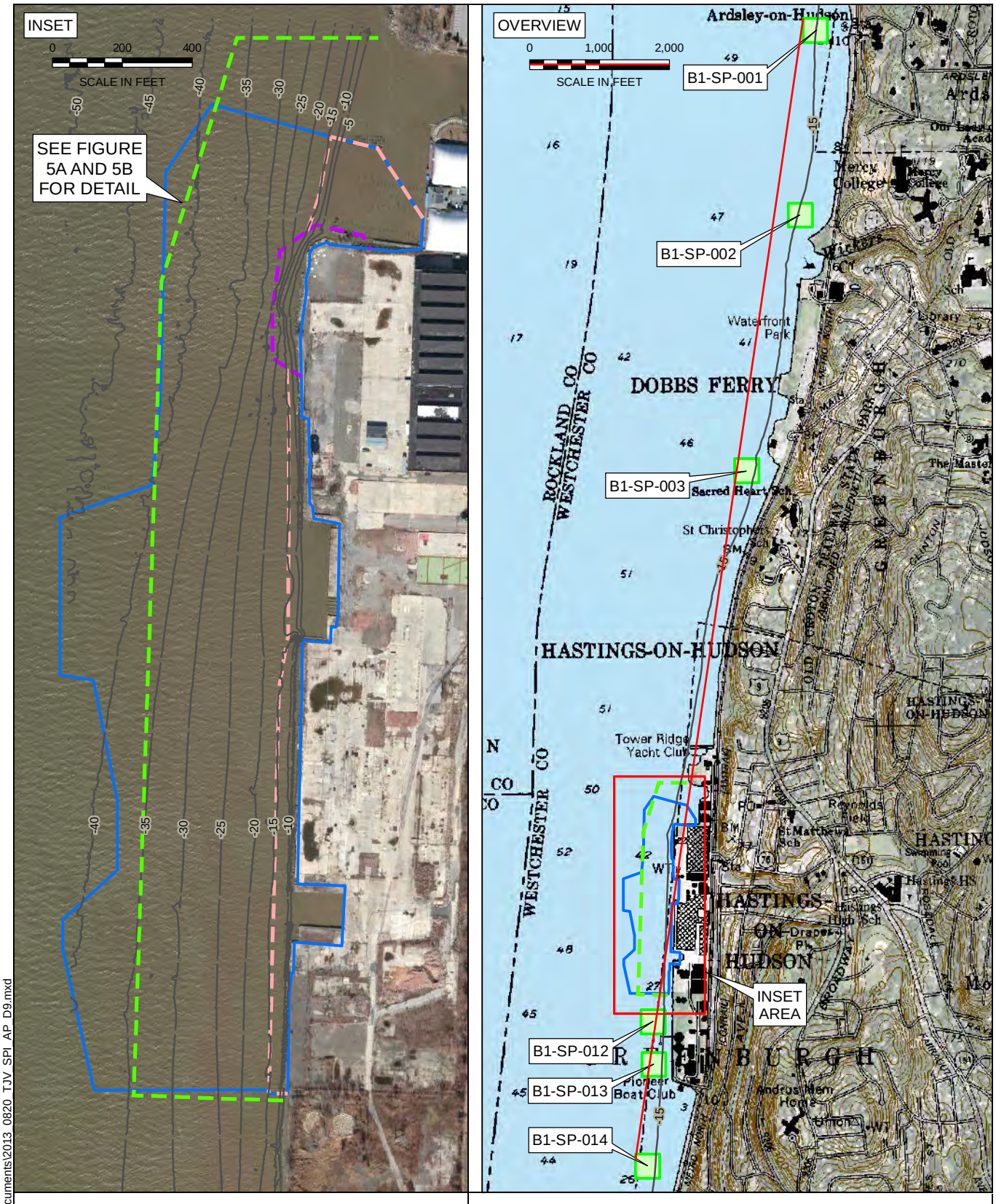
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINESAMPLING AND ANALYSIS PLAN - FISH AND SHELLFISH

SCALE: AS SHOWN
AUGUST 2013

FIGURE 5

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Biota_AP_D9.mxd



HABITAT CHARACTERIZATION (SPI)

LIMITS OF SPI GRID

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

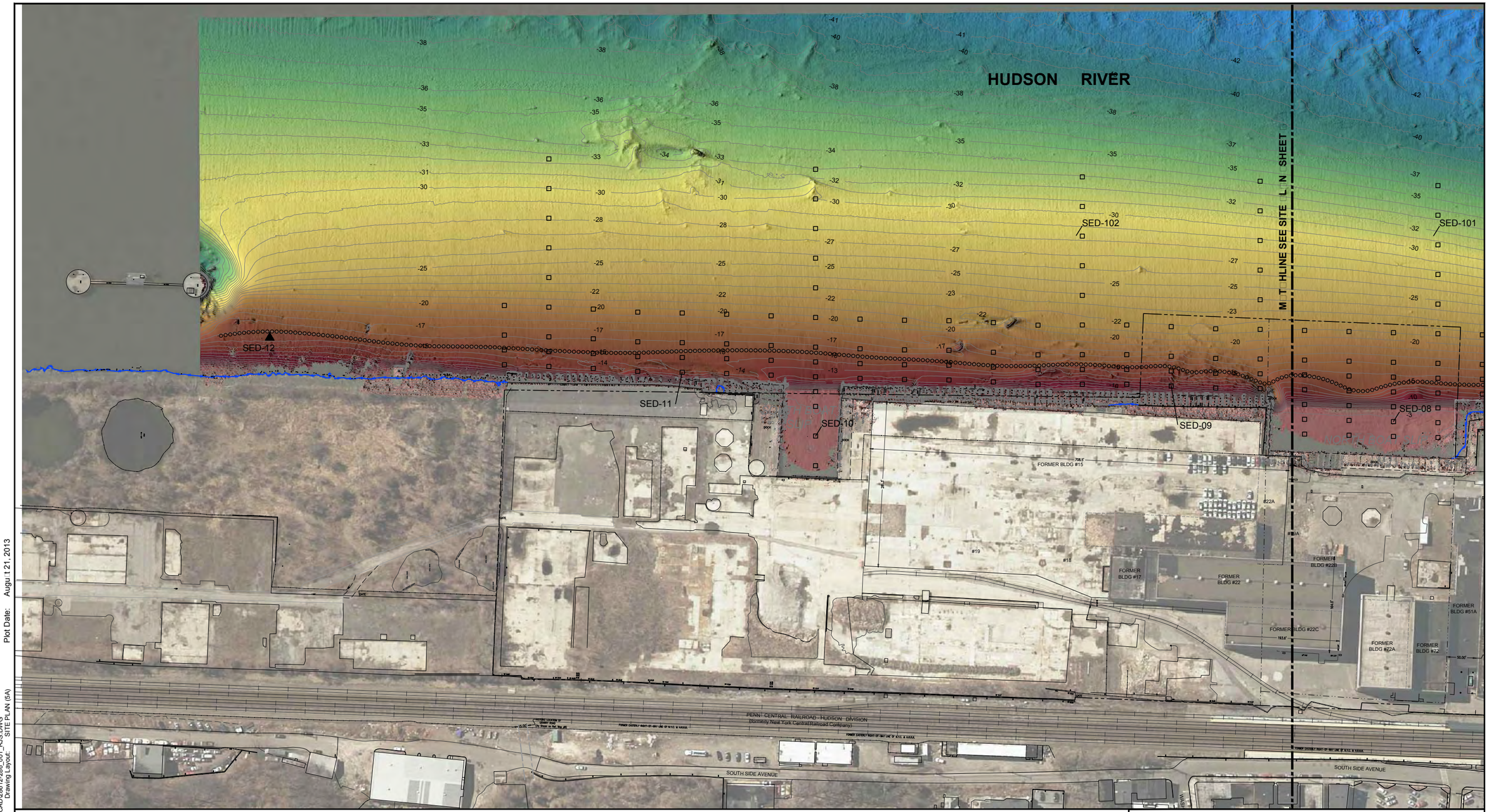
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - HABITAT CHARACTERIZATION (SPI)

SCALE: AS SHOWN
AUGUST 2013

FIGURE 6

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_SPI_AP_D9.mxd



Plot Date: August 21, 2013

G:\28612_HASTINGS\286\CAD\286122-286_001_RJS.DWG
Drawing Layout: SITE PLAN (6A)

Drawing Name: LUCIDO, SAM
Operator Name:

LEGEND

- PROPERTY LINE
- RAIL ROAD
- APPROXIMATE SPI LOCATION
- EL. - 15 FT. DEPTH CONTOUR
- NORTHWEST EXTENSION
- SED-12 ▲ SEDIMENT SAMPLE LOCATION AND NUMBER (SPI LOCATIONS INCLUDED AT THESE LOCATIONS)

NOTES

1. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
2. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
3. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
4. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

W S N E

0 80 160

SCALE IN FEET

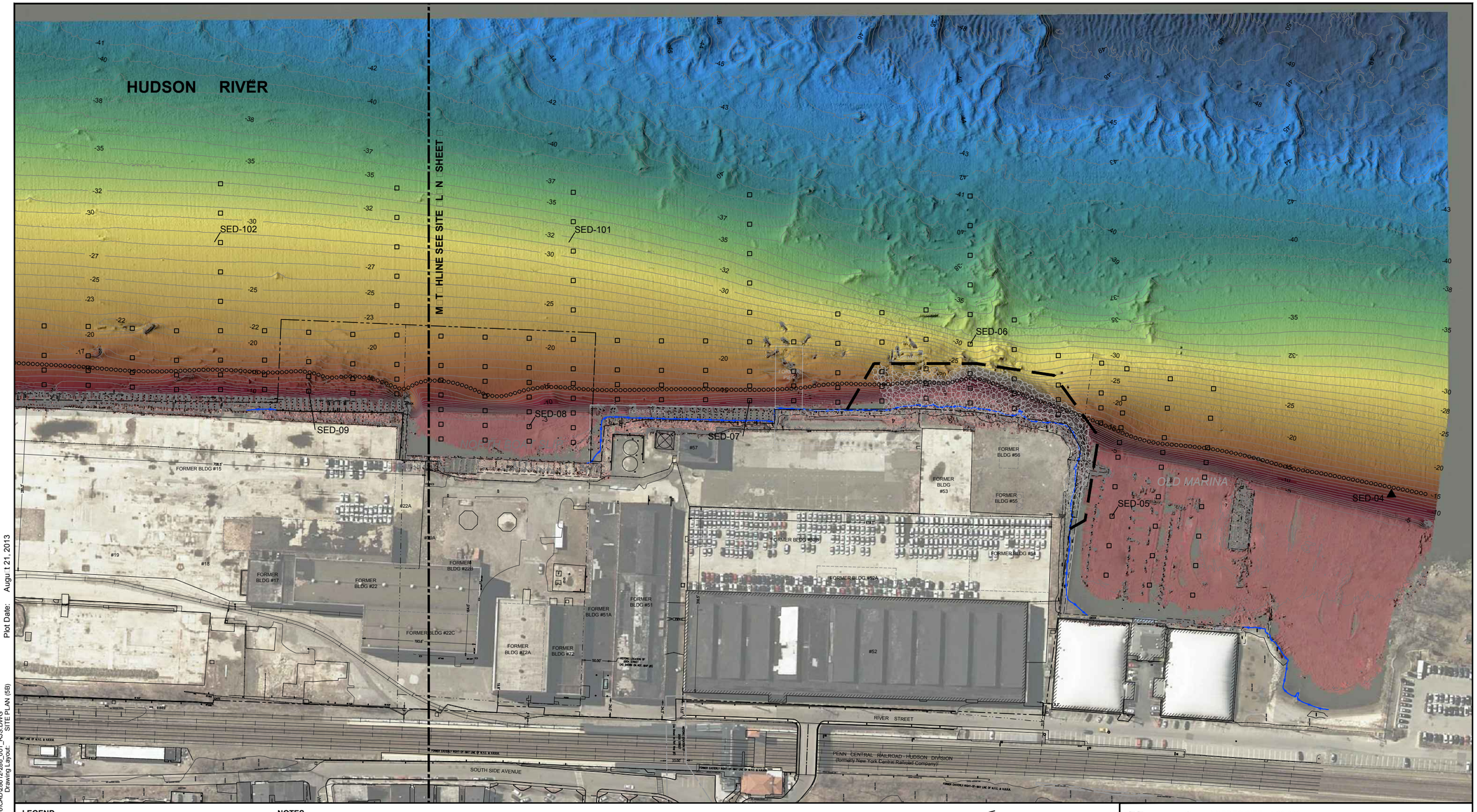
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SPI LOCATIONS SHEET 1 of 2

SCALE: AS SHOWN
APRIL 2013

FIGURE 6A



Plot Date: August 21, 2013
G:\28612_HASTINGS\286\CAD\28612-286_001_PJS.DWG
Drawing Layout: SITE PLAN (5B)
Drawing Name:
Operator Name: LUCIDO, SAM

LEGEND

- PROPERTY LINE
- RAIL ROAD
- APPROXIMATE SPI LOCATION
- EL. - 15 FT. DEPTH CONTOUR
- NORTHWEST EXTENSION
- SED-04 ▲ SEDIMENT SAMPLE LOCATION AND NUMBER (SPI LOCATIONS INCLUDED AT THESE LOCATIONS)

NOTES

1. PROPERTY BOUNDARY INFORMATION PROVIDED BY WENDEL COMPANIES, DRAWING XVE-HUDSON-TOPO.DWG, PROJECT NO. 438504, DATED SEPTEMBER 21, 2012.
2. GRID SYSTEM IS THE NEW YORK STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD 83, U.S. SURVEY FEET.
3. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND ARE BASED ON DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN 2009 AND OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE (NYGIS).
4. THE CONTOUR INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

W S N E

0 80 160
SCALE IN FEET

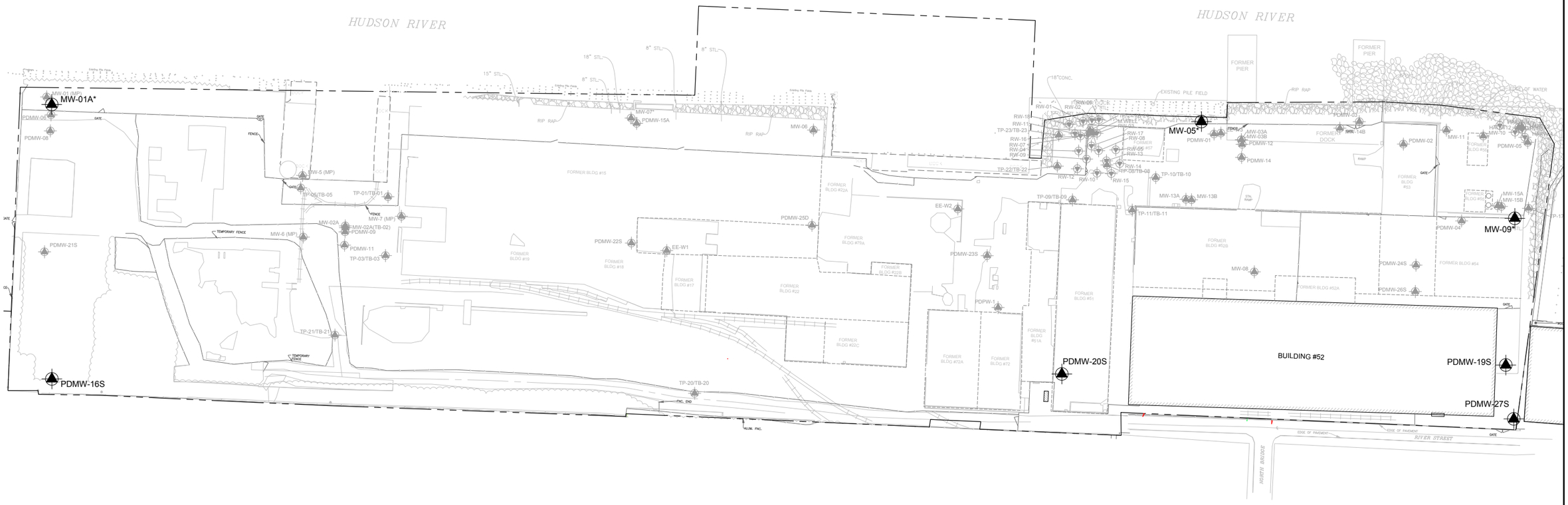
HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SPI LOCATIONS SHEET 2 of 2

SCALE: AS SHOWN
APRIL 2013

FIGURE 6B



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP-RAP
- PDI SAMPLING WELL LOCATION
- EXISTING MONITORING WELL
- RECOVERY WELL

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YOR

GROUNDWATER SAMPLING LOCATION PLAN

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 7

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:15 PM Layout: FIG 3.2B
\\DTR\COMMON\28612_HASTINGS\293\CAD\28612-293-0010 2006 OU1 SAMPLING.DWG

HUDSON RIVER

SOUTH BOAT SLIP

NORTH BOAT SLIP

FORMER BLDG #15

FORMER BLDG #79A

FORMER BLDG #19

FORMER BLDG #18

FORMER BLDG #17

FORMER BLDG #22A

FORMER BLDG #22B

FORMER BLDG #22C

FORMER BLDG #72A

FORMER BLDG #72

FORMER BLDG #51

FORMER BLDG #51A

BASELINE AIR MONITORING LOCATION

FORMER BLDG #57

RIVER (PRIMARY)

FENCE (SECONDARY)

FORMER BLDG #53

FORMER BLDG #56

NORTHWEST CORNER AREA

FORMER BLDG #55

FORMER BLDG #52B

OLD MARINA

FORMER BLDG #54

FORMER SATURANT PUMP HOUSE

FORMER BLDG #52A

BLDG #52

RIVER STREET

PENN CENTRAL RAILROAD - HUDSON DIVISION
(formerly New York Central Railroad Company)

SOUTH SIDE AVENUE

WASHINGTON AVE

SOUTH SIDE AVENUE

SOUTH SIDE AVENUE

LEGEND:

- APPROXIMATE LOCATION OF METEOROLOGICAL STATION
- PROPOSED AIR MONITORING LOCATION
- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- EXISTING FENCE
- NEW FENCE (MATCH EXISTING CHAIN LINK)
- TEMPORARY FENCE MOUNTED ON JERSEY BARRIER. (8 FOOT MIN.)
- RIP-RAP
- UG DRAINS / SEWER TO RIVER

NOTES:

1. BASE PLAN PROVIDED BY BOSWELL ENGINEERING DRAWING NO. 04-209-MW (01/27/2006).
2. HISTORICAL SURVEY INFORMATION PROVIDED BY PARSONS IN JULY 2005.
3. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS. THE MEAN HIGH LINE IS ESTIMATED AT ELEVATION +2.2 FEET. MEAN LOW IS SHOWN AT ELEVATION -1.0 FEET, BUT IS UNDERSTOOD TO BE AT APPROXIMATELY ELEVATION -2.0 FEET.
4. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PROVIDED BY AQUASURVEY INC. IN NOVEMBER 2007.

N

0 100 200 300 400

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE AIR MONITORING LOCATION PLAN

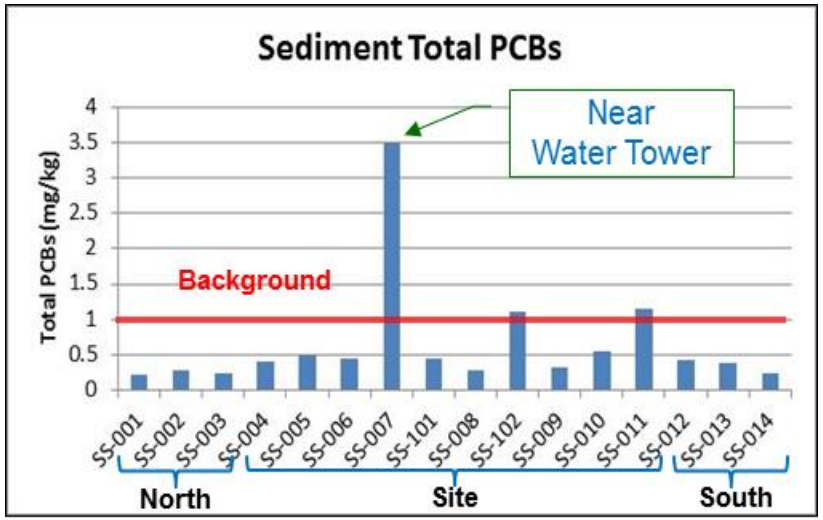
SCALE: AS SHOWN
SEPTEMBER 2015

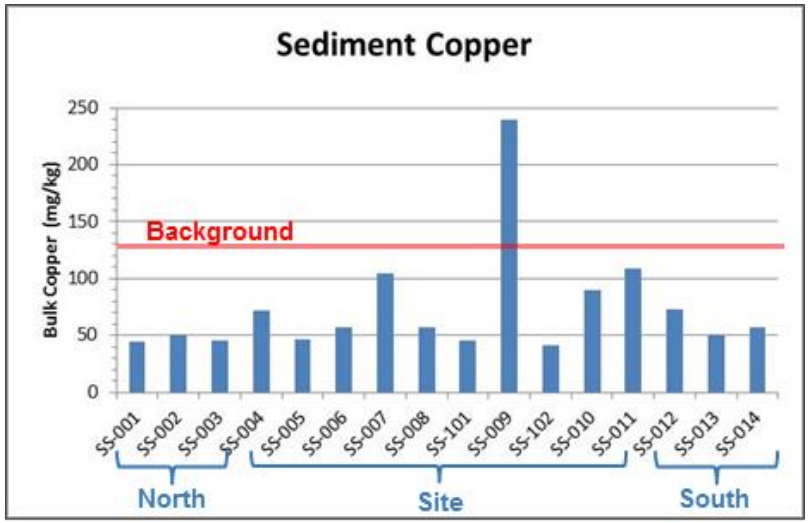
FIGURE 8

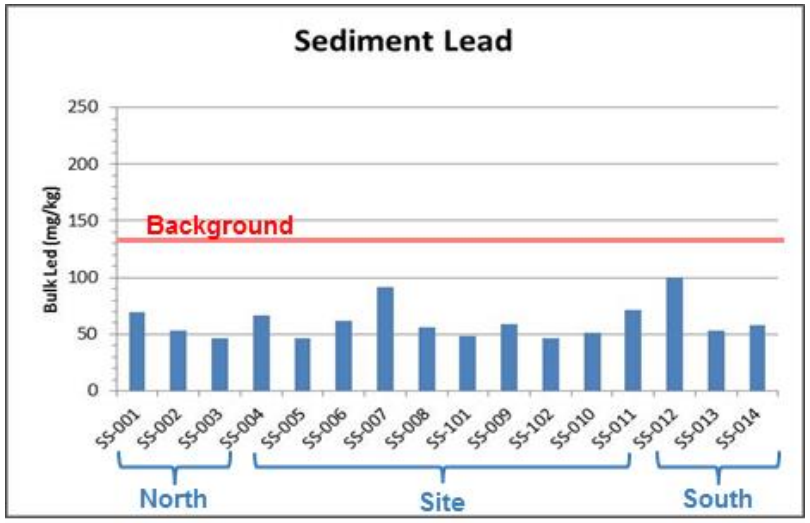
POSTOLOWSKI, KEVIN Printed: 1/29/2015 5:59 PM Layout: AIR
G:\28612\GLOBAL\CAD\28612-SITEPLAN_R1 AIR.DWG

Figure 9

Concentrations of PCBs, Copper, Lead and Zinc in Sediment
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY







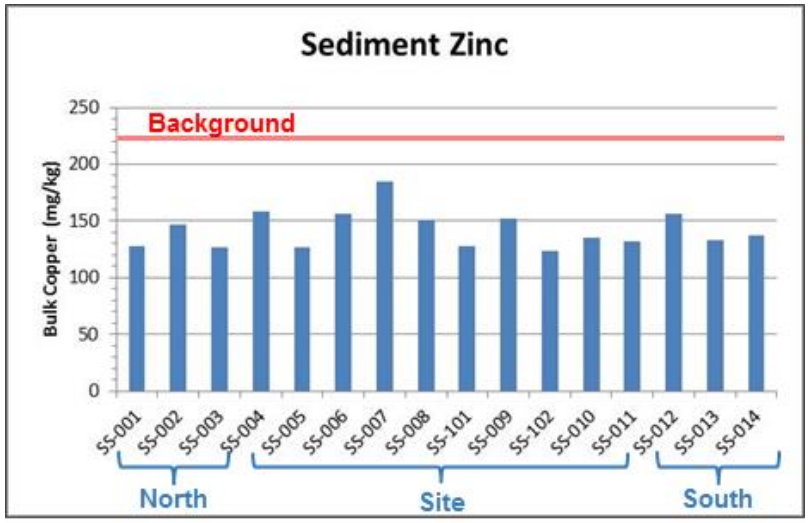
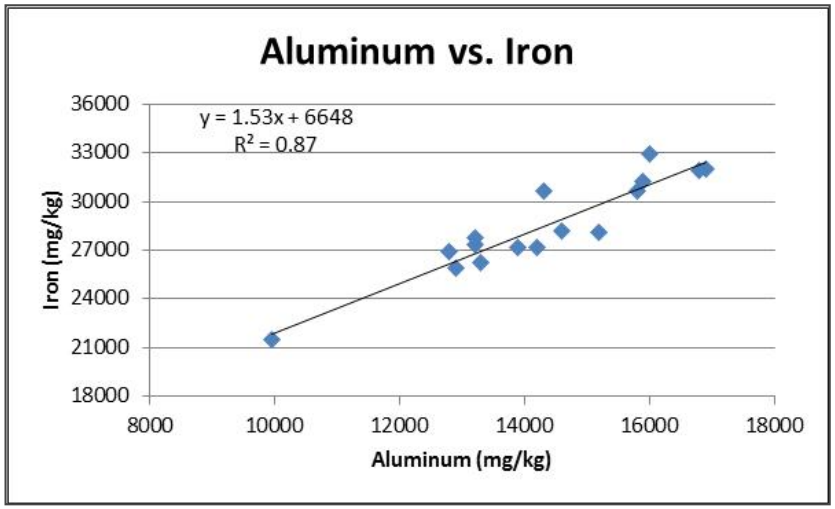
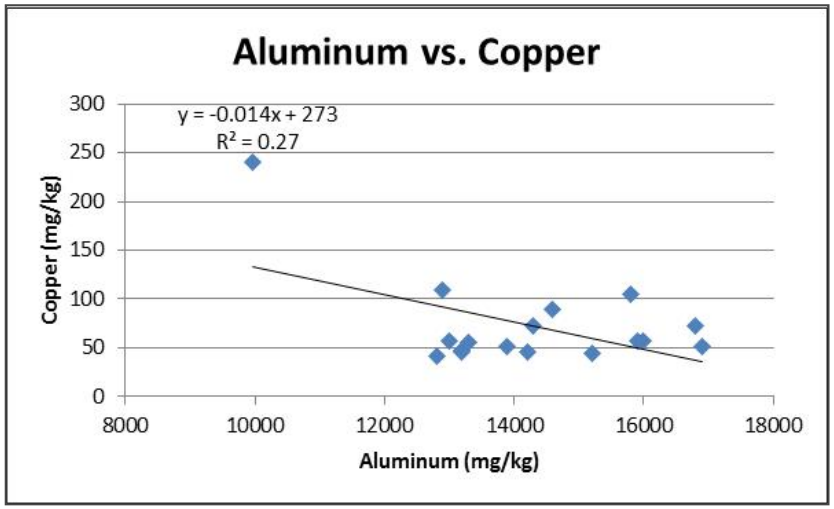
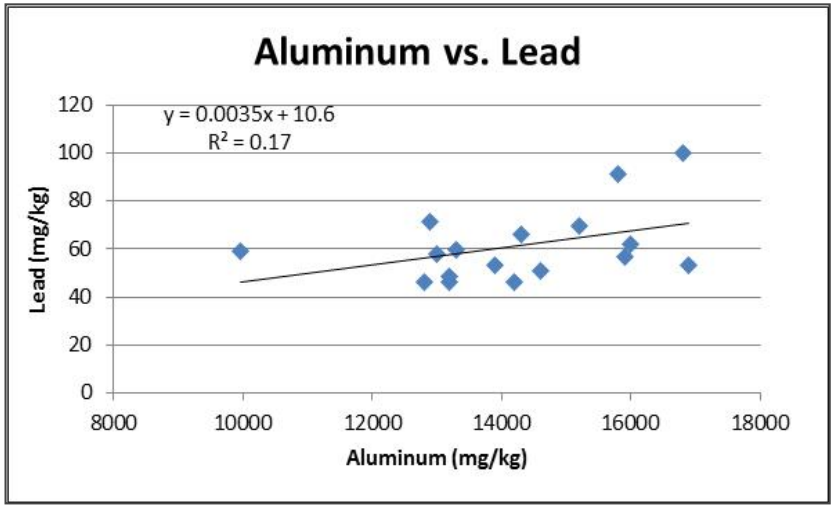


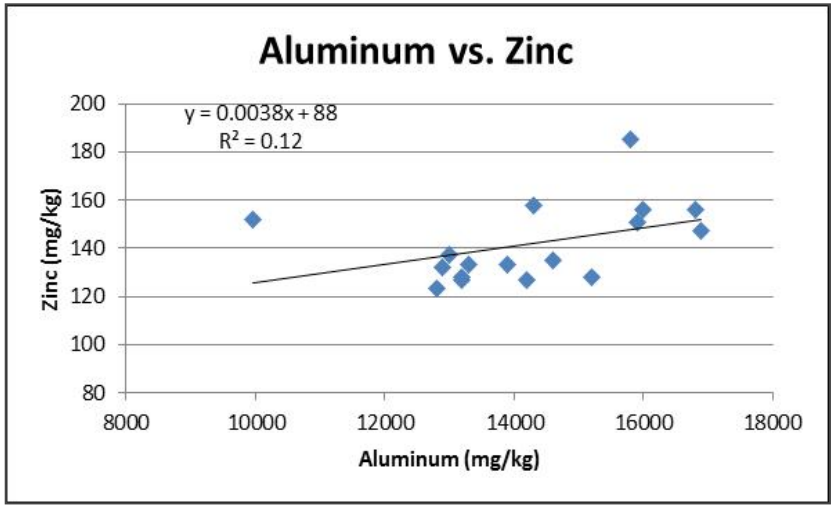
Figure 10

Geochemical Relationships: Aluminum vs. Iron, Copper, Lead and Zinc
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, NY









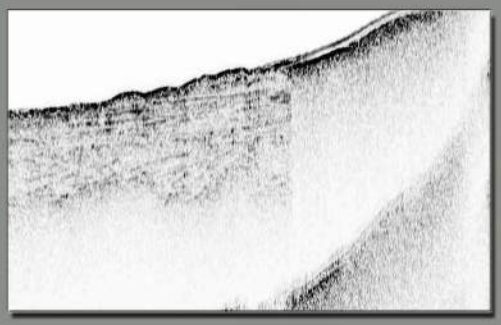
ATTACHMENT A

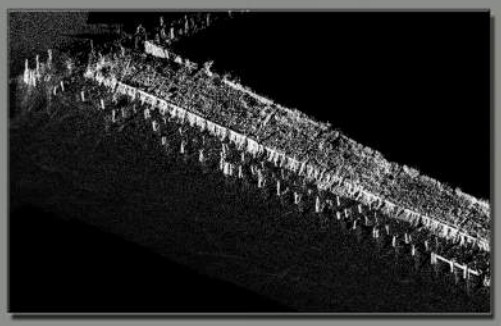
HYDROGRAPHOC SURVEY REPORT (OCEAN SURVEYS INC.)

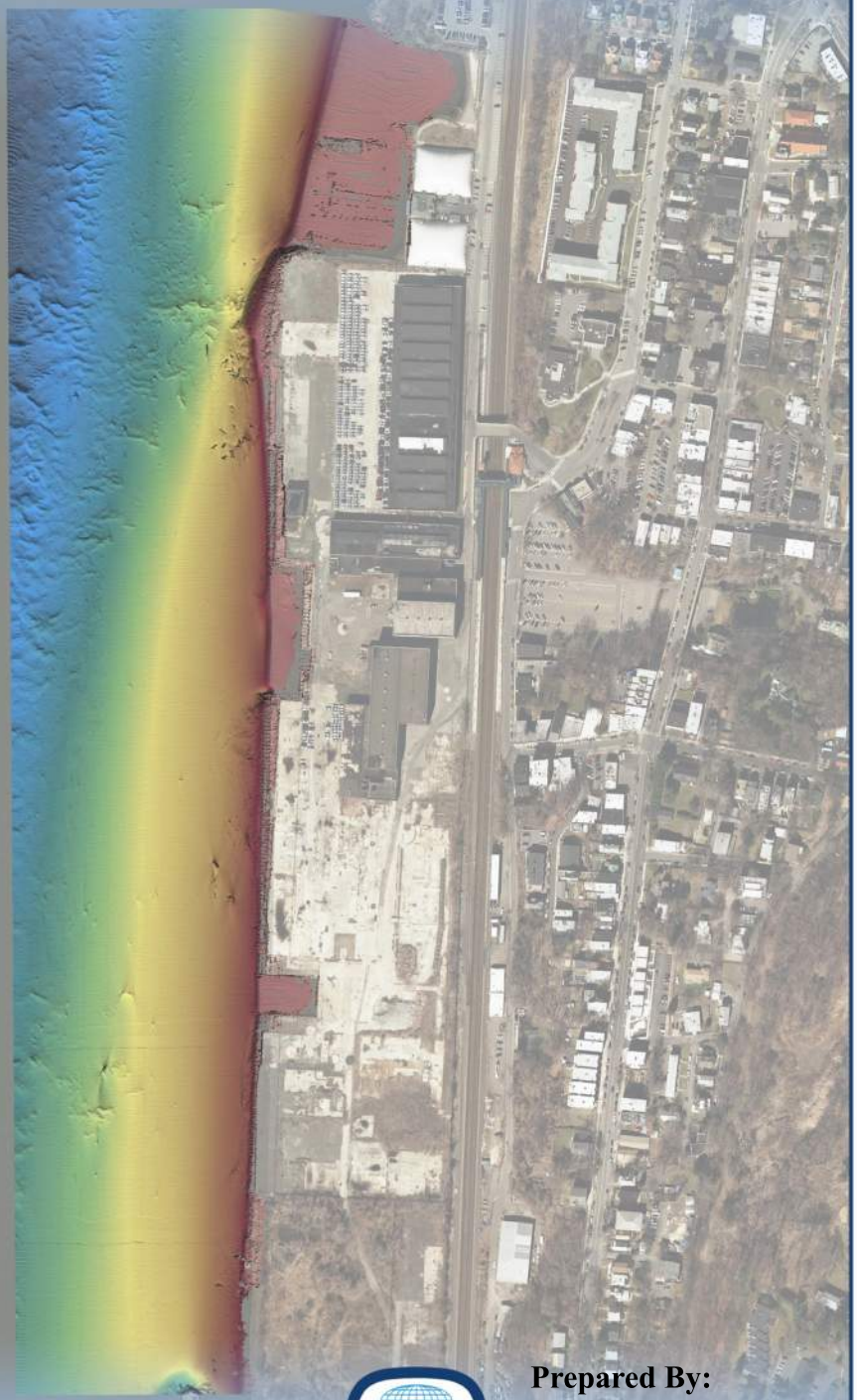
Final Report

Multibeam Hydrography, Shoreline Laser Scanning, and Subbottom Profiling Survey

Hudson River
Hastings on Hudson, New York







OSI Report #12ES056
5 February 2013

HALEY & ALDRICH

Prepared For:
Haley & Aldrich
8735 Rosehill Road, Suite 340
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OSI

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Ocean Surveys, Inc.
129 Mill Rock Road East
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FINAL REPORT

MULTIBEAM HYDROGRAPHY, SHORELINE LASER SCANNING, AND SUBBOTTOM PROFILING SURVEY
HUDSON RIVER, HASTINGS ON HUDSON, NEW YORK

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FINAL REPORT

MULTIBEAM HYDROGRAPHY, SHORELINE LASER SCANNING, AND SUBBOTTOM PROFILING SURVEY
HUDSON RIVER, HASTINGS ON HUDSON, NEW YORK

1.0 INTRODUCTION

During the period 10 - 16 December 2012, Ocean Surveys, Inc. (OSI) performed a multi-sensor marine geophysical survey in the Hudson River offshore Hastings on Hudson, New York (Figure 1). These investigations were completed under subcontract to Haley & Aldrich, Inc. (H&A) to support remediation of a 28-acre New York State Superfund site once owned by Anaconda Wire and Cable.

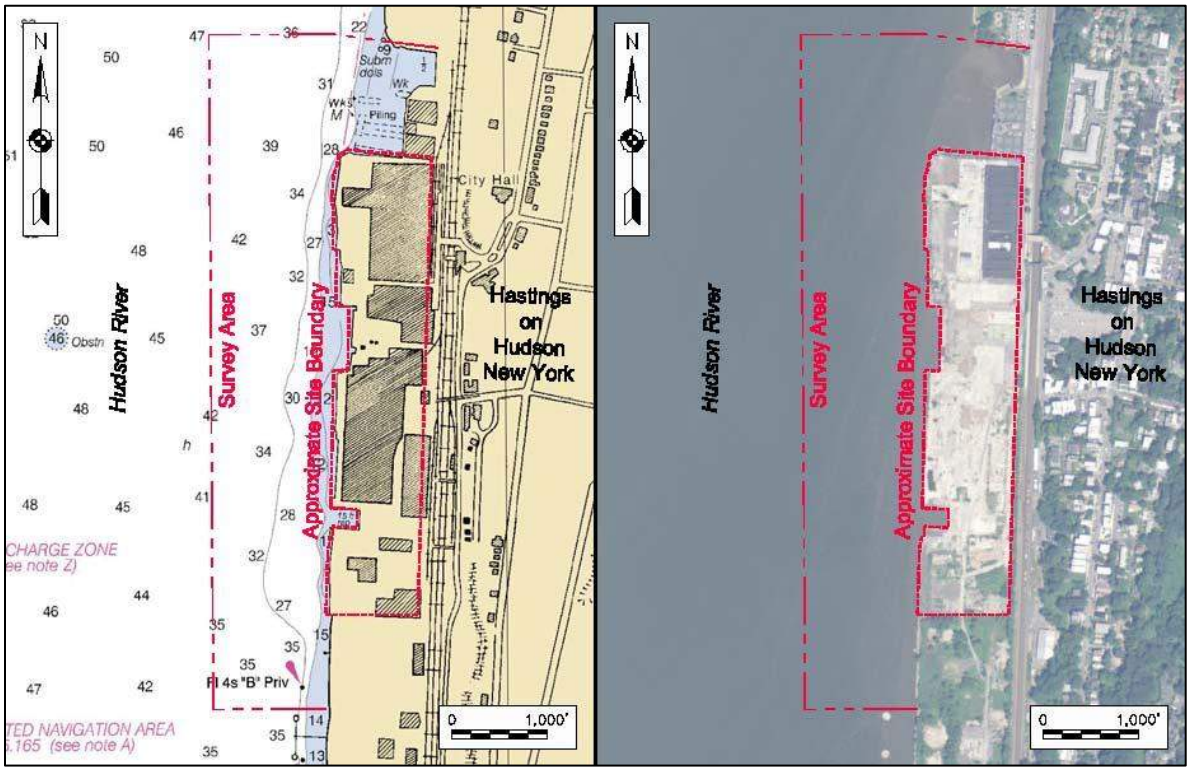

Figure 1. Location of approximate site boundary and survey area in the Hudson River offshore Hastings on Hudson, New York (NOAA Nautical Chart 12346 in background on left; 2011 USGS Aerial Photo in background on right).

2.0 PROJECT SUMMARY

2.1 Project Background and Objectives

The 28-acre site on the riverfront in Hastings on Hudson has a long history of industrial development dating back to the mid-1800's. Companies that have occupied the property and surrounding area included the Hudson River Steam Sugar Refinery, Hastings Pavement Company, National Conduit and Cable Company, American Brass Company, Anaconda Wire and Cable, Atlantic Richfield, and Harbor at Hastings Associations among others. In 1998, Atlantic Richfield's affiliate, AERL, purchased the property and initiated remediation efforts. H&A coordinates the remediation of the site in conjunction with AERL, local and state agencies, and interested parties.

OSI was subcontracted by H&A to acquire marine geophysical data offshore of the site to support remediation. The area investigated included approximately 3,400 feet of the shoreline centered on the site boundary and extended approximately 800 feet into the river. Survey objectives included:

1. Collecting georeferenced XYZ data from the riverward edge of the site up to and including the shoreline and shoreline features within the limits of vessel access; and

2. Collecting subbottom acoustic profiles along transects spaced at 50-foot intervals throughout the site in order to characterize the sediments in the near subsurface.

This report presents the results of a multi-sensor marine geophysical survey performed to address these objectives. To accomplish the project objectives, the following geophysical survey tasks were completed:

- **Conduct a multibeam hydrographic survey** to document water depths and identify features present on the bottom
- **Conduct shoreline laser scanning** to document shoreline features along the riverfront

- **Conduct a subbottom profile survey** to characterize the sediments in the near subsurface

2.2 Summary of Safety Procedures, Field Survey and Equipment

Prior to commencement of field operations, the OSI vessel identified to perform the survey, *R/V Osprey*, underwent the BP Marine Vessel Assurance Process including a vessel inspection following that of the International Marine Contractors Association (IMCA). OSI then submitted the following safety documents to H&A for the project:

- Haley & Aldrich Subcontractor Pre-Qualification Health and Safety Evaluation Form
- OSI Job Safety Analysis (JSA) for Proposed Survey Operations
- OSHA Logs of OSI Work-Related Injuries and Illnesses for 2008-2011
- OSI Experience Modification Ratings for 2009-2012
- OSI Health & Safety Plan and Freshwater Vessel Operations Manual

Upon arriving on site, the OSI survey crew (40-hour OSHA trained and certified) met with Ana Mora of H&A at the project trailer to conduct pre-survey safety meetings. These meetings occurred on 10-11 December 2012 and included a discussion of safety procedures on site, the identification of safety hazards associated with the geophysical survey, and how to mitigate for those hazards. In addition to this pre-survey safety meeting, the OSI crew met with the H&A representative at the beginning and end of each survey day throughout the investigation for a safety briefing onboard the vessel.

In order to obtain a hydrographic and topographic data set of the riverine and shoreline terrestrial environments, multibeam hydrography data were collected at or near high tide in areas accessible by the survey vessel, and shoreline laser scanning was conducted at or near low tide allowing an overlap of the two data sets. Trackline spacing for these investigations were variable, and were designed to achieve near full bottom coverage for the accessible areas of the site.

The subbottom profile survey entailed collection of both Chirp and dual-frequency subbottom data concurrently along 50-foot spaced shore-parallel tracklines. In addition, data were collected along shore-perpendicular "tie" lines at varying distances throughout the survey area for quality control. Figure 2 illustrates tracklines along which subbottom data were collected.

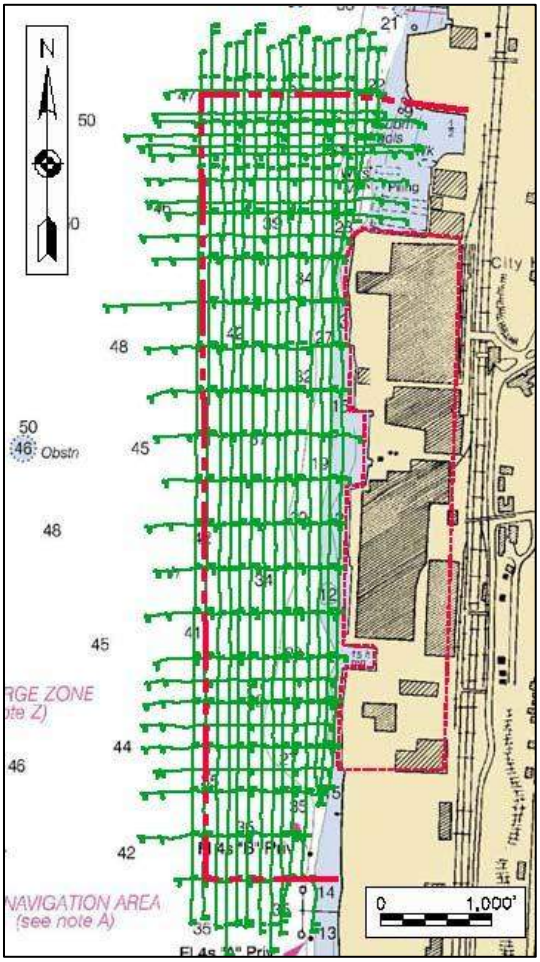

Figure 2. Subbottom data survey tracklines shown in green (NOAA Nautical Chart 12346 in background).

Survey operations were conducted by a two person survey crew consisting of a project manager/hydrographer and a geologist/geophysicist aboard OSI's *R/V Osprey*, a shallow draft 25-foot fiberglass survey vessel equipped with a fully-enclosed cabin, dual-outboard motors and the following survey instrumentation:

- *Applanix POS MV RTK Global Positioning System Interfaced with an On Site Trimble 750 GPS Base Station*

- *HYPACK Navigation and Data-Logging Computer System*
- *Reson SeaBat 7125 Multibeam Echosounder*
- *Sea-Bird Electronics SBE19plus SEACAT Profiler*
- *MDL Dynascan Laser Scanner*
- *Odom Echotrac Mark II Dual-Frequency Echosounder*
- *EdgeTech 3100XS 2-16 kHz Chirp Subbottom Profiling System*

Specification sheets for equipment used during the survey are available upon request. Operational procedures employed to collect the data can be found in Appendix 1. Figures 3 and 4 illustrate the equipment configuration used onboard the survey vessel. During hydrographic and laser scanning operations (Figure 3), the Reson SeaBat 7125 echosounder was hard mounted to the starboard side of the vessel approximately midships and the MDL Dynascan laser scanner was hard mounted to the cabin roof on the starboard side of the vessel. During geophysical operations (Figure 4), the Odom Echotrac Mark II Dual-Frequency Echosounder transducer was hard mounted to the starboard side of the vessel approximately midships and the Chirp SB216 was towed three feet astern of the transducer on the starboard side of the vessel.

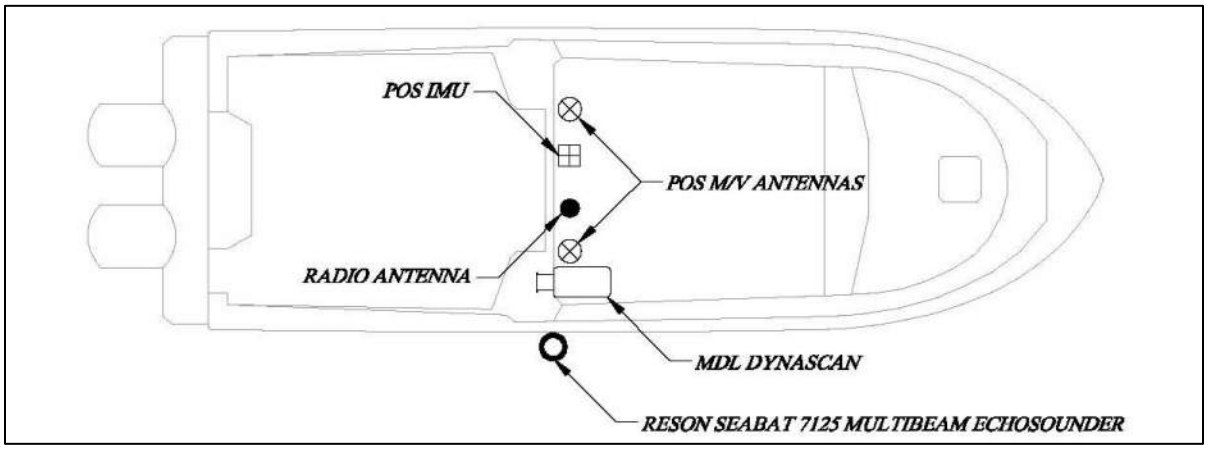

Figure 3. General equipment configuration and layout aboard the *R/V Osprey* during hydrographic and laser scanning survey operations.

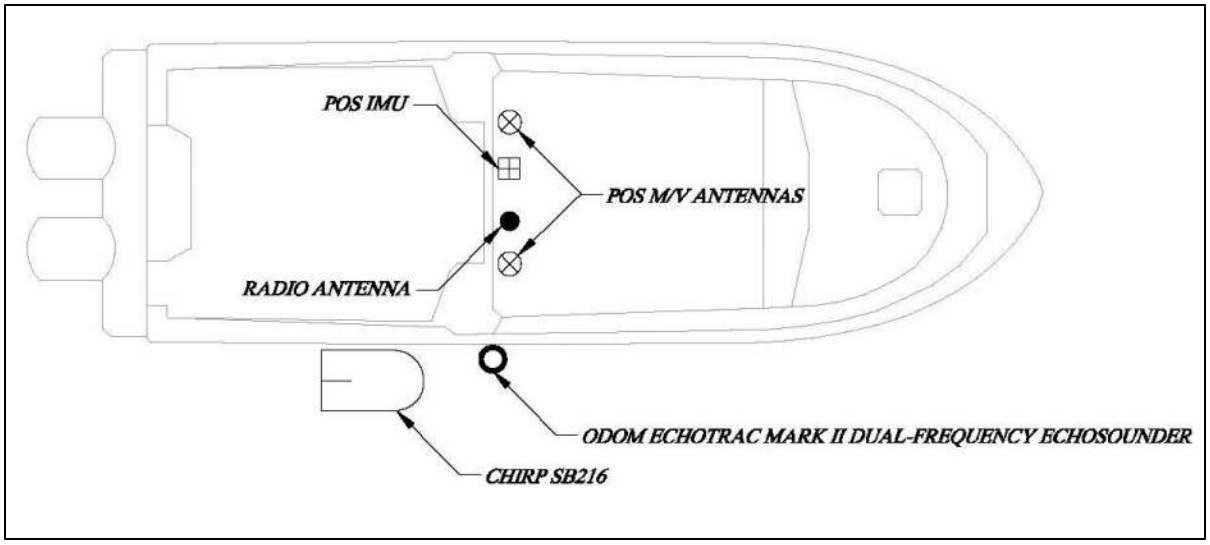

Figure 4. General equipment configuration and layout aboard the *R/V Osprey* during subbottom survey operations.

2.3 Horizontal and Vertical Control

Prior to starting survey operations, it was necessary for the field crew to establish a shore based real-time kinematic (RTK) Global Positioning System (GPS) reference station on a known benchmark to provide position correctors to the survey vessel and achieve centimeter-level positioning for the field survey. H&A agreed to provide the horizontal and vertical measurements for two control points on site including one point on which the GPS base station would be installed and one point along the shoreline to be used as a daily navigation check. Once onsite, horizontal and vertical measurements were only available for the base station control point "WCP 120". This point is a drill hole marked with an orange triangle situated on a concrete pad approximately 175 feet south-southwest of the H&A project trailer on site (Figure 5a and 5b). Only vertical measurements were available for the second control point "HHBOLT" which was to be used for daily navigation checks. This point is an "X" marked on a large steel bolt extending horizontally from z-sheet along the shoreline near the southwest corner of the site approximately 1,575 feet south-southwest of the H&A project trailer (Figure 5a and 5c). OSI needed additional control on site to assure accuracy of the GPS system. H&A then supplied the OSI survey crew with horizontal measurements for two alternate points on site "N01" and "S08. Once the GPS base station had been set up on "WCP 120" these points were surveyed and found to be within 0.1 feet of horizontal

measurements provided by H&A, and thus verified the accuracy of horizontal control on site. OSI then established the horizontal position of "HHBOLT" by occupying the point for one minute and averaging position information recorded during that time. Vertical measurements made by OSI of this point were within 0.01 feet of the elevation provided by H&A and thus verified the accuracy of vertical control on site. The primary control points utilized for this study have been listed in Table 1 below.

Project horizontal reference is the NY State Plane Coordinate System, East Zone (3101), NAD 83 in US Survey Feet. Project vertical reference is the North American Vertical Datum of 1988 (NAVD88), in feet.

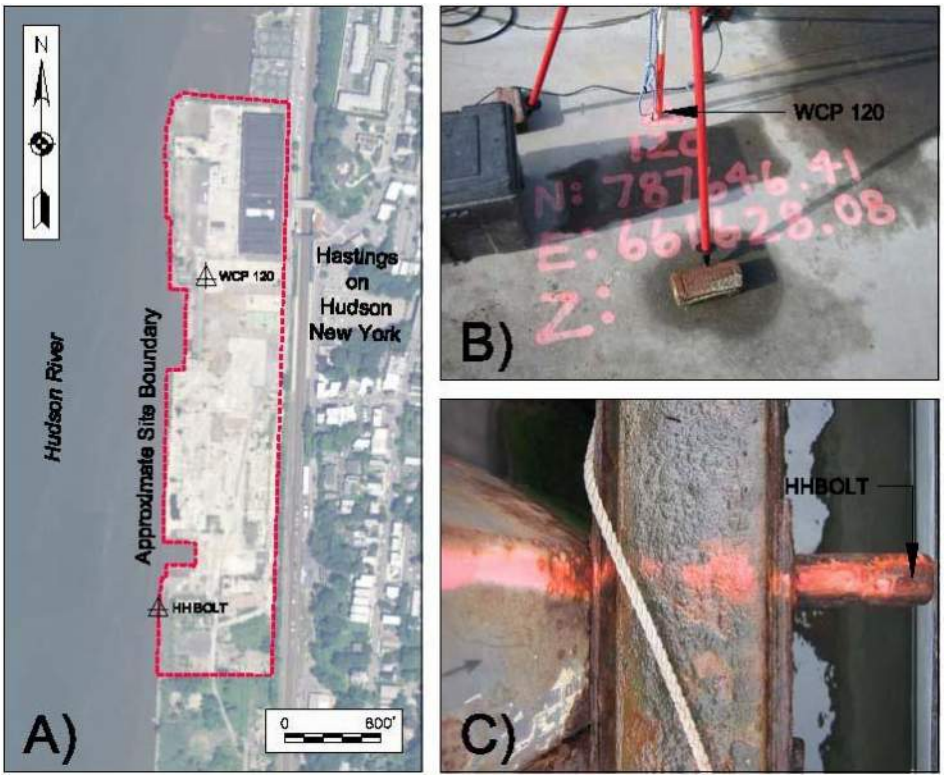

Figure 5. The location of onsite control is shown above in (A). The GPS base station was established on control point "WCP 120" shown in (B). "HHBOLT", shown in (C), was used as a daily navigation check during survey operations.

Table 1
Project Control

Control Point	Position *	NAVD88 Elevation	Description
WCP 120	N 787646.41 E 661628.08	7.97 ft	Point where RTK GPS base station was setup; this point is a drill hole marked with an orange triangle situated on a concrete pad approximately 175 feet south-southwest of the H&A project trailer on site
HHBOLT	N 786262.48 E 661429.15	2.96 ft	Point used for daily navigation check; this point is an "X" marked on a large steel bolt extending horizontally from z-sheet along the shoreline near the southwest corner of the site approximately 1,575 feet south-southwest of the H&A project trailer

*Note: Position coordinates referenced to the New York State Plane Coordinate System, East Zone (3101), in feet (NAD83).

2.4 Chronology of Field Operations

Table 2 provides a chronology of field operations:

Table 2
Chronology of Field Investigation

Task	Date	Description
Mobilization/Safety Meeting	10 Dec 2012	OSI crew transits to Tarrytown, NY, launches *R/V Osprey*, and then meets client on site for project safety meeting.
Mobilization/Safety Meeting	11 Dec 2012	OSI crew completes project safety meeting on site, establishes GPS base station and control on site
Perform Multibeam testing/calibration	12 Dec 2011	Perform multibeam equipment testing/calibration
Multibeam Survey Operations	12-14 Dec 2012	Conduct multibeam survey operations
Laser Scanning testing/calibration	14 Jan 2012	Perform laser scanning equipment testing/calibration
Laser Scanning Survey Operations	14-15 Dec 2012	Conduct laser scanning survey operations
Perform Subbottom testing/calibration	15 Dec 2011	Perform subbottom equipment testing/calibration
Subbottom Survey Operations	15-16 Dec 2012	Conduct subbottom survey operations. Survey completed
Demobilize vessel	17 Dec 2012	Vessel and crew demobilize on-site and depart

3.0 DATA PROCESSING AND PRODUCTS

Following completion of the field investigation, the acquired data sets were processed and interpreted. For a more detailed discussion of processing and analysis methods followed by OSI, refer to Appendix 2. Final data are presented in plan view at a scale of 1 inch = 50 feet on nine drawing sheets (30 by 42 inches). Table 3 summarizes the data presented on each project drawing.

Table 3
Overview of Project Drawings

Drawing	Data Presented
1 – Elevation Contours	One-foot elevation contours based on processed sounding and laser scan data.
2 – Sun-Illuminated Display	Sun-illuminated colorized elevation plan based on processed sounding and laser scan data.
3 – Subbottom Profile Tracklines and Subsurface Interpretation.	Includes all subbottom survey vessel tracklines and an overview characterization of sediments in the near subsurface (via review of the subbottom profile data).

All drawings are provided separately in full-scale. Digital drawing files (AutoCAD 2004 format), interpreted Chirp subbottom profiles, a digital XYZ file in ASCII format of multibeam and laser scanning data gridded to 2 feet cells, and a copy of this report (PDF format) are provided on a disc included in a sleeve at the end of the original copy of this report. All raw digital data files acquired during the course of the survey (HYPACK, laser scan, and subbottom profile) will be archived in-house and are available upon request.

4.0 DATA ANALYSIS AND DISCUSSION

This section discusses findings from the hydrographic, shoreline laser scanning, and subbottom profiling surveys. Elevations discussed in the following sections are referenced to the NAVD88 datum. Seasonal variations, storm events, and/or man's influence since the time of the surveys may have altered conditions reported herein.

4.1 Hydrographic Survey and Shoreline Laser Scanning Data

Hydrographic data acquired within the survey limits ranged from approximately 0 to -50 feet with maximum depths observed in the northwest offshore corner of the site. Figure 6 illustrates characteristic shoreline and riverbed features identified within the survey area. Along the shoreline, armor stone, z-sheet, debris, and pilings associated with shore protection efforts were identified and mapped with laser scanning equipment. Three well-defined cutout features along the shoreline were identified which may have previously served as docking facilities within the site. Water depths within these cutouts were generally less than three feet. In general, the riverbed slopes steeply along the shoreline and at the entrance to the three cutouts, then slopes more gently further offshore. With the exception of several isolated features described below, the riverbed appears generally featureless close to shore and becomes more hummocky offshore with sand waves evident in the northwest corner of the site.

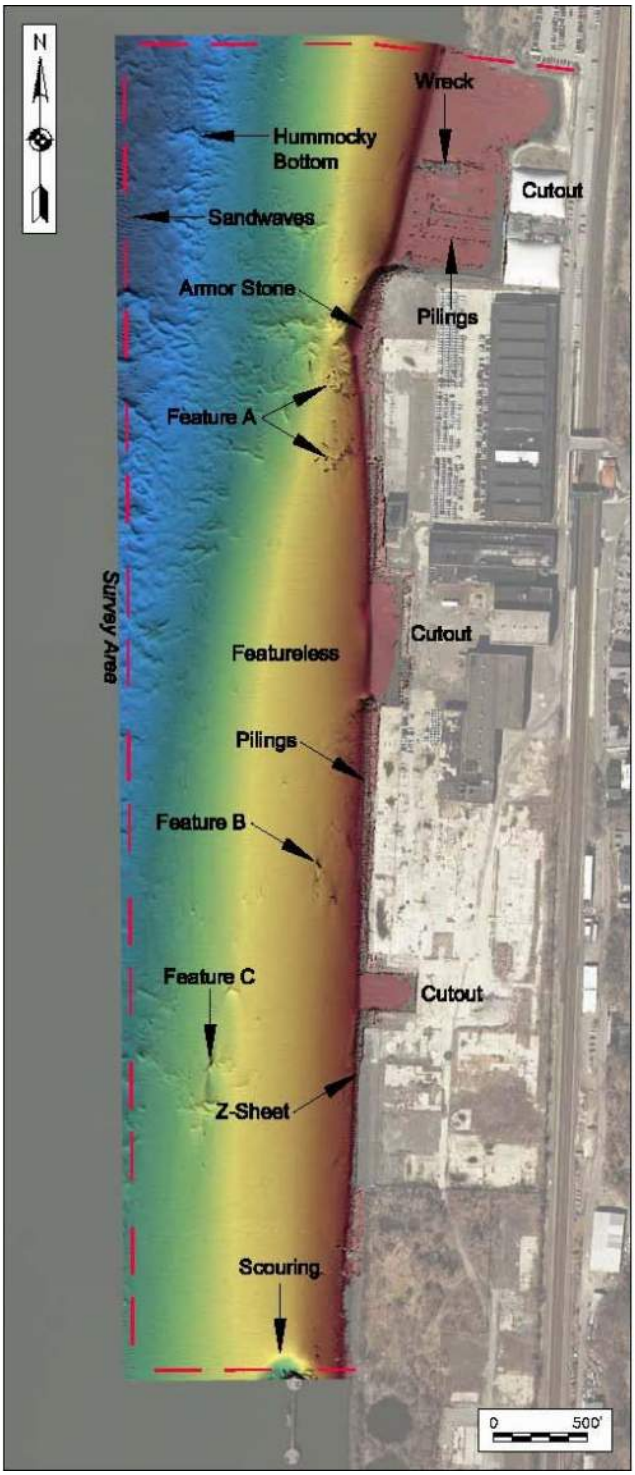

Figure 6. Hydrography and shoreline features within the survey area.

As documented in Project Drawings 1 and 2, and illustrated in Figure 6, numerous isolated features were identified on the

riverbed including a sunken barge approximately 100 feet long and 25 feet wide and a large number of abandoned pilings in the northernmost cutout. The three most prominent features have been designated A, B, and C. Feature A, located along the shoreline in the north end of the site, exhibits up to three feet of relief and likely represents broken pilings scattered along the riverbed. Further south, Features B and C exhibit three and four feet of relief respectively and are most likely associated with debris. Within the southeast corner of the site, scouring up to ten feet deep was identified within 60 feet of a large mooring dolphin located just outside of the survey area (Figure 7).

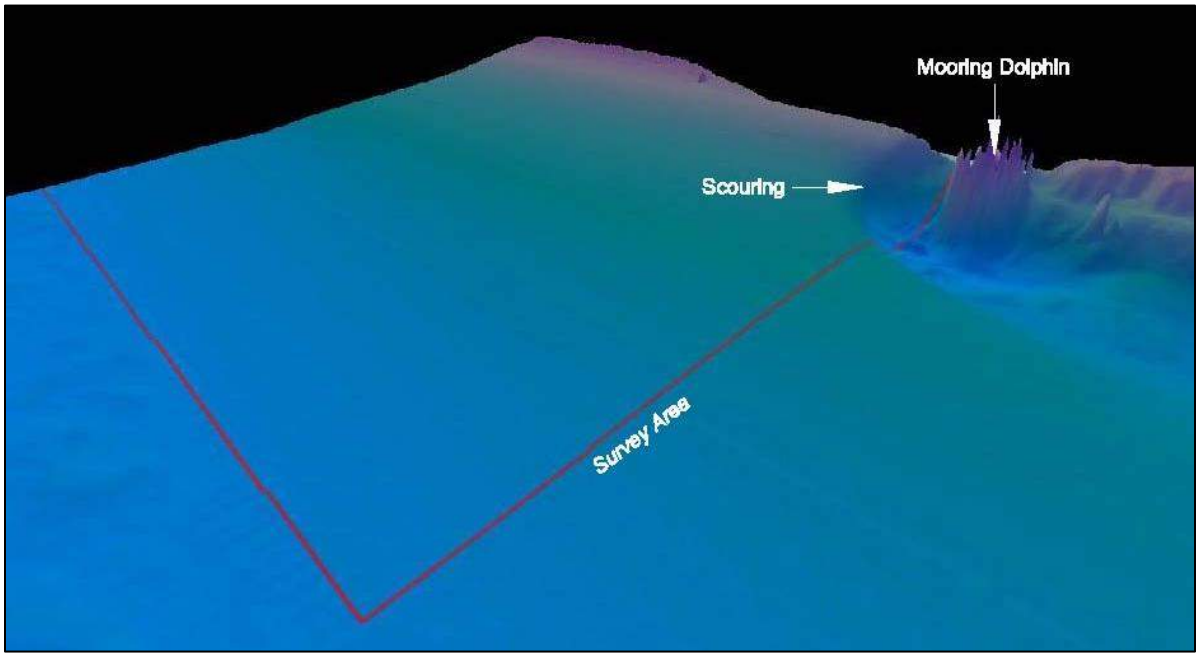

Figure 7. Oblique view of color-shaded relief multibeam data illustrating scouring around mooring dolphin at southeast corner of survey area.

4.2 Subbottom Profiling Data

Subbottom data were attained on site utilizing both a Chirp subbottom profiler and dual frequency depth sounding system. Since geologic site conditions control the success of subbottom acoustic penetration and data developed, employing the two systems provided a broad range of frequencies and energy to investigate the expected variable sequence of sediments in the shallow subsurface. During the subbottom profiling survey both Chirp and dual-frequency depth data were acquired concurrently along all survey tracklines.

Comparison of subbottom profile data collected by the two systems indicates the dual-frequency data did not provide additional insight into characterization of subsurface sediments beyond that attained by the Chirp system. Acoustic reflections identified by the dual-frequency system were typically restricted to the upper five feet and were also identified with the Chirp system which recorded reflections up to 30 feet below the riverbed. Figure 8 shows subbottom data collected by both systems in the same area. The Chirp system was able to identify shallow reflections recorded by the dual-frequency system as well as deeper reflections. Based on these findings data collected by the Chirp profiling system were used as the primary tool to characterize subsurface conditions within the site.

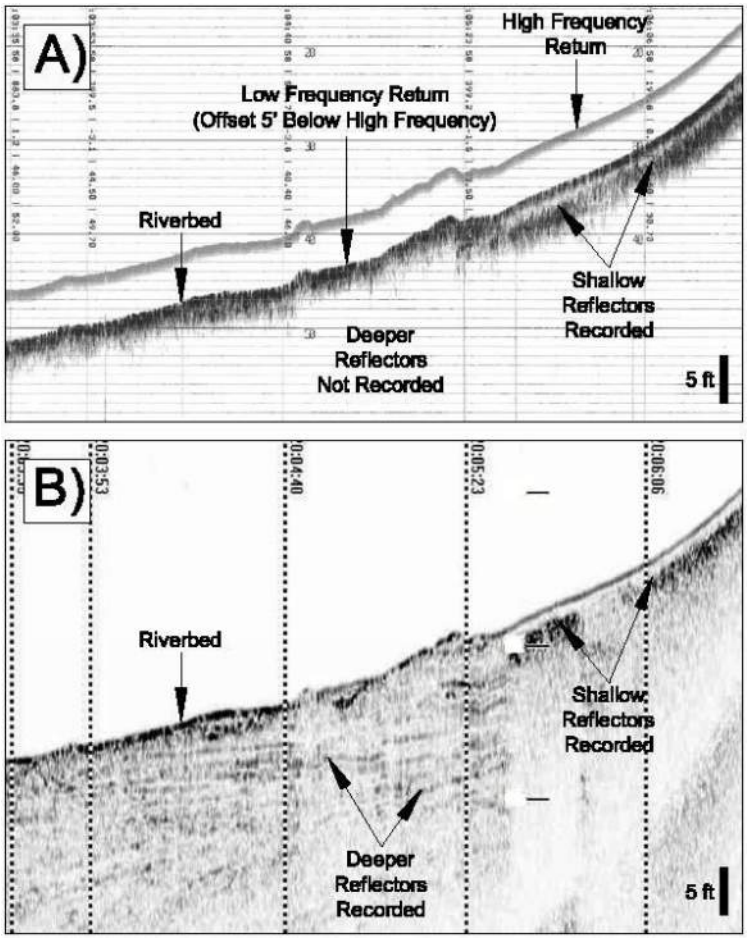

Figure 8. Comparison of dual-frequency subbottom data (A) to Chirp subbottom data (B) collected along shore perpendicular survey line 58. The Chirp subbottom system achieved deeper penetration and proved to be best suited in characterizing subsurface sediments within the survey area.

To better understand the surface and subsurface conditions existing within the site, the Chirp data were characterized along each survey trackline into four distinct Types as listed in Table 4 and discussed below. The aerial extent of these Types is illustrated in Figure 9 and on Drawing 3, Sheets 1-3. Distinction between the different Types and interpreted sediments is interpretative rather than exact and variations within each mapped area will exist.

Table 4
Chirp Data Characterization

Characterization Type	Characterization	Interpretation
1	Chaotic riverbed reflections, no subbottom penetration attained	Surficial debris including armor stone and pilings
2	Smooth riverbed reflections, limited subbottom penetration attained, transparent reflections 1-2 feet thick	1-2 feet of aqueous sediment overlying gaseous sediments
3	Hummocky riverbed reflections, up to 20 feet of subbottom penetration attained, horizontal reflections resolved	Horizontally bedded clay, silt and sand
4	Sandwaves on riverbed, no subbottom penetration attained	Compact sand

Type 1 reflections are characterized by chaotic riverbed reflections and lack of acoustic penetration below as shown in Figure 10. These characteristic reflections were found to be scattered along the shoreline and are interpreted to represent armor stone, pilings, and man-made debris associated with shore protection efforts at the site.

Apart from the Type 1 areas, the majority of the nearshore portion of the site exhibited Type 2 reflections which are characterized by a smooth riverbed with surficial transparent acoustic reflections 1-2 feet thick and lack of acoustic penetration below as illustrated in Figure 11. Type 2 reflections are interpreted to represent a westward thinning veneer of soft aqueous mud, generally 1-2 feet thick, overlying gaseous sediments. Gaseous sediments are defined as unconsolidated materials which contain concentrations of gases generated as a by-product of the decomposition of organic matter. The gases trapped in the sediment inhibit acoustic

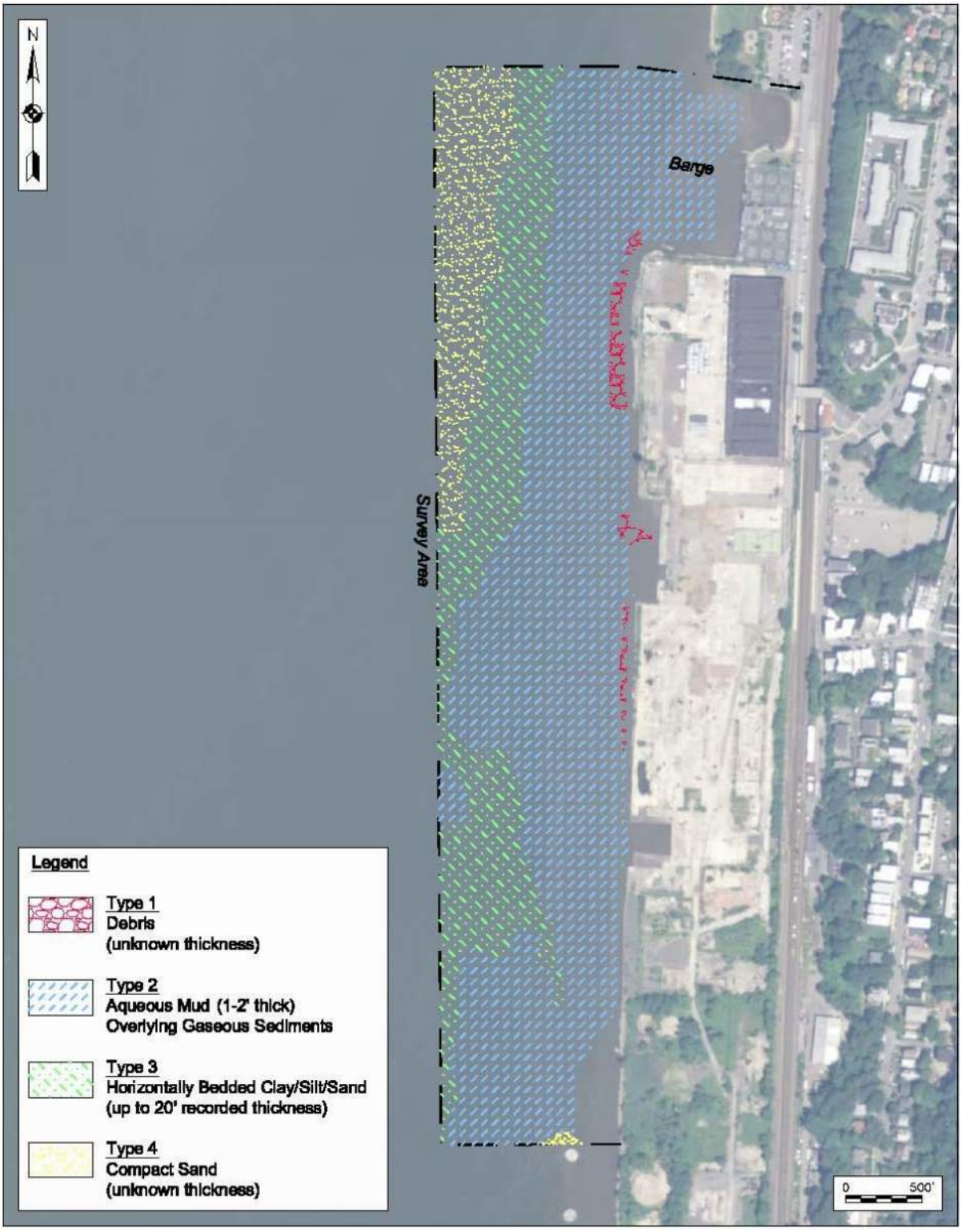

Figure 9. Subsurface characterization types mapped within the survey area through interpretation of Chirp data (2011 USGS Aerial Photo in background).

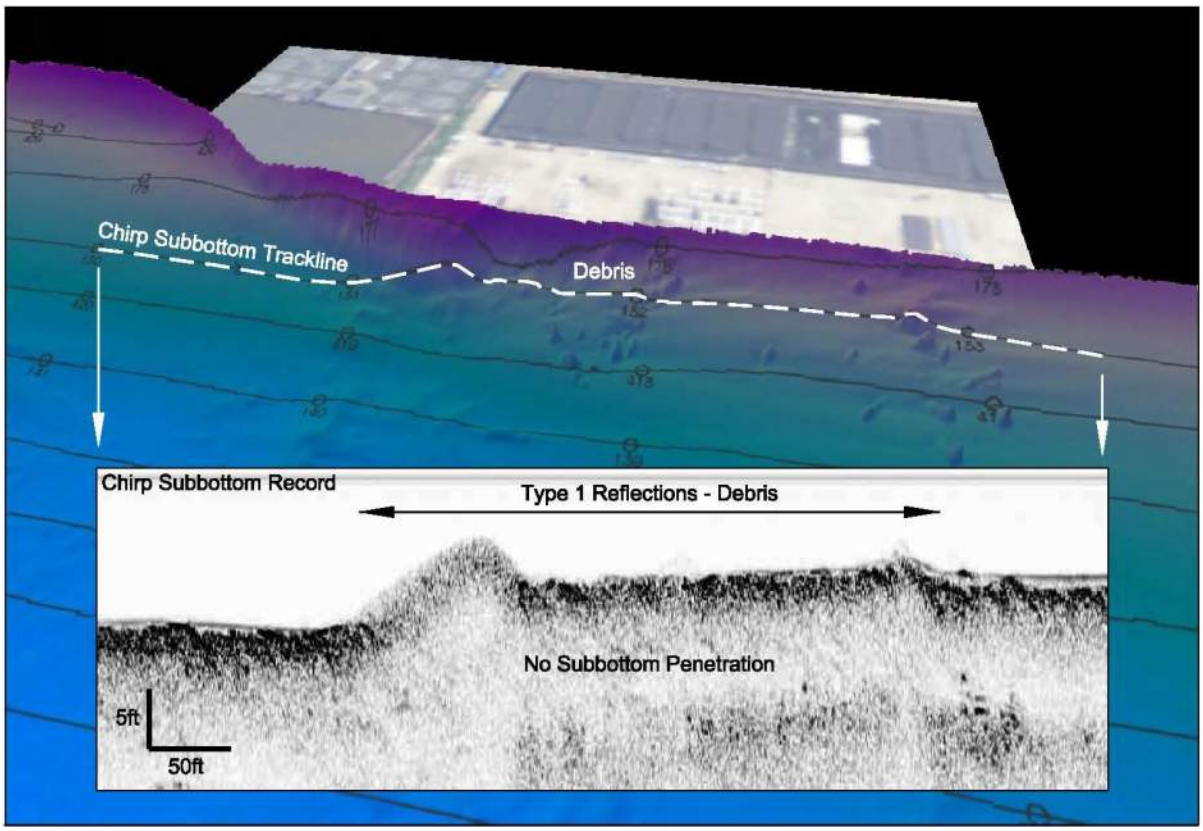

Figure 10. Subbottom record illustrating Type 2 reflections characterized by chaotic riverbed reflections and lack of acoustic penetration below. Type 2 areas are interpreted as debris including armor stone and pilings scattered along the shoreline.

propagation and thus inhibit the subbottom profiler from resolving deeper subsurface acoustic reflections. This is not an uncommon phenomenon and often characterizes sediments in upland rivers, bays and estuaries.

Immediately west of the mapped Type 2 areas, the subsurface was characterized by horizontal reflections up to 20 feet below the riverbed as illustrated in Figure 11. This area, mapped as Type 3, is interpreted to represent horizontally bedded clays, silts, and sands. Subbottom records indicate these horizontally bedded sediments may extend under the Type 2 area to the east where acoustic penetration was inhibited by gaseous sediments in the near subsurface.

The deeper northwest corner of the survey area is typified by Type 4 reflections including scattered sandwaves on the riverbed and a lack of subbottom penetration (Figure 12). These

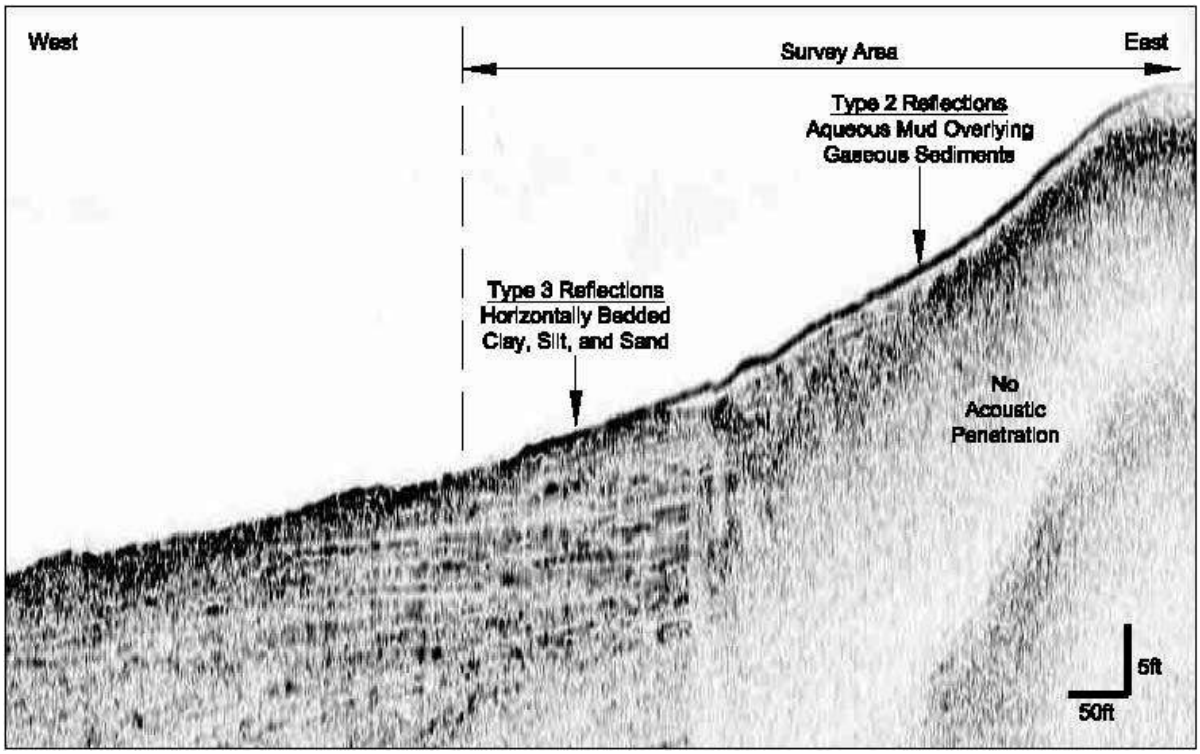

Figure 11. Shore-perpendicular Chirp subbottom record illustrating Type 2 and Type 3 reflections. Type 2 reflections are interpreted as soft aqueous mud overlying gaseous sediments which inhibit acoustic penetration. Type 3 areas are interpreted as horizontally bedded clay, silt and sand.

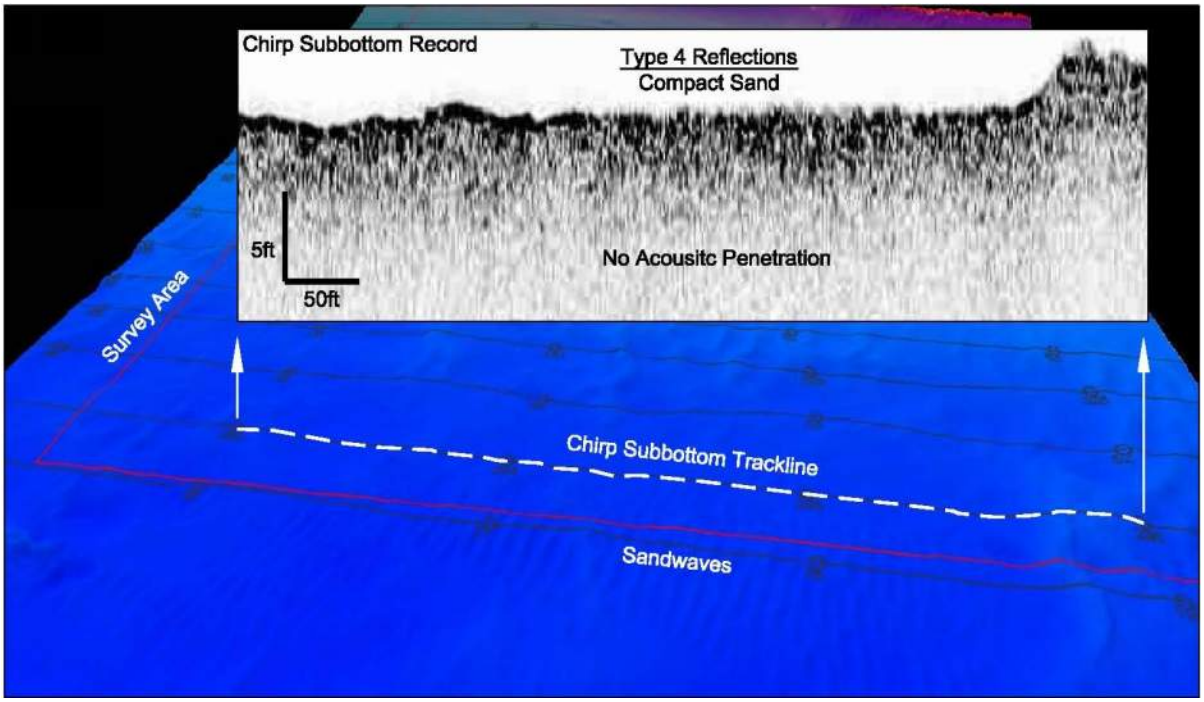

Figure 12. Type 4 reflections are interpreted as compact sand. Evidence includes the presence of sand waves on the riverbed and lack of acoustic penetration.

acoustic reflections along with the clear presence of sandwaves in the multibeam data indicate this area is typified by compact sand at the surface and near subsurface. Type 4 reflections were also identified in the southeast portion of the site within a scour hole surrounding a mooring dolphin.

5.0 SUMMARY AND RECOMMENDATIONS

A multi-sensor marine geophysical survey including the acquisition of multibeam soundings, shoreline laser scanning, and subbottom profiling data was performed in the Hudson River offshore of a designated New York State Superfund site in Hastings on Hudson, NY. The objective of these investigations was to document current conditions in the offshore site to support remediation of the area.

Laser scanning and hydrographic data documented the presence of armor stone, pilings, and z-sheet along the shoreline associated with shore protection efforts. Water depths documented within the site range from approximately 0-50 feet NAVD88. Three shallow cutouts less than 3 feet deep were identified along the shoreline. In general, the riverbed slopes offshore and to the northwest with slope grades greatest along the shoreline. With the exception of several isolated features scattered throughout the site, the nearshore riverbed appears generally featureless while the riverbed in the deeper portions of the survey area to the northwest appears more hummocky with sand waves evident along the northwest corner of the site. Several large features were identified within the site that could potentially be problematic to remediation or removal of contaminated sediments. The largest of the features appears to be a sunken barge approximately 100 feet by 25 feet identified in a shallow cut out along the shoreline in the northeast corner of the site. Bottom scouring was observed in the southeast portion of the survey area adjacent to two mooring dolphins located outside of the survey area to the south.

To better understand the surface and subsurface conditions existing within the site and assist in planning for future nearshore remediation efforts, chirp subbottom data were characterized into four distinct Types. Type 1 reflections were found scattered along the shoreline and

were characterized by distinct obstructions on the riverbed and a lack of subbottom penetration. These areas are interpreted to represent debris including armor stone and pilings. Types 2 reflections dominated the nearshore portion of the site and were characterized by westward thinning, semi-transparent reflections 1-2 feet thick and a lack of subbottom penetration below. This area is interpreted to represent soft aqueous muds underlain by gaseous sediments. Because of the presence of organic gases in this sediment and the resulting lack of acoustic penetration, sediments underlying this unit are unknown. Further offshore, Type 3 reflections were mapped which consisted of horizontal reflections recorded up to 20 feet below the riverbed. These areas are interpreted to represent horizontally bedded clay, silt and sand. Type 4 reflections were mapped within the deepest portion of the site in the northwest corner of the survey area. Although subbottom acoustic penetration was not achieved in this area, both the presence of sandwaves in the multibeam data and the character of surficial acoustic reflections in the subbottom data indicate compact sands lie at the surface and shallow subsurface within this area.

Subsurface sediment types described herein were inferred through analysis of the geophysical data. It is highly recommended that geotechnical samples be acquired to groundtruth interpretations presented herein, and provide supplemental data in those areas where subbottom penetration could not be achieved. Geotechnical sampling methods such as cores, borings, and/or grab sampling could be performed. Sample locations should ideally be placed at intersections of subbottom tracklines to provide the best use of the data set.

APPENDIX 1

EQUIPMENT OPERATIONS AND PROCEDURES

Applanix POS MV RTK Global Positioning System Interfaced with an On Site Trimble 750 GPS Base Station

Hypack Navigation Software

Reson SeaBat 7125 400 kHz Multibeam Echosounder

Sea-Bird Electronics 19 Plus SEACAT Profiler

MDL Dynascan Laser Scanner

Odom Echotrac Mark II Dual-Frequency Echosounder

EdgeTech 3100XS 2-16 kHz Chirp Subbottom Profiler

EQUIPMENT OPERATIONS AND PROCEDURES

Applanix POS MV RTK Global Positioning System Interfaced with an On Site Trimble 750 GPS Base Station

The Applanix POS (**P**osition and **O**rientation **S**ystem) MV provides reliable, high-speed and high-precision positioning that utilizes the latest developments in aided inertial technology. The system components include a POS computer system (PCS), inertial measurement unit (IMU), primary and secondary GPS antennae, and all power, antenna, and interconnecting data cables. The system not only provides the highest precision DGPS positioning, but also includes motion and compass measurements normally separate from other manufactured GPS systems. The POS MV delivers a full six degree-of-freedom position and orientation solution to provide the following parameters: position (latitude, longitude, elevation), velocity (north, east, vertical), attitude (roll, pitch, true heading), heave (real-time, delayed), acceleration vectors, and angular rate vectors. The POS MV was engineered specifically for areas of problematic GPS/DGPS reception and demanding motion compensation applications, using inertial measurements during GPS dropouts or degraded differential correctors to maintain accurate navigation solutions.

For this project, the POS MV was interfaced with a Trimble 750 base reference station receiver, setup on a known control point onshore, via a radio modem data link for receiving differential corrections. The radio modem is interfaced to the POS MV receiver via RS232 connection. In this system configuration, the manufacturer states a horizontal position accuracy of ±2 cm. The POS MV system is interfaced to the HYPACK navigation software for trackline control and data logging.

Vertical positioning of the survey vessel and depth sounder transducers was also accomplished using the POS MV RTK system. Using an ellipsoid height established for the base GPS station, and a published geoid model for the region encompassing the survey area, HYPACK navigation software calculates elevations of designated sensors on the vessel in real time. In this manner, water depths relative to the project datum are achieved.

HYPACK Navigation Software

Survey vessel trackline control and position fixing were obtained by utilizing an OSI computer-based data-logging package running HYPACK navigation software. The computer is interfaced with the DGPS onboard the survey vessel. Vessel position data were updated at 100-millisecond intervals and input to the HYPACK navigation system which processes the geodetic position data into State Plane coordinates used to guide the survey vessel accurately along preselected tracklines. The incoming data are logged on disk and processed in real time allowing the vessel position to be displayed on a video monitor and compared to each preplotted trackline as the survey progresses. Digitized shoreline, NOAA charts, and the locations of existing structures, buoys, and control points can also be displayed on the monitor in relation to the vessel position. The OSI computer logging system, combined with

the HYPACK software, thus provide an accurate visual representation of survey vessel location in real time, combined with highly efficient data logging capability and post-survey data processing and plotting routines.

Prior to and during the reconnaissance field work, trackline files were generated for use with the navigation software which included the lines to be surveyed each day. Review and interpretation of ongoing investigations allowed new planned line files to be developed for surveying additional areas of interest.

Reson SeaBat 7125 400 kHz Multibeam Echosounder

Precision swath water depth measurements were obtained by using a Reson SeaBat 7125 digital multibeam echosounder capable of recording high resolution water depths up to 175 meters. The SeaBat 7125 is a dual-frequency MBES System with operational frequencies of 200 kHz or 400 kHz. For this project, the echosounder's 400 kHz capability was employed. At this frequency the 7125 system illuminates a swath of the seafloor that is 140º across track by 1º along track with a maximum ping rate of 50 Hz. The system can be configured to collect 240 or 512 equidistant beams with a depth resolution of 6 mm. Digital data were output through the Ethernet data port and displayed in real time on a high-resolution color monitor.

Sea-Bird Electronics SBE19*plus* SEACAT Profiler

Water column velocity measurements were logged a minimum of three times daily using Sea-Bird Electronics 19*plus* SEACAT Profiler. The SBE 19*plus* is the next generation personal CTD, bringing numerous improvements in accuracy, resolution, reliability and ease-of-use. The 19*plus* samples at 4 Hz, has 0.005°C accuracy and has 8 Mbytes of memory. Data are recorded in non-volatile FLASH memory and can be transferred and processed on a PC. The 19*plus* has a fast sampling and pump controlled TC-ducted flow configuration, significantly reducing salinity spiking caused by ship heave.

The sound velocity profiles collected using the Sea-Bird are important for adjusting the multibeam and single beam depth soundings for velocity changes in the water column to attain the highest level depth accuracy possible. Sound velocity is also input to the TrackLink USBL system for ensuring accurate time to distance conversions.

MDL Dynascan Laser Scanner

To map the shoreline and shoreline features above the water's surface, OSI used a vessel-mounted MDL Dynascan Laser scanner. The Dynascan is a fully integrated scanning system which includes the scanning laser (sweep rate up to 20Hz), RTK-GNSS positioning, internal motion compensation, and GNSS heading compensation. The scanning laser is a Class 1 (FDA/IEC) laser: rated as non-hazardous. The surveyor is able to monitor data collection in real-time via an on-board MDL interface and control package as the vessel navigates along

the shoreline. The unit is capable of 360 degree scanning, however, for vessel-mounted applications the "offshore" portion of the scan is usually masked.

Odom Echotrac Mark II Dual-Frequency Echosounder

Shallow subsurface stratigraphy was explored using an Odom Echotrac Mark II dual-frequency echosounder with a 24 and 200 kilohertz transducer. Transmitted power for both high and low channels is individually adjustable via front panel mounted controls. Transmit power is adjustable from the minimum of less than 20 watts in high frequency shallow water applications to over 1600 watts in low frequency deep water versions. Transmit Pulse Width is variable either automatically (actual value dependent on frequency and depth) or manually by keypad entry. The unit is compact, portable, and rugged, built to survive tough field conditions. The high frequency provides precise, high-resolution depth records and the low frequency provides some acoustic penetration of the riverbed and mapping of subsurface reflections depending on local conditions. The Echotrac uses a solid-state thermal printer as well as digital data output (via RS232) which allows integration with the OSI computer-based navigation system including HYPACK software. Other features include internal or external eventing, gain sensitivity controls, and auto scale changing among others. The recorder also incorporates both tide and draft corrections plus a calibration capability for local water mass sound speed. A depth resolution of 0.1 foot is reported by the manufacturer.

EdgeTech 3200-XS 2-16 kHz "Chirp" Subbottom Profiler
(functionally equivalent to EdgeTech 3100 used for this investigation)

Information concerning subsurface stratigraphy was explored through use of an EdgeTech 3200-XS "Chirp" subbottom profiler system operating at frequencies of 2 to 16 kilohertz. The subbottom profiler consists of three components: the deck unit (XStar topside computer, amplifier, monitor, keyboard, and trackball), an underwater cable, and a Model SB216 towed vehicle housing the transducers. Data are acquired, logged, and displayed using the Discover Subbottom software.

The 3200 XS Chirp sonar is a versatile subbottom profiler that generates cross-sectional images and collects normal incidence reflection data over many frequency ranges. The system transmits and receives an FM pulse signal generated via a streamlined towed vehicle (subsurface transducer array). The outgoing FM pulse is linearly swept over a full spectrum range of 2-16 kHz for a period of approximately 20 milliseconds. The acoustic return received at the hydrophone array is cross-correlated with the outgoing FM pulse and sent to the deck unit for display and archiving, generating a high-resolution image of the subbottom stratigraphy. Because the FM pulse is generated by a converter with a wide dynamic range and a transmitter with linear components, the energy, amplitude, and phase characteristics of the acoustic pulse can be precisely controlled and enhanced.

During data acquisition, all records were annotated with relevant supporting information, line number, run number, navigation event marks and numbers for correlation with vessel position data.

APPENDIX 2

DATA PROCESSING AND ANALYSIS METHODS

Navigation and Hydrographic Data

Laser Scanning Data

Odom Dual Frequency Data

Chirp Subbottom Profile Data

DATA PROCESSING AND ANALYSIS METHODS

Navigation and Hydrographic Data

Upon completion of the field work, the multibeam data were processed using HYPACK MBMAX 2010 multibeam editor. Digital depth data were first checked against the graphic sounding records for verification of depth quality. Erroneous digital depths caused by floating and drifting debris, air bubbles from passing ship's wake, or fish in the water column were filtered out of the data. The editing process is performed with care to eliminate points attributed to objects in the water column (fish, floating line, etc.) while preserving small features important to the project (boulders and other potential obstructions). The digital files containing vessel position and hydrographic data were then processed to correct for field calibrations (sound velocity profiles) and adjust the sounding data to the required datum. Depth processing also incorporates the heave, pitch, and roll measurements to correct for beam position on the seafloor.

Individual depth data points were used to generate surface models that placed the sounding points into cell bins of a sufficient size to preserve the features of interest. The processed x, y, z data for the survey area was then contoured with QuickSurf Version 5.2 digital terrain modeling (DTM) software at a one foot interval and presented in a plan view format in Drawing 1. A sun-illuminated, colorized elevation plan was generated using a 2 by 2-foot grid cell within the software program Global Mapper, Version 13 and presented on the project drawing.

Laser Scanning Data

The Dynascan Laser scan produces geo-referenced and motion-corrected XYZ data. During post-processing these data are brought into an XYZ editor to remove point scatter, reflected fliers, and to trim extraneous data. Edited laser data is then compared with bathymetric sonar data (e.g. multibeam sonar) in areas of overlap. If necessary, small adjustments are made to account for sensor offsets and system latency.

Odom Dual-Frequency Data

Paper records of dual-frequency subbottom data were compared to subbottom data collected by the Chirp system to determine whether the dual-frequency data could provide additional insight to subsurface conditions within the survey area. Following the review of both data sets concurrently, it was determined that the chirp system recorded shallow subsurface reflections recorded by the dual-frequency system as well as deeper reflections not recorded by the dual-frequency system. Since the dual-frequency data did not provide additional insight, only the Chirp subbottom data is presented herein.

Chirp Subbottom Profile Data

Once back in the office, Chirp subbottom profiles were processed utilizing EdgeTech's Discover-Sub-Bottom, Version 3.42, software package. Processing steps included correcting for sound velocity, and application of overall and time varied gains to obtain maximum resolution for interpretation. Since the vertical axis of the seismic records is signal travel time and not material thickness, a conversion from time to thickness or reflection depth was performed. A constant propagation velocity of 4,921 feet per second (1,500 m/s) was used during depth and thickness computations as an average representative velocity of saturated sediments in the site. Digital images of each subbottom profile were then generated for review and interpretation. Finally, subsurface sediments within the site were divided into distinct types, and the horizontal extent of each type was mapped in AutoCAD. This interpretation is presented as an overlay to the subbottom trackline plot presented on the project drawing.

ATTACHMENT B

SEDIMENT PROFILE IMAGING REPORT
Germano & Associates, Inc.

HALEY ALDRICH

Sediment Profile Imaging Report

June 2014

Benthic Habitat Condition Survey at Hastings on Hudson

Prepared for

Haley & Aldrich, Inc.
70 Blanchard Road, Suite 204
Burlington, MA 01803

H&A File Number: 28612-295

Prepared by

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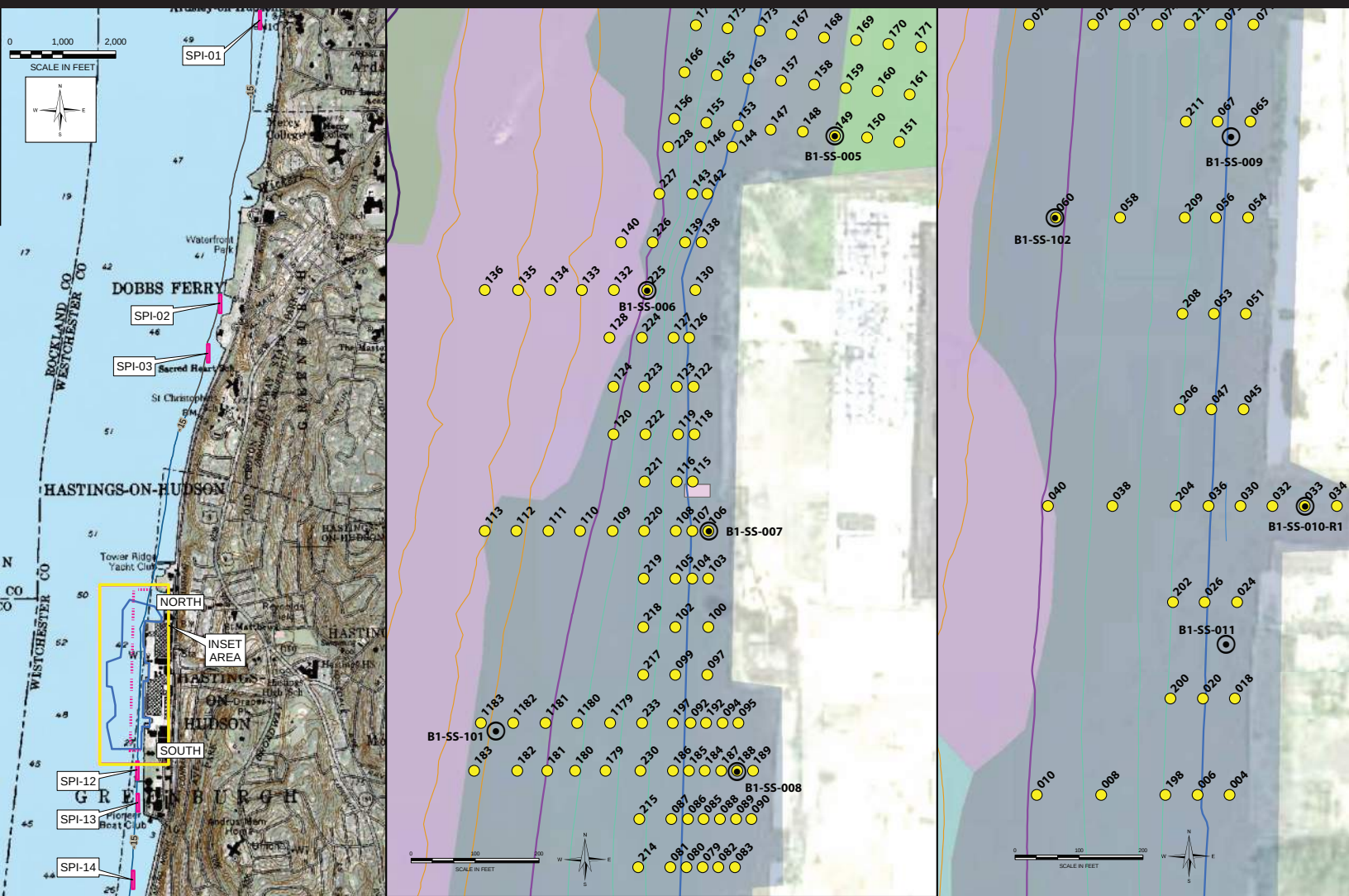

Sediment Profile Imaging Report

BENTHIC HABITAT CONDITION SURVEY AT HASTINGS ON HUDSON

Prepared for

Haley & Aldrich, Inc
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June, 2014

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1.0
INTRODUCTION

In April, 2013, Haley & Aldrich of New York (H&A) developed a Baseline Sampling and Analysis Plan (BSAP) as one requirement of the pre-construction monitoring investigations being done at the former Anaconda Wire & Cable Company site (herein Site). Along with colleagues at Ocean Surveys, Inc. (OSI), scientists from Germano & Associates, Inc. (G&A) were retained as an integral part of the H&A team, tasked with the responsibility for meeting two data quality objectives (DQOs) which was to observe the current condition of:

- the benthic habitat at selected Site and background locations employing Sediment Profile Imaging (SPI) technology;
- the benthic community at selected Site and background locations (by obtaining sediment grab samples to analyze both the numbers and types of organisms).

The results of these monitoring activities will provide a benchmark against which future post-construction performance monitoring can be compared in order to determine if there is any change in benthic habitat as a result of the selected remedial alternatives.

While the data presented in the initial remedial investigation (RI) could be considered as a baseline (Earth Tech 2000), this information is more than a decade old; because most of the offshore area is delineated as a depositional area (Bell *et al*., 2006a,b), conditions have most likely changed since the initial characterization studies performed as part of the RI due to the accumulation of suspended sediment.

2.0
MATERIALS AND METHODS

Between October 16-24, 2013, G&A scientists aboard the *R/V Willing* (Ocean Surveys, Inc., Old Saybrook, CT) collected SPI images and grab samples in the Hudson River above, adjacent to and below the Site. Using an Ocean Imaging Systems Model 3731 sediment profile camera, a total of 614 sediment profile images were collected at 182 stations (generally three photographs per location). To be consistent with historical information obtained during the RI (Tetra Tech, 2000), contemporaneous sediment samples were also obtained using a Petite Ponar grab at 16 stations (Figure 1) during the field sampling operations. The grab samples from the 16 stations were sieved through a 0.5 mm screen, preserved in buffered formalin, and shipped to Barry A.Vittor & Associates, Inc. (Mobile, AL) for sorting, identification and evaluation of the benthic community.

SPI was developed more than three decades ago as a rapid reconnaissance tool for characterizing physical, chemical, and biological seafloor processes and has been used in numerous benthic surveys throughout North America, Asia, Europe, and Africa (Rhoads and Germano 1982, 1986, 1990; Revelas et al. 1987; Diaz and Schaffner, 1988; Valente et al. 1992; Germano et al. 2011). The sediment profile camera works like an inverted periscope. A Nikon D7000 SLR camera (16.2-megapixel) with two 16-gigabyte secure digital (SD) memory cards is mounted horizontally inside a watertight housing on top of a wedge-shaped prism. The prism has a Plexiglas® faceplate at the front with a mirror placed at a 45° angle at the back. The camera lens looks down at the mirror, which is reflecting the image from the faceplate. The prism has an internal strobe mounted inside at the back of the wedge to provide illumination for the image; this chamber is filled with distilled water, so the camera lens always has an optically clear path. The whole wedge and camera assembly is mounted on a moveable carriage within a large stainless steel frame. The frame is lowered to the seafloor on a winch wire, and the tension on the wire keeps the prism in the "up" position. When the frame comes to rest on the seafloor, the winch wire goes slack and the camera prism descends into the sediment at a slow, controlled rate by the dampening action of a hydraulic piston so as not to disturb the sediment-water interface. As the unit descends into the sediment, the frame trips a trigger that activates a time-delay circuit of variable length (operator-selected) to allow the camera to penetrate the seafloor before any image is taken (Figure 2). The knife-sharp edge of the prism transects the sediment, and the prism penetrates the bottom. The strobe is discharged after the appropriate time delay to obtain a cross-sectional image of the upper 20 cm of the sediment bed. The resulting images give the viewer the same perspective as looking through the side of an aquarium half-filled with sediment. After the first image is obtained at the first location, the camera is then raised up about 2 to 3 meters off the bottom to allow the strobe to recharge; a wiper blade mounted on the frame

removes any mud adhering to the faceplate. The strobe recharges within 5 seconds, and the camera is ready to be lowered again for a replicate image. Surveys can be accomplished rapidly by "pogo-sticking" the camera across the sediment bed while automatically recording geopositional fixes on the surface vessel.

Two types of adjustments to the SPI system are typically made in the field: physical adjustments to the chassis stop collars (or adding/subtracting lead weights to the chassis to control penetration in harder or softer sediments) and electronic software adjustments to the Nikon D7000 to control camera settings. Camera settings (f-stop, shutter speed, ISO equivalents, digital file format, color balance, etc.) are selectable through a water-tight USB port on the camera housing and the Nikon Control Pro® software. At the beginning of the survey, the time on the sediment profile camera's internal data logger was synchronized with the internal clock on the computerized navigation system to local time. Details of the camera settings for each digital image are available in the associated parameters file embedded in the electronic image file; for this survey, the ISO-equivalent was set at 640. The additional camera settings used were as follows: shutter speed was 1/250, f9, white balance set to flash, color mode to Adobe RGB, sharpening to none, noise reduction off, and storage in compressed raw Nikon Electronic Format (NEF) files (approximately 20 MB each). Electronic files were converted to high-resolution jpeg (8-bit) format files (3264 x 4928 pixels) using Nikon Capture NX2® software (Version 2.2.7).

A minimum of three replicate images were taken at each station; each SPI replicate is identified by the time recorded on the digital image file in the camera and on disk along with vessel position on the navigation computer. The unique time stamp on the digital image was then cross-checked with the time stamp in the navigational system computer data file. The field crew also recorded redundant written sample logs. Images were downloaded periodically (sometimes after each station) to verify successful sample acquisition or to assess what type of sediment/depositional layer was present at a particular station. Digital image files were renamed with the appropriate station name immediately after downloading on deck as a further quality assurance step.

Test exposures of the Kodak® Color Separation Guide (Publication No. Q-13) were made on deck at the beginning and end of each survey to verify that all internal electronic systems were working to design specifications and to provide a color standard against which final images could be checked for proper color balance. A spare camera and charged battery were carried in the field at all times to insure uninterrupted sample acquisition. After deployment of the camera at each station, the frame counter was checked to make sure that the requisite number of replicates had been taken. In addition, a prism penetration depth indicator on the camera frame was checked to verify that the optical prism had actually penetrated the bottom to a sufficient depth. If images were missed (frame counter indicator or verification from digital download) or the penetration depth was insufficient (penetration indicator), chassis stops were adjusted and/or weights

were added or removed, and additional replicate images were taken. Changes in prism weight amounts, the presence or absence of mud doors, and chassis stop positions were recorded for each replicate image. Images were inspected at high magnification to determine whether any stations needed resampling with different stop collar or weight settings.

Following completion of the field operations, the raw NEF image files were converted to high-resolution jpeg (8-bit) format files (3264 x 4928 pixels) using Nikon Capture NX2 software. Once converted to jpeg format, the intensity histogram (RGB channel) for each image was adjusted in Adobe Photoshop® to maximize contrast without distortion. The jpeg images were then imported to Sigmascan Pro® (Aspire Software International) for image calibration and analysis; one image from each station was selected for analysis. Calibration information was determined by measuring 1-cm gradations from the Kodak® Color Separation Guide. This calibration information was applied to all SPI images analyzed. Linear and area measurements were recorded as number of pixels and converted to scientific units using the calibration information.

Measured parameters were recorded on a Microsoft Excel© spreadsheet. G&A's senior scientist (Dr. J. Germano) subsequently checked all these data as an independent quality assurance/quality control review of the measurements before final interpretation was performed.

2.1 MEASURING, INTERPRETING, AND MAPPING SPI PARAMETERS

2.1.1 Sediment Type

The sediment grain-size mode and range were visually estimated from the color images by overlaying a grain-size comparator that was at the same scale. This comparator was prepared by photographing a series of standard sediment samples that ranged from coarse silt/granule to sand sized particles (Udden-Wentworth size classes) with the SPI camera. Seven grain-size classes were on this comparator: >4 phi (silt-clay), 4-3 phi (very fine sand), 3-2 phi (fine sand), 2 - 1 phi (medium sand), 1-0 phi (coarse sand), 0 - (-1) phi (very coarse sand), < -1 phi (granule and larger). The lower limit of optical resolution of the photographic system was about 62 microns, allowing recognition of grain sizes equal to or greater than coarse silt ($\geq$ 4 phi). The accuracy of this method has been documented by comparing SPI estimates with grain-size statistics determined from laboratory sieve analyses (Germano et al. 2011).

The comparison of the SPI images with Udden-Wentworth sediment standards photographed through the SPI optical system was also used to map near-surface

stratigraphy such as sand-over-mud and mud-over-sand. When mapped on a local scale, this stratigraphy can provide information on relative transport magnitude and frequency.

2.1.2 Prism Penetration Depth

The SPI prism penetration depth was measured from the bottom of the image to the sediment-water interface. The area of the entire cross-sectional sedimentary portion of the image was digitized, and this number was divided by the calibrated linear width of the image to determine the average penetration depth. Linear maximum and minimum depths of penetration were also measured. All three measurements (maximum, minimum, and average penetration depths) were recorded in the data file.

Prism penetration is a noteworthy parameter; if the number of weights used in the camera is held constant throughout a survey, the camera functions as a static-load penetrometer. Comparative penetration values from sites of similar grain size give an indication of the relative water content of the sediment. Sediments that are turned over by the feeding and burrowing activity of the macroinvertebrate community (bioturbation) and/or rapidly accumulating sediments tend to have the highest water contents and greatest prism penetration depths.

The depth of penetration also reflects the bearing capacity and shear strength of the sediments. Overconsolidated or relic sediments and shell-bearing sands resist camera penetration. Highly bioturbated, sulfitic, or methanogenic muds are the least consolidated, and deep penetration is typical. Seasonal changes in camera prism penetration have been observed at the same station in other studies and are related to the control of sediment geotechnical properties by bioturbation (Rhoads and Boyer 1982). The effect of water temperature on bioturbation rates appears to be important in controlling both biogenic surface relief and prism penetration depth (Rhoads and Germano 1982).

2.1.3 Small-Scale Surface Boundary Roughness

Surface boundary roughness was determined by measuring the vertical distance between the highest and lowest points of the sediment-water interface. The surface boundary roughness (sediment surface relief) measured over the width of sediment profile images typically ranges from 0.02 to 3.8 cm, and may be related to either physical structures (ripples, rip-up structures, mud clasts) or biogenic features (burrow openings, fecal mounds, foraging depressions). Biogenic roughness typically changes seasonally and is related to the interaction of bottom turbulence and bioturbational activities.

The camera must be level in order to take accurate boundary roughness measurements. In sandy sediments, boundary roughness can be a measure of sand wave height. On silt-clay bottoms, boundary roughness values often reflect biogenic features such as fecal

mounds or surface burrows. The size and scale of boundary roughness values can have dramatic effects on both sediment erodibility and localized oxygen penetration into the bottom (Huettel et al., 1996).

2.1.4 Thickness of Depositional Layers

Because of the camera's unique design, SPI can be used to detect the thickness of depositional and dredged material layers. SPI is effective in measuring layers ranging in thickness from 1 mm to 20 cm (the height of the SPI optical window). During image analysis, the thickness of the newly deposited sedimentary layers can be determined by measuring the distance between the pre- and post-depositional sediment-water interface. Recently deposited material is usually evident because of its unique optical reflectance and/or color relative to the underlying material representing the pre-disposal surface. Also, in most cases, the point of contact between the two layers is clearly visible as a textural change in sediment composition, facilitating measurement of the thickness of the newly deposited layer.

2.1.5 Mud Clasts

When fine-grained, cohesive sediments are disturbed, either by physical bottom scour or faunal activity (such as decapod foraging), intact clumps of sediment are often scattered about the seafloor. These mud clasts can be seen at the sediment-water interface in SPI images. During analysis, the number of clasts was counted, the diameter of a typical clast was measured, and their oxidation state was assessed. The abundance, distribution, oxidation state, and angularity of mud clasts can be used to make inferences about the recent pattern of seafloor disturbance in an area.

Depending on their place of origin and the depth of disturbance of the sediment, mud clasts can be reduced or oxidized. In SPI images, the oxidation state is apparent from the reflectance (see Section 2.1.6). Also, once at the sediment-water interface, these mud clasts are subject to the effects of currents and/or changes in levels of dissolved oxygen. Evidence from laboratory microcosm observations of reduced sediments placed within an aerobic environment indicates that oxidation of reduced surface layers by diffusion alone is quite rapid, occurring within 6 to 12 hours (Germano 1983). Consequently, the detection of reduced mud clasts in an obviously aerobic setting suggests a recent origin. The size and shape of the mud clasts are also revealing; some clasts seen in the profile images are artifacts caused by the camera deployment (mud clots falling off the back of the prism or the wiper blade). Naturally-occurring mud clasts may be moved and broken by bottom currents and animals (macro- or meiofauna; Germano 1983). Over time, these naturally-occurring, large angular clasts become small and rounded.

2.1.6 Apparent Redox Potential Discontinuity Depth

Aerobic near-surface marine sediments typically have higher reflectance relative to underlying hypoxic or anoxic sediments. Surface sands washed free of mud also have higher optical reflectance than underlying muddy sands. These differences in optical reflectance are readily apparent in SPI images; the oxidized surface sediment contains particles coated with ferric hydroxide (an olive or tan color), while reduced iron sulfides below this oxygenated layer are darker, generally gray to black (Fenchel 1969; Lyle 1983). The boundary between the colored ferric hydroxide surface sediment and underlying gray to black sediment is called the apparent redox potential discontinuity (aRPD).

The depth of the apparent RPD in the sediment column is an important time-integrator of dissolved oxygen conditions within sediment porewaters. In the absence of bioturbating organisms, this high reflectance layer (in muds) will typically reach a thickness of 2 mm below the sediment-water interface (Rhoads 1974). This RPD depth is controlled by the diffusion rate of molecular oxygen into the sediment/water interface and the oxygen demand of the sediment and associated microflora. In sediments that have very high sediment oxygen demand (SOD), the sediment may lack a lighter (high reflectance) layer even when the overlying water column is aerobic.

In the presence of bioturbating macrofauna, the thickness of the high reflectance layer may be several centimeters. The relationship between the thickness of this high reflectance layer and the presence or absence of free molecular oxygen in the associated porewaters must be considered with caution. The actual RPD is the boundary or horizon that separates the positive Eh region of the sediment column from the underlying negative Eh region. The exact location of the Eh = 0 boundary can be determined accurately only with microelectrodes; hence, the relationship between the change in optical reflectance, as imaged with the SPI camera, and the actual RPD could only be determined by making *in situ* Eh measurements. For this reason, the optical reflectance boundary, as imaged, was described in this study as the "apparent" RPD and it was mapped as a mean value. In general, the depth of the actual Eh = 0 horizon will be either equal to or slightly shallower than the depth of the optical reflectance boundary (Rosenberg *et al*., 2001). This is because bioturbating organisms can mix ferric hydroxide-coated particles downward into the bottom below the Eh = 0 horizon. As a result, the apparent mean RPD depth can be used as an estimate of the depth of porewater exchange, usually through diffusion or porewater irrigation (bioturbation). Biogenic particle mixing depths can be estimated by measuring the maximum and minimum depths of imaged feeding voids in the sediment column. This parameter represents the particle mixing depths of head-down feeders, mainly polychaetes.

The rate of depression of the apparent RPD within the sediment is relatively slow in organic-rich muds, on the order of 200 to 300 micrometers per day; therefore this

parameter has a long time constant (Germano and Rhoads 1984). The rebound in the apparent RPD is also slow (Germano 1983). Measurable changes in the apparent RPD depth using the SPI optical technique can be detected over periods of 1 or 2 months. This parameter is used effectively to document changes (or gradients) that develop over a seasonal or yearly cycle related to water temperature effects on bioturbation rates, seasonal hypoxia, SOD, and infaunal recruitment. Time-series RPD measurements following a disturbance can be a critical diagnostic element in monitoring the degree of recolonization in an area by the ambient benthos (Rhoads and Germano 1986).

The apparent mean RPD depth also can be affected by local erosion. The peaks of disposal mounds are commonly scoured by divergent flow over the mound. This scouring can wash away fines and shell or gravel lag deposits, and can result in a very thin surface oxidized layer. During storm periods, erosion may completely remove any evidence of the apparent RPD (Fredette *et al*., 1988).

Another important characteristic of the apparent RPD is the contrast in reflectance at this boundary. This contrast is related to the interactions among the degree of organic loading, the bioturbation activity in the sediment, and the concentrations of dissolved oxygen in an area. High inputs of labile organic material increase SOD and, subsequently, sulfate reduction rates and the associated abundance of sulfide end products. This results in more reduced (lower-reflectance) sediments at depth and higher RPD contrasts. In a large region with low apparent RPD contrasts, smaller discrete areas with images of higher RPD contrasts may be indicative of an input of organic-rich material such as phytoplankton, other naturally-occurring organic detritus, dredged material, or sewage sludge.

Because the determination of the apparent RPD requires discrimination of optical contrast between oxidized and reduced particles, it is difficult, if not impossible, to determine the depth of the apparent RPD in well-sorted sands of any size that have little to no silt or organic matter in them (Painter *et al*, 2007). When using SPI technology on sand bottoms, little information other than grain-size, prism penetration depth, and boundary roughness values can be measured; while oxygen has no doubt penetrated the sand beneath the sediment-water interface due to physical forcing factors acting on surface roughness elements (Ziebis *et al*., 1996; Huettel *et al*., 1998), estimates of the mean apparent RPD depths in these types of sediments are indeterminate with conventional light photography.

2.1.7 Organic Loading, Sedimentary Methane, and Thiophilic Bacterial Colonies

If organic loading is extremely high, porewater sulfate is depleted and methanogenesis occurs. The process of methanogenesis is indicated by the appearance of methane bubbles in the sediment column, and the number and total area covered by all methane

pockets is measured. These gas-filled voids are readily discernable in SPI images because of their irregular, generally circular aspect and glassy texture (due to the reflection of the strobe off the gas bubble).

A primary diagnostic feature indicating an area is suffering from hypoxic conditions due to organic enrichment is the presence of the *Beggiatoa* or *Beggiatoa*-like colonies (note: while we cannot state with certainty that any bacterial colonies seen in profile or plan view images are indeed the genus *Beggiatoa* without microscopic identification, we can state with certainty that these are definitely in the same family of sulfur-oxidizing bacteria that only appear in hypoxic or anoxic conditions). These colonies have diagnostic morphology that has been documented in numerous other sediment profile imaging surveys (Karakassis et al., 2002; Nilsson & Rosenberg, 1997; Rosenberg et al., 2001; Germano et al. 2011). The presence of sulfur-oxidizing bacterial colonies appear when boundary-layer dissolved oxygen concentrations drop into the "hypoxic" range between 0 - 1 mg/L (Rosenberg and Diaz, 1993).

2.1.8 Infaunal Successional Stage

The mapping of infaunal successional stages is readily accomplished with SPI technology. These stages are recognized in SPI images by the presence of dense assemblages of near-surface polychaetes and/or the presence of subsurface feeding voids; both may be present in the same image. Mapping of successional stages is based on the theory that organism-sediment interactions in fine-grained sediments follow a predictable sequence after a major perturbation of the sediment. This theory states that primary succession results in "the predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance. These invertebrates interact with sediment in specific ways. Because functional types are the biological units of interest, our definition does not demand a sequential appearance of particular invertebrate species or genera (Rhoads and Boyer 1982). This theory is presented in Pearson and Rosenberg (1978) and further developed in Rhoads and Germano (1982) and Rhoads and Boyer (1982).

This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (Figure 3).

After an area of bottom is disturbed by natural or anthropogenic events, the first invertebrate assemblage (Stage 1) appears within days after the disturbance. Stage 1 consists of assemblages of tiny tube-dwelling marine polychaetes that reach population

densities of 10^4 to 10^6 individuals/m². These animals feed at or near the sediment-water interface and physically stabilize or bind the sediment surface by producing a mucous "glue" that they use to build their tubes. Sometimes deposited dredged material layers contain Stage 1 tubes still attached to mud clasts from their location of origin; these transported individuals are considered as part of the *in situ* fauna in our assignment of successional stages.

If there are no repeated disturbances to the newly colonized area, then these initial tube-dwelling suspension or surface-deposit feeding taxa are followed by burrowing, head-down deposit-feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. The animals in these later-appearing communities (Stage 2 or 3) are larger, have lower overall population densities (10 to 100 individuals/m²), and can rework the sediments to depths of 3 to 20 cm or more. The feeding and burrowing activity of these animals "loosen" the sedimentary fabric, increase the water content in the sediment, lower the sediment shear strength, and actively recycle nutrients because of the high exchange rate with the overlying waters.

In dynamic estuarine and coastal environments, it is simplistic to assume that benthic communities always progress completely and sequentially through all four stages in accordance with the idealized conceptual model depicted in Figure 3. Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn, 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms co-existing at the same time and place with Stage 3, resulting in the assignment of a "Stage 1 on 3" or "Stage 2 on 3" designation.

While the successional dynamics of invertebrate communities in fine-grained sediments have been well-documented, the successional dynamics of invertebrate communities in sand and coarser sediments are not well-known. Subsequently, the insights gained from sediment profile imaging technology regarding biological community structure and dynamics in sandy and coarse-grained bottoms are fairly limited.

2.1.9 Biological Mixing Depth

During the past two decades, there has been a considerable emphasis on studying the effects of bioturbation on sediment geotechnical properties as well as sediment diagenesis (Ekman *et al*., 1981; Nowell et al., 1981; Rhoads and Boyer, 1982; Grant *et al*., 1982; Boudreau, 1986; 1994; 1998). However, an increasing focus of research is centering on the rates of contaminant flux in sediments (Reible and Thibodeaux, 1999; François *et al*., 2002; Gilbert *et al*., 2003). The two parameters that affect the rate of contaminant flux the greatest are erosion and bioturbation (Reible and Thibodeaux, 1999). The depth to which sediments are bioturbated, or the biological mixing depth, can be an important parameter for studying either nutrient or contaminant flux in sediments. While the

apparent RPD is one potential measure of biological mixing depth, it is quite common in profile images to see evidence of biological activity (burrows, voids, or actual animals) well below the mean apparent RPD. Both the minimum and maximum linear distance from the sediment surface to both the shallowest and deepest feature of biological activity are measured along with a notation of the type of biogenic structure measured. From these, either the minimum, maximum, or average biological mixing depth can be mapped across a surveyed area of interest.

2.2 USING SPI DATA TO ASSESS BENTHIC QUALITY & HABITAT CONDITIONS

While various measurements of water quality such as dissolved oxygen, contaminant levels, or nutrients are often used to assess regional ecological quality, interpretation is difficult because of the transient nature of water-column phenomena. Measurement of a particular value of any water-column variable represents an instantaneous "snapshot" that can change within minutes after the measurement is taken. By the time an adverse signal in the water column such as a low dissolved oxygen concentration is persistent, the system may have degraded to the point where resource managers can do little but map the spatial extent of the phenomenon while gaining a minimal understanding of factors contributing to the overall degradation.

The seafloor, on the other hand, is a long-term integration of sediment processes and overlying water quality; values for any variable measured are the result of physical, chemical, and biological interactions on time scales much longer than those present in a rapidly moving fluid. The seafloor is thus an excellent indicator of environmental quality, both in terms of historical impacts and of future trends for any particular variable.

Physical measurements made from the "optical cores" obtained with the SPI system provide background information about gradients in physical disturbance (caused by dredging, disposal, oil platform cuttings and drilling muds discharge, trawling, or storm resuspension and transport) in the form of maps of sediment grain size, boundary roughness, sediment textural fabrics, and structures. The levels of organic matter and the degree of SOD can be inferred from the optical reflectance of the sediment column and the apparent RPD depth. Organic matter is an important indicator of the relative value of the sediment as a carbon source for both bacteria and infaunal deposit feeders. SOD is an important measure of ecological quality; an accumulation of organic matter can quickly deplete oxygen in sediment by stimulating bacterial respiration, which places an oxygen demand on porewater. Bottom dwellng animals will subsequently have a potentially limited oxygen resource (Kennish, 1986).

The apparent RPD depth is useful in assessing the quality of a habitat for epifauna and infauna from both physical and biological points of view. The apparent RPD depth in

profile images has been shown to be directly correlated to the quality of the benthic habitat in polyhaline and mesohaline estuarine zones (Rhoads and Germano, 1986; Revelas *et al*. 1987; Valente *et al*., 1992). Controlling for differences in sediment type and physical disturbance factors, apparent RPD depths < 1 cm can indicate chronic benthic environmental stress or recent catastrophic disturbance.

The distribution of successional stages in the context of the mapped disturbance gradients is one of the most sensitive indicators of the ecological quality of the seafloor (Rhoads and Germano 1986). The presence of Stage 3 equilibrium taxa (mapped from subsurface feeding voids as observed in profile images) can be a good indication of benthic habitat stability and quality. A Stage 3 assemblage indicates that the sediment surrounding these organisms has not been disturbed in the recent past and that the levels of bioavailable contaminants may be relatively low. These inferences are based on past work, primarily in temperate latitudes, showing that Stage 3 species are relatively intolerant of sediment disturbance, organic enrichment, and sediment contamination. Stage 3 species expend metabolic energy on sediment bioturbation (both particle advection and porewater irrigation) that alters sediment properties, including porewater profiles of sulfate, nitrate, and RPD depth in the sedimentary matrix near their burrows or tubes (Aller and Stupakoff, 1996; Rice and Rhoads, 1989). This bioturbation enhances the breakdown of organic matter by stimulating microbial decomposition ("microbial gardening"). Stage 3 benthic assemblages are very stable and are also called climax or equilibrium seres.

The metabolic energy expended in bioturbation is rewarded by creating a sedimentary environment where refractory organic matter is converted to usable food. Stage 3 bioturbation has been likened to processes such as stirring and aeration used in tertiary sewage treatment plants to accelerate organic decomposition. Physical disturbance, contaminant loading, and/or over-enrichment result in habitat destruction and in local extinction of the climax seres. Loss of Stage 3 species results in the loss of efficiency in bioturbation and may be followed by a buildup of organic matter (sediment eutrophication). Once Stage 3 species are depleted or excluded from an area, they may not reappear for several years. This is due to relatively low rates of recruitment, population increase and ontogenetic growth (Rhoads and Germano, 1986).

The presence of Stage 1 seres (in the absence of Stage 3 seres) can indicate that the bottom is an advanced state of organic enrichment, has been contaminated, or experienced a substantial physical disturbance. Unlike Stage 3 communities, Stage 1 seres have a relatively high tolerance for organic enrichment and contaminants. These opportunistic species have high rates of recruitment, high ontogenetic growth rates, and live and feed near the sediment-water interface, typically in high densities. Stage 1 seres often co-occur with Stage 3 seres in marginally enriched areas. In this case, Stage 1 seres feed on labile organic detritus settling onto the sediment surface, while the subsurface Stage 3 seres tend to specialize on the more refractory buried organic reservoir of detritus.

Stage 1 and 3 seres have dramatically different effects on the geotechnical properties of the sediment (Rhoads and Boyer, 1982). With their high population densities and their feeding efforts concentrated at or near the sediment-water interface, Stage 1 communities tend to bind fine-grained sediments physically, making them less susceptible to resuspension and transport. Just as a thick cover of grass will prevent erosion on a terrestrial hillside, so too will these dense assemblages of tiny polychaetes serve to stabilize the sediment surface. Conversely, Stage 3 taxa increase the water content of the sediment and lower its shear strength through their deep burrowing and pumping activities, rendering the bottom more susceptible to erosion and resuspension. In shallow areas of fine-grained sediments that are susceptible to storm-induced or orbital wave energy, it is quite possible for Stage 3 taxa to be carried along in the water column in suspension with fluid muds. When redeposition occurs, these Stage 3 taxa can become reestablished in an otherwise physically disturbed surface sedimentary fabric.

SPI has been shown to be a powerful reconnaissance tool that can efficiently map gradients in sediment type, biological communities, or disturbances from physical forces or organic enrichment. The conclusions reached at the end of this report are about dynamic processes that have been deduced from imaged structures; as such, they should be considered hypotheses available for further testing/confirmation. Past experience has shown that the most parsimonious explanation is usually the one borne out by subsequent data confirmation.

2.3 BENTHIC SAMPLE COLLECTION AND PROCESSING

A single sediment grab sample was collected for benthic community analysis at each of 16 sediment sampling stations (Figure 1). Upon arrival at the target station, the grab sampler was set in the open position and lowered to the bottom. Upon reaching the bottom, the device was slowly retrieved, causing the bucket to close and retain a sediment sample from the 0 – 6” depth interval. The grab sampler then was pulled up using an electric winch and placed on an outboard stand secured to the survey vessel.

Once each grab sample was determined to be of acceptable quality (i.e., minimal disturbance to the sediment surface and the presence of overlying water within the grab), the sediment was transferred to a stainless steel sieve (0.5 mm mesh screen). The sieve was placed on the outboard stand and river water was pumped through a hose which was used to gently wash away the sediment. Extreme care was taken to ensure that no material on the screen was lost over the side of the sieve while agitating or washing the sample.

The organisms and material (e.g., shells, plant detritus, rock fragments, etc.) retained on the screen were placed into labeled, wide-mouth plastic sample jars and immediately preserved using 10% buffered formalin. Each benthic infaunal sample jar was labeled externally and internally. All samples were delivered to Barry A. Vittor & Associates, Inc.

(BVA) of Mobile, AL for detailed benthic analysis: sorting, enumeration and identification to Lowest Practicable Identification Level (LPIL).

At the BVA laboratory, each benthic sample was sorted with a dissecting microscope, and the preserved specimens identified and counted. Individual organisms were removed from each sample and placed in vials, then labeled by major taxonomic group. Taxonomists with a specialization within each major taxonomic group proceeded to identify the preserved organisms to the LPIL. Quality Assurance and Control procedures (QA/QC) associated with the benthic taxonomic analyses are described in BVA's standard laboratory Quality Assurance Plan.

2.4 DATA ANALYSIS METHODS

Multidimensional scaling (MDS) is an exploratory ordination tool that is useful for reducing multiple variables into a simpler graphical representation to illustrate the dominant structure of relationships among stations in a multivariate dataset.

MDS attempts to reconstruct the relationships among stations, as described by the chosen dissimilarity coefficient, using a specified number of dimensions. The MDS method used here was nonmetric MDS (N-MDS) which is suitable for datasets containing non-normal variables, or variables on mixed measurement scales (e.g., infaunal densities). The N-MDS solution is the result of a numerical iterative search for an ordination of stations, typically in 2 or 3 dimensions, which has the same rank ordering as the original dissimilarities. If the dataset can be reduced to, for example, a two-dimensional plot with low stress (<10 percent), then the N-MDS plot can be viewed as a good representation of the relationships among stations for the full dataset. If a 2- or 3-dimensional representation has high stress, then one can conclude that the variables in the dataset are not highly inter-correlated, and the relationships among stations are not easily simplified to a few dimensions.

The two-dimensional N-MDS plot is an effort to portray all pairwise dissimilarity relationships among stations in two dimensions with an arrangement whose rank ordering matches as closely as possible the rank ordering of all pairwise dissimilarity relationships on the full, original dataset. The two-dimensional representation is found by minimizing "stress" which is a measure of how much the two-dimensional plot deviates from the original relationships. Kruskal's "stress formula one" was used to quantify stress:

$$Stress = 100 \sqrt{\sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \left(d_{ij} - \hat{d}_{ij}\right)^2 \Big/ \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \hat{d}_{ij}^{\,2}}$$

Where d_{ij} is the dissimilarity between the *i*th and *j*th point in the complete dataset, and $\hat{d}_{ij}$ is the Euclidean distance between the same two stations in the two-dimensional N-MDS plot. The smaller the stress value, the better the representation shown in the two-dimensional plot matches the original relationships. The intent for the N-MDS plot is to illustrate the relationships among stations, and not necessarily to use the two dimensions for data reduction (unless stress is sufficiently low). Large-scale patterns in station relationships will still be visible even when the stress value is high. The stress value simply provides a measure of how well the two dimensions capture the structure among stations.

For the N-MDS on the benthic abundance data, the Bray-Curtis dissimilarity coefficient was applied after the data were square-root transformed to reduce the influence of the skewed taxonomic group densities.

The N-MDS configurations were generated using the ***metaMDS*** function in the *vegan* package (Oksanen, *et al*. 2013) in R (R Core Team 2013). The Bray-Curtis coefficients were calculated using the *distance* function in the *ecodist* package (Goslee and Urban, 2007).

Interpretation of the taxonomic drivers, as well as identification of the structuring habitat variables, for the two-dimensional ordination shown in the N-MDS plot was supported by smoothed contour plots. In these contour plots a single variable (e.g., one of the benthic variables contributing to the N-MDS ordination, or an independent habitat variable) was predicted from the MDS axis values via a generalized additive model (GAM). The resulting smoothed response curves are similar to isopleths of the response variable predicted from the two-dimensional orientation of points on the N-MDS plot. From one of these contour plots we can interpret how the contoured variable is related to the similarity, or difference, between stations based on their distance in the N-MDS ordination.

The contour plots were generated using the *ordisurf* function in the *vegan* package (Oksanen *et al*., 2013) in R (R Core Team 2013).

3.0
RESULTS

3.1 SEDIMENT PROFILE IMAGING RESULTS

One replicate image was analyzed from each of the stations surveyed. A complete set of all the summary data measured from each sediment profile image is presented in Appendix A.

Parameters such as boundary roughness and mud clast data (number, size) provide supplemental information pertaining to the physical regime and bottom sediment transport activity at a site. Even though mud clasts are definitive characteristics whose presence can indicate physical disturbance of some form, the mud clasts noted in the images from this survey were either biogenic in origin or artifacts due to sampling (mud clumps clinging to the frame base) and not indicative of physical disturbance or sediment transport activities. Therefore, mud clast data were not used as individual parameters for interpretation.

The results for some SPI parameters are sometimes indicated in the data appendix or on the maps as being "Indeterminate" (Ind). This is a result of the sediments being either: 1) too compact for the profile camera to penetrate adequately, preventing observation of surface or subsurface sediment features, 2) too soft to bear the weight of the camera, resulting in over-penetration to the point where the sediment/water interface was above the window (imaging area) on the camera prism (the sediment/water interface must be visible to measure most of the key SPI parameters like aRPD depth, penetration depth, and infaunal successional stage), or 3) the sediment consisted of uniformly-colored sand lacking a visible aRPD contrast and for which infaunal successional dynamics, generally speaking, are not well-known. All mapped values represent the measurement obtained from a single image.

3.1.1 Grain Size

With the exception of seven stations, the sediments throughout the entire area surveyed were either one of two types: 1) primarily muds (fine-grained, silt-clay sediments with a major mode of $\geq$4 phi Figure 4a-c) or 2) a surface layer of silty, very fine sand over a silt clay foundation (Figure 5). At six locations (3 in the Inset Area North and 3 in the northern reference area; see Figure 4 b-c) rocks, oyster shells, or debris on the bottom prevented the camera prism from penetrating the bottom and getting any useful information (Figure 6). There was one station close to shore in the Inset Area North (Figure 4b) that had poorly-sorted coarse sand (Figure 7). This area is adjacent to a stormwater outfall so this observation may be associated with this type of feature.

3.1.2 Prism Penetration Depth

With the exception of the seven stations mentioned in the previous section where silt-clay sediments were not the dominant grain-size, the variation in prism penetration found throughout the Site (Figure 8 a-c) was a function of infaunal reworking depth, presence of subsurface methane gas, and presence/absence of rocks/shells providing some surface armoring (Figure 9). Prism penetration depth throughout the whole study area (all sampled stations) ranged from 0 – 19.9 cm, with an overall average penetration value of 13.1 cm; with the exception of the three nearshore stations where rocks/shell debris were present, most of the locations sampled in the area adjacent to OU-2 (Figure 8 a-b) had similar penetration values.

3.1.3 Surface Boundary Roughness

Surface boundary roughness ranged from 0.12 to 6.24 cm, with an overall Site average value of 0.75 (Figure 10 a-c); the origin of these small-scale topographic elevations was primarily due to biogenic processes (Appendix A). The larger values measured were caused by physical effects or sampling artifacts caused by the camera prism catching on a shell or rock and dragging it down while disrupting the sediment-water interface (Figure 11); the majority of the values measured in the area adjacent to OU-2 (Figure 10 a-b) had values less than 1.5 cm.

3.1.4 Apparent Redox Potential Discontinuity Depth

The distribution of mean apparent RPD depths ranged from 0.1 – 7.8 cm, with an overall Site average depth of 2.3 cm; the spatial distribution of aRPD depths is shown in Figure 12 a-c. There is a noticeable pattern in aRPD depths at the stations in the OU-2 Site; values are generally higher closer to the shore and decrease with increasing distance from shore (and water depth), until the 30-ft contour is reached and aRPD values reach their nadir, especially at the northwest corner of the Site (Figure 12 b).

3.1.5 Organic Loading, Sedimentary Methane, and Thiophilic Bacterial Colonies

There were no stations surveyed where the overlying water was hypoxic nor was sediment oxygen demand at a level that thiophilic bacterial colonies bloomed; while no *Beggiatoa* mats were detected, there were stations where excess organic enrichment caused subsurface methane to be generated (Figure 13a-c); the presence of subsurface methane generally occurred more often in nearshore stations (indicating organic enrichment is from nearby land run-off; Figure 14) although there were also a few stations in water depths exceeding 30 ft (e.g. Stations 113, 133, and 183) where subsurface methane was found (Figure 13b).

3.1.6 Infaunal Successional Stage

The mapped distribution of infaunal successional stages is shown in Figure 15 a-c; while Stage 3 taxa were prevalent at the reference stations to the north and south of the Site (Figure 15c), they were also quite common at stations adjacent to the Site (Figures 15 a-b and 16). However, the spatial distribution of early successional seres seen in Figure 15b reflects patterns of both physical disturbance (Figure 17) and organic enrichment (Figure 18) occurring in the sediments adjacent to the Site.

3.1.7 Biological Mixing Depth

The range of depths to which animals were actively deposit-feeding in the sediments was from 1.7 to 18.5 cm, with an overall Site average feeding void depth of 15.8 cm (Figure 19 a-c); these should be considered minimum estimates, because many of the stations showed evidence of bioturbation that exceeded prism penetration depth (see comment field in Appendix A; Figure 20). These bioturbation depths exceed the general average range cited for mixing zones in the scientific literature of approximately 10 cm (Boudreau, 1992, 1998, 2004; Mermillod-Blondin *et al*., 2003).

3.2 BENTHIC MACROINVERTEBRATES

Benthic macrofauna were identified to the LPIL, and a complete list of all species identified from each grab is presented in Appendix B. At three of the sediment sampling locations (one from each of the north and south reference areas, and one from the Site), triplicate grabs were taken to get an idea of within-station variability. The summary results are presented in Table 3.1, with a list of the dominant species (those comprising 90% of the abundance) for each station presented in Table 3.2.

Table 3.1
Summary of Benthic Community Results

STATION NAME	NUMBER OF INDIVIDUALS	TOTAL # OF TAXA (SPECIES RICHNESS)	DENSITY (#/M^2)	DIVERSITY (H')	EVENNESS (J')	SIMPSON'S INDEX (D)	GRAIN SIZE (PERCENT SILT)	TOC (%)
B1-SS-001	1056	19	21120	1.12	0.38	0.55	92.0	2.2
B1-SS-002	1604	26	32080	1.33	0.41	0.45	98.9	2.8
B1-SS-003-R1	1213	15	24260	1.47	0.54	0.33	96.4	2.4
B1-SS-003-R2	1076	16	21520	1.31	0.47	0.36	96.4	2.4
B1-SS-003-R3	2018	19	40360	1.16	0.39	0.40	96.4	2.4
B1-SS-004	1777	10	35540	0.61	0.26	0.72	96.4	2.7
B1-SS-005	1172	15	23440	1.86	0.69	0.22	97.3	2.8
B1-SS-006	1840	19	36800	1.86	0.63	0.23	98.0	3.5
B1-SS-007	1424	18	28480	1.37	0.47	0.39	93.8	2.6
B1-SS-008	795	15	15900	1.35	0.50	0.43	93.2	2.7
B1-SS-009	1113	17	22260	1.10	0.39	0.56	80.9	1.6
B1-SS-010-R1	1331	21	26620	1.16	0.38	0.55	98.6	2.2
B1-SS-010-R2	1030	21	20600	1.39	0.46	0.43	98.6	2.2
B1-SS-010-R3	578	19	11560	1.36	0.46	0.46	98.6	2.2
B1-SS-011	867	21	17340	1.17	0.39	0.49	88.4	2.3
B1-SS-012	434	12	8680	1.49	0.60	0.31	93.7	2.9
B1-SS-013	954	14	19080	1.40	0.53	0.39	96.0	2.3
B1-SS-014-R1	1400	13	28000	1.28	0.50	0.40	93.5	1.7
B1-SS-014-R2	1616	14	32320	1.43	0.54	0.35	93.5	1.7
B1-SS-014-R3	842	17	16840	1.59	0.56	0.33	93.5	1.7
B1-SS-101	888	15	17760	1.20	0.44	0.48	92.5	2.1
B1-SS-102	812	17	16240	1.49	0.53	0.33	93.5	2.2

Table 3.2
Dominant Species (90% total abundance) by Station

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-001	Arthropoda	*Leucon americanus*	774	1056	73.3%	774	73.3%
	Annelida	Tubificidae (LPIL)	112	1056	10.6%	886	83.9%
	Mollusca	*Ischadium recurvum*	56	1056	5.3%	942	89.2%
	Annelida	*Heteromastus filiformis*	26	1056	2.5%	968	91.7%
B1-SS-002	Mollusca	Littorina (LPIL)	1024	1604	63.8%	1024	63.8%
	Arthropoda	*Leucon americanus*	292	1604	18.2%	1316	82.0%
	Annelida	Tubificidae (LPIL)	108	1604	6.7%	1424	88.8%
	Mollusca	*Macoma balthica*	30	1604	1.9%	1454	90.6%
B1-SS-003-R1	Arthropoda	*Leucon americanus*	600	1213	49.5%	600	49.5%
	Mollusca	Littoraria (LPIL)	314	1213	25.9%	914	75.4%
	Annelida	Tubificidae (LPIL)	144	1213	11.9%	1058	87.2%
	Annelida	*Heteromastus filiformis*	40	1213	3.3%	1098	90.5%
B1-SS-003-R2	Arthropoda	*Leucon americanus*	522	1076	48.5%	522	48.5%
	Mollusca	Littoraria (LPIL)	374	1076	34.8%	896	83.3%
	Annelida	Tubificidae (LPIL)	90	1076	8.4%	986	91.6%
B1-SS-003-R3	Arthropoda	*Leucon americanus*	954	2018	47.3%	954	47.3%
	Mollusca	Littoraria (LPIL)	846	2018	41.9%	1800	89.2%
	Annelida	Tubificidae (LPIL)	104	2018	5.2%	1904	94.4%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-004	Arthropoda	*Leucon americanus*	1488	1777	83.7%	1488	83.7%
	Annelida	Tubificidae (LPIL)	212	1777	11.9%	1700	95.7%
B1-SS-005	Annelida	Tubificidae (LPIL)	408	1172	34.8%	408	34.8%
	Arthropoda	*Leptocheirus plumulosus*	312	1172	26.6%	720	61.4%
	Arthropoda	*Leucon americanus*	132	1172	11.3%	852	72.7%
	Mollusca	Bivalvia (LPIL)	84	1172	7.2%	936	79.9%
	Annelida	*Heteromastus filiformis*	76	1172	6.5%	1012	86.3%
	Nemertea	Nemertea (LPIL)	56	1172	4.8%	1068	91.1%
B1-SS-006	Arthropoda	*Leucon americanus*	628	1840	34.1%	628	34.1%
	Annelida	Tubificidae (LPIL)	568	1840	30.9%	1196	65.0%
	Mollusca	Littoraria (LPIL)	228	1840	12.4%	1424	77.4%
	Annelida	*Heteromastus filiformis*	120	1840	6.5%	1544	83.9%
	Mollusca	*Macoma balthica*	48	1840	2.6%	1592	86.5%
	Annelida	*Streblospio benedicti*	44	1840	2.4%	1636	88.9%
	Arthropoda	*Cyathura polita*	40	1840	2.2%	1676	91.1%
B1-SS-007	Arthropoda	*Leucon americanus*	796	1424	55.9%	796	55.9%
	Annelida	Tubificidae (LPIL)	376	1424	26.4%	1172	82.3%
	Annelida	*Heteromastus filiformis*	80	1424	5.6%	1252	87.9%
	Mollusca	*Macoma balthica*	44	1424	3.1%	1296	91.0%
B1-SS-008	Arthropoda	*Leucon americanus*	500	795	62.9%	500	62.9%
	Annelida	Tubificidae (LPIL)	122	795	15.3%	622	78.2%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-008	Mollusca	Bivalvia (LPIL)	44	795	5.5%	666	83.8%
(cont)	Mollusca	Littoraria (LPIL)	42	795	5.3%	708	89.1%
	Annelida	*Heteromastus filiformis*	26	795	3.3%	734	92.3%
B1-SS-009	Arthropoda	*Leucon americanus*	828	1113	74.4%	828	74.4%
	Annelida	Tubificidae (LPIL)	90	1113	8.1%	918	82.5%
	Annelida	*Heteromastus filiformis*	54	1113	4.9%	972	87.3%
B1-SS-009	Mollusca	Littoraria (LPIL)	44	1113	4.0%	1016	91.3%
B1-SS-010-R1	Mollusca	Littoraria (LPIL)	974	1331	73.2%	974	73.2%
	Arthropoda	*Leucon americanus*	140	1331	10.5%	1114	83.7%
	Mollusca	Bivalvia (LPIL)	42	1331	3.2%	1156	86.9%
	Mollusca	*Tellina agilis*	32	1331	2.4%	1188	89.3%
	Annelida	Tubificidae (LPIL)	28	1331	2.1%	1216	91.4%
B1-SS-010-R2	Mollusca	Littoraria (LPIL)	654	1030	63.5%	654	63.5%
	Arthropoda	*Leucon americanus*	160	1030	15.5%	814	79.0%
	Mollusca	Bivalvia (LPIL)	57	1030	5.5%	871	84.6%
	Mollusca	Tellina agilis	40	1030	3.9%	911	88.4%
	Annelida	Tubificidae (LPIL)	27	1030	2.6%	938	91.1%
B1-SS-010-R3	Mollusca	Littoraria (LPIL)	383	578	66.3%	383	66.3%
	Arthropoda	*Leucon americanus*	72	578	12.5%	455	78.7%
	Mollusca	*Tellina agilis*	25	578	4.3%	480	83.0%
	Annelida	Tubificidae (LPIL)	22	578	3.8%	502	86.9%
	Annelida	*Heteromastus filiformis*	15	578	2.6%	517	89.4%
	Annelida	*Nereis succinea*	13	578	2.2%	530	91.7%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-011	Arthropoda	*Leucon americanus*	584	867	67.4%	584	67.4%
	Annelida	Tubificidae (LPIL)	142	867	16.4%	726	83.7%
	Annelida	*Heteromastus filiformis*	44	867	5.1%	770	88.8%
	Mollusca	Littoraria (LPIL)	37	867	4.3%	807	93.1%
B1-SS-012	Arthropoda	*Leucon americanus*	186	434	42.9%	186	42.9%
	Annelida	Tubificidae (LPIL)	150	434	34.6%	336	77.4%
	Annelida	*Heteromastus filiformis*	22	434	5.1%	358	82.5%
B1-SS-012	Mollusca	*Macoma balthica*	22	434	5.1%	380	87.6%
	Mollusca	Littoraria (LPIL)	19	434	4.4%	399	91.9%
B1-SS-013	Arthropoda	*Leucon americanus*	566	954	59.3%	566	59.3%
	Annelida	Tubificidae (LPIL)	138	954	14.5%	704	73.8%
	Mollusca	Littoraria (LPIL)	118	954	12.4%	822	86.2%
	Mollusca	Bivalvia (LPIL)	36	954	3.8%	858	89.9%
	Annelida	*Heteromastus filiformis*	34	954	3.6%	892	93.5%
B1-SS-014-R1	Arthropoda	*Leucon americanus*	820	1400	58.6%	820	58.6%
	Mollusca	Littoraria (LPIL)	256	1400	18.3%	1076	76.9%
	Annelida	Tubificidae (LPIL)	206	1400	14.7%	1282	91.6%
B1-SS-014-R2	Arthropoda	*Leucon americanus*	860	1616	53.2%	860	53.2%
	Mollusca	Littoraria (LPIL)	312	1616	19.3%	1172	72.5%
	Annelida	Tubificidae (LPIL)	248	1616	15.3%	1420	87.9%
	Annelida	*Heteromastus filiformis*	76	1616	4.7%	1496	92.6%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-014-R3	Arthropoda	*Leucon americanus*	444	842	52.7%	444	52.7%
	Annelida	Tubificidae (LPIL)	142	842	16.9%	586	69.6%
	Mollusca	Littoraria (LPIL)	104	842	12.4%	690	81.9%
	Annelida	*Heteromastus filiformis*	46	842	5.5%	736	87.4%
	Mollusca	*Macoma balthica*	28	842	3.3%	764	90.7%
B1-SS-101	Annelida	Tubificidae (LPIL)	592	888	66.7%	592	66.7%
	Annelida	*Heteromastus filiformis*	140	888	15.8%	732	82.4%
	Mollusca	*Macoma balthica*	70	888	7.9%	802	90.3%
B1-SS-102	Annelida	Tubificidae (LPIL)	410	812	50.5%	410	50.5%
	Arthropoda	*Leucon americanus*	168	812	20.7%	578	71.2%
	Annelida	*Heteromastus filiformis*	130	812	16.0%	708	87.2%
	Mollusca	*Macoma balthica*	34	812	4.2%	742	91.4%

Patterns in the benthic data set (Appendix B) were evaluated with an N-MDS ordination based on the Bray-Curtis dissimilarities among the 22 samples (Table 3.1). The stress for the two dimensional N-MDS ordination plot (Figure 21) was 13%, considered to be a 'fair' to 'poor' representation of the multivariate data set (McCune and Grace, 2002, after Kruskal, 1964). This indicates that the relationships among samples based on the Bray-Curtis dissimilarities for the 53 taxa observed in this study are not easily summarized into a two dimensional representation. Of the 53 total unique taxa identified, 41 of these taxa were present in fewer than half the samples and at very low abundance values, i.e., 10 individuals or less in any one sample. With so many taxa present at low abundance levels, the dissimilarities in the benthic communities were complex and not easily generalized.

The ordination results were driven by the variability in the more dominant taxa found in the samples, particularly the oligochaetes (Tubificidae), the cumacean *Leucon americanus*, the polychaete *Heteromastus filiformis*, and small gastropods (Littorinidae). The relationship between these taxonomic drivers and the N-MDS ordination axes are illustrated via pairwise scatterplots (Figures 22), as well as through the contour plots which model these taxonomic variables as a smoothed function of the N-MDS ordination axes (Figure 23). The highest Tubificidae and *H. filiformis* abundances are found at the stations in the top-left quadrant of the ordination plot (Stations SS-101, SS-006, SS-102, and SS-005), and the lowest abundances are found at the stations on the right side (Station SS-010 all three reps; see Figure 24). The bivalve *Tellina agilis* was present only at the three replicates of station SS-010, thus providing exclusive delineation of those three samples.

The physical habitat variables for the benthic stations were derived from the nearest SPI survey stations (Figure 1; Table 3.3). When a benthic station did not coincide with a SPI station, the average of the nearest SPI stations was used for this comparison, e.g., benthic station SS-009 was associated with the SPI results averaged for Stations 065 and 067. The relationship between the physical habitat variables (i.e., water depth, camera penetration depth, aRPD depth, percent TOC and percent silt) were plotted against the N-MDS ordination axes to illustrate how physical habitat may be correlated with the benthic community patterns (Figure 24). There tended to be very little association of the benthic community patterns with these habitat variables, except for water depth (Figures 24 & 25).

The small-scale spatial variability was measured by the similarity among the three field replicates at each of three stations (Stations SS-003, SS-010, and SS-014). For benthic abundance, the variability among field replicates (measured by the coefficient of variation, CV) was comparable or slightly greater than the variability among the 16 station values (within station CVs ranged from 31% to 39%, while between station CV was 35%; Table 3.4). Abundance values could be quite variable among replicates within a station for some of the more common taxa; for example, *Leucon americanus* ranged from 522 to 864 individuals among field replicates at Station SS-003, or gastropods in the family Littorinidae ranged from 383 to 974 individuals among replicates at Station SS-010 (Figure 26, top); however, much of this within-

station variability appears to controlled by population density and disappears when these dominants are viewed by percent total abundance in the sample (Figure 26, bottom). The variability among replicates for taxa richness was substantially lower within stations (6 to 14%) compared to between stations (23%; Table 3.4). Individual taxa, if present at a station, tended to be present in all three replicates. The general level of similarity of the communities within each station is illustrated by the clustering of the three replicates within each station in the ordination plot (Figures 21, 23, and 25).

Table 3.3
Association Between Benthic & SPI Station Locations

Benthic station	SPI Station(s)
B1-SS-001	413
B1-SS-002	420
B1-SS-003-R1-3	430
B1-SS-004	
B1-SS-005	149
B1-SS-006	225
B1-SS-007	106
B1-SS-008	188
B1-SS-009	Average of (65,67)
B1-SS-010-R1-3	33
B1-SS-011	Average of (18,24)
B1-SS-012	522
B1-SS-013	534
B1-SS-014-R1-3	541
B1-SS-101	Average of (1182,1183)
B1-SS-102	60

Table 3.4
Summary of Benthic Community Parameters

Summary Parameter	Number of Individuals	# of Taxa (Richness)	Density (#/m^2)	Diversity (H')	Evenness (J')	Simpson's Index (D)
Minimum	434	10	8680	0.61	0.26	0.22
Maximum	2018	26	40360	1.86	0.69	0.72
CV among station values	33%	23%	35%	20%	20%	28%
CV among SS-003 reps	35%	12%	35%	12%	16%	10%
CV among SS-010 reps	39%	6%	39%	9%	10%	13%
CV among SS-014 reps	31%	14%	31%	11%	6%	10%

CV = coefficient of variation (standard deviation divided by the mean)

4.0
DISCUSSION

The results from the SPI survey and benthic grab results have provided a thorough baseline characterization of the submerged habitat near the Site against which future changes can be measured, and the value of using both types of survey techniques was illustrated by the combined results. The grab sample results confirmed the sediment grain-size results from the SPI image analysis and provided both species names and abundance/richness measurements which cannot be derived from the profile images. The profile images, on the other hand, provided much more detailed spatial information on the existing benthic community structure as well as providing information on sediment transport and disturbance regimes not available from the benthic grab analysis. In fact, without the additional information provided by the sediment profile images, one would have been left with a very biased view and (mis)interpretation of what forces are influencing benthic community structure.

The area next to the Site is primarily a fine-grained bottom (silt-clay), with the exception of a handful of nearshore stations where either coarser sands exist or armored shell coverings provide a surface for epifaunal organisms (barnacles, mussels, bryozoans, hydroids) to thrive (Figures 4 and 7). In river systems, it is the rule (rather than the exception) that sediments will be deposited, banks will erode, and floodplains, islands, and side channels will undergo either very slow or dramatically rapid changes over time (Simons and Sentürk, 1992). At the sediments adjacent to the Site, even though sediment grain size is fairly uniform (Figure 4, Table 3.1), short-term sediment disturbance appears to be a function of water depth (Figure 12a) which is most likely related to ship traffic (either from normal river traffic or offshore activities associated with the land-based operations at the Site). If one examines Figure 12a, there is a noticeable, consistent decrease in aRPD depth as one moves offshore; this disturbance appears to be caused by erosion and transport of the surface oxidized layer most likely due to ship propwash. All of the profile images show a similar pattern as one moves offshore along these perpendicular sampling transects: a relatively healthy sedimentary habitat with a thick surface oxidized layer that changes rapidly as that higher-water content, lower shear strength, dilated, oxidized surface layer was eroded and resuspended from ship's propwash and then re-settled on the bottom (Figure 27). This disturbance pattern was also reflected in the status of the infaunal successional stages at these locations (compare Figure 12a with Figure 15a).

The macroinvertebrate assemblage documented in the initial RI (Earth Tech 2000) indicated a community that was primarily dominated by relatively pollution tolerant organisms such as polychaetes, amphipods, crustaceans, and bivalves. That study showed no apparent difference in the benthic metrics (e.g. abundance, diversity, biotic indices) between the Site and background stations. While the species composition has changed slightly in the time that has passed since the initial investigation, the overall conclusion has not; by traditional benthic metrics alone, there is no real difference between the Site or reference stations (Figure 21) in benthic community

structure. Both the Site and the Reference stations are very similar and dominated by pollution tolerant (Stage 1 in Figure 3) organisms; none of the organisms identified in this study could be classified as 'sensitive' to pollution (Pelletier *et al*., 2010) and no organisms listed could be categorized as 'rare, threatened or endangered' species.
The results from traditional benthic community analyses are heavily influenced by the numerically dominant taxa and do not take into account either size or biomass. For example, a 2 mm juvenile or 10 cm adult polychaete are counted as equivalent if they are the same species, and 1000 cumaceans of mm size that stay on the sediment surface and are very transient will have a much larger influence on multivariate statistical plots than 1 large bivalve that may be mixing the sediment at depth. A look at Table 3.2 and Figure 28 show that all the benthic samples, regardless of whether they were from sediment adjacent to the Site or from the north or south reference area, were dominated by cumaceans, small snails, and oligochaetes, and these 3 groups were the primary "ordination drivers" when looking for differences in the benthic community results. The cumacean *Leucon americanus* was the most prevalent benthic organism in the grab samples and usually the dominant taxon at the majority of stations (Table 3.2); these tiny creatures live partially buried in the sediment, feeding on small particles in the upper few millimeters or by grazing material from the surfaces of individuals grains, and many species are known to migrate into the water column diurnally and become part of the plankton (Watling, 1979). The next most common taxon found were tiny gastropods (snails) from the family Littorinidae; during the initial exploratory data analysis, Station SS-002 sorted out as unique from the others because the 1,024 individual snails out of the total 1,604 animals found in that grab were members of the genus *Littorina*, while all of the other benthic samples that also had high numbers of gastropods were members of the genus *Littoraria* (Appendix B).

The real "infaunal" dominant, i.e., one that actually burrows into the sediment, that influenced the benthic analyses were the tubificid oligochaetes and the capitellid polychaete, *Heteromastus filiformis* (Figure 28) which are both "pollution tolerant" organisms and classified as "Stage 1" taxa (Figure 3) in the sediment profile image analysis results (Appendix A). What were present in very low numbers and did not affect the "traditional" benthic community analyses but whose effects were quite visible in the profile images were the Stage 3 taxa (which have a profound influence on both the biological mixing depth as well as the aRPD depth; see Figure 20). So, while the traditional benthic community analyses show no real differences among stations in either grain size (Table 3.1) or benthic community structure (Figures 21-25) that could be correlated with any effects due to the Site (no differences between the adjacent area stations versus the reference stations), the SPI results did show variation in both grain size from localized sediment transport (Figure 4 a-c), differences in aRPD depth due to localized disturbance (Figure 12 a-c), and the typical small-scale spatial variation in benthic community structure due to both physical disturbance and anthropogenic activities (Figure 15 a-c) that one would expect to see in any urban estuarine setting (Rhoads et al. 1978; Rhoads and Germano, 1982; Elliott and Quintino 2007). However, neither the SPI nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site.

5.0
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FIGURES

OVERVIEW

INSET AREA NORTH

SPI station

Surface sediment grab station

CONTOUR

6-9 meters

1-4 meters

11+ meters

Shugart Dock

APPROXIMATE 45 FOOT CONTOUR

APPROXIMATE 30 FOOT CONTOUR

APPROXIMATE 15 FOOT CONTOUR

SEDIMENT TYPE

Deposition - thick

Deposition - thin

Deposition - unres. thickness

Dynamic - scour

Dynamic - waves

Erosion - non-deposition

0 1,000 2,000

SCALE IN FEET

N

W E

S

SPI-01

SPI-02

SPI-03

SPI-12

SPI-13

SPI-14

Ardsley-on-Hudson

DOBBS FERRY

HASTINGS-ON-HUDSON

HASTINGS ON HUDSON

GREENBURGH

Waterfront Park

Sacred Heart Sch

St Christopher's Sch

Tower Ridge Yacht Club

Pioneer Boat Club

Merry College

Our Lady Acad

Reynolds Field

St Matthews

Hastings High Sch

Hastings Swimming Pool

Andrus Mem Home

Union

Draper Pk

NORTH

SOUTH

INSET AREA

INSET

SPI station

Surface sediment grab station

LIMITS OF SPI GRID

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

0 200 400

SCALE IN FEET

B1-SS-004

B1-SS-005

B1-SS-006

B1-SS-101

B1-SS-007

B1-SS-008

HABITAT CHARACTER-IZATION (SPI)

LIMITS OF SPI GRID

BATHYMETRIC CONTOUR

OU-2 BOUNDARY

NOTES:

1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

0 100 200

SCALE IN FEET

a

Figure 1a: Location of SPI and benthic grab stations surveyed in the Hudson River in October, 2013.

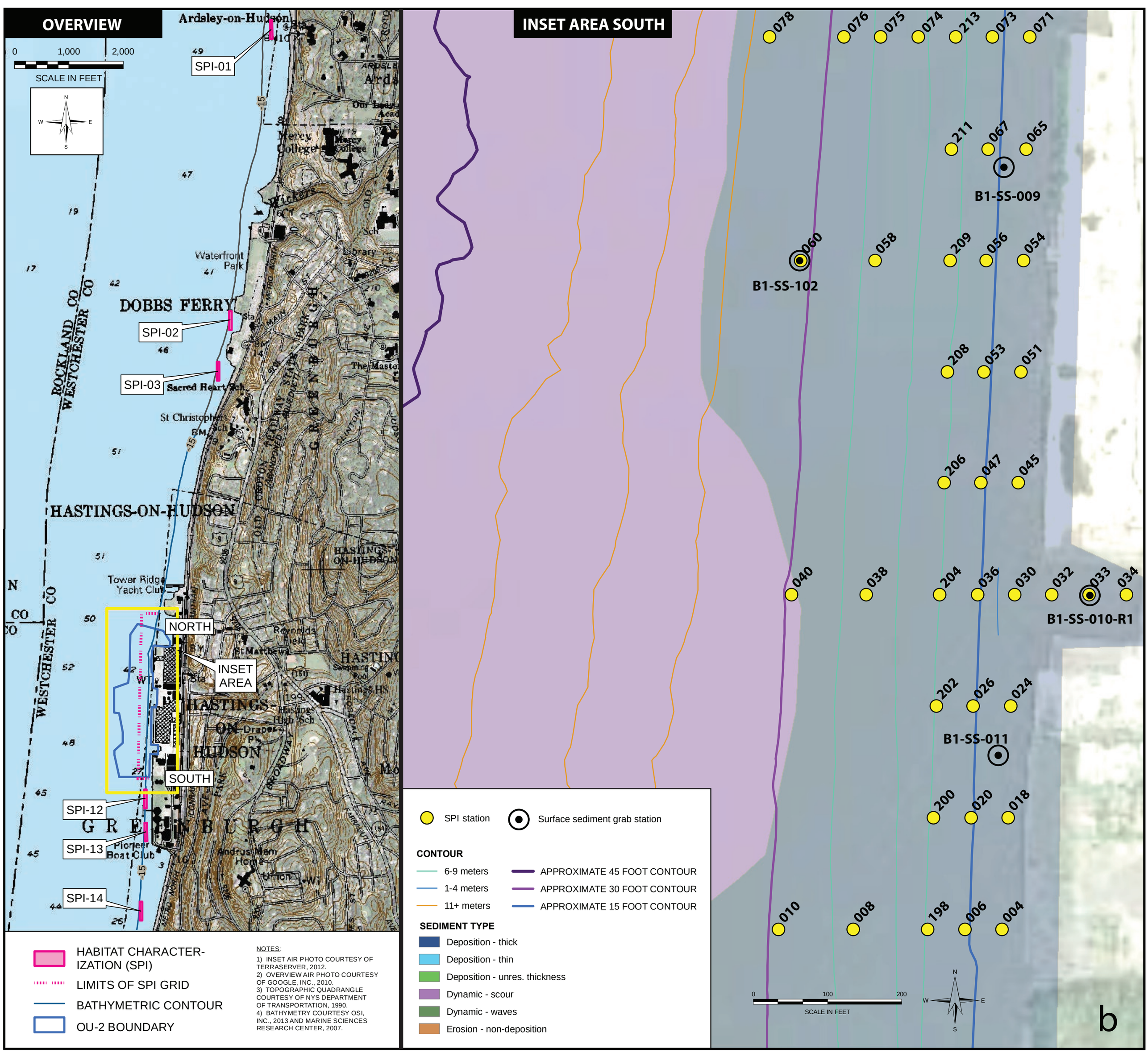


Figure 1b: Location of SPI and benthic grab stations surveyed in the Hudson River in October, 2013.

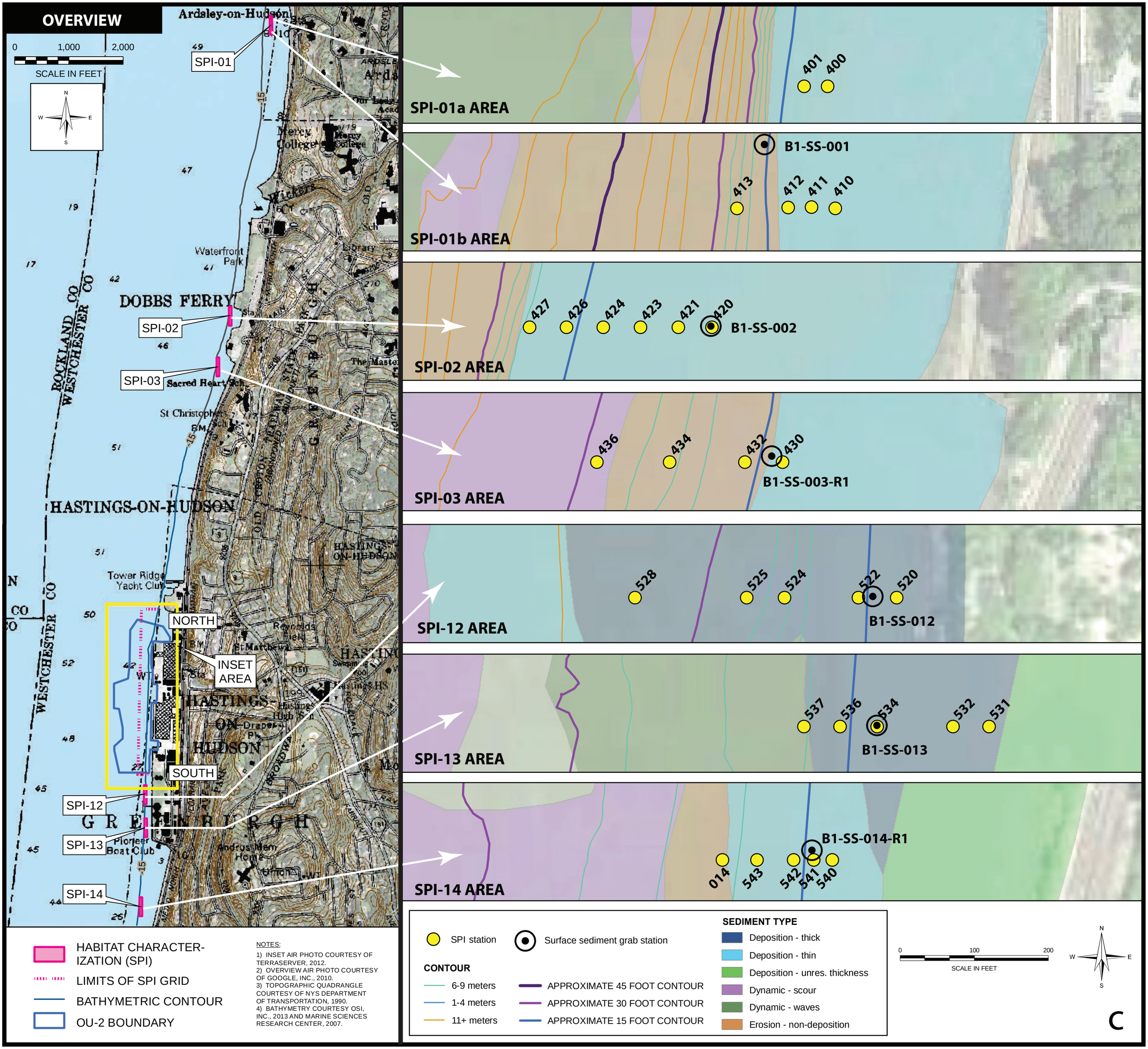


Figure 1c: Location of SPI and benthic grab stations surveyed in the Hudson River in October, 2013.

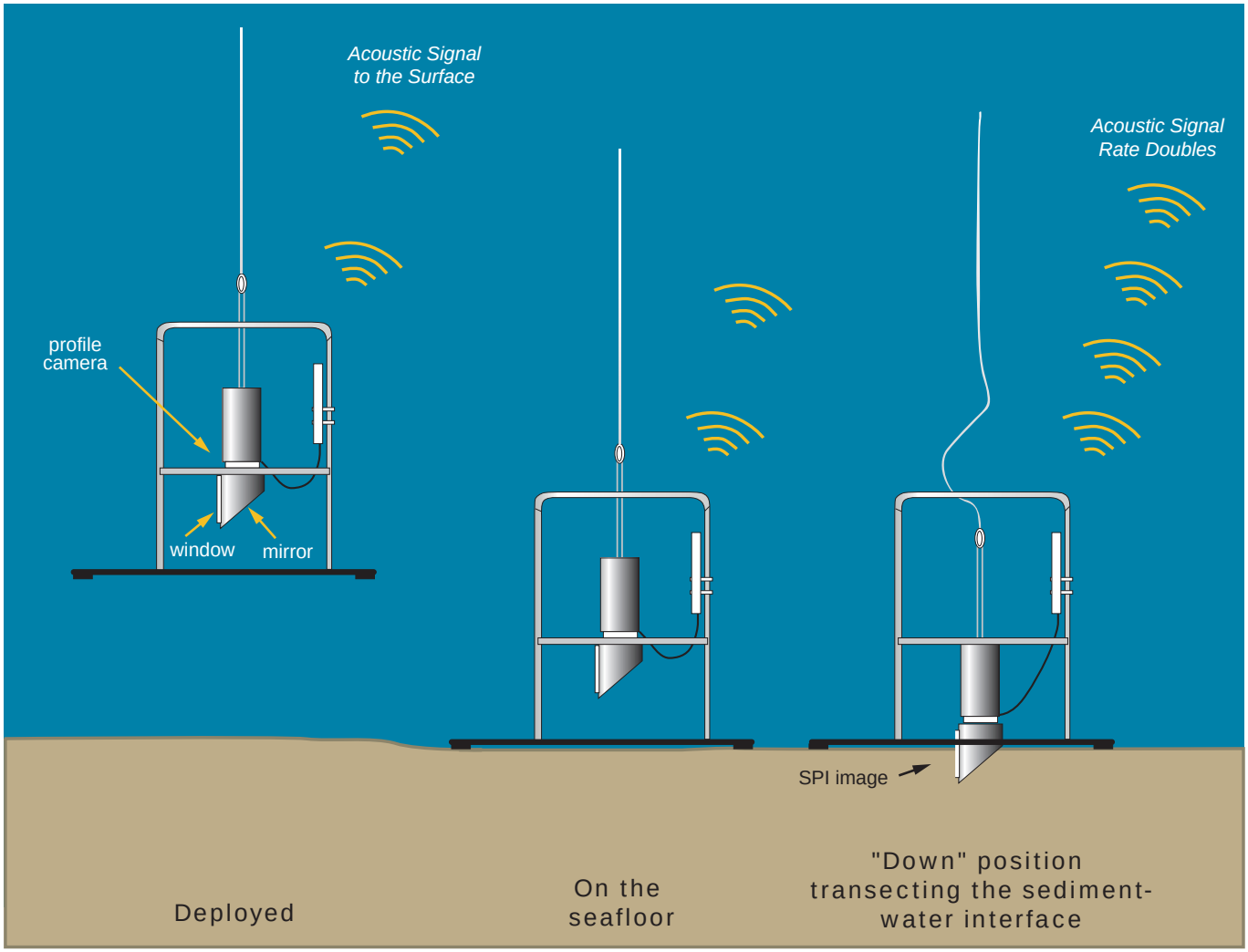


Figure 2: Deployment and operation of the Ocean Imaging Model 3731 Sediment Profile camera.

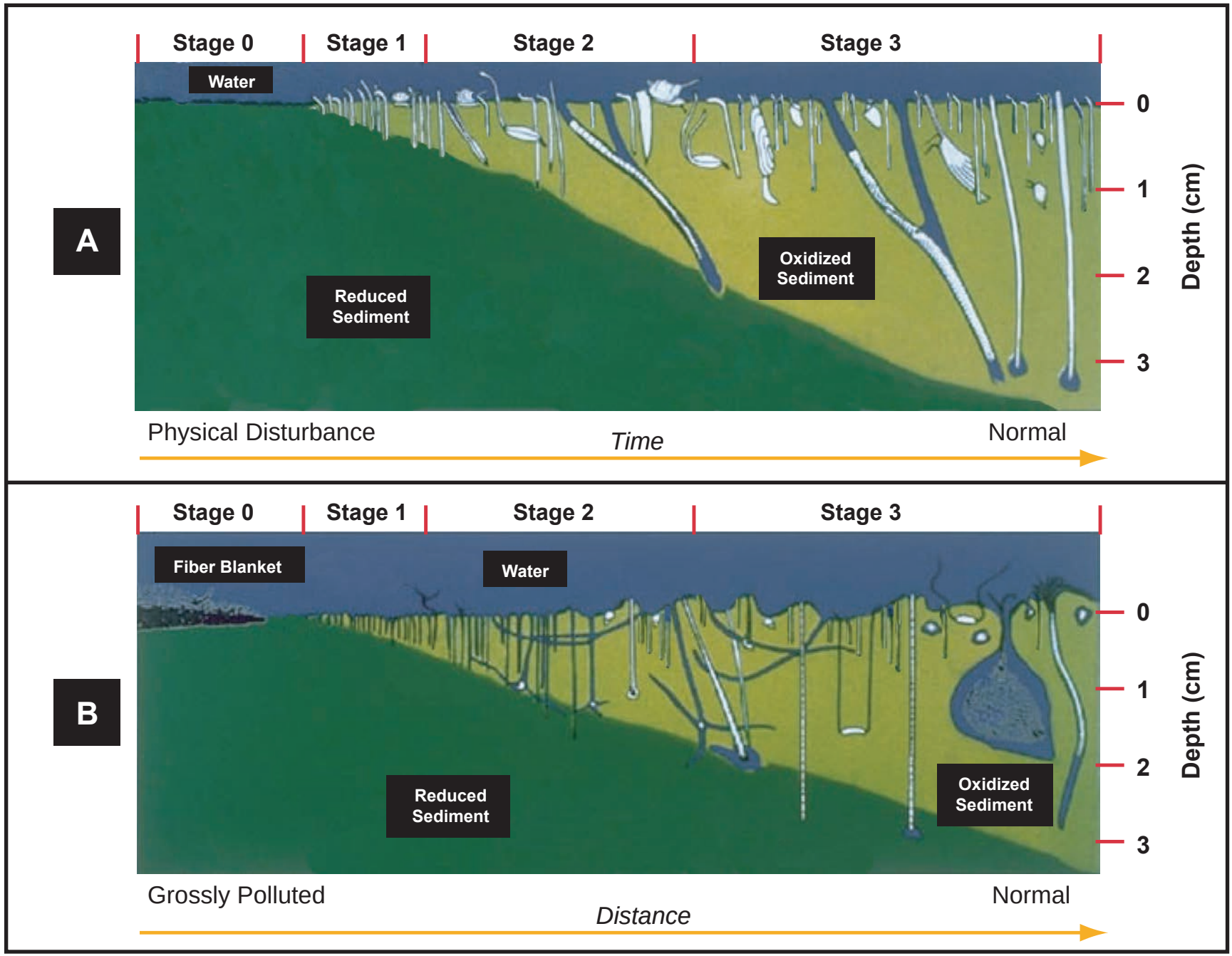


Figure 3: Soft-bottom benthic community response to physical disturbance (top panel) or organic enrichment (bottom panel). From Rhoads and Germano (1982).

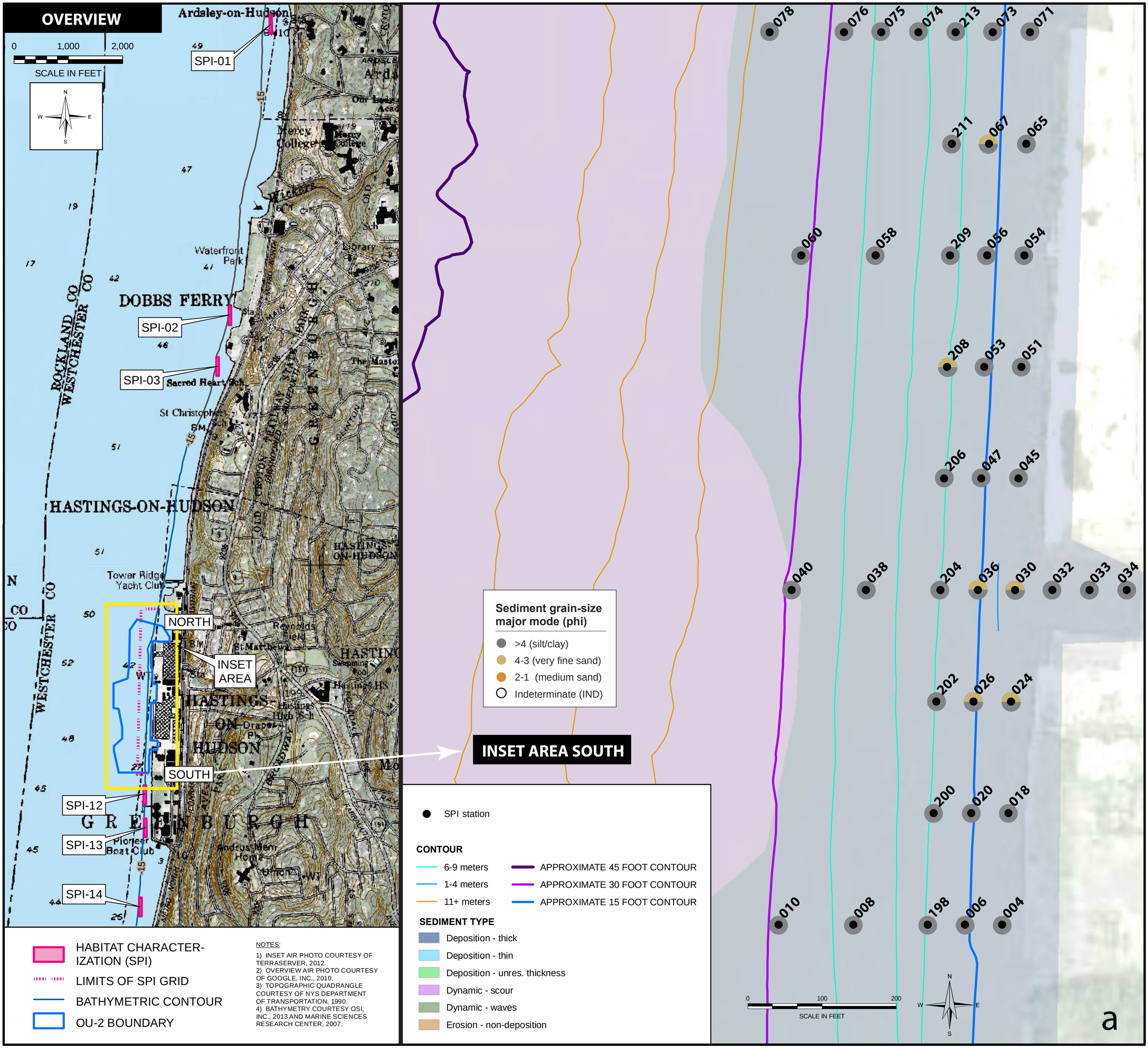


Figure 4a. Spatial distribution of sediment grain size major mode (phi units) at Hastings on Hudson in October, 2013.

OVERVIEW

0 1,000 2,000

SCALE IN FEET

N W E S

SPI-01

SPI-02

SPI-03

NORTH

SOUTH

INSET AREA

SPI-12

SPI-13

SPI-14

Ardsley-on-Hudson

DOBBS FERRY

HASTINGS-ON-HUDSON

GREENBURGH

Waterfront Park

Tower Ridge Yacht Club

Pioneer Boat Club

St Christopher Sch

Sacred Heart Sch

Library

Hastings High Sch

HABITAT CHARACTER-IZATION (SPI)

LIMITS OF SPI GRID

BATHYMETRIC CONTOUR

OU-2 BOUNDARY

NOTES:

1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

SPI station

CONTOUR

- 6-9 meters
- 1-4 meters
- 11+ meters
- Shugart Dock
- APPROXIMATE 45 FOOT CONTOUR
- APPROXIMATE 30 FOOT CONTOUR
- APPROXIMATE 15 FOOT CONTOUR

SEDIMENT TYPE

- Deposition - thick
- Deposition - thin
- Deposition - unres. thickness
- Dynamic - scour
- Dynamic - waves
- Erosion - non-deposition

INSET AREA NORTH

Sediment grain-size major mode (phi)

- >4 (silt/clay)
- 4-3 (very fine sand)
- 2-1 (medium sand)
- Indeterminate (IND)

0 100 200

SCALE IN FEET

N W E S

b

Figure 4b. Spatial distribution of sediment grain size major mode (phi units) at Hastings on Hudson in October, 2013.

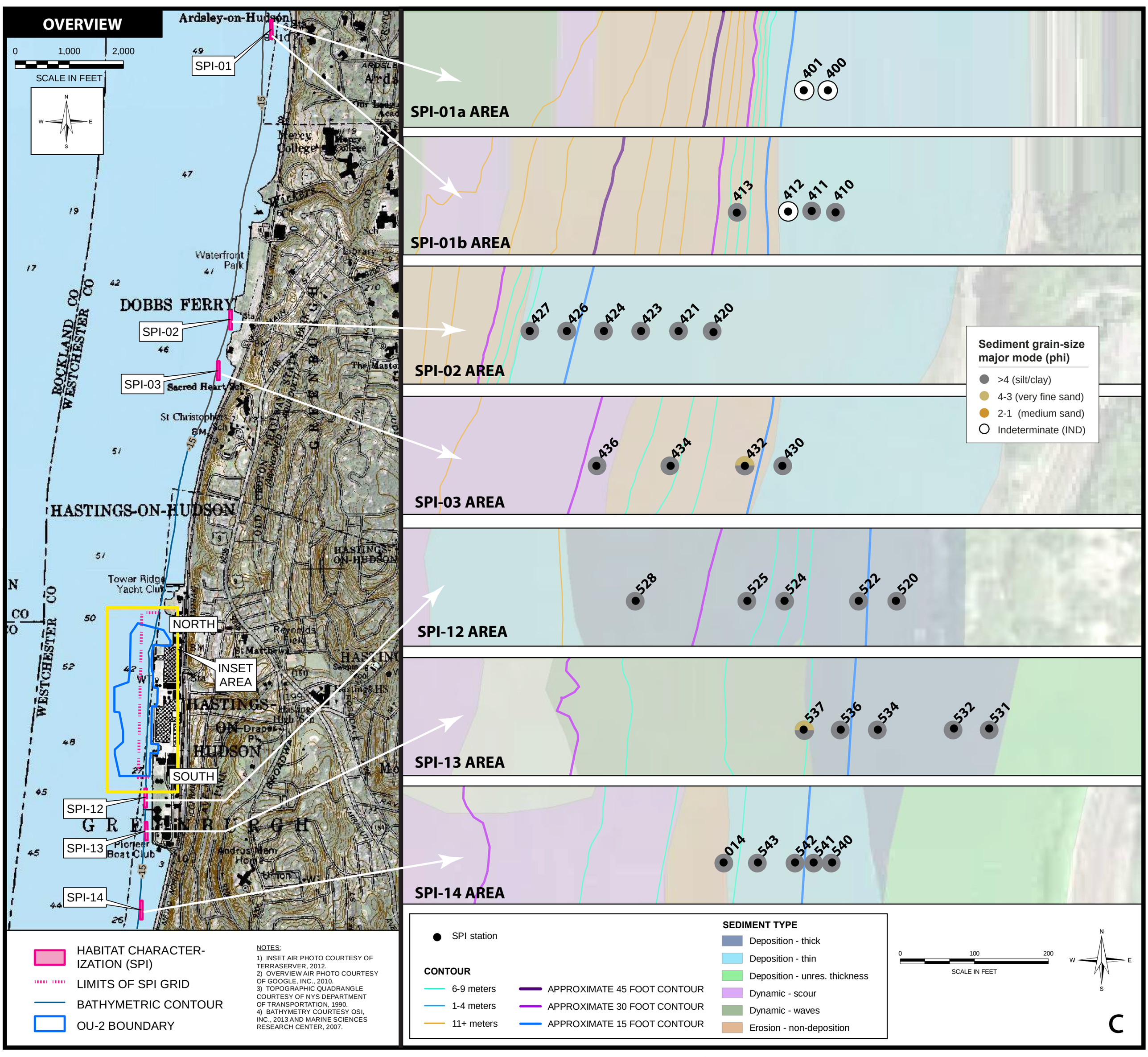
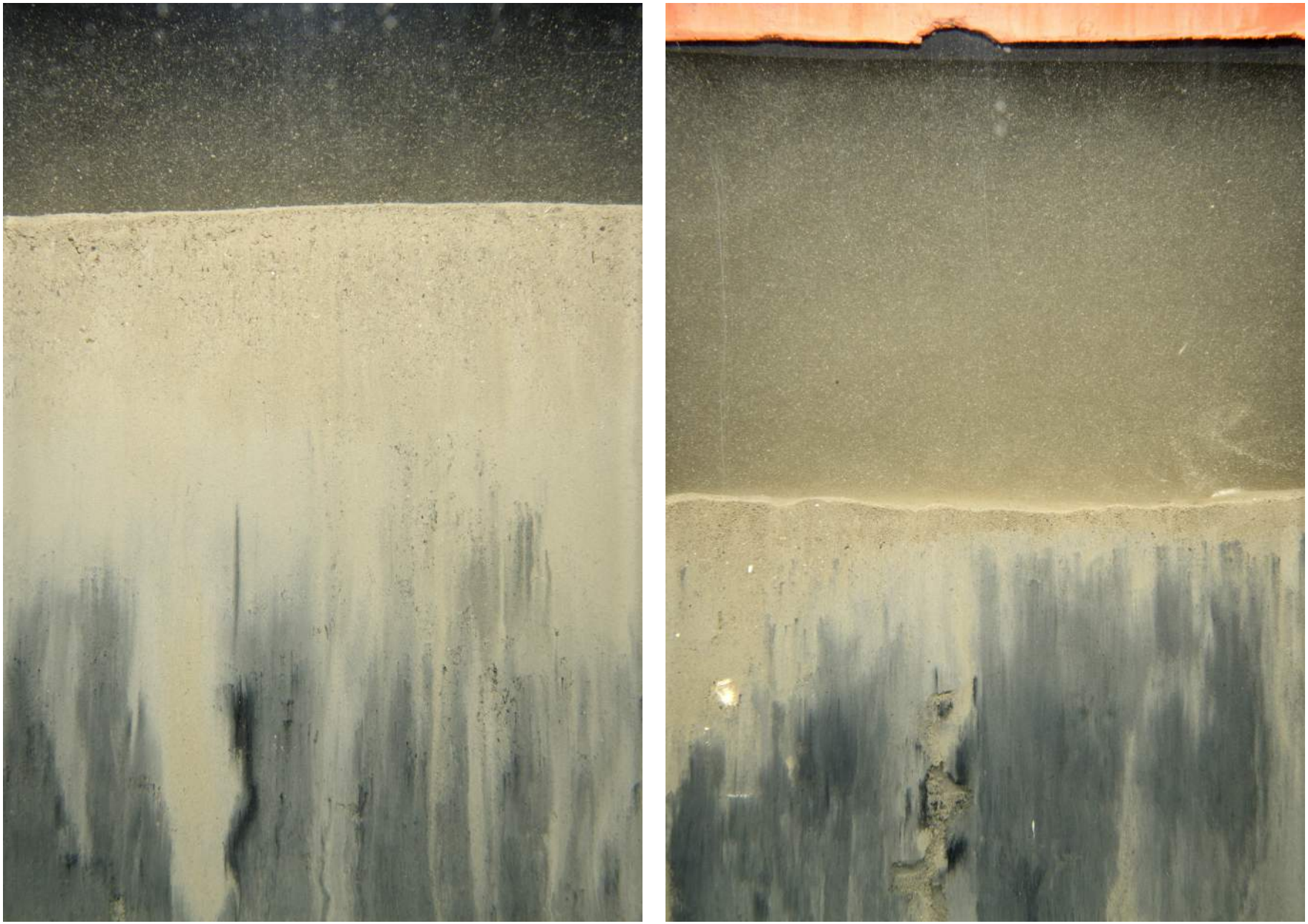
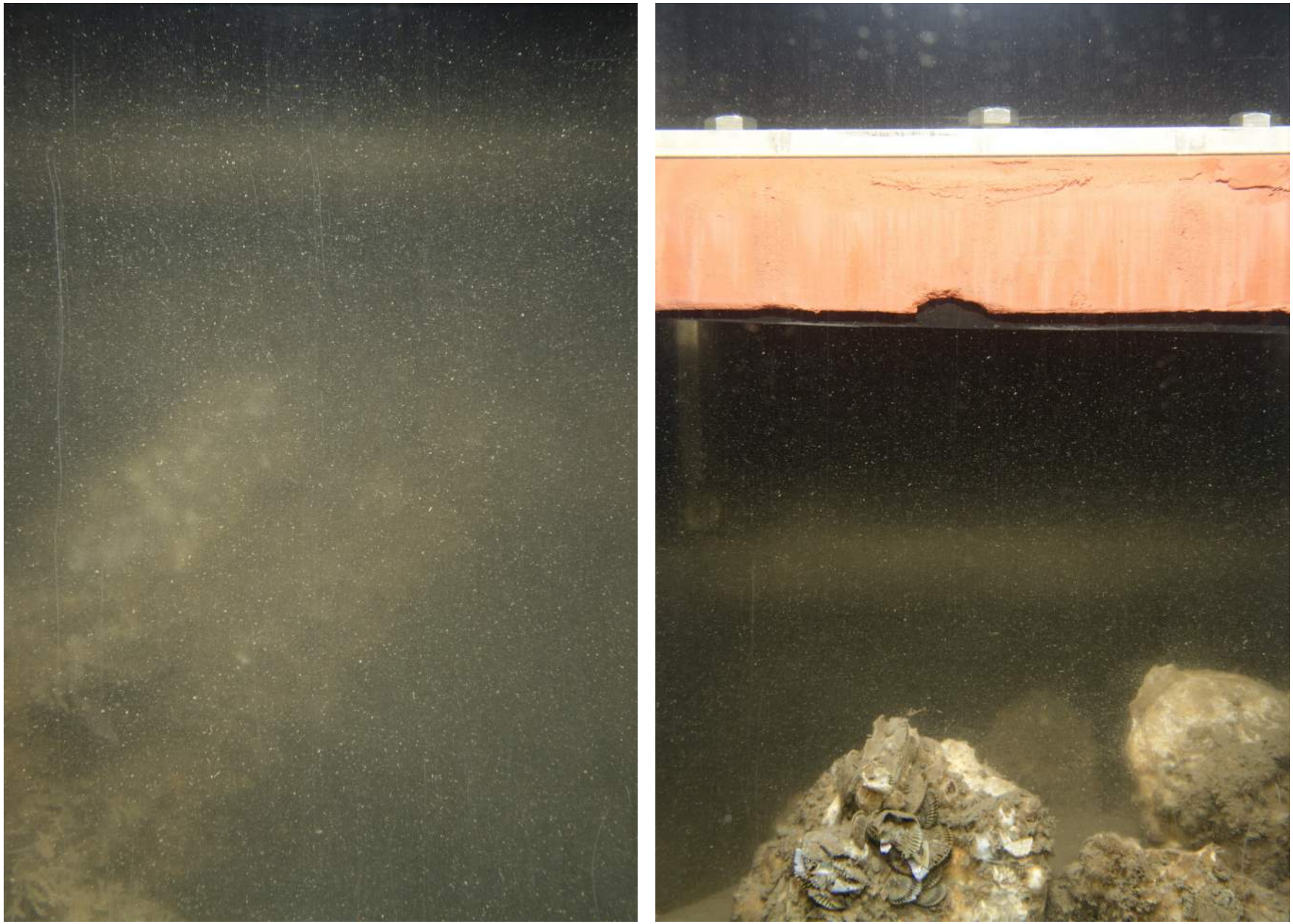


Figure 4c. Spatial distribution of sediment grain size major mode (phi units) at Hastings on Hudson in October, 2013.



Station 30 Station 38

Figure 5: These profile images from Station 30 (left) and 38 (right) show the two dominant sediment types found throughout the site: either a surface layer of silty fine sand over mud (Station 30) or a sediment grain-size major mode of silt-clay (Station 38). Scale: width of each profile image = 14.5 cm.



Station 115 Station 401

Figure 6: These profile images from Station 115 (left) and 401 (right) show debris (section of an old piling in the background, left image) or oyster shells on the surface (right image) that prevented the camera prism from penetrating the bottom. Scale: width of each image = 14.5 cm.

Figure 7: This profile image from Station 95 shows poorly-sorted coarse sand at a shallow (4 ft. water depth) location close to shore in the Inset Area North. Scale: width of profile image = 14.5 cm.

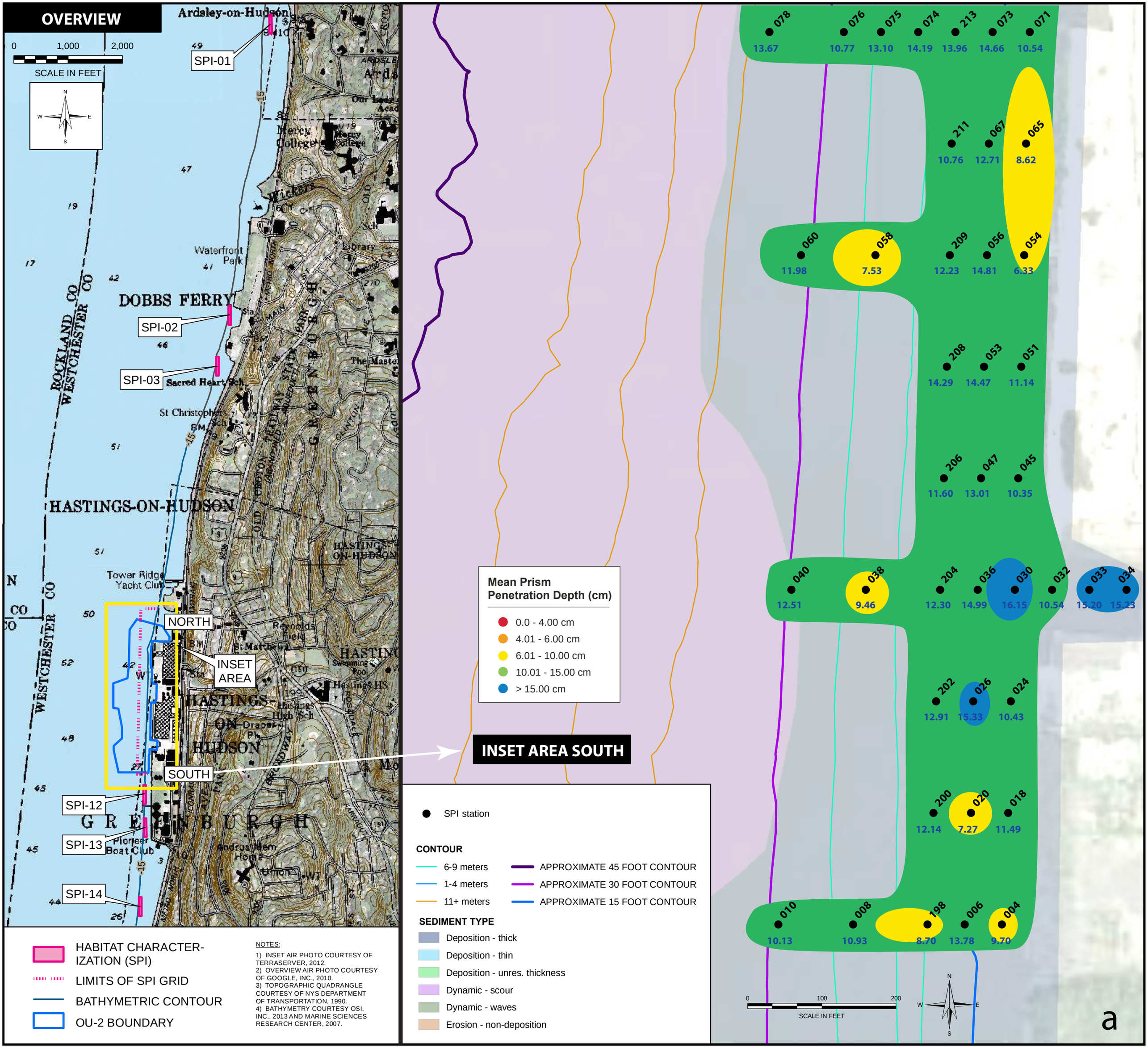


Figure 8a. Spatial distribution of mean prism penetration depth (cm) at Hastings on Hudson in October, 2013.

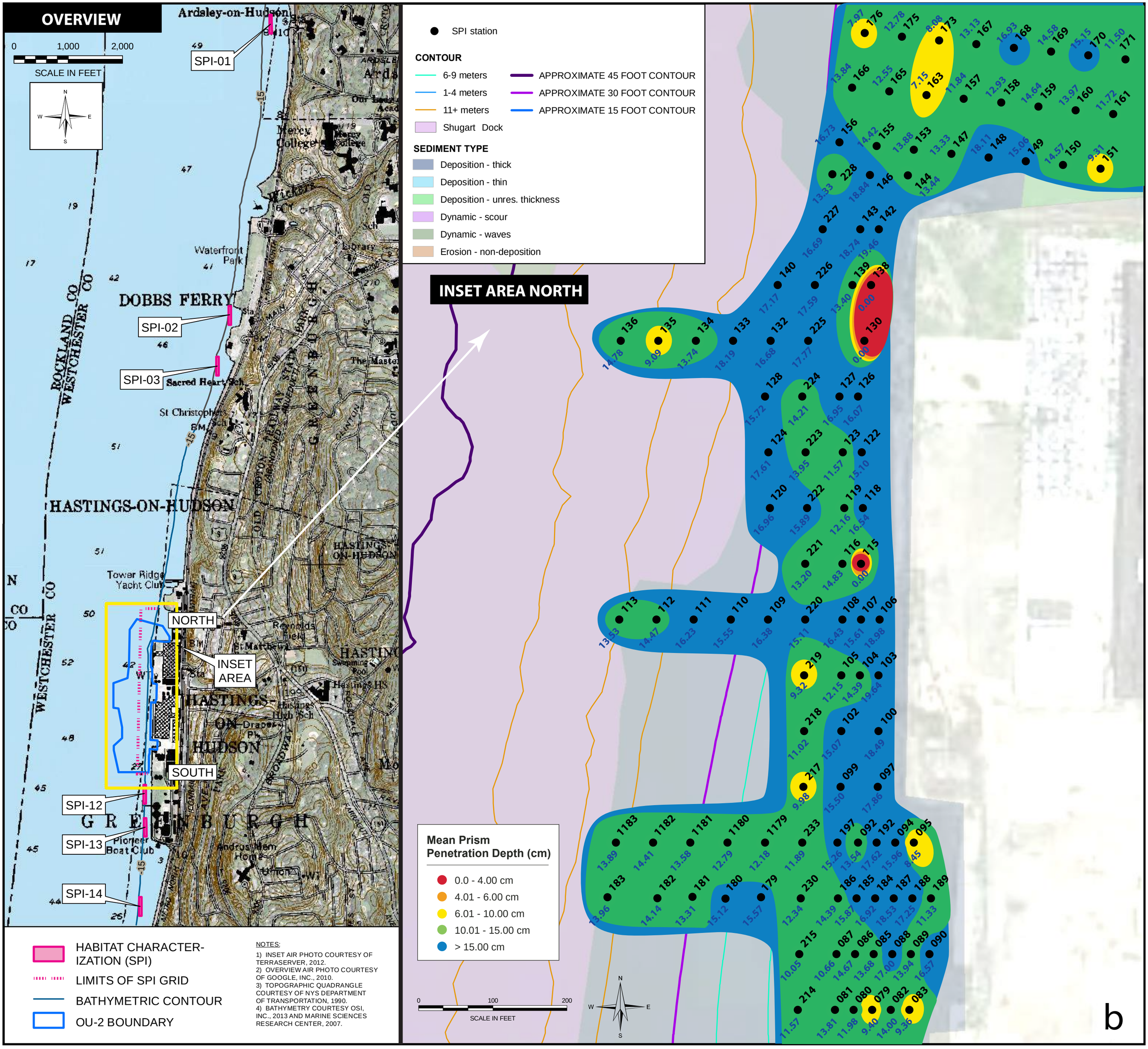


Figure 8b. Spatial distribution of mean prism penetration depth (cm) at Hastings on Hudson in October, 2013.

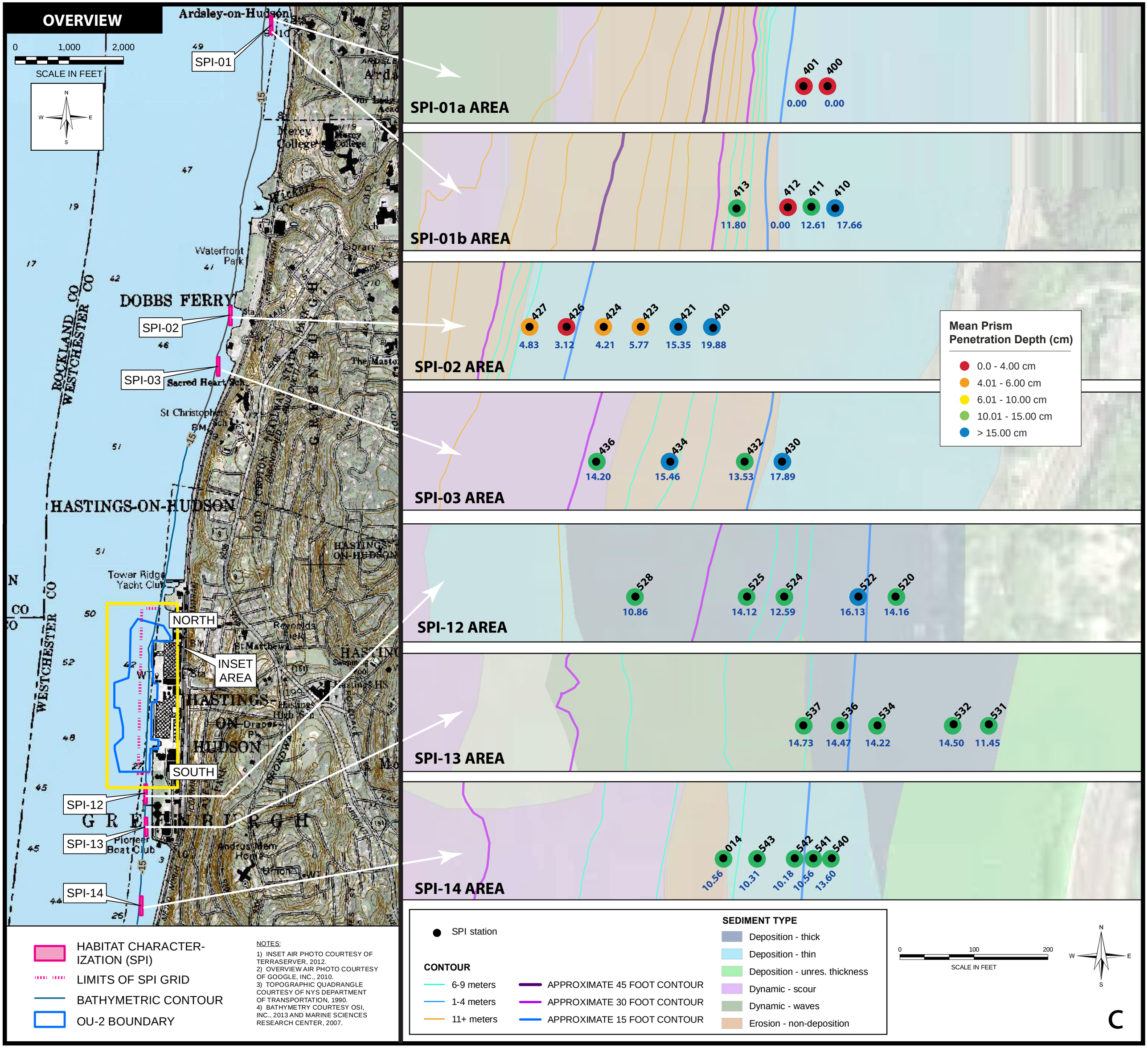


Figure 8c. Spatial distribution of mean prism penetration depth (cm) at Hastings on Hudson in October, 2013.

Station 6

Station 88

Figure 9: These profile images from Station 6 (left) and 88 (right) show the variation in prism penetration due to surface shell/cobble (left) or subsurface methane (right) and their effects on sediment bearing strength. Scale: width of each image = 14.5 cm.

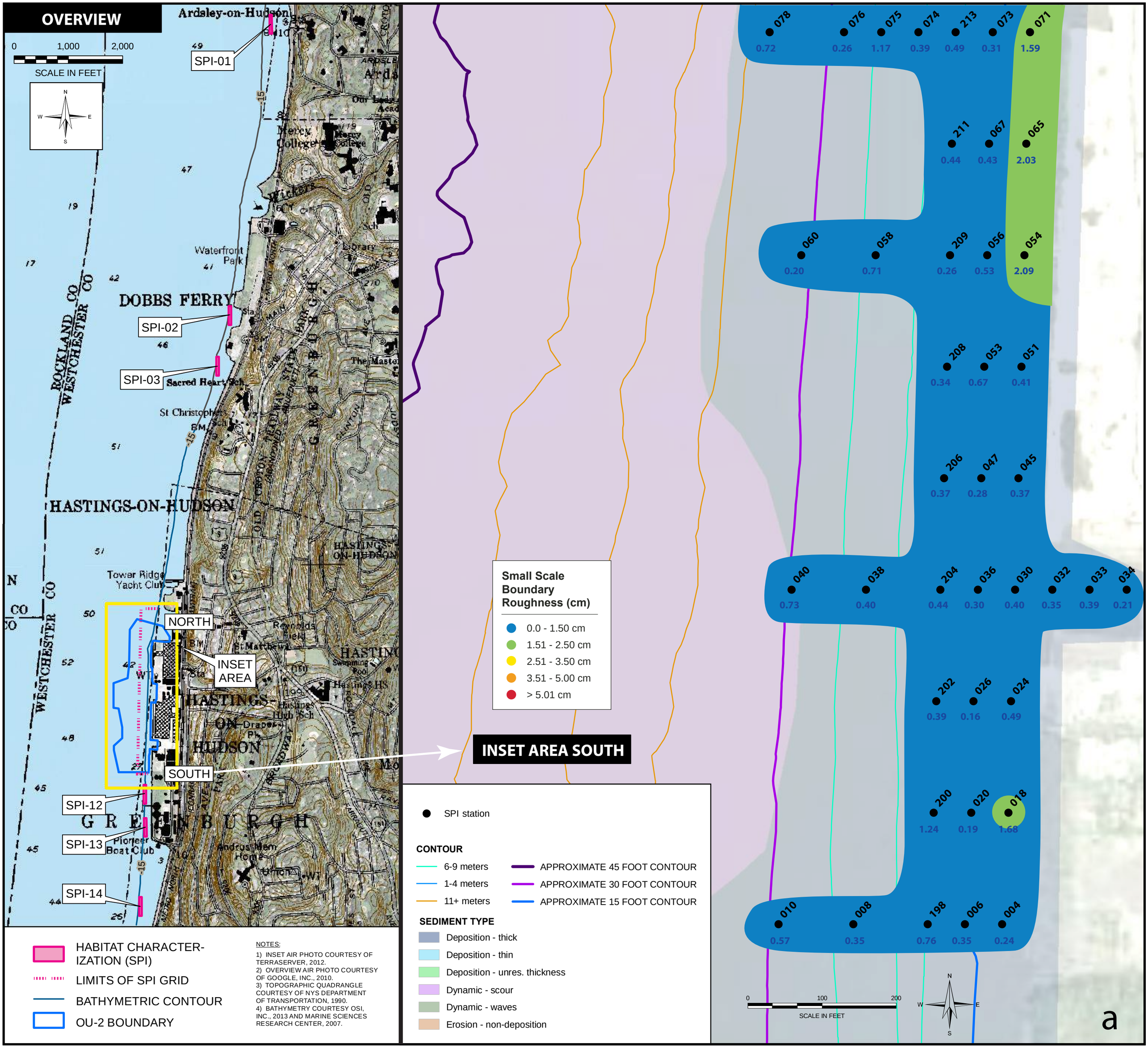


Figure 10a. Spatial distribution of small-scale boundary roughness (cm) at Hastings on Hudson in October, 2013.

OVERVIEW

0 1,000 2,000

SCALE IN FEET

SPI-01

SPI-02

SPI-03

NORTH

SOUTH

INSET AREA

SPI-12

SPI-13

SPI-14

INSET AREA NORTH

SPI station

CONTOUR

- 6-9 meters
- 1-4 meters
- 11+ meters
- APPROXIMATE 45 FOOT CONTOUR
- APPROXIMATE 30 FOOT CONTOUR
- APPROXIMATE 15 FOOT CONTOUR
- Shugart Dock

SEDIMENT TYPE

- Deposition - thick
- Deposition - thin
- Deposition - unres. thickness
- Dynamic - scour
- Dynamic - waves
- Erosion - non-deposition

Small Scale Boundary Roughness (cm)

- 0.0 - 1.50 cm
- 1.51 - 2.50 cm
- 2.51 - 3.50 cm
- 3.51 - 5.00 cm
- > 5.01 cm

0 100 200

SCALE IN FEET

HABITAT CHARACTER-IZATION (SPI)

LIMITS OF SPI GRID

BATHYMETRIC CONTOUR

OU-2 BOUNDARY

NOTES:

1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

b

Figure 10b. Spatial distribution of small-scale boundary roughness (cm) at Hastings on Hudson in October, 2013.

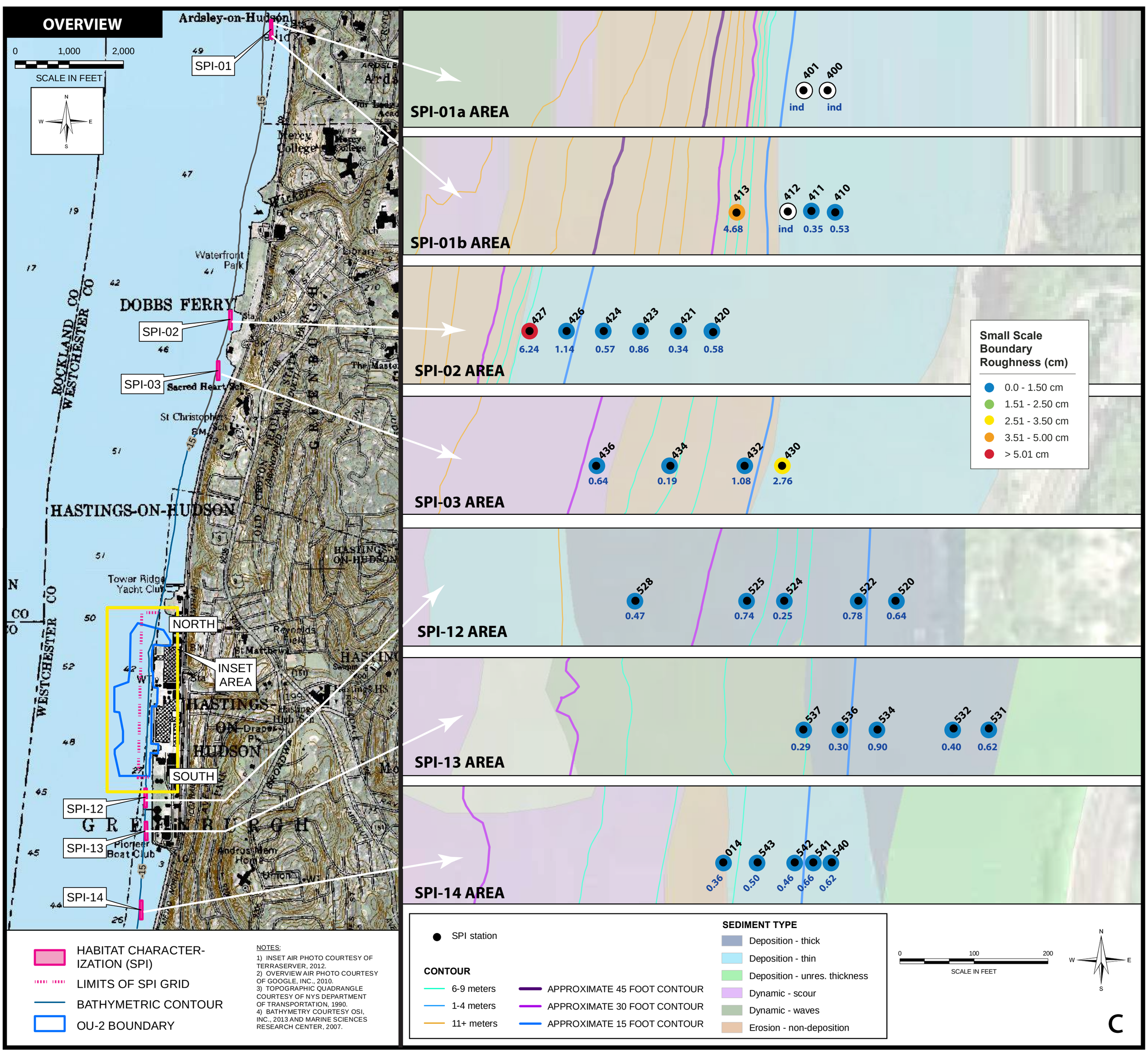


Figure 10c. Spatial distribution of small-scale boundary roughness (cm) at Hastings on Hudson in October, 2013.

Figure 11: The largest surface boundary roughness value measured was at Station 427, where a rock or shell was dragged down on the right side of the image to create a relatively large change in surface topography. Scale: width of profile image = 14.5 cm.

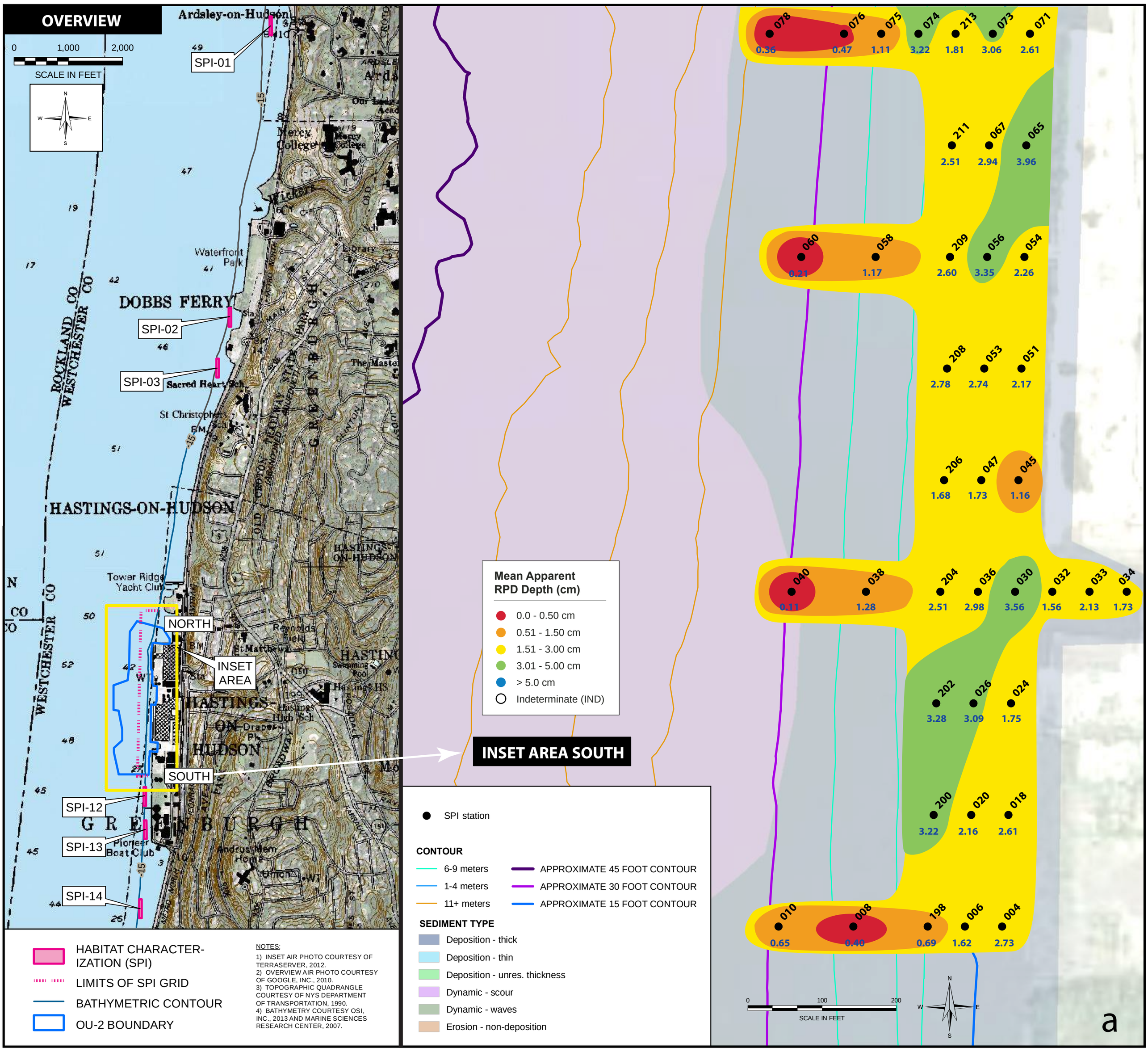


Figure 12a. Spatial distribution of mean aRPD depth (cm) at Hastings on Hudson in October, 2013.

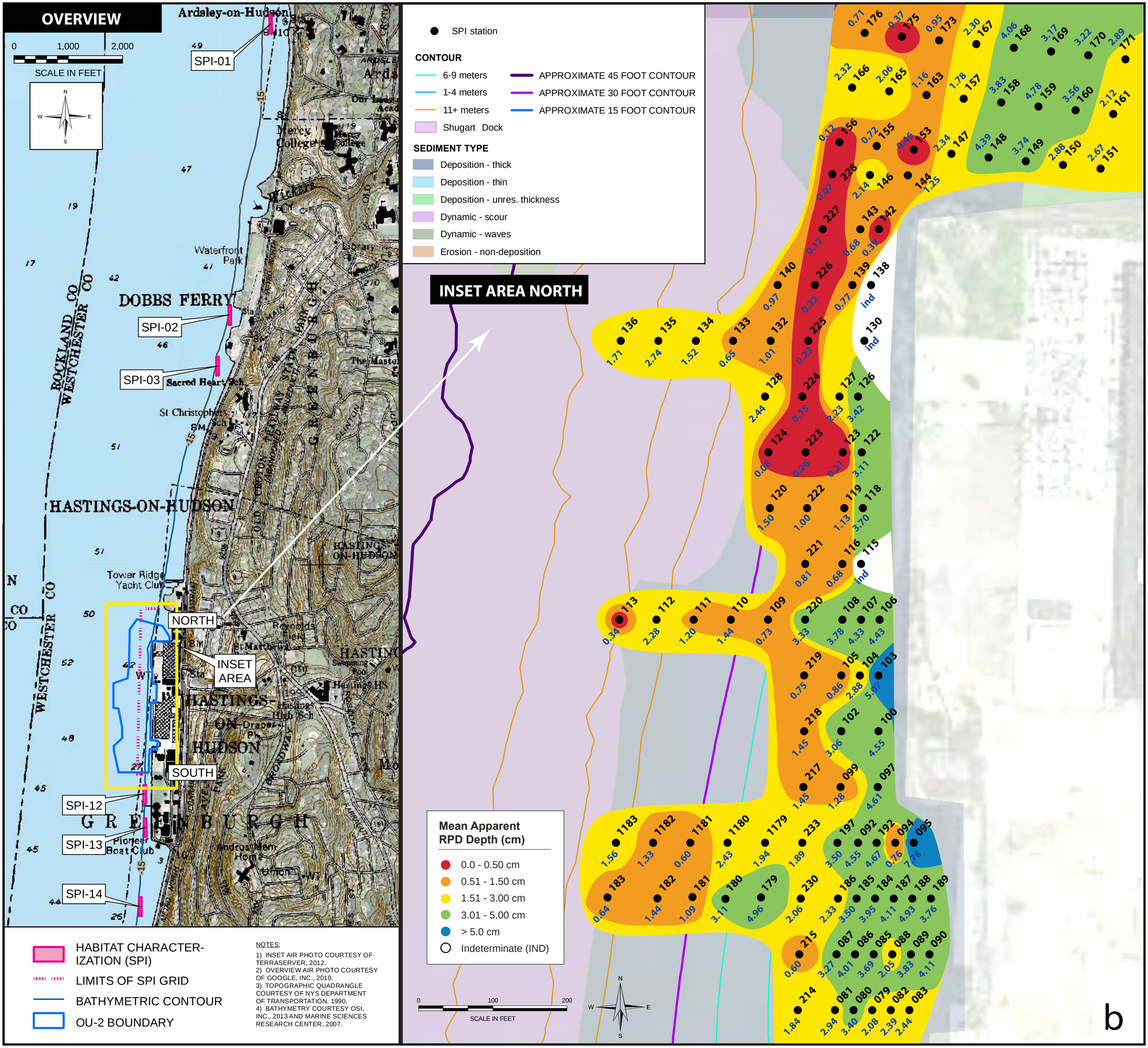


Figure 12b. Spatial distribution of mean aRPD depth (cm) at Hastings on Hudson in October, 2013..

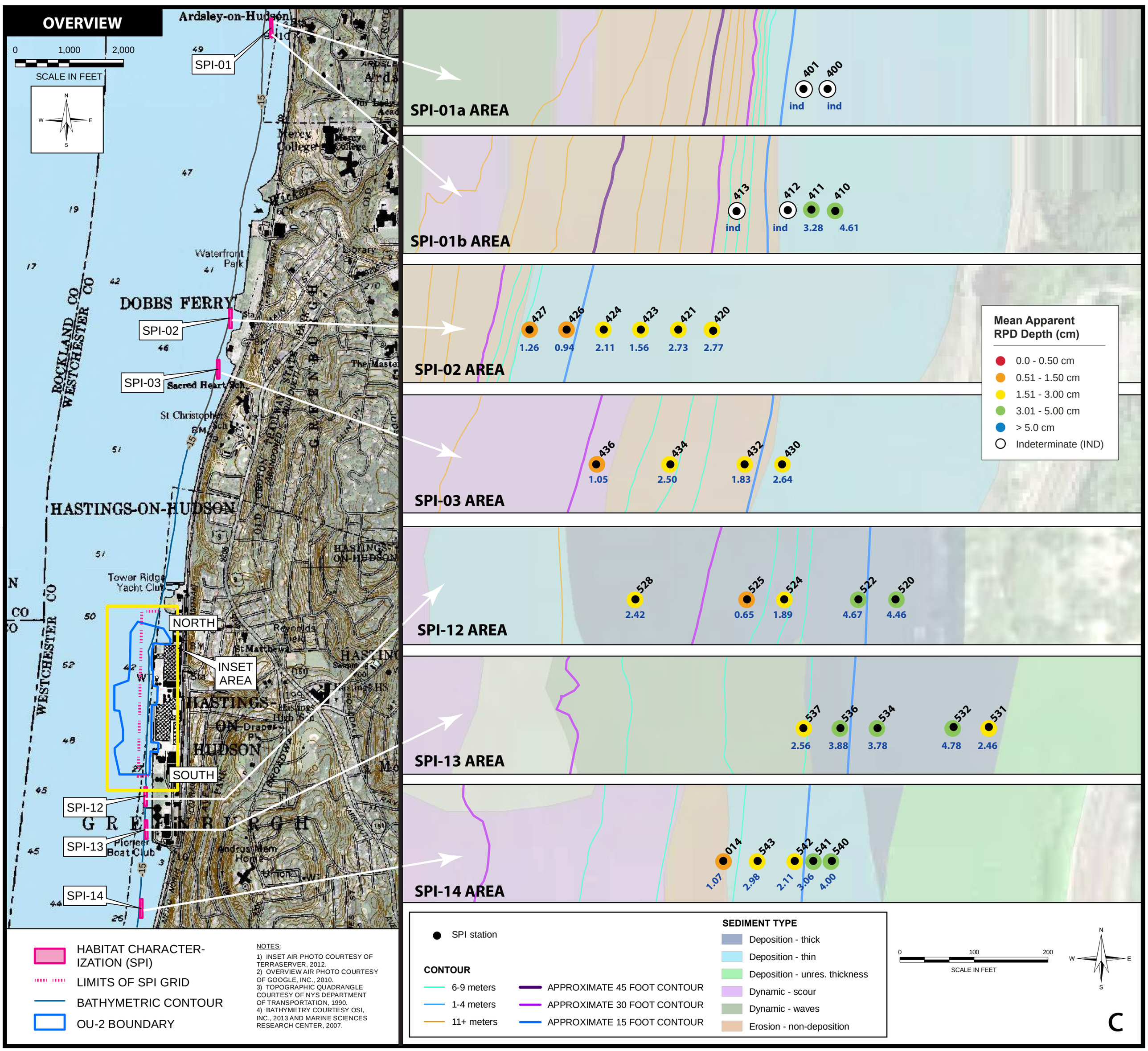


Figure 12c. Spatial distribution of mean aRPD depth (cm) at Hastings on Hudson in October, 2013.

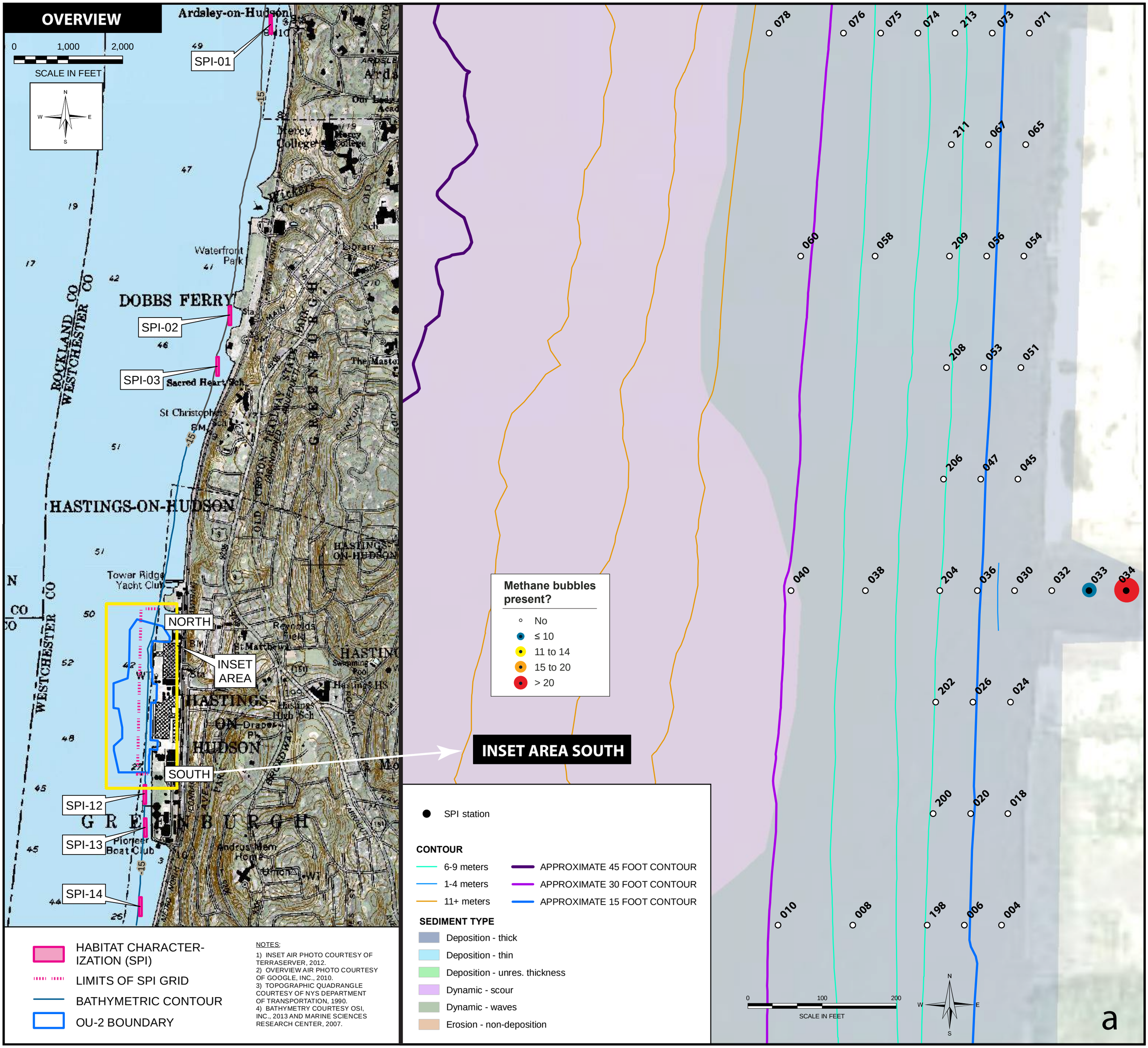


Figure 13a. Stations where subsurface methane was detected at Hastings on Hudson in October, 2013.

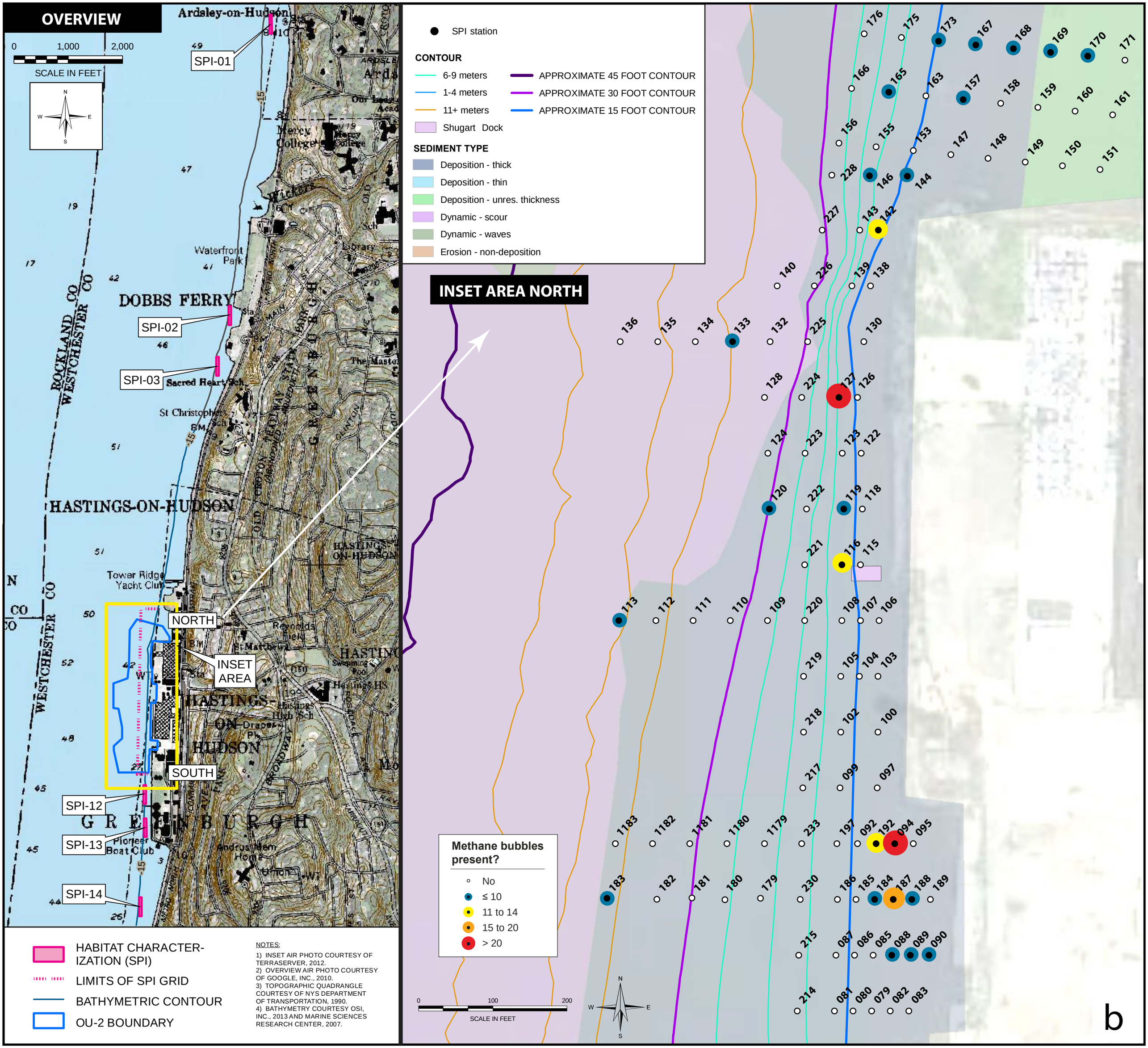


Figure 13b. Stations where subsurface methane was detected at Hastings on Hudson in October, 2013.

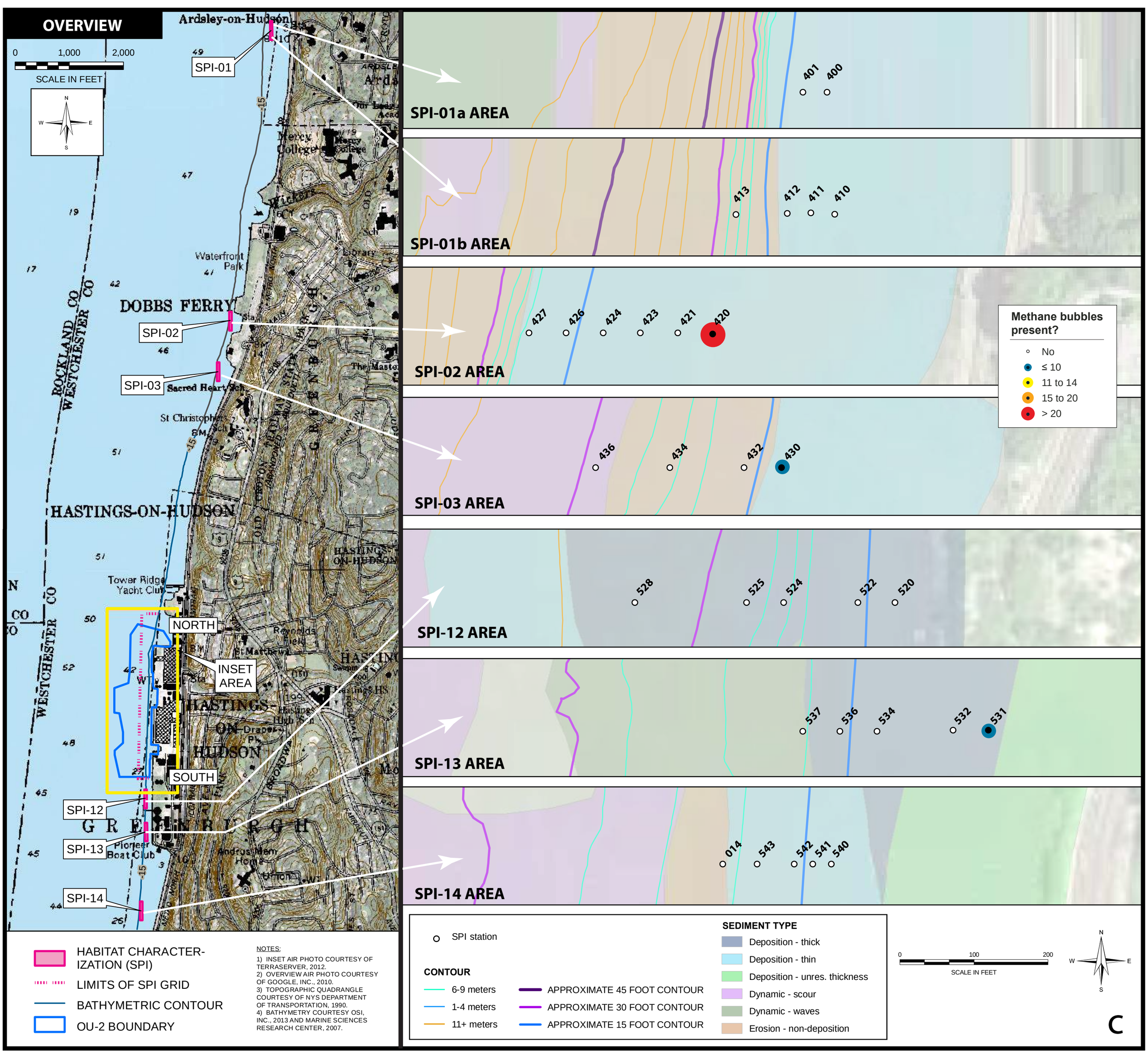


Figure 13c. Stations where subsurface methane was detected at Hastings on Hudson in October, 2013.

Figure 14: This profile image from Station 33 located in less than 5 feet of water near the southern boundary of the OU-2 site shows a large pocket of methane in the lower right corner. Scale: width of profile image = 14.5 cm.

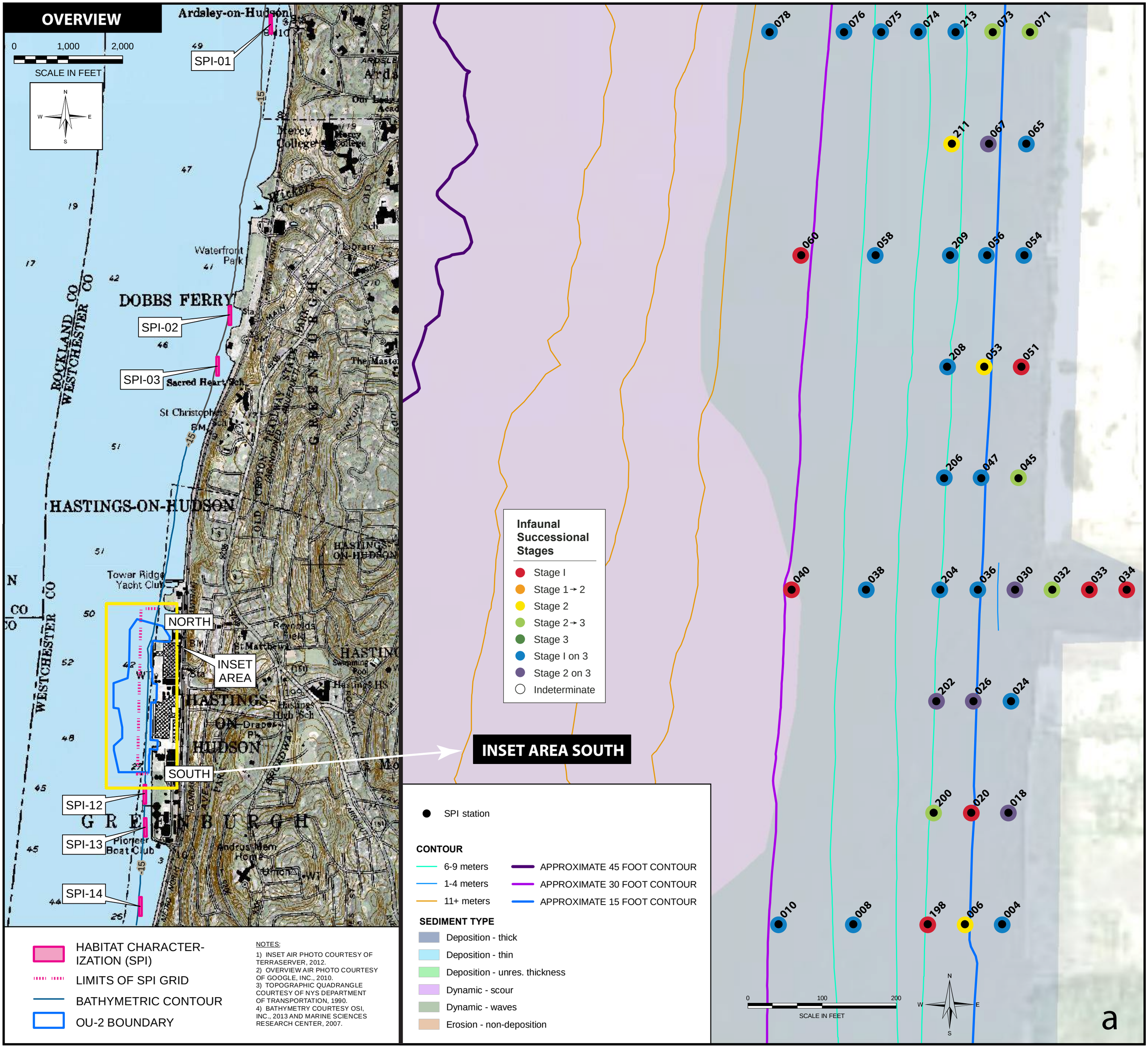


Figure 15a. Spatial distribution of infaunal successional stages at Hastings on Hudson in October, 2013.

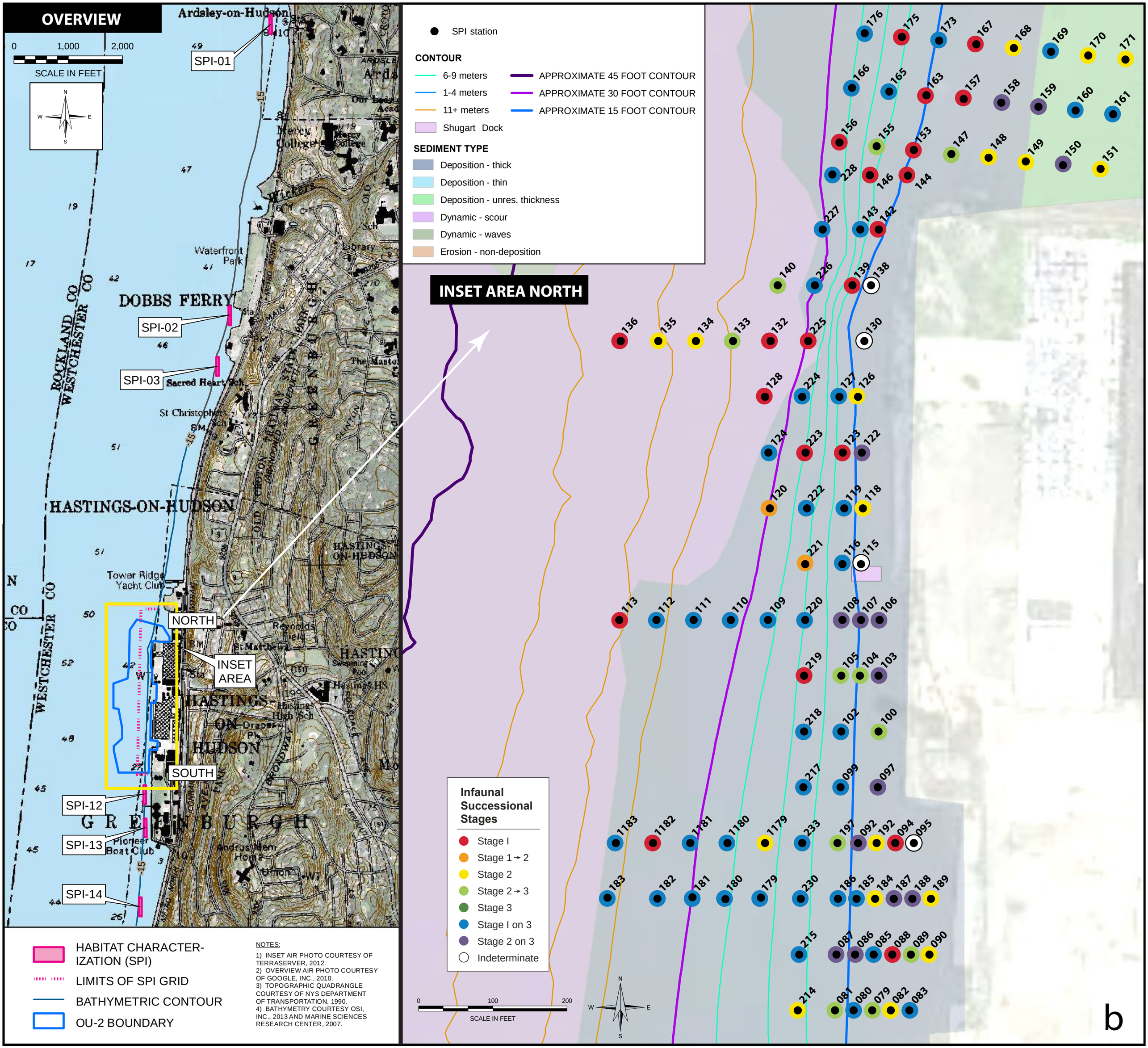


Figure 15b. Spatial distribution of infaunal successional stages at Hastings on Hudson in October, 2013.

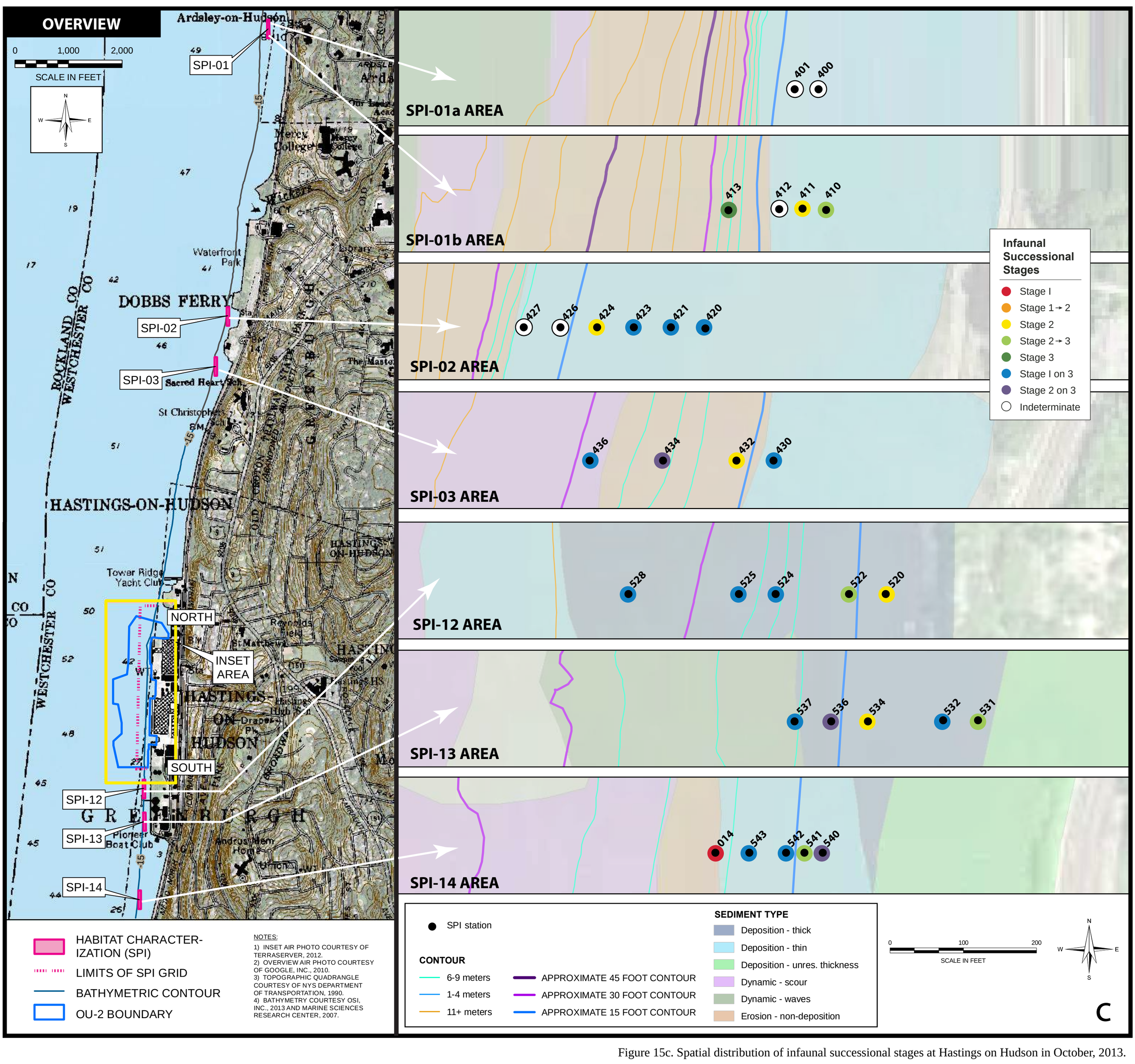


Figure 15c. Spatial distribution of infaunal successional stages at Hastings on Hudson in October, 2013.

Figure 16: This profile image from Station 213 from the Inset Area South (Figure 15a) adjacent to the OU-2 site shows multiple occurrences of subsurface burrows and feeding voids (arrows), a positive observation of Stage 3 taxa. Scale: width of profile image = 14.5 cm.

Figure 17: This profile image from Station 132 shows the surface oxidized layer eroded away from propwash action resulting from the barge drilling activities in the northwest corner of the site. There is no evidence of the presence of deposit feeding taxa. Scale: width of profile image = 14.5 cm

Figure 18: This profile image from Station 144 shows low reflectance subsurface sediments along with trapped methane gas (organic enrichment) as well as recent surface erosion (resuspension and re-settlement of oxidized layer) from boating activity, resulting in retrograde successional seres. Scale: width of profile image = 14.5 cm.

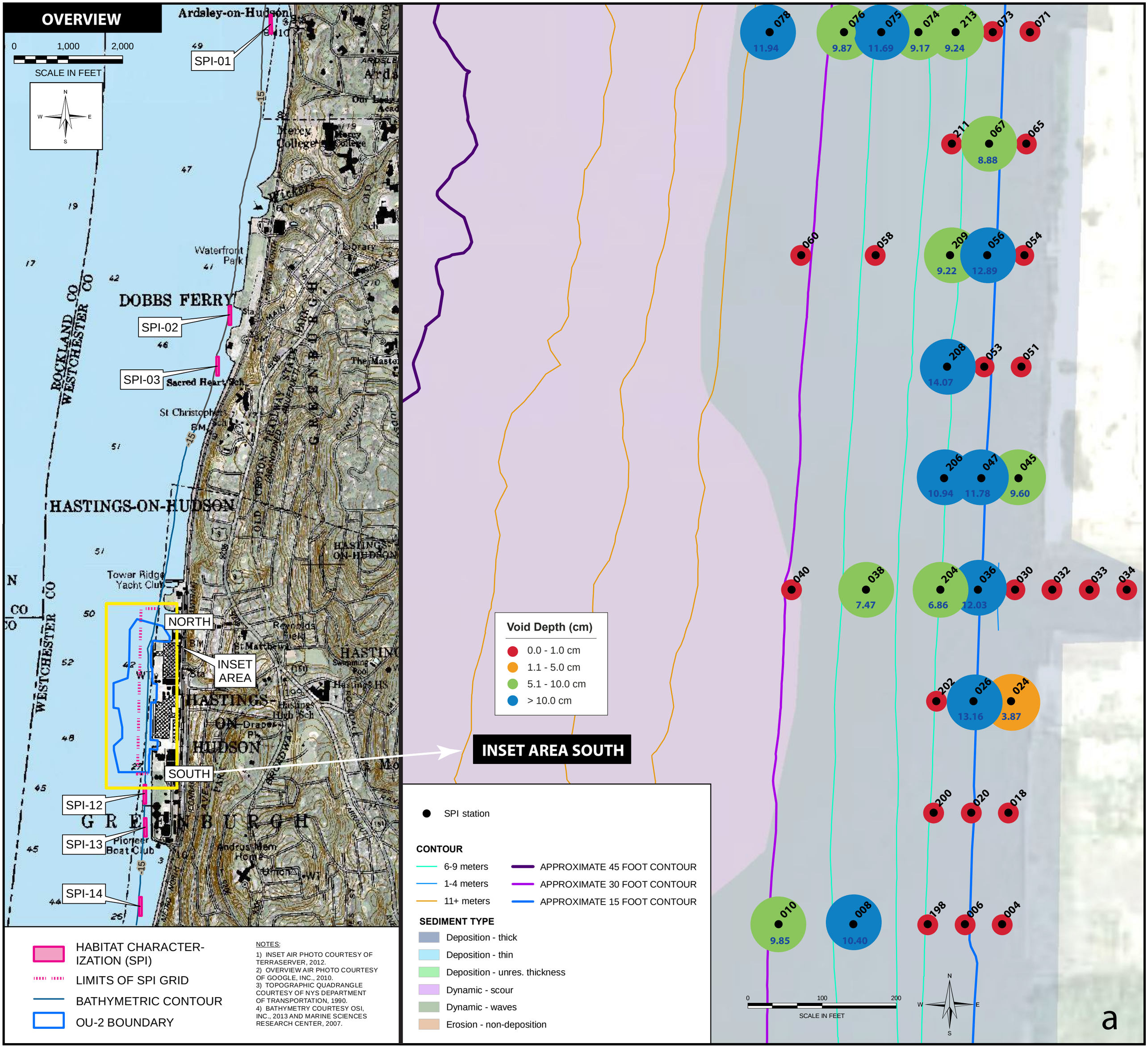


Figure 19a. Spatial distribution of average feeding void depth (cm) at Hastings on Hudson in October, 2013.

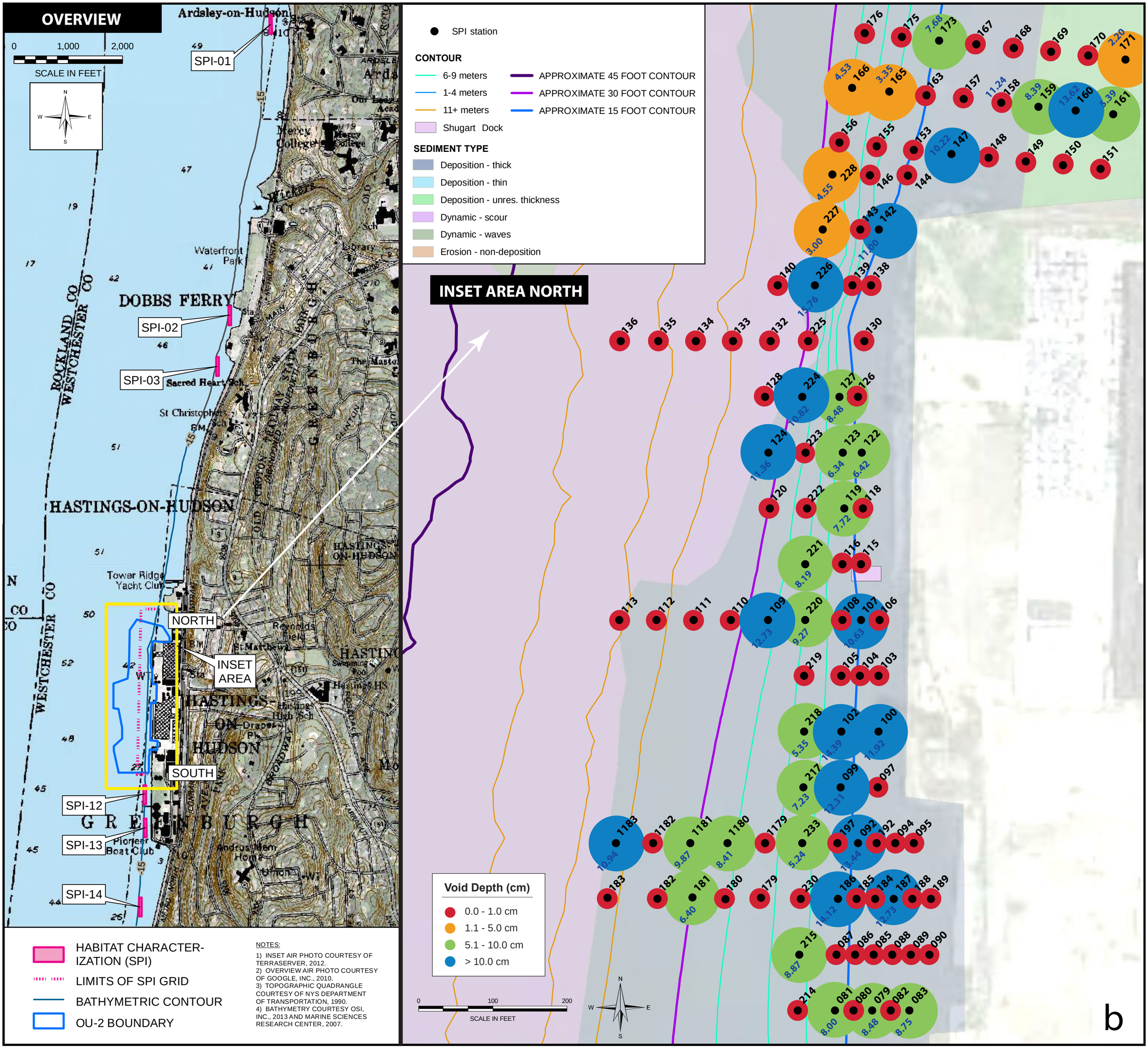


Figure 19b. Spatial distribution of average feeding void depth (cm) at Hastings on Hudson in October, 2013.

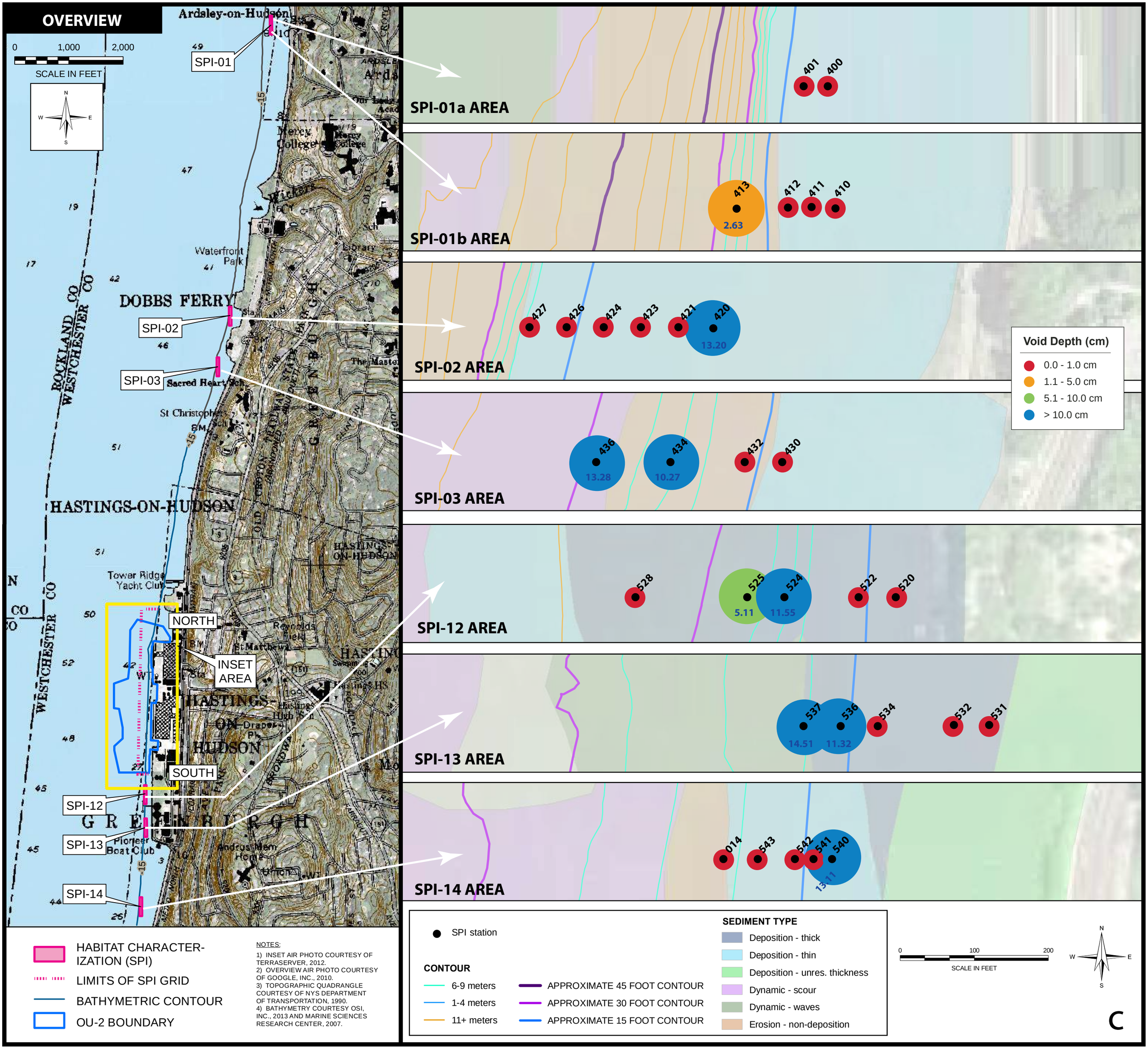


Figure 19c. Spatial distribution of average feeding void depth (cm) at Hastings on Hudson in October, 2013.

Figure 20: This profile image from Station 56 shows transected burrows and the top portion of a feeding void at the base of the image (arrow), indicating that the biological mixing depth at this location exceeds the depth of the camera prism penetration. Scale: width of profile image = 14.5 cm.

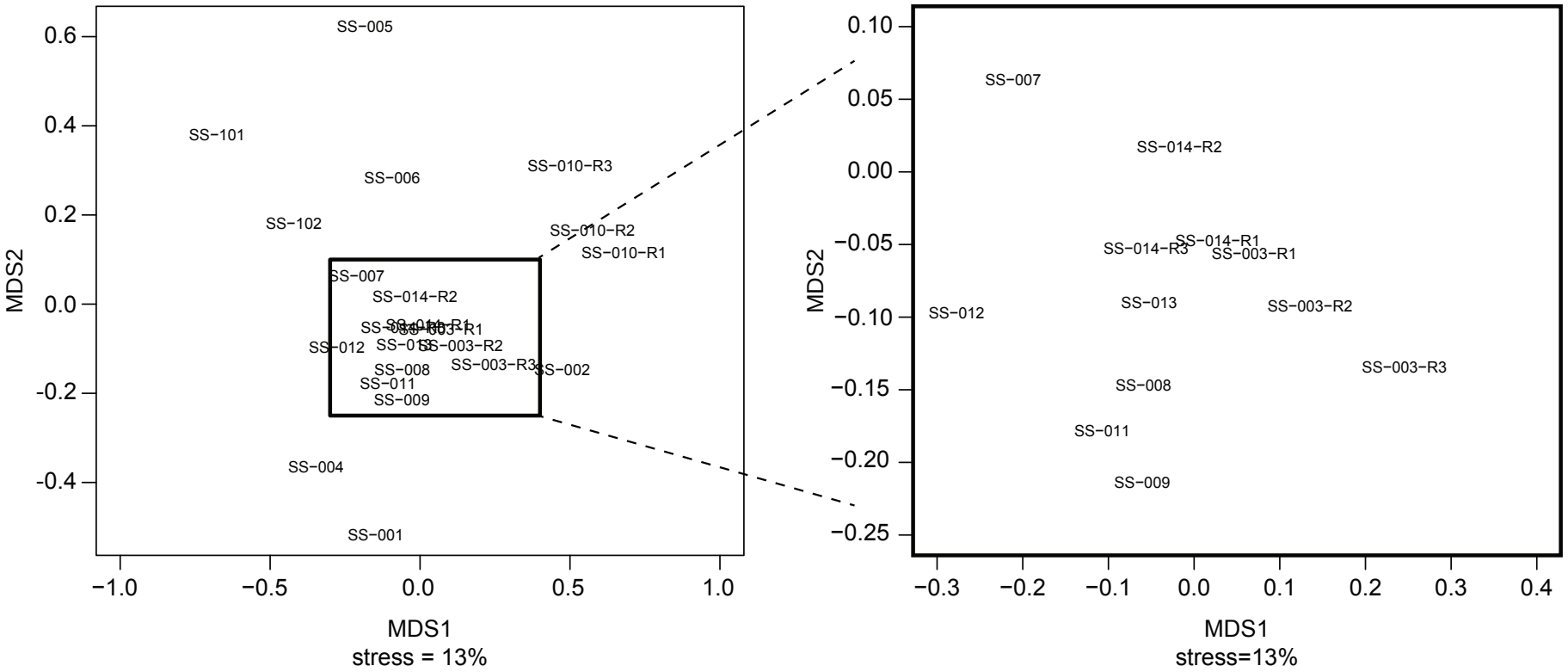


Figure 21: N-MDS ordination of Bray-Curtis dissimilarities for Hastings on Hudson benthic station samples, with zoom-in detail for area outlined.

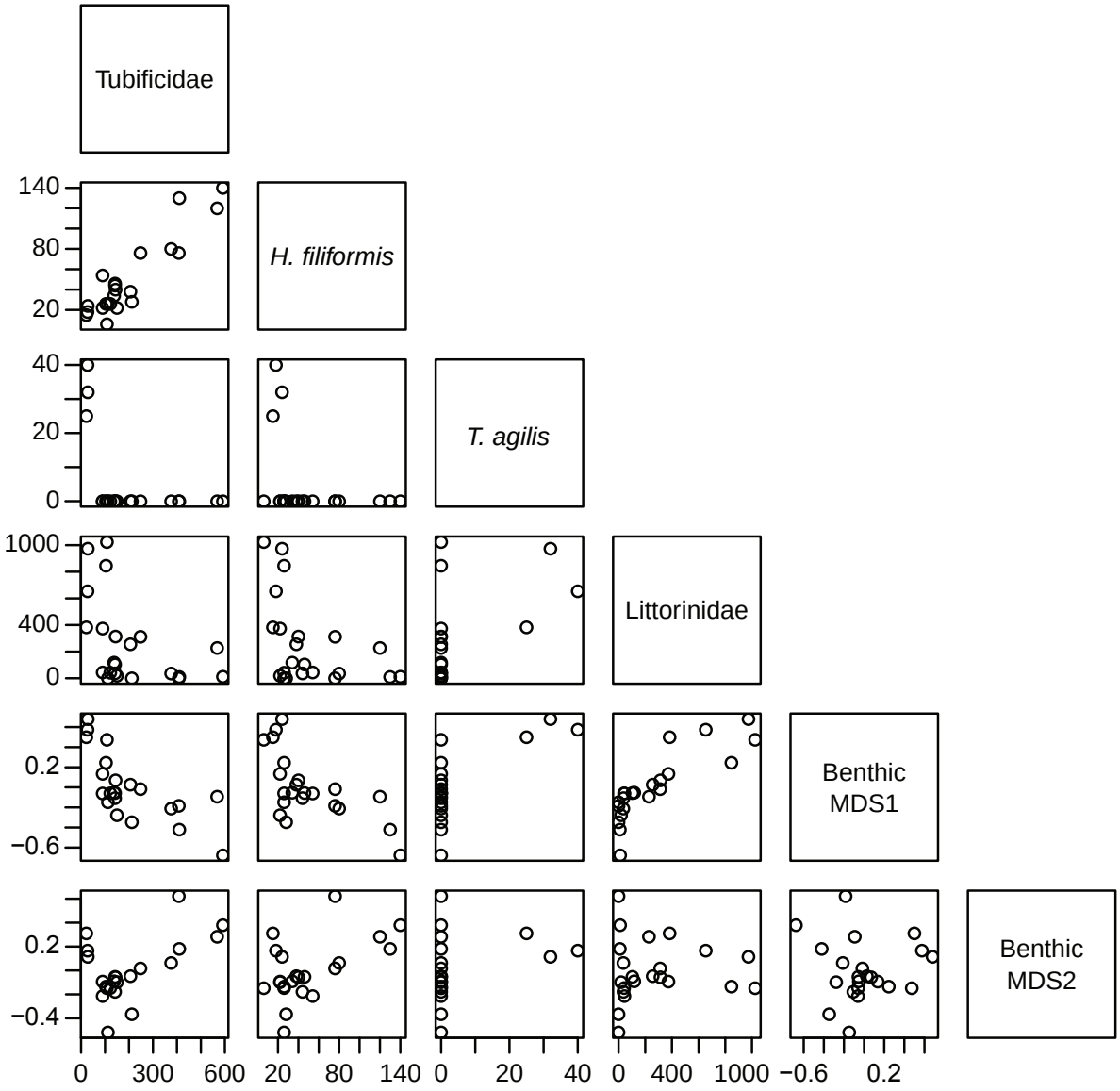


Figure 22: Pairwise scatterplots of benthic N-MDS variables with dominant taxa.

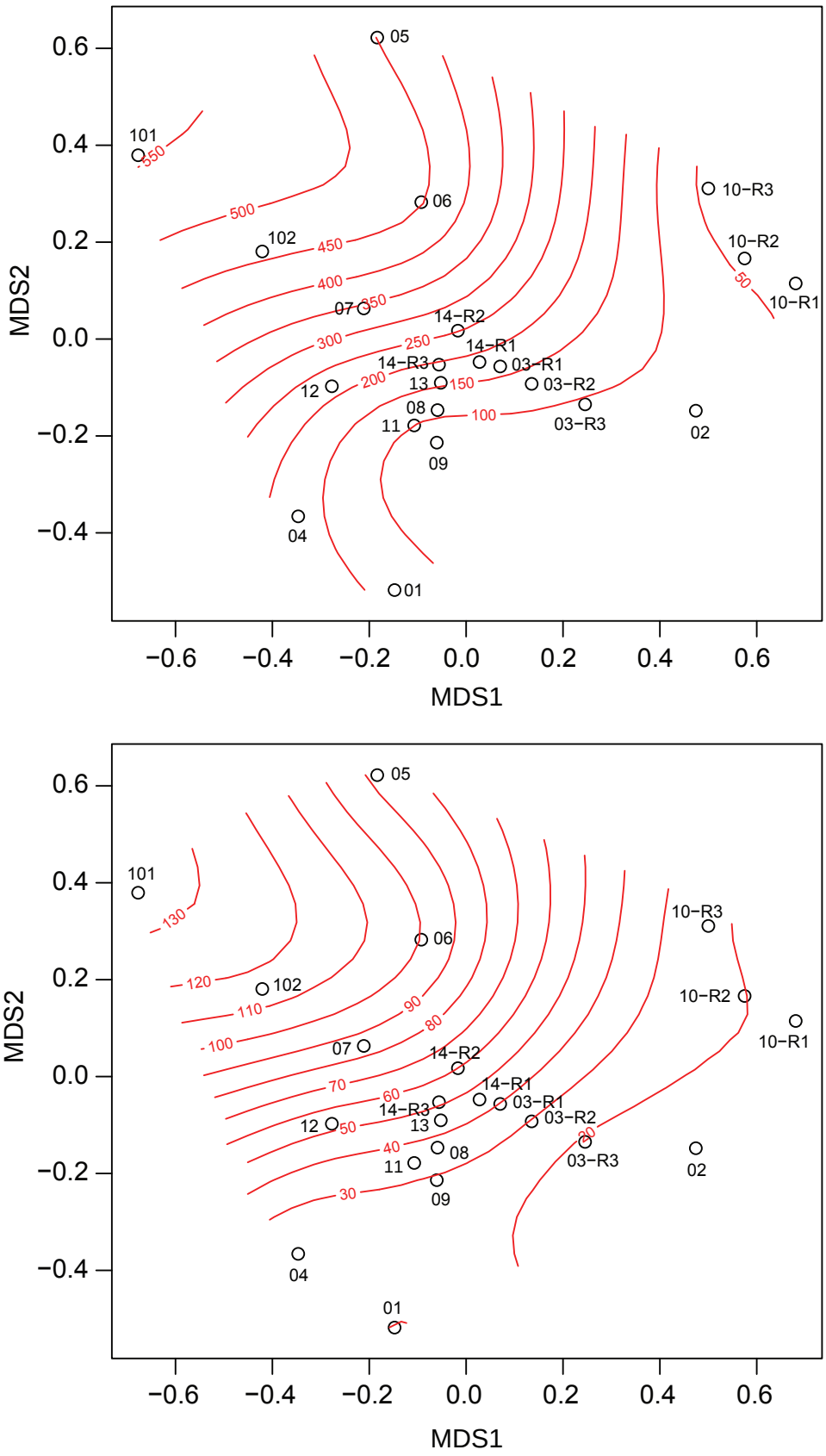


Figure 23: Benthic contours by oligochaete (top) and *Heteromastus filiformis* (bottom) abundance.

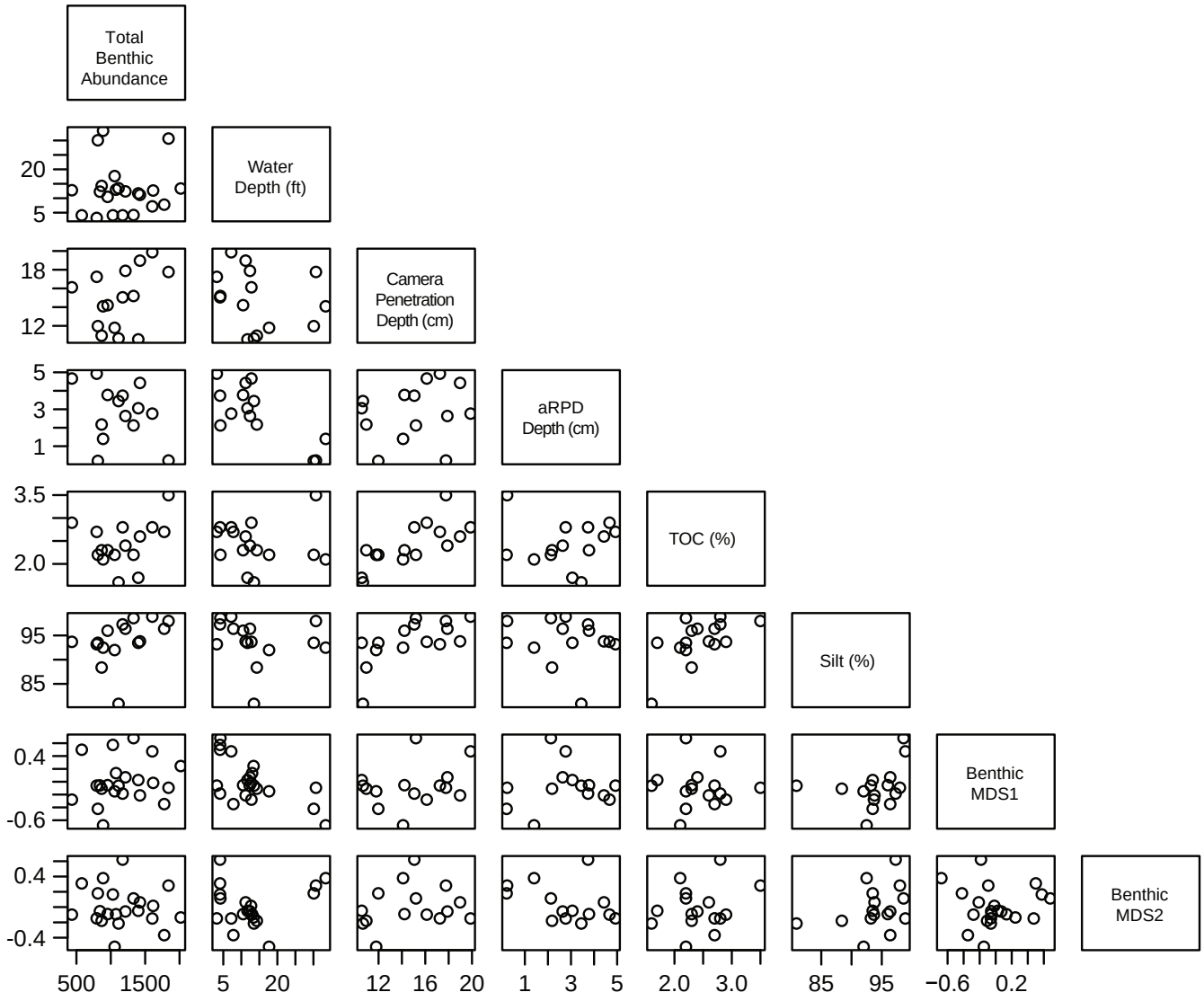


Figure 24: Pairwise scatterplots of benthic N-MDS variables with environmental parameters.

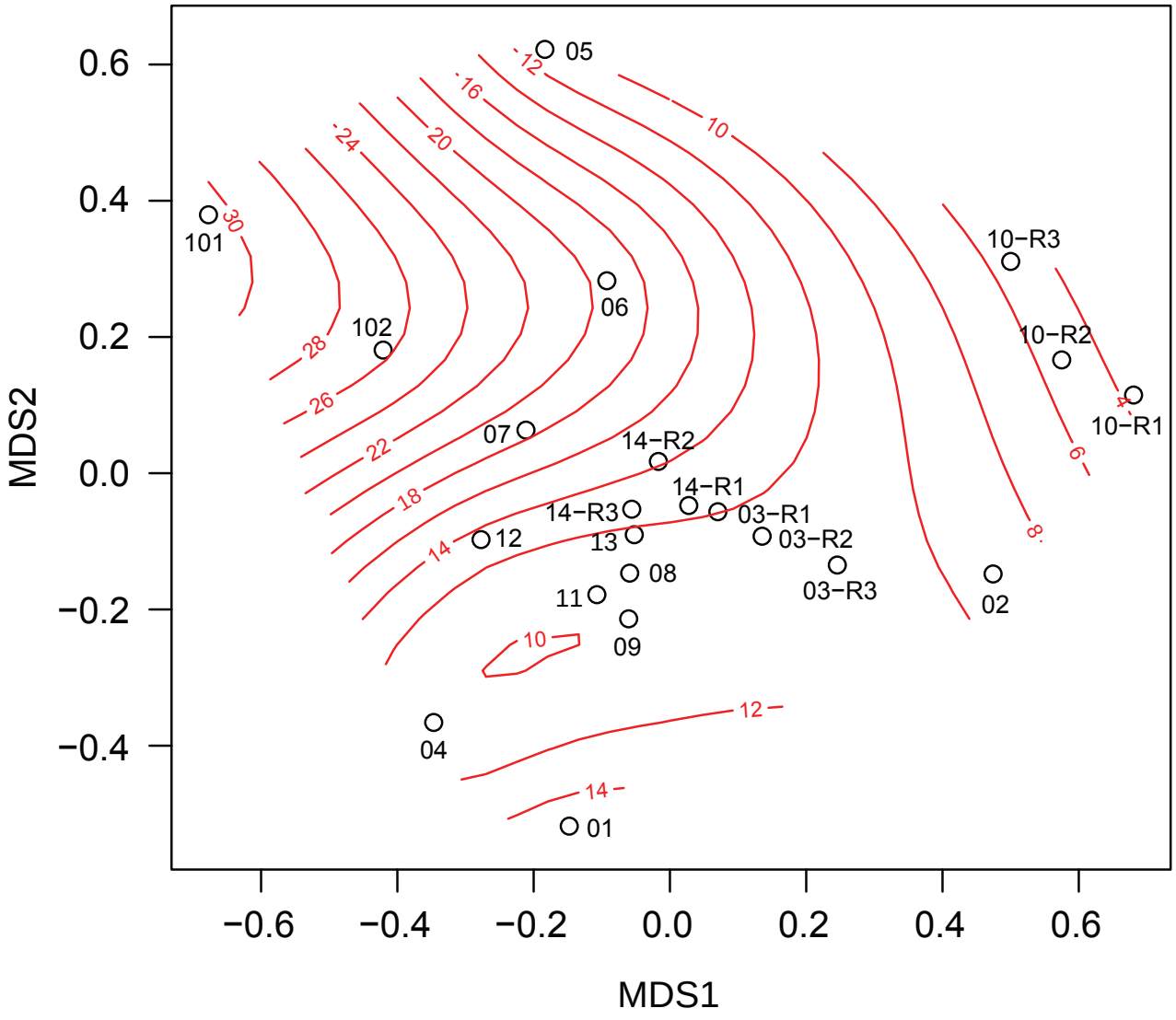


Figure 25: Benthic contours by water depth (ft).

Figure 26: Barplot of dominant taxa for the 3 stations with field replicates by number of individuals per grab (top) and by percent total sample abundance (bottom). Note how the variability in abundance disappears when viewed as proportion of total sample abundance.

Station 56 **Station 58** **Station 60**

Figure 27: Note the decrease in thickness of the surface oxidized layer from resuspension and re-settlement (sharp contact boundary between aRPD and subsurface sediments) of the surface oxidized particles as one moves offshore in these 3 representative images from the same transect: Station 56 (left), Station 58 (center), and Station 60 (right). Scale: width of each profile image = 14.5 cm.

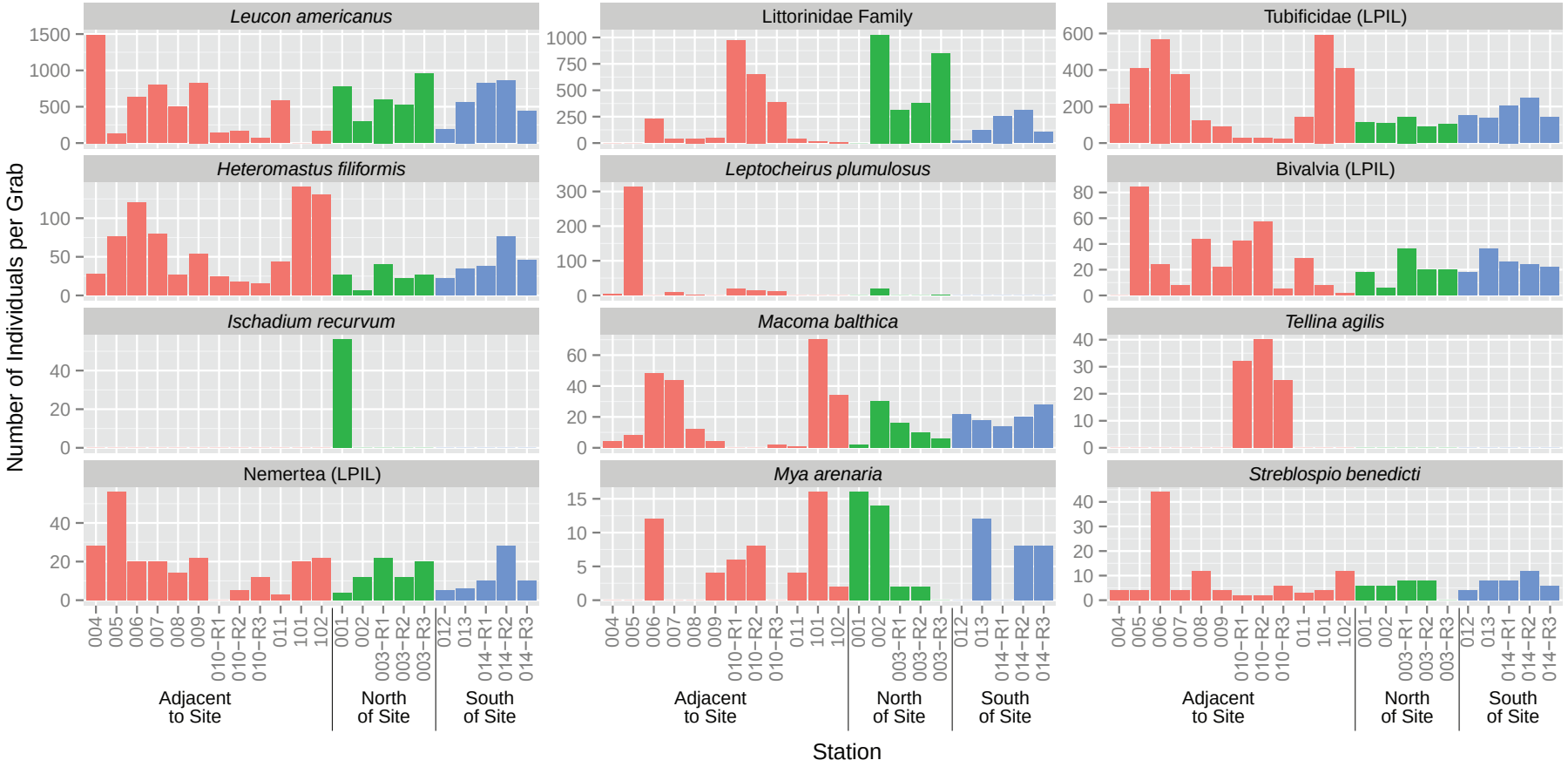


Figure 28: Barplots of counts of dominant taxa for each station (note scale differences on Y-axis).

APPENDIX A

Sediment Profile Image Analysis Results

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
4	A	10/16/2013	9:13:27	12	0	15.6	14.451	>4	>4	1	>4 to 1	140.103	9.70	9.57	9.81	0.24	Biological	39.42	2.73	0	-
6	E	10/17/2013	8:29:19	13.5	3	18.3	14.451	>4	>4	1	>4 to 1	199.1058	13.78	13.62	13.97	0.35	Biological	23.40	1.62	1	reduced
8	C	10/23/2013	7:56:59	15	1	25.1	14.451	>4	>4	1	>4 to 1	157.8933	10.93	10.78	11.12	0.35	Biological	5.79	0.40	0	-
10	A	10/23/2013	8:01:21	15	1	28.6	14.451	>4	>4	1	>4 to 1	146.3906	10.13	9.91	10.48	0.57	Biological	9.46	0.65	0	-
14	C	10/24/2013	9:51:36	15	1	20	14.451	>4	>4	1	>4 to 1	152.6163	10.56	10.43	10.79	0.36	Biological	15.46	1.07	5	both
18	A	10/16/2013	9:30:08	12	0	15.8	14.451	>4	>4	1	>4 to 1	165.9709	11.49	10.69	12.37	1.68	Physical	37.75	2.61	0	-
20	A	10/16/2013	9:37:57	12	0	17.6	14.451	>4	>4	1	>4 to 1	105.1185	7.27	7.16	7.35	0.19	Biological	31.21	2.16	0	-
24	A	10/16/2013	9:44:09	12	0	15.2	14.451	4 to 3/ >4	>4	1	>4 to 1	150.725	10.43	10.23	10.72	0.49	Biological	25.22	1.75	0	-
26	F	10/17/2013	8:22:43	13.5	3	17.6	14.451	4 to 3/ >4	>4	1	>4 to 1	221.5835	15.33	15.29	15.45	0.16	Biological	44.66	3.09	0	-
30	F	10/17/2013	8:38:12	13.5	3	15	14.451	4 to 3/ >4	>4	1	>4 to 1	233.3338	16.15	15.88	16.28	0.40	Biological	51.46	3.56	0	-
32	C	10/16/2013	10:05:54	12	0	4.2	14.451	>4	>4	2	>4 to 2	152.2848	10.54	10.34	10.70	0.35	Biological	22.57	1.56	10+	reduced
33	A	10/23/2013	12:24:39	15	2	4.8	14.451	>4	>4	2	>4 to 2	219.6178	15.20	14.96	15.35	0.39	Biological	30.75	2.13	0	-
34	E	10/17/2013	8:42:53	13.5	3	4.9	14.451	>4	>4	1	>4 to 1	220.1255	15.23	15.14	15.35	0.21	Biological	25.01	1.73	10+	both
36	D	10/17/2013	8:48:14	13.5	3	17.6	14.451	4 to 3/ >4	>4	1	>4 to 1	216.6266	14.99	14.81	15.11	0.30	Biological	43.01	2.98	0	-
38	A	10/23/2013	8:08:52	15	1	25	14.451	>4	>4	1	>4 to 1	136.6846	9.46	9.30	9.70	0.40	Biological	18.47	1.28	0	-
40	B	10/23/2013	8:16:03	15	1	28.6	14.451	>4	>4	2	>4 to 2	180.8353	12.51	12.15	12.87	0.73	Biological	1.66	0.11	0	-
45	C	10/16/2013	10:24:12	12	0	13.9	14.451	>4	>4	1	>4 to 1	149.5895	10.35	10.18	10.55	0.37	Biological	16.71	1.16	0	-
47	D	10/17/2013	8:53:27	13.5	3	18.7	14.451	>4	>4	1	>4 to 1	188.0742	13.01	12.87	13.16	0.28	Biological	24.94	1.73	0	-
51	A	10/16/2013	10:33:45	12	0	14.6	14.451	>4	>4	1	>4 to 1	161.0031	11.14	10.91	11.32	0.41	Biological	31.34	2.17	0	-
53	D	10/17/2013	9:05:17	13.5	3	19	14.451	>4	>4	1	>4 to 1	209.0614	14.47	14.10	14.77	0.67	Biological	39.54	2.74	10+	oxidized
54	E	10/17/2013	9:12:11	13.5	3	12.8	14.451	>4	>4	-6	>4 to -6	91.44901	6.33	5.22	7.31	2.09	Biological	32.65	2.26	0	-
56	F	10/17/2013	9:17:49	13.5	3	18.6	14.451	>4	>4	1	>4 to 1	213.9574	14.81	14.62	15.15	0.53	Biological	48.34	3.35	0	-
58	B	10/23/2013	8:23:34	15	1	25.3	14.451	>4	>4	2	>4 to 2	108.844	7.53	7.28	7.99	0.71	Biological	16.86	1.17	2	reduced
60	B	10/23/2013	8:30:21	15	1	29.9	14.451	>4	>4	2	>4 to 2	173.1107	11.98	11.88	12.08	0.20	Biological	3.03	0.21	0	-
65	E	10/17/2013	9:22:35	13.5	3	14.3	14.451	>4	>4	1	>4 to 1	124.5076	8.62	7.45	9.48	2.03	Biological	57.18	3.96	0	-
67	E	10/17/2013	9:27:15	13.5	3	18	14.451	4 to 3/ >4	>4	1	>4 to 1	183.66	12.71	12.41	12.84	0.43	Biological	42.47	2.94	10+	both
71	C	10/16/2013	11:14:42	12	0	15.6	14.451	>4	>4	1	>4 to 1	152.3288	10.54	9.69	11.28	1.59	Biological	37.73	2.61	4	reduced

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
73	D	10/17/2013	9:32:03	13.5	3	20	14.451	>4	>4	1	>4 to 1	211.796	14.66	14.50	14.81	0.31	Biological	44.16	3.06	0	-
74	C	10/17/2013	10:17:07	13.5	3	25.6	14.451	>4	>4	1	>4 to 1	205.0068	14.19	14.01	14.39	0.39	Biological	46.58	3.22	1	reduced
75	A	10/17/2013	10:25:10	13.5	3	27.9	14.451	>4	>4	2	>4 to 2	189.2574	13.10	12.49	13.66	1.17	Biological	16.05	1.11	0	-
76	A	10/23/2013	8:38:08	15	1	27.6	14.451	>4	>4	1	>4 to 1	155.6749	10.77	10.67	10.93	0.26	Biological	6.80	0.47	0	-
78	A	10/23/2013	8:44:08	15	1	27.2	14.451	>4	>4	2	>4 to 2	197.497	13.67	13.44	14.16	0.72	Physical	5.15	0.36	0	-
79	B	10/16/2013	11:35:06	12	0	13.1	14.451	>4	>4	1	>4 to 1	135.9048	9.40	9.14	9.82	0.68	Biological	30.05	2.08	3	both
80	C	10/24/2013	11:49:01	15	1	15.9	14.451	>4	>4	1	>4 to 1	173.0864	11.98	11.67	12.20	0.53	Biological	49.17	3.40	5	oxidized
81	E	10/17/2013	9:39:46	13.5	3	20.2	14.451	>4	>4	1	>4 to 1	199.5303	13.81	13.48	14.18	0.70	Biological	42.55	2.94	0	-
82	D	10/23/2013	13:26:03	15	0	8.2	14.451	>4	>4	1	>4 to 1	202.3304	14.00	13.41	14.68	1.28	Biological	34.52	2.39	0	-
83	C	10/16/2013	11:30:57	12	0	2.7	14.451	4 to 3/ >4	>4	1	>4 to 1	135.2007	9.36	9.27	9.56	0.29	Biological	35.32	2.44	10+	both
85	B	10/24/2013	11:25:40	15	1	14.8	14.451	>4	>4	1	>4 to 1	197.6327	13.68	13.21	14.03	0.81	Biological	53.36	3.69	0	-
86	C	10/23/2013	12:08:15	15	2	16.9	14.451	4 to 3/ >4	>4	0	>4 to 0	211.9609	14.67	14.52	14.81	0.29	Biological	57.94	4.01	0	-
87	A	10/24/2013	11:40:29	15	1	17.6	14.451	>4	>4	1	>4 to 1	154.0804	10.66	10.60	10.72	0.12	Biological	47.27	3.27	0	-
88	D	10/24/2013	11:16:06	15	1	8.2	14.451	>4	>4	1	>4 to 1	245.7213	17.00	16.59	17.58	1.00	Biological	29.68	2.05	0	-
89	A	10/24/2013	11:10:03	15	1	3	14.451	4 to 3/ >4	>4	1	>4 to 1	201.495	13.94	13.17	14.72	1.55	Biological	55.40	3.83	0	-
90	A	10/23/2013	11:51:00	15	2	4.5	14.451	4 to 3/ >4	>4	1	>4 to 1	239.4848	16.57	15.90	16.98	1.08	Biological	59.40	4.11	0	-
92	C	10/24/2013	11:01:39	15	1	15.8	14.451	4 to 3/ >4	>4	1	>4 to 1	195.6518	13.54	13.33	13.94	0.61	Biological	65.73	4.55	5	oxidized
94	A	10/24/2013	10:55:14	15	1	3.9	14.451	>4	>4	1	>4 to 1	230.6924	15.96	15.77	16.20	0.43	Biological	10.94	0.76	0	-
95	A	10/23/2013	11:44:32	15	2	4	14.451	2 to1	>4	-4	>4 to -4	122.1568	8.45	7.69	9.27	1.58	Physical	112.39	7.78	0	-
97	B	10/23/2013	11:33:57	15	2	14.9	14.451	4 to 3/ >4	>4	1	>4 to 1	258.0552	17.86	17.70	18.01	0.31	Biological	66.64	4.61	10+	both
99	A	10/23/2013	11:37:57	15	2	18.7	14.451	>4	>4	1	>4 to 1	223.9501	15.50	15.30	15.70	0.40	Biological	18.55	1.28	0	-
100	C	10/16/2013	14:30:56	13.5	3	12.3	14.451	4 to 3/ >4	>4	1	>4 to 1	267.2159	18.49	18.21	18.71	0.50	Biological	65.80	4.55	0	-
102	A	10/16/2013	14:35:35	13.5	3	16.6	14.451	4 to 3/ >4	>4	1	>4 to 1	217.8152	15.07	14.90	15.16	0.27	Biological	44.16	3.06	0	-
103	C	10/23/2013	11:12:10	15	2	12.7	14.451	4 to 3/ >4	>4	1	>4 to 1	283.7806	19.64	18.60	20.74	2.14	Biological	73.31	5.07	10+	both
104	A	10/23/2013	11:16:30	15	2	16.1	14.451	>4	>4	1	>4 to 1	208.0153	14.39	14.22	14.61	0.39	Biological	41.67	2.88	2	oxidized
105	B	10/23/2013	11:22:50	15	2	18.8	14.451	>4	>4	2	>4 to 2	175.5443	12.15	12.01	12.26	0.25	Biological	12.42	0.86	10+	both
106	A	10/16/2013	14:57:10	13.5	3	11.2	14.451	>4	>4	1	>4 to 1	274.2751	18.98	18.75	19.23	0.48	Biological	64.01	4.43	0	-
107	B	10/16/2013	15:04:02	13.5	3	15.9	14.451	4 to 3/ >4	>4	1	>4 to 1	225.6453	15.61	15.37	15.87	0.50	Biological	62.62	4.33	1	oxidized

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108	B	10/16/2013	15:10:51	13.5	3	16.9	14.451	4 to 3/ >4	>4	0	>4 to 0	237.4712	16.43	16.22	16.62	0.40	Biological	54.59	3.78	0	-
109	B	10/23/2013	15:09:56	15	1	29.2	14.451	>4	>4	1	>4 to 1	236.6374	16.38	16.16	16.64	0.48	Biological	10.48	0.73	4	both
110	B	10/23/2013	9:03:07	15	1	29.9	14.451	>4	>4	1	>4 to 1	224.6908	15.55	15.23	15.72	0.49	Biological	20.87	1.44	0	-
111	A	10/23/2013	15:15:15	15	1	34.5	14.451	4 to 3/ >4	>4	1	>4 to 1	234.5624	16.23	16.08	16.36	0.28	Biological	17.35	1.20	0	-
112	A	10/23/2013	9:08:12	15	1	35.6	14.451	4 to 3/ >4	>4	1	>4 to 1	209.087	14.47	14.13	14.73	0.60	Biological	32.90	2.28	0	-
113	A	10/23/2013	15:21:16	15	1	39.6	14.451	>4	>4	1	>4 to 1	195.5177	13.53	13.25	13.72	0.46	Biological	4.93	0.34	0	-
115	C	10/23/2013	14:55:52	15	2	16.2	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	Physical	ind	ind	0	-
116	C	10/23/2013	15:01:35	15	2	21.1	14.451	>4	>4	1	>4 to 1	214.2966	14.83	14.37	15.73	1.37	Biological	9.80	0.68	4	reduced
118	B	10/23/2013	10:53:04	15	2	15.2	14.451	4 to 3/ >4	>4	1	>4 to 1	239.087	16.54	16.03	17.22	1.20	Biological	53.51	3.70	0	-
119	A	10/23/2013	11:03:27	15	2	20.0	14.451	>4	>4	0	>4 to 0	175.784	12.16	11.77	12.55	0.78	Biological	16.29	1.13	10+	both
120	A	10/23/2013	9:58:43	15	1	28.8	14.451	>4	>4	1	>4 to 1	245.137	16.96	16.82	17.25	0.43	Biological	21.70	1.50	0	-
122	B	10/19/2013	8:34:52	15	1	11.6	14.451	>4	>4	1	>4 to 1	218.1936	15.10	14.70	16.10	1.40	Biological	44.88	3.11	0	-
123	B	10/19/2013	8:40:32	15	1	18.2	14.451	>4	>4	2	>4 to 2	167.2452	11.57	11.37	11.72	0.36	Biological	2.97	0.21	10+	reduced
124	C	10/23/2013	9:53:39	15	1	30.3	14.451	>4	>4	2	>4 to 2	254.4195	17.61	17.37	17.89	0.52	Biological	1.20	0.08	0	-
126	C	10/19/2013	14:08:18	15	2	12.5	14.451	4 to 3/ >4	>4	1	>4 to 1	232.2725	16.07	15.12	17.09	1.97	Biological	49.43	3.42	0	-
127	B	10/19/2013	14:15:50	15	2	20.5	14.451	>4	>4	2	>4 to 2	244.987	16.95	16.48	17.89	1.41	Biological	32.23	2.23	10+	both
128	B	10/24/2013	7:30:59	15	1	30.8	14.451	>4	>4	2	>4 to 2	227.201	15.72	15.55	15.94	0.39	Biological	35.32	2.44	2	reduced
130	B	10/19/2013	8:52:13	15	1	7.6	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
132	A	10/24/2013	7:35:39	15	1	30.3	14.451	>4	>4	2	>4 to 2	241.0545	16.68	16.04	17.25	1.20	Biological	14.63	1.01	4	reduced
133	B	10/23/2013	9:17:58	15	1	34.9	14.451	>4	>4	2	>4 to 2	262.8625	18.19	18.06	18.38	0.32	Biological	9.38	0.65	0	-
134	B	10/23/2013	9:23:16	15	1	36.6	14.451	>4	>4	1	>4 to 1	198.5239	13.74	13.51	13.90	0.39	Biological	21.96	1.52	10+	both
135	A	10/23/2013	9:31:37	15	1	38.5	14.451	>4	>4	1	>4 to 1	131.3574	9.09	9.01	9.22	0.21	Biological	39.60	2.74	0	-
136	B	10/23/2013	9:38:49	15	1	40.3	14.451	>4	>4	1	>4 to 1	213.5736	14.78	13.97	15.35	1.38	Biological	24.69	1.71	0	-
138	B	10/19/2013	13:54:05	15	2	8.6	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	Biological	ind	ind	0	-
139	C	10/19/2013	14:02:25	15	2	16.6	14.451	>4	>4	1	>4 to 1	193.5724	13.40	12.59	14.36	1.77	Biological	11.06	0.77	0	-
140	A	10/24/2013	7:46:28	15	1	31.9	14.451	>4	>4	2	>4 to 2	248.1149	17.17	16.94	17.39	0.45	Biological	14.05	0.97	0	-
142	C	10/19/2013	13:41:48	15	2	19.2	14.451	>4	>4	1	>4 to 1	281.2047	19.46	19.32	19.77	0.45	Biological	5.65	0.39	0	-

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143	B	10/19/2013	13:46:50	15	2	24.9	14.451	>4	>4	1	>4 to 1	270.8464	18.74	18.50	19.16	0.66	Biological	9.77	0.68	0	-
144	A	10/19/2013	13:26:18	15	2	16.8	14.451	>4	>4	1	>4 to 1	194.2156	13.44	13.08	13.74	0.66	Biological	17.99	1.25	0	-
146	C	10/19/2013	13:33:24	15	2	23.0	14.451	>4	>4	1	>4 to 1	272.2377	18.84	17.98	19.46	1.49	Biological	30.96	2.14	3	reduced
147	F	10/20/2013	10:23:26	15	1	2.6	14.451	>4	>4	1	>4 to 1	192.5623	13.33	12.22	13.94	1.73	Biological	33.84	2.34	10+	both
148	B	10/19/2013	9:38:20	15	2	4.0	14.451	4 to 3/ >4	>4	0	>4 to 0	261.6712	18.11	17.67	18.22	0.55	Biological	63.42	4.39	0	-
149	A	10/19/2013	9:28:06	15	2	4.2	14.451	>4	>4	1	>4 to 1	217.6382	15.06	14.86	15.23	0.37	Biological	54.08	3.74	1	oxidized
150	C	10/19/2013	9:24:02	15	2	4.0	14.451	>4	>4	1	>4 to 1	210.5455	14.57	14.49	14.88	0.39	Biological	41.68	2.88	0	-
151	C	10/19/2013	9:17:27	15	1	3.5	14.451	>4	>4	1	>4 to 1	134.5917	9.31	9.16	9.49	0.34	Biological	38.54	2.67	0	-
153	C	10/19/2013	13:08:20	15	2	16.5	14.451	>4	>4	1	>4 to 1	200.5668	13.88	13.72	14.22	0.50	Biological	6.59	0.46	0	-
155	A	10/19/2013	13:18:26	15	2	19.5	14.451	>4	>4	2	>4 to 2	208.333	14.42	13.51	15.33	1.82	Biological	10.44	0.72	0	-
156	A	10/20/2013	9:48:33	15	1	28.0	14.451	>4	>4	2	>4 to 2	241.7812	16.73	16.31	17.00	0.69	Biological	1.74	0.12	10+	both
157	D	10/20/2013	10:27:47	15	1	9.2	14.451	>4	>4	1	>4 to 1	171.0426	11.84	11.27	12.81	1.54	Biological	25.66	1.78	0	-
158	B	10/19/2013	10:22:06	15	2	4.4	14.451	4 to 3/ >4	>4	1	>4 to 1	186.8045	12.93	12.63	13.39	0.76	Biological	55.34	3.83	10+	both
159	C	10/19/2013	10:16:21	15	2	4.0	14.451	4 to 3/ >4	>4	1	>4 to 1	211.5845	14.64	14.49	14.81	0.32	Biological	69.04	4.78	0	-
160	C	10/19/2013	10:11:47	15	2	4.3	14.451	>4	>4	1	>4 to 1	201.8344	13.97	13.58	14.20	0.62	Biological	51.38	3.56	0	-
161	A	10/19/2013	10:01:53	15	2	4.2	14.451	>4	>4	1	>4 to 1	169.3789	11.72	11.35	12.24	0.89	Biological	30.58	2.12	0	-
163	B	10/19/2013	12:45:04	15	2	18.8	14.451	>4	>4	1	>4 to 1	103.3497	7.15	6.40	8.01	1.61	Biological	16.82	1.16	0	-
165	C	10/19/2013	12:52:38	15	2	21.2	14.451	>4	>4	1	>4 to 1	181.3642	12.55	12.77	13.45	0.68	Biological	29.71	2.06	0	-
166	C	10/20/2013	11:12:17	15	1	28.5	14.451	>4	>4	1	>4 to 1	199.9925	13.84	13.53	14.17	0.64	Biological	33.47	2.32	0	-
167	D	10/20/2013	10:34:01	15	1	6.1	14.451	>4	>4	1	>4 to 1	189.747	13.13	12.81	13.26	0.45	Biological	33.25	2.30	0	-
168	B	10/19/2013	11:00:55	15	2	3.8	14.451	4 to 3/ >4	>4	1	>4 to 1	244.6249	16.93	16.60	17.25	0.65	Biological	58.61	4.06	0	-
169	A	10/19/2013	10:53:55	15	2	4.0	14.451	4 to 3/ >4	>4	0	>4 to 0	210.6536	14.58	14.33	14.66	0.33	Biological	45.76	3.17	0	-
170	A	10/19/2013	10:46:30	15	2	4.0	14.451	>4	>4	1	>4 to 1	218.9086	15.15	14.98	15.28	0.30	Biological	46.52	3.22	0	-
171	A	10/19/2013	10:33:38	15	2	4.1	14.451	>4	>4	0	>4 to 0	166.1972	11.50	11.06	11.80	0.74	Biological	41.75	2.89	10+	both
173	A	10/19/2013	12:22:37	15	2	17	14.451	4 to 3/ >4	>4	0	>4 to 0	116.7271	8.08	7.72	8.46	0.74	Biological	13.66	0.95	0	-

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
175	B	10/19/2013	12:30:46	15	2	21.6	14.451	>4	>4	2	>4 to 2	184.7423	12.78	12.53	13.03	0.50	Biological	5.38	0.37	2	reduced
176	B	10/20/2013	10:58:41	15	1	26.4	14.451	>4	>4	1	>4 to 1	115.216	7.97	7.40	8.32	0.92	Biological	10.30	0.71	0	-
179	B	10/16/2013	13:49:04	13.5	3	23	14.451	>4	>4	1	>4 to 1	224.9348	15.57	15.39	15.79	0.40	Biological	71.69	4.96	0	-
180	B	10/16/2013	13:55:11	13.5	3	25.5	14.451	>4	>4	1	>4 to 1	218.5269	15.12	14.98	15.62	0.64	Biological	44.96	3.11	0	-
181	C	10/23/2013	15:30:21	15	1	30.4	14.451	>4	>4	1	>4 to 1	192.4114	13.31	12.80	13.50	0.70	Biological	15.80	1.09	10+	both
182	A	10/23/2013	8:52:30	15	1	31.9	14.451	>4	>4	1	>4 to 1	204.3931	14.14	13.90	14.38	0.48	Biological	20.87	1.44	0	-
183	A	10/23/2013	15:33:51	15	1	36.4	14.451	>4	>4	1	>4 to 1	201.8037	13.96	13.89	14.09	0.20	Biological	9.23	0.64	0	-
184	D	10/16/2013	13:21:41	13.5	3	10.2	14.451	4 to 3/ >4	>4	0	>4 to 0	244.5748	16.92	16.57	17.04	0.46	Biological	57.12	3.95	0	-
185	F	10/16/2013	13:28:22	13.5	3	14.5	14.451	4 to 3/ >4	>4	1	>4 to 1	229.3174	15.87	15.73	16.10	0.37	Biological	50.62	3.50	0	-
186	A	10/16/2013	13:32:01	13.5	3	16.3	14.451	>4	>4	1	>4 to 1	207.9515	14.39	14.17	14.54	0.37	Biological	33.72	2.33	0	-
187	C	10/16/2013	13:02:27	13.5	1	5.8	14.451	4 to 3/ >4	>4	1	>4 to 1	267.7356	18.53	18.09	19.65	1.57	Biological	59.38	4.11	6	oxidized
188	A	10/17/2013	9:54:16	13.5	3	5.0	14.451	4 to 3/ >4	>4	0	>4 to 0	249.2763	17.25	16.31	17.55	1.24	Biological	71.24	4.93	0	-
189	A	10/17/2013	9:47:39	13.5	3	4.9	14.451	4 to 3/ >4	>4	1	>4 to 1	163.7394	11.33	10.61	11.78	1.17	Biological	54.37	3.76	0	-
192	C	10/16/2013	14:05:50	13.5	3	12.2	14.451	4 to 3/ >4	>4	1	>4 to 1	254.6778	17.62	17.38	17.89	0.50	Biological	67.44	4.67	0	-
197	B	10/16/2013	14:09:46	13.5	3	16.3	14.451	>4	>4	1	>4 to 1	220.5381	15.26	14.77	15.74	0.97	Biological	50.59	3.50	0	-
198	A	10/23/2013	13:38:06	15	2	21.1	14.451	>4	>4	2	>4 to 2	125.7251	8.70	8.26	9.02	0.76	Biological	10.03	0.69	10+	both
200	C	10/23/2013	13:46:37	15	2	22.3	14.451	>4	>4	1	>4 to 1	175.4282	12.14	11.62	12.86	1.24	Biological	46.56	3.22	0	-
202	B	10/23/2013	13:51:22	15	2	22.0	14.451	>4	>4	1	>4 to 1	186.5637	12.91	12.79	13.18	0.39	Biological	47.36	3.28	6	both
204	C	10/23/2013	13:57:26	15	2	21.9	14.451	>4	>4	1	>4 to 1	177.7626	12.30	12.10	12.54	0.44	Biological	36.33	2.51	10+	both
206	A	10/23/2013	14:02:04	15	2	23.8	14.451	>4	>4	1	>4 to 1	167.676	11.60	11.37	11.74	0.37	Biological	24.31	1.68	0	-
208	A	10/23/2013	14:07:38	15	2	23.4	14.451	4 to 3/ >4	>4	0	>4 to 0	206.5169	14.29	14.19	14.52	0.34	Biological	40.14	2.78	0	-
209	A	10/23/2013	14:12:55	15	2	23.4	14.451	>4	>4	1	>4 to 1	176.7338	12.23	12.10	12.36	0.26	Biological	37.58	2.60	0	-
211	C	10/23/2013	14:19:59	15	2	24.5	14.451	>4	>4	1	>4 to 1	155.461	10.76	10.63	11.07	0.44	Biological	36.22	2.51	2	oxidized
213	A	10/17/2013	10:05:02	13.5	3	23.0	14.451	>4	>4	1	>4 to 1	201.7544	13.96	13.66	14.15	0.49	Biological	26.13	1.81	10+	both
214	A	10/23/2013	14:26:15	15	2	22.4	14.451	>4	>4	1	>4 to 1	167.2361	11.57	11.30	11.81	0.51	Biological	26.58	1.84	0	-
215	C	10/23/2013	14:32:31	15	2	23.2	14.451	>4	>4	1	>4 to 1	145.2745	10.05	9.75	10.21	0.46	Biological	8.71	0.60	10+	both
217	A	10/23/2013	14:36:54	15	2	24.1	14.451	>4	>4	0	>4 to 0	144.281	9.98	9.60	10.17	0.57	Biological	20.97	1.45	0	-
218	C	10/16/2013	14:42:43	13.5	3	20.8	14.451	>4	>4	2	>4 to 2	159.2336	11.02	10.61	11.33	0.71	Biological	21.01	1.45	10+	both
219	B	10/23/2013	14:43:15	15	2	24.9	14.451	>4	>4	2	>4 to 2	134.6555	9.32	8.91	9.64	0.73	Biological	10.87	0.75	10+	both
220	C	10/16/2013	15:20:43	13.5	3	23.0	14.451	>4	>4	1	>4 to 1	218.3801	15.11	14.96	15.20	0.24	Biological	48.10	3.33	0	-
221	C	10/23/2013	14:49:49	15	2	25.8	14.451	>4	>4	2	>4 to 2	190.6867	13.20	12.93	13.64	0.71	Biological	11.71	0.81	10+	both
222	A	10/23/2013	10:03:53	15	1	24.8	14.451	>4	>4	2	>4 to 2	229.6368	15.89	15.66	16.24	0.58	Biological	14.47	1.00	10+	both

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
223	B	10/20/2013	8:31:43	15	1	26.4	14.451	>4	>4	2	>4 to 2	201.5796	13.95	13.70	14.13	0.43	Biological	3.81	0.26	4	both
224	B	10/20/2013	8:42:07	15	1	26.2	14.451	>4	>4	2	>4 to 2	205.3785	14.21	13.76	14.65	0.89	Biological	2.22	0.15	4	reduced
225	A	10/20/2013	8:47:08	15	1	29.5	14.451	>4	>4	2	>4 to 2	256.7409	17.77	16.79	19.21	2.43	Biological	3.35	0.23	0	-
226	B	10/20/2013	8:52:47	15	1	29.5	14.451	>4	>4	2	>4 to 2	254.2621	17.59	17.49	17.84	0.35	Biological	4.62	0.32	10+	both
227	B	10/20/2013	9:19:40	15	1	28.8	14.451	>4	>4	1	>4 to 1	241.2527	16.69	15.77	17.81	2.05	Biological	2.41	0.17	3	reduced
228	B	10/20/2013	9:56:11	15	1	28.4	14.451	>4	>4	1	>4 to 1	192.6038	13.33	12.54	14.20	1.66	Biological	1.08	0.07	10+	both
230	C	10/16/2013	13:41:39	13.5	3	19.6	14.451	>4	>4	1	>4 to 1	178.2941	12.34	12.11	12.52	0.41	Biological	29.71	2.06	0	-
233	A	10/16/2013	14:16:16	13.5	3	19.8	14.451	>4	>4	1	>4 to 1	171.8101	11.89	11.49	12.15	0.66	Biological	27.29	1.89	0	-
400	B	10/18/2013	7:37:55	13.5	3	12.8	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
401	B	10/18/2013	7:44:30	13.5	3	13.6	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
410	C	10/22/2013	15:02:08	15	2	10.3	14.451	>4	>4	1	>4 to 1	255.1887	17.66	17.31	17.84	0.53	Biological	66.64	4.61	0	-
411	B	10/22/2013	15:14:00	15	2	10.7	14.451	>4	>4	1	>4 to 1	182.2031	12.61	12.40	12.75	0.35	Biological	47.37	3.28	0	-
412	B	10/22/2013	15:19:05	15	2	10.8	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
413	B	10/22/2013	15:24:42	15	2	23.2	14.451	>4	>4	2	>4 to 2	170.4661	11.80	8.91	13.58	4.68	Physical	ind	ind	0	-
420	A	10/22/2013	15:33:21	15	2	5.9	14.451	>4	>4	2	>4 to 2	287.3413	19.88	19.55	20.13	0.58	Biological	40.03	2.77	0	-
421	A	10/22/2013	15:39:11	15	2	8.3	14.451	>4	>4	1	>4 to 1	221.7818	15.35	15.19	15.53	0.34	Biological	39.46	2.73	10+	both
423	C	10/22/2013	15:45:39	15	2	11.9	14.451	>4	>4	1	>4 to 1	83.38152	5.77	5.26	6.12	0.86	Biological	22.49	1.56	0	-
424	C	10/22/2013	15:50:45	15	2	12.6	14.451	>4	>4	1	>4 to 1	60.77874	4.21	3.93	4.50	0.57	Biological	30.51	2.11	0	-
426	C	10/22/2013	15:57:42	15	2	13.5	14.451	>4	>4	1	>4 to 1	45.12728	3.12	2.55	3.69	1.14	Biological	13.61	0.94	0	-
427	C	10/22/2013	16:03:11	15	2	18.7	14.451	>4	>4	1	>4 to 1	69.8677	4.83	0.00	6.24	6.24	Physical	18.15	1.26	0	-
430	A	10/22/2013	16:18:46	15	2	8.2	14.451	>4	>4	1	>4 to 1	258.5829	17.89	16.30	19.06	2.76	Biological	38.14	2.64	0	-
432	C	10/22/2013	16:26:22	15	2	14.9	14.451	4 to 3/ >4	>4	1	>4 to 1	195.5434	13.53	13.06	14.15	1.08	Biological	26.49	1.83	0	-
434	A	10/22/2013	16:35:08	15	2	23.0	14.451	>4	>4	0	>4 to 0	223.3568	15.46	15.42	15.61	0.19	Biological	36.15	2.50	0	-
436	C	10/22/2013	16:42:49	15	2	28.0	14.451	>4	>4	1	>4 to 1	205.1497	14.20	13.93	14.57	0.64	Biological	15.16	1.05	0	-
520	D	10/24/2013	10:07:39	15	0	11.2	14.451	>4	>4	1	>4 to 1	204.6333	14.16	13.69	14.33	0.64	Biological	64.41	4.46	10+	oxidized
522	D	10/24/2013	10:12:23	15	0	15.1	14.451	>4	>4	1	>4 to 1	233.1637	16.13	15.06	15.83	0.78	Biological	67.44	4.67	0	-
524	A	10/24/2013	8:16:19	15	1	23.7	14.451	>4	>4	1	>4 to 1	181.8816	12.59	12.44	12.69	0.25	Biological	27.29	1.89	0	-
525	A	10/24/2013	8:11:16	15	1	26.0	14.451	>4	>4	1	>4 to 1	204.0506	14.12	13.81	14.56	0.74	Biological	9.43	0.65	0	-
528	B	10/24/2013	8:04:06	15	1	31	14.451	>4	>4	1	>4 to 1	156.9623	10.86	10.64	11.11	0.47	Biological	35.00	2.42	3	reduced
531	C	10/24/2013	8:43:47	15	1	2.8	14.451	>4	>4	1	>4 to 1	165.4467	11.45	11.15	11.78	0.62	Biological	35.53	2.46	0	-
532	B	10/24/2013	8:48:44	15	1	4.8	14.451	>4	>4	1	>4 to 1	209.4763	14.50	14.33	14.73	0.40	Biological	69.04	4.78	2	oxidized

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
534	C	10/24/2013	9:01:34	15	1	10.2	14.451	>4	>4	1	>4 to 1	205.5549	14.22	13.80	14.70	0.90	Biological	54.69	3.78	3	oxidized
536	B	10/24/2013	9:12:19	15	1	15.5	14.451	>4	>4	0	>4 to 0	209.0587	14.47	14.31	14.61	0.30	Biological	56.03	3.88	10+	both
537	A	10/24/2013	9:17:32	15	1	18.9	14.451	4 to 3/ >4	>4	1	>4 to 1	212.8912	14.73	14.57	14.86	0.29	Biological	36.93	2.56	0	-
540	A	10/24/2013	9:28:15	15	1	6.5	14.451	>4	>4	1	>4 to 1	196.5322	13.60	13.30	13.93	0.62	Biological	57.85	4.00	8	both
541	A	10/24/2013	9:33:41	15	1	12	14.451	>4	>4	1	>4 to 1	152.6017	10.56	10.20	10.86	0.66	Biological	44.15	3.06	2	reduced
542	B	10/24/2013	9:41:21	15	1	15.8	14.451	>4	>4	1	>4 to 1	147.1437	10.18	10.01	10.47	0.46	Biological	30.51	2.11	2	reduced
543	A	10/24/2013	9:44:46	15	1	17.4	14.451	>4	>4	1	>4 to 1	148.925	10.31	10.06	10.55	0.50	Biological	43.11	2.98	0	-
1179	A	10/24/2013	10:27:56	15	1	24	14.451	>4	>4	0	>4 to 0	176.0207	12.18	11.94	12.42	0.48	Biological	28.10	1.94	0	-
1180	C	10/24/2013	10:34:10	15	1	26.1	14.451	>4	>4	1	>4 to 1	184.7749	12.79	12.56	13.00	0.44	Biological	35.13	2.43	0	-
1181	A	10/24/2013	10:37:14	15	1	29.9	14.451	>4	>4	1	>4 to 1	196.268	13.58	13.41	13.78	0.37	Biological	8.65	0.60	0	-
1182	A	10/24/2013	10:41:50	15	1	33.0	14.451	>4	>4	1	>4 to 1	208.2534	14.41	14.18	14.55	0.37	Biological	19.26	1.33	0	-
1183	A	10/24/2013	10:47:42	15	1	35.0	14.451	>4	>4	1	>4 to 1	200.7024	13.89	13.65	14.17	0.51	Biological	22.47	1.56	0	-

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
4	A	n	n	Silt-clay admixed with very fine sand evidence of deeper burrowers	0	-	-	-	1 on 3
6	E	n	n	Silt-clay with minor fraction of very fine sand; mud clast wiper blade artifact; fecal pellets; some burrowing at depth; low reflectance subsurface sediment	0	-	-	-	2
8	C	n	n	Thin layer of silty very fine sand over silt-clay; half bivalve shell at surface on left; thin aRPD; active void mostly filled with oxidized sed	1	10.01	10.79	10.40	1 on 3
10	A	n	n	Silt-clay with minor fraction of very fine sand ; aRPD deeper on right; shallow burrowing; some evidence of deeper burrowers on right	1	9.22	10.48	9.85	1 on 3
14	C	n	n	Silt-clay with minor fraction of very fine sand in top 2 cm; small reduced mud clasts on surface wiper blade artifacts; shell frag at surface; patches of gray sed at SWI and smeared against faceplate (also camera artifacts)	0	-	-	-	1
18	A	n	n	Silt clay with silty very fine sand in upper 2-3 cm; shallow burrowing and through aRPD; evidence of larger burrower in relict aRPD just to left of center; polychaete at 7.5cm on right	0	-	-	-	2 on 3
20	A	n	n	Silt-clay with very fine sand in upper 2-3 cm; small polychaete against faceplate on left	0	-	-	-	1
24	A	n	n	Silty very fine sand over silt-clay; shallow burrowing; voids in upper 5 cm, large worm against faceplate at left	2	3.33	4.40	3.87	1 on 3
26	F	n	n	Silty very fine sand in upper 2-3 cm over silt-clay; fecal pellets at SWI; couple amphipod tubes visible in background; void at depth on right	1	13.05	13.27	13.16	2 on 3
30	F	n	n	Silty very fine sand over silt-clay, fecal pellets at SWI; couple small polychaetes at base of aRPD; small polychaete at 13cm, transected burrows at depth	0	-	-	-	2 on 3
32	C	n	n	Silt-clay with some admixed very fine sand; small mud clasts on surface are wiper blade artifacts; bits of microalgal growth on surface; shallow burrowing; relict aRPD; polychaete at 5cm	0	-	-	-	2 -> 3
33	A	1	n	Silt clay with minor fraction of very fine sand; bits of microalgal growth on surface; shallow burrowing; relict aRPD; polychaete, maybe capitellid, at base of aRPD on left; 1 large methane bubble at depth on right	0	-	-	-	1
34	E	20+	n	Silt clay with some very fine sand; small to medium mud clasts on surface (artifacts); shallow burrowing; relict aRPD; relict aRPD; methane bubbles from 6.5cm to depth	0	-	-	-	1
36	D	n	n	Silty very fine sand over silt; fecal pellets at SWI; shallow burrowing and through aRPD; larger polychaete at 8.75cm; active voids at depth	3	9.55	14.50	12.03	1 on 3
38	A	n	n	Silt-clay with minor fraction of very fine sand; bivalve shell on surface in background; aRPD deeper on left, w bivalve shell visible; voids in series at center	3	5.71	9.22	7.47	1 on 3
40	B	n	n	Silt-clay; few fecal pellets at SWI; very thin, patchy aRPD, small polychaete at 9cm	0	-	-	-	1
45	C	n	n	Silt-clay with minor fraction of very fine sand; fecal pellets; burrowing through aRPD	1	9.44	9.76	9.60	2 -> 3
47	D	n	n	Silt-clay with fecal pellets at SWI; burrowing in aRPD; voids at depth as well as transected burrows	2	10.95	12.60	11.78	1 on 3
51	A	n	n	Homogeneous silt-clay with minor fraction of very fine sand; shallow burrowing.	0	-	-	-	1
53	D	n	n	Silt-clay with some very fine sand and plant debris in upper 2 cm; small mud clasts on surface (camera artifacts); fecal pellets; burrowing through aRPD	0	-	-	-	2
54	E	n	n	Mixture of silt-clay with rocks on surface and some very fine to fine sand in upper 2-3 cm; fecal pellets; aRPD is deeper on left, burrowing throughout profile	0	-	-	-	1 on 3
56	F	n	n	Silt-clay with surface layer enriched with very fine sand; fecal pellets on surface; biorturbation exceeds prism penetration depth	4	11.31	14.47	12.89	1 on 3
58	B	n	n	Silt-clay with some reduced mud clast artifacts from wiper blade on surface;aRPD deeper on left; fauna (bivalve) at ~2cm on right; transected vertical burrow oxygenated halo on left; large opening at depth is drag-down artifact by prism blade (most likely caught edge of bivalve shell)	0	-	-	-	1 on 3
60	B	n	n	Well-sorted silt-clay; fecal pellets; thin aRPD	0	-	-	-	1
65	E	n	n	Silt-clay with some admixed very fine sand in upper 2-4 cm; burrowing through aRPD; evidence of deeper burrower on right edge ~5 cm	0	-	-	-	1 on 3
67	E	n	n	Silty very fine sand over silt-clay; small mud clasts on surface (sampling artifacts); bits of debris at SWI and in upper cm; relict aRPD; small polychaete at 4.9cm; void at depth and small burrow next to it on right	1	8.78	8.97	8.88	2 on 3
71	C	n	n	Silt clay with some very fine sand in upper 2 cm, small mud clasts (camera artifacts) on surface; long polychaete at 6.6cm	0	-	-	-	2 -> 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
73	D	n	n	Silt-clay with very fine sand in upper 2 cm, shallow burrowing and through aRPD; relict aRPD; small polychaete at ~8cm	0	-	-	-	2 -> 3
74	C	n	n	Silt-clay with very fine sand in top half-cm; reduced mud clast is camera artifact, shell frag on surface; fecal pellets; shallow burrowing; voids at depth	3	8.12	10.22	9.17	1 on 3
75	A	n	n	Silt-clay with some shell fragments on SWI, bioturbation exceeds prism penetration depth	2	9.72	13.66	11.69	1 on 3
76	A	n	n	Silt-clay with very fine sand in upper surface cm; thin aPRD; fecal pellets; small thin polychaete at 4.5cm.	1	9.75	9.98	9.87	1 on 3
78	A	n	n	Silt-clay with thin aRPD, surface appears erosional with evidence of particle transport; portions of Stage 1 worms against faceplate, active void at lower right	1	11.27	12.61	11.94	1 on 3
79	B	n	n	Silt-clay with some very fine sand at surface, mud clasts on surface are camera artifacts; one large void at depth	1	7.48	9.47	8.48	2 -> 3
80	C	n	n	Well-sorted silt-clay with some mud clast artifacts on surface;bioturbation depth exceeds prism penetration depth	0	-	-	-	1 on 3
81	E	n	n	Silt clay with some very fine sand in upper 2 cm; fecal pellets; burrowing through aRPD; void and transected burrow at depth	1	7.85	8.15	8.00	2 -> 3
82	D	n	n	Silt-clay with surface half-cm enriched with very fine sand; shallow burrowing; relict aRPD, homogeneous sub-surface fabric	0	-	-	-	2
83	C	n	n	Silty very fine sand over silt-clay; small to med mud clasts (camera artifacts) on surface; voids at depth	2	8.54	8.95	8.75	1 on 3
85	B	n	n	Silt-clay with some very fine sand in the top 1-2 cm; small tubes at SWI, burrowing through aRPD; polychaete burrow at 9.5cm	0	-	-	-	1 on 3
86	C	n	n	Silty very fine sand over silt-clay; fecal pellets; few small bits of debris in upper cm; small polychaetes in aRPD down to 6.6cm; larger polychaete at 8cm	0	-	-	-	2 on 3
87	A	n	n	Silt clay enriched with very fine sand in surface layer; fecal pellets; burrowing evident throughout profile, thin polychate at base of relict aRPD at 5.8cm	0	-	-	-	2 on 3
88	D	3	n	Silt -clay with mud clast artifacts & smearing from camera disturbance; methane bubbles at depth	0	-	-	-	1
89	A	2	n	Silty very fine sand over silt-clay; evidence of burrowing at depth	0	-	-	-	2 -> 3
90	A	2	n	Silty very fine sand over silt; shallow burrowing; relict aRPD; small polychaete at 7.5cm; two small methane bubbles at depth	0	-	-	-	2
92	C	n	n	Silty very fine sand over silt-clay; small mud clasts on surface (camera artifacts); small burrows through aRPD; relict aRPD; small polychaete at 9.8cm; void at depth	1	12.94	13.94	13.44	2 on 3
94	A	20+	n	Silt-clay with distinct depositional layer on surface with sharp contact boundary, most likely re-settlement of propwash resuspension; methane bubbles from 7cm to depth	0	-	-	-	1
95	A	n	n	Poorly sorted medium to coarse sand; pebbles on surface; bit of green algae in background; some void-like gaps in upper cms, low reflectance but deep aRPD, most likely hydraulically-driven.	0	-	-	-	indeterminate
97	B	n	n	Sitly very fine sand over silt-clay; small to medium mud clasts (camera artifact) at surface; small burrowing in aRPD;	0	-	-	-	2 on 3
99	A	n	n	Silt-clay with fecal pellets at SWI; shallow burrowing; active void at depth	1	10.67	13.94	12.31	1 on 3
100	C	n	n	Silty very fine sand over silt-clay; small burrows through aRPD; deep relict aRPD; void is small	1	11.86	11.98	11.92	2 -> 3
102	A	n	n	Silty very fine sand over silt-clay; fecal pellets at SWI; burrowing evident throughout depth of profile; transected burrow at depth	1	14.30	14.39	14.39	1 on 3
103	C	n	n	Silty very fine sand over silt-clay; small to med mud clasts (camera artifacts) on surface, thin polychaete at 4.8cm; evidence of deeper burrowers.	0	-	-	-	2 on 3
104	A	n	n	Silt-clay with some very fine sand in top cm;small mud clasts (camera artifacgt0 on surface; fecal pellets; bits of shell frag and small bits of debris in upper couple cms; some shell frag at depth; evidence of burrowing at depth	0	-	-	-	2 -> 3
105	B	n	n	Silt-clay with small mud clasts (camera artifacts) and bits of debris on surface; shell frag on surface; fecal pellets; thin aRPD; some evidence of deeper burrowing- burrow on right, transected burrow on left	0	-	-	-	2 -> 3
106	A	n	n	Silt-clay with some very fine sand in top layer; small burrows through aRPD; deep relict aRPD, evidence of burrowing at depth	0	-	-	-	2 on 3
107	B	n	n	Silty very fine sand over silt-clay; mud clast is camera artifact; fecal pellets at SWI and in upper cm; burrowing through aRPD and throughout profile	5	8.28	12.99	10.63	2 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
108	B	n	n	Silty very fine sand over silt-clay;burrowing through aRPD as well as subsurface sediment; medium polychaete at ~6cm	0	-	-	-	2 on 3
109	B	n	n	Silt-clay with mud clast artifacts from camera on surface; fecal pellets; thin aPRD; relict aRPD; large void on left	2	11.06	14.41	12.73	1 on 3
110	B	n	n	Silt clay with fecal pellet layer; burrowing evident through profile; patch of gray sediment in center of image is smear artifact from faceplate; relict aRPD; few thin polychaetes from 5 cm to 11+cm, transected burrow halo at lower left quadrant.	0	-	-	-	1 on 3
111	A	n	n	Silty very fine sand over silt-clay; burrowing visible at depth; relict aRPD; couple thin polychaetes below aRPD.	0	-	-	-	1 on 3
112	A	n	n	Silty very fine sand centimeter layer over silt-clay; fecal pellets at SWI; small white shell frag at surface; evidence of burrowing at depth (transected burrow halos)	0	-	-	-	1 on 3
113	A	2	n	Homogeneous silt-clay fabric with fecal pellets at SWI; very thin patchy aRPD; small methane bubbles at depth	0	-	-	-	1
115	C	n	n	No images with penetration - hard bottom, large rocks visible in background	-	-	-	-	indeterminate
116	C	11	n	Silt-clay with mud clast artifacts on surface from camera sled; very thin aRPD; polychaete visible at ~4cm; methane bubbles at 9cm; Stage 3 taxa apparently present but in very low densities	0	-	-	-	1 on 3
118	B	n	n	Silty very fine sand over silt-clay; fecal pellets; burrowing through aRPD; small polychaete at 5.5 cm; relict aRPD	0	-	-	-	2
119	A	6	n	Silt-clay with enriched subsurface organics; transected burrows at depth with biogenic sorted particles inside them; bioturbation exceeds prism penetration depth	1	7.39	8.04	7.72	1 on 3
120	A	6	n	Homogeneous textured silt-clay with fecal pellets at SWI and in upper 1 cm; shallow burrowing; long thin polychaetes at 8 cm	0	-	-	-	1 -> 2
122	B	n	n	Silt clay with minor fraction of very fine sand in top 2 cm; small burrows through aRPD; small void as well as transected burrows at depth	1	6.25	6.58	6.42	2 on 3
123	B	n	n	Silt-clay; very thin aRPD; reduced mud clasts (camera artifact) and small pebbles at SWI; void is thin	1	6.23	6.44	6.34	1
124	C	n	n	Silt-clay; fecal pellets and small patch of oxidized sed; small polychaetes at 7cm, fecal pellets visible in one; transected burrows at right. aRPD slightly deeper in other replicates from this station	1	11.08	11.64	11.36	1 on 3
126	C	n	n	Silty very fine sand over silt-clay; small burrows through aRPD; small polychaete near base of aRPD on left	0	-	-	-	2
127	B	20+	n	Silt-clay with surface layer enriched with some very fine sand; shallow burrowing; two small polychaetes ~5 cm; methane bubbles from 6cm to depth	2	7.49	9.48	8.48	1 on 3
128	B	n	n	Silt-clay with surface layer enriched with some very fine sand; subsurface sediment homogeneous fabric	0	-	-	-	1
130	B	n	n	No images with penetration; hard bottom/rocks present	-	-	-	-	indeterminate
132	A	n	n	Homogeneous silt-clay fabric with v thin aRPD, area at center couple cm deep with fecal pellets; small mud clasts (camera artifact) at surface; small thin polychaete at 5cm to left; propwash erosion	0	-	-	-	1
133	B	6	n	Homogeneous silt-clay fabric with shell fragments and some very fine sand in top half cm; fecal pellets; shallow burrowing; large polychaete with fecal pellets at 7.8cm at right; methane bubbles at depth; propwash erosion	0	-	-	-	2 -> 3
134	B	n	n	Homogeneous silt-clay fabric with fecal pellets throughout upper 1 cm; shallow burrowing; polychaete with fecal pellets at 7.5cm; propwash erosion	0	-	-	-	2
135	A	n	n	Silt-clay with few shell frag on surface; fecal pellets layer on surface; shallow burrowing through aRPD; relict aRPD; small polychaete at 5.5cm; propwash erosion	0	-	-	-	2
136	B	n	n	Silt-clay, shallow burrowing; polychaete with fecal pellets at 4.5cm; surface looks like eroded from propwash	0	-	-	-	1
138	B	n	n	Oyster shells visible in this rep, surface must be armored with shells - no penetration in other reps	-	-	-	-	indeterminate
139	C	n	n	Silt-clay with re-settled oxidized particles from propwash erosion; shallow burrowing; thin aRPD; long polychaete at ~8cm	0	-	-	-	1
140	A	n	n	Silt-clay with homogeneous subsurface fabric; transected burrows at depth, sharp contact boundary of aRPD layer indicating re-settlement of propwash suspension	0	-	-	-	2 -> 3
142	C	13	n	Silt; thin aRPD, layer of light gray sed, relict aRPD below; shallow burrowing; fecal pellets; small polychaetes at ~ 4cm; voids and methane bubbles at depth	1	10.13	11.88	11.00	1

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
143	B	n	n	Silt-clay; thin aRPD; 2 polychaetes at 4cm; relict aRPD below layer of gray sed; transected burrow halos at depth	0	-	-	-	1 on 3
144	A	1	n	Silt-clay; shallow burrowing; large methane bubble at 5.5cm; oxidized surface layer redeposisted from resuspended material (propwash or storm)	0	-	-	-	1
146	C	6	n	Silt-clay; reduced mud clasts (camera artifact) on surface; shallow burrowing; relict aRPD; methane bubbles at 4cm; oxidized surface layer redeposited material that had been resuspended from storm or propwash	0	-	-	-	1
147	F	n	n	Silt clay with some very fine sand in upper cm; small-med mud clasts (camera artifact) on surface; shallow burrows; relict aRPD; small void at depth	1	10.11	10.33	10.22	2 -> 3
148	B	n	n	Silty very fine sand over silt-clay;small burrowing through aRPD; few small bits of debris in upper cm; relict aRPD	0	-	-	-	2
149	A	n	n	Silty clay with some very fine sand in upper 2 cm; burrowing through aRPD; homogeneous subsurface fabric	0	-	-	-	2
150	C	n	n	Silt-clay with minor fraction of very fine sand in upper 1-2 cm; small to medium burrows in aRPD; polychaetes at 5, 7,11cm, transected burrow at depth	0	-	-	-	2 on 3
151	C	n	n	Silt-clay with very fine sand admixed in top 1-2 cm; transected burrows at depth	0	-	-	-	2
153	C	n	n	Silt-clay with homogeneous subsurface fabric; sharp contact boundary of aRPD layer indicating re-settlement of resuspended sediment from propwash or storm	0	-	-	-	1
155	A	0	n	Silt-clay with transected burrow at right, piece of wood fragment dragged down by prism to left of burrow that has smeared down oxidized sediment; oxidized layer contact boundary on left shows area experiences periodic resuspension of sediments	0	-	-	-	2 -> 3
156	A	n	n	Silt-clay with very thin aRPD of mostly fecal pellets; small polychaete at 2.8cm. Surface recently eroded	0	-	-	-	1
157	D	9	n	Silt-clay with depositional aRPD from re-settlement of resuspended particles; fecal pellets; shallow burrowing; relict aRPD; methane bubbles from 5cm to depth	0	-	-	-	1
158	B	n	n	Silty very fine sand over silt-clay; small mud clasts (camera artifact) on surface; small burrows through aRPD; void at depth	1	11.15	11.33	11.24	2 on 3
159	C	n	n	Silty very fine sand over silt-clay; fecal pellets; small burrows in upper cm; reduced sediment smears on aRPD layer are wiper artifacts; small yellowish worm at ~8cm on right; void at left at ~8cm	1	7.83	8.94	8.39	2 on 3
160	C	n	n	Silt-clay withsmall burrows in oxidized layer; transected burrows at depth.	1	13.23	14.01	13.62	1 on 3
161	A	n	n	Silt-clay with minor fraction of very fine sand in top cm; shallow burrowing through aRPD; relict aRPD; polychaete at 5.2 cm; small void at 5.3cm at left	1	5.31	5.47	5.39	1 on 3
163	B	n	n	Silt-clay with sharp contact boundary of oxidized surface layer, re-settlement of resuspended material; some fecal pellets at surface; algal debris at surface on right.	0	-	-	-	1
165	C	4	n	Silt-clay with shallow burrowing; small tubes at SWI and polychaete at base of aRPD at left; large burrow on right ; methane bubbles from 4.5 cm to depth	1	2.12	4.59	3.35	1 on 3
166	C	n	n	Silt clay with most of surface oxidized layer eroded away (propwash?); fecal pellets at SWI; shallow burrowing; polychaete ~4.5cm; evidence of burrowing at depth	1	4.41	4.65	4.53	1 on 3
167	D	6	n	Silt clay with re-settled oxidized layer above lighter oxidized sed (resuspension and subsequent deposition); small burrows through aRPD; long polychaete with fecal pellets at 5.5 cm; methane bubbles from 2.5cm to depth	0	-	-	-	1
168	B	5	n	2-3 cm layer of silty very fine sand over silt-clay; small burrows throughout aRPD; methane bubble at 8.5 cm and small ones at depth	0	-	-	-	2
169	A	3	n	Silty very fine sand over silt-clay; patch of gray sed at SWI and just below on right is smear from wiper blade on faceplate; small burrows in aRPD; evidence of deeper burrows in relict aRPD; small methane bubbles at depth	0	-	-	-	1 on 3
170	A	2	n	Silt clay with minor fractionof very fine sand in top 2 cm; small to med burrowing activity in aRPD; small methane bubbles at depth on left	0	-	-	-	2
171	A	n	n	Silt-clay with very fine sand in upper 1-2 cm; small-med mud clasts on surface; fecal pellets; small to med burrowing activity and small void at base of aRPD; relict aRPD	1	1.95	2.45	2.20	2
173	A	10	n	Silty very fine sand (recently settled resuspended layer) over silt-clay ; shallow burrowing; at 3cm infaua/deeper burrow; transected burrows/voids at depth, methane extremely small bubbles at mid depth on right	3	6.95	8.41	7.68	1 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
175	B	n	n	Silt-clay; thin aRPD of re-settled oxidized particles that were formerly resuspended; few bits of debris on surface; fecal pellets, shallow burrowing	0	-	-	-	1
176	B	n	n	Silt-clay; thin aRPD; bits of debris on surface; tubes & fecal pellets; transected burrows at depth	0	-	-	-	1 on 3
179	B	n	n	Silt-clay with fecal pellets @ SWI; deep relict aRPD, transected vertical burrow	0	-	-	-	1 on 3
180	B	n	n	Silt-clay with fecal pellets at SWI; evidence of deeper burrowers	0	-	-	-	1 on 3
181	C	n	n	Silt-clay with small-med mud clasts (camera artifact) at surface; bivalve shell fragment on left; fecal pellets; small thin polychaete at ~2cm, transected burrows at depth	2	1.74	11.06	6.40	1 on 3
182	A	n	n	Silt-clay with small bits of shell debris in upper cm; fecal pellets; relict aRPD; evidence of deeper burrowing; small polychaete at ~10cm	0	-	-	-	1 on 3
183	A	5	n	Silt-clay with shell frag on surface; bits of debris in upper cm; fecal pellets; patchy aRPD (recently eroded surface) and polychaete at 11 cm; methane bubbles at depth on left	0	-	-	-	1 on 3
184	D	2	n	Silty very fine sand over silt-clay; few bits of debris in upper cms; burrowing through aRPD; methane bubbles at depth on right	0	-	-	-	2
185	F	n	n	Silty very fine sand over silt-clay; few bits of debris in upper cms; evidence of burrowing throughout profile	0	-	-	-	1 on 3
186	A	n	n	Silt-clay with minor fraction of very fine sand in top cm; fecal pellets @ SWI; small opening of larger burrow at base of relict aRPD; void at depth	1	13.89	14.35	14.12	1 on 3
187	C	15	n	Silty very fine sand over silt-clay; large mud clasts (camera sled artifact) on surface; small bits of debris in upper cms; small polychaete at 5.3cm; small void and methane bubbles at depth	1	12.70	12.76	12.73	2 on 3
188	A	3	n	Silty very fine sand over silt-clay; bits of plant debris to 3-4 cm below SWI; burrowing throughout profile; methane bubbles at depth; transected burrow bottom right	0	-	-	-	2 on 3
189	A	n	n	Silty very fine sand over silt-clay; small burrows through aRPD; small polychaete at 2.5cm at right	0	-	-	-	2
192	C	12	n	Silty very fine sand over silt-clay; fecal pellets at SWI; few bits of plant debris in upper cm; methane bubbles at depth	0	-	-	-	2
197	B	n	n	Silt-clay with minor fraction of very fine sand in upper 2 cm; organic enrichment at depth, small worms visible against faceplate, portion of transected burrow lower left corner	0	-	-	-	2 -> 3
198	A	n	n	Silt-clay; surface covered with small to med-large mud clasts; thin aRPD indicative of propwash re-settlement	0	-	-	-	1
200	C	n	n	Silt-clay with minor fraction of very fine sand in upper 2 cm; evidence of burrowing throughout profile	0	-	-	-	2 -> 3
202	B	n	n	Silt-clay with minor fraction of very fine sand in upper 2 cm; small to med mud clasts (camera artifacts) on surface; fecal pellets; burrowing through aRPD; evidence of deeper burrowing at depth	0	-	-	-	2 on 3
204	C	n	n	Silt-clay with some silty very fine sand in surface layer; small-med mud clasts (camera artifact) on surface; void on right at depth	1	6.53	7.18	6.86	1 on 3
206	A	n	n	Silt-clay with very fine sand and fecal pellets @ SWI; deeper burrowers visible throughout profile	1	10.68	11.19	10.94	1 on 3
208	A	n	n	Silty very fine sand over silt-clay; fecal pellets; transected burrowslead to filled void - with some fecal pellets- below aRPD at center	1	13.61	14.52	14.07	1 on 3
209	A	n	n	Silt-clay with fecal pellets in upper cm; voids at depth	2	6.62	11.81	9.22	1 on 3
211	C	n	n	Silt-clay with layer of fecal pellets @ SWI; homogeneous fabric	0	-	-	-	2
213	A	n	n	Silty very fine sand over silt-clay; fecal pellets; voids at depth	2	6.04	12.45	9.24	1 on 3
214	A	n	n	Silt-clay with leaf at surface, with small arthopod on left side; fecal pellets; small polychaetes at 3 and 4 cm.	0	-	-	-	2
215	C	n	n	Silt-clay with mud clasts (camera artifact) on surface; fecal pellets; voids are small and at depth	2	8.30	9.43	8.87	1 on 3
217	A	n	n	Silt-clay with fecal pellets @ SWI; bivalve shell at ~3-4cm; small void	1	6.61	7.84	7.23	1 on 3
218	C	n	n	Silt-clay with mud clasts (camera artifact) on surface; fecal pellets @ SWI; transected burrows at depth	3	3.90	6.79	5.35	1 on 3
219	B	n	n	Silt-clay; small mud clast artifacts on surface; bivalve shell frag on surface; shallow burrowing, few fecal pellets.	0	-	-	-	1
220	C	n	n	Silt-clay with layer of fecal pellets at surface; transected burrow and two small voids at depth.	3	4.68	13.87	9.27	1 on 3
221	C	n	n	Silt-clay with mud clast artifacts on surface; few fecal pellets at SWI; void at depth on left	1	7.10	9.27	8.19	1 -> 2
222	A	n	n	Silt-clay with small mud clasts at surface; thin layer of fecal pellets at SWI relict aRPD; burrow with stack of fecal pellets at 8.75cm at left	0	-	-	-	1 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
223	B	n	n	Silt-clay with thin aRPD; fecal pellets at SWI; long polychaete at 6cm; burrow with fecal pellets at 8 cm; two other polychetes from 8cm to depth	0	-	-	-	1
224	B	n	n	Silt-clay with thin aRPD; fecal pellets at SWI; polychaete at 3 and 6cms, deeper one with fecal pellets, evidence of burrowing at depth	1	10.73	10.91	10.82	1 on 3
225	A	n	n	Silt-clay; bivalve shells at surface on right; very thin aRPD with fecal pellets at SWI; two large polychaetes at 7.5cm (probably Capitellids)	0	-	-	-	1
226	B	n	n	Silt-clay with small mud clast artifacts from camera and fecal pellets at SWI; small polychaete at 6 cm on left; narrow void at depth	1	15.20	16.32	15.76	1 on 3
227	B	n	n	Silt-clay with eroded oxidized surface layer; bivalve shell frag on surface; fecal pellets at SWI; small void; relict aRPD; evidence of deeper burrowing; transected burrows at depth on right	1	2.82	3.19	3.00	1 on 3
228	B	n	n	Silt-clay with fecal pellets at SWI; patchy aRPD; relict aRPD; small polychaete at 3 cm	1	4.18	4.92	4.55	1 on 3
230	C	n	n	Silt-clay with fecal pellets @ SWI; evidence of subsurface burrowing	0	-	-	-	1 on 3
233	A	n	n	Silt-clay with fecal pellets @ SWI; transected burrow at depth	1	4.51	5.97	5.24	1 on 3
400	B	n	n	No penetration; surface covered with oyster shells	-	-	-	-	indeterminate
401	B	n	n	No penetration; surface covered with barnacle-covered oyster shells	-	-	-	-	indeterminate
410	C	n	n	Silt-clay with light gray sediment smeared over redox layer (prism blade artifact); evidence of deeper burrowers below aRPD and at depth	0	-	-	-	2 -> 3
411	B	n	n	Silt-clay with homogeneous subsurface fabric	0	-	-	-	2
412	B	n	n	Hard bottom with no effective penetration; one mound of very fine sand at center visible;	0	-	-	-	indeterminate
413	B	n	n	Silt-clay, uneven surface disturbed by camera prism catching on bivalve shells and dragging them down through sediment column.	1	2.01	3.25	2.63	3
420	A	20+	n	Silt-clay with small tubes at SWI; relict aRPD; small void at mid-depth with methane bubbles, more methane bubbles at depth;	2	7.85	18.54	13.20	1 on 3
421	A	n	n	Silt-clay; many mud clasts on surface; fecal pellets; shallow burrowing; aRPD deeper on left; relict aRPD; evidence of burrowing at depth	0	-	-	-	1 on 3
423	C	n	n	Silt-clay; evidence of deeper burrowers just below aRPD to left of center	0	-	-	-	1 on 3
424	C	n	n	Silty very fine sand; shallow burrowing	0	-	-	-	2
426	C	n	n	Silt clay with surface armoring of bivalve shells; successional stage impossible to determine because of limited penetration.	0	-	-	-	indeterminate
427	C	n	n	Silt-clay with armored bottom (confirmed by other replicates); penetration too shallow for successional stage determination	0	-	-	-	indeterminate
430	A	1	n	Silt-clay; fecal pellets in upper cms; relict aRPD; indications of deeper burrowers at depth; methane bubble at depth	0	-	-	-	1 on 3
432	C	n	n	Silty very fine sand over silt-clay; fecal pellets in upper cms; relict aRPD; 2 polychaetes at 4 cm	0	-	-	-	2
434	A	n	n	Silt-clay with minor fraction of very fine sand in upper cm; burrowing through aRPD to 3 cm; aRPD deeper on left; relict aRPD; voids at depth	2	8.73	11.81	10.27	2 on 3
436	C	n	n	Silt-clay with some very fine sand admixed in upper cm; transected burrows at depth	1	12.42	14.15	13.28	1 on 3
520	D	n	n	Silty very fine sand over silt-clay; many small mud clasts (camera artifact) on surface; some fecal pellets at surface; small burrows through aRPD; deep relict aRPD	0	-	-	-	2
522	D	n	n	Silt-clay with minor fraction of very fine sand in upper 2-3 cm; evidence of shallow subsurface burrowing; homogeneous subsurface fabric, high albedo (low organics) in sediment	0	-	-	-	2 -> 3
524	A	n	n	Silt-clay with minor fraction of very fine sand in surface cm; some fecal pellets in upper cm; relict aRPD; burrow with fecal pellets at 8 cm	1	10.94	12.16	11.55	1 on 3
525	A	n	n	Silt-clay with few fecal pellets in upper cm; shallow burrowing	1	4.95	5.27	5.11	1 on 3
528	B	n	n	Silt-clay; mud clasts (camera artifacts) on surface; fecal pellets in upper cms; bits of debris below aRPD; edge of burrow/void transected mid subsurface on right	0	-	-	-	1 on 3
531	C	1	n	Silt-clay with some fecal pellets in upper cm; shallow burrowing and larger one at 2.7 cm at left; rellict aRPD; small polychaetes at 6.7cm; methane bubble at 3.5cm	0	-	-	-	2 -> 3
532	B	n	n	Silt-clay with shallow burrowing and some fecal pellets incorporated in aRPD; relict aRPD; evidence of deeper burrowing/voids at depth on right	0	-	-	-	1 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
534	C	n	n	Silt-clay; small mud clasts (camera artifacts) on surface; small burrowing through aRPD; relict aRPD	0	-	-	-	2
536	B	n	n	Silty very fine sand over silt-clay; surface covered with small mud clasts (camera artifacts); some fecal pellets at SWI; burrowing throught aRPD; bit of large polychaete at 4.8cm; voids are small	1	11.19	11.44	11.32	2 on 3
537	A	n	n	Silty very fine sand over silt-clay; short tubes on surface; fecal pellets incorporated into upper cms; shallow burrowing; small polychaete with fecal pellets at 3.7cm; active void at depth	1	14.16	14.86	14.51	1 on 3
540	A	n	n	Silt-clay with small to small-med mud clasts on surface; burrowing through aRPD; deeper burrow at 8cm with infauna partially visible; void at depth on right	1	12.91	13.30	13.11	2 on 3
541	A	n	n	Silt clay with some fecal pellets in upper cms; shallow burrowing down to 2.3cm; small polychaete at 7 cm	0	-	-	-	2 -> 3
542	B	n	n	Silt-clay with some very fine sand and few pellets in upper cm; small polychaete at 4cm; transected burrow at depth	0	-	-	-	1 on 3
543	A	n	n	Silt-clay with small tubes in background, bioturbation exceeds prism penetration depth, transected burrow at depth.	0	-	-	-	1 on 3
1179	A	n	n	Silt-clay with some very fine sand admixed in upper cm; low organics and homogeneous subsurface fabric	0	-	-	-	2
1180	C	n	n	Silt clay with some very fine sand admixed in upper 2 cm; some fecal pellets on surface and in upper cm; gray sediment at SWI at center is smear artifact from wiper blade; two small polychaetes at depth on right	1	7.88	8.94	8.41	1 on 3
1181	A	n	n	Silt clay with some very fine sand and fecal pellets in upper cm; shallow burrowing; relict aRPD; polychaete at 3cm; few small polychaetes at 7.5cm	1	9.72	10.02	9.87	1 on 3
1182	A	n	n	Silt clay with some very fine sand and fecal pellets in upper cm; shallow burrowing; small polychaete at 3cm	0	-	-	-	1
1183	A	n	n	Silt-clay with fecal pellets and shell fragments at SWI and in upper cm; polychaete with fecal pellets at 9.5 cm; voids at depth	2	9.33	12.54	10.94	1 on 3

APPENDIX B

Sediment Grab Benthic Identification Results

Haley and Aldrich - NY

October, 2013

Raw Data Table

Station	Phylum	Class	Order	Family	Taxa or LPIL	Number Rep 1	Total
B1-SS-001	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	112	112
B1-SS-001	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-001	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	4	4
B1-SS-001	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-001	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	26	26
B1-SS-001	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-001	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	774	774
B1-SS-001	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-001	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	2	2
B1-SS-001	Arthropoda	Malacostraca	Amphipoda	Melitidae	Melitidae (LIPL)	2	2
B1-SS-001	Mollusca	Bivalvia	Mytiloida	Mytilidae	Ischadium recurvum	56	56
B1-SS-001	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	16	16
B1-SS-001	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	2	2
B1-SS-001	Mollusca	Bivalvia	Veneroida	Veneridae	Veneridae (LPIL)	4	4
B1-SS-001	Mollusca	Bivalvia	Veneroida	Dressenidae	Mytilopsis leucophaeata	4	4
B1-SS-001	Mollusca	Gastropoda			Gastropoda (LPIL)	16	16
B1-SS-001	Mollusca	Bivalvia			Bivalvia (LPIL)	18	18
B1-SS-001	Mollusca	Bivalvia	Veneroida	Dreissenidae	Dreissena polymorpha	4	4
B1-SS-001	Nemertea				Nemertea (LPIL)	4	4
B1-SS-002	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	108	108
B1-SS-002	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-002	Annelida	Polychaeta	Spionida	Spionidae	Dipolydora socialis	2	2
B1-SS-002	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	4	4
B1-SS-002	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-002	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	6	6
B1-SS-002	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-002	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroides	8	8
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	20	20
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus (LPIL)	2	2
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	4	4
B1-SS-002	Arthropoda	Ostracoda	Podocopida		Podocopida (LPIL)	2	2
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-002	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	292	292
B1-SS-002	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	30	30
B1-SS-002	Mollusca	Gastropoda	Neotaenioglossa	Littorinidae	Littorina (LPIL)	1024	1024
B1-SS-002	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	14	14
B1-SS-002	Mollusca	Bivalvia	Veneroida	Mactridae	Rangia cuneata	6	6
B1-SS-002	Mollusca	Bivalvia	Veneroida	Mactridae	Mactridae (LPIL)	18	18
B1-SS-002	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	10	10
B1-SS-002	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellinidae (LPIL)	16	16
B1-SS-002	Mollusca	Bivalvia			Bivalvia (LPIL)	6	6
B1-SS-002	Nemertea				Nemertea (LPIL)	12	12
B1-SS-002	Platyhelminthes	Turbellaria			Turbellaria (LPIL)	2	2
B1-SS-002	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	4	4

		Haley and Aldrich - NY					
			October, 2013				
			Raw Data Table				
Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-003-R1	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	144	144
B1-SS-003-R1	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	6	6
B1-SS-003-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	6	6
B1-SS-003-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	40	40
B1-SS-003-R1	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-003-R1	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	14	14
B1-SS-003-R1	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-003-R1	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-003-R1	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	600	600
B1-SS-003-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	16	16
B1-SS-003-R1	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	2	2
B1-SS-003-R1	Mollusca	Bivalvia			Bivalvia (LPIL)	36	36
B1-SS-003-R1	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	314	314
B1-SS-003-R1	Nemertea				Nemertea (LPIL)	22	22
B1-SS-003-R1	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-003-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	22	22
B1-SS-003-R2	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	90	90
B1-SS-003-R2	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-003-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-003-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	2	2
B1-SS-003-R2	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	6	6
B1-SS-003-R2	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	522	522
B1-SS-003-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-003-R2	Nemertea				Nemertea (LPIL)	12	12
B1-SS-003-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	10	10
B1-SS-003-R2	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	2	2
B1-SS-003-R2	Mollusca	Bivalvia			Bivalvia (LPIL)	20	20
B1-SS-003-R2	Mollusca	Bivalvia	Mytiloida	Mytilidae	Mytilidae (LPIL)	2	2
B1-SS-003-R2	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	374	374
B1-SS-003-R2	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-003-R2	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1
B1-SS-003-R3	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	104	104
B1-SS-003-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	26	26
B1-SS-003-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	2	2
B1-SS-003-R3	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	8	8
B1-SS-003-R3	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Phyllodocidae (LPIL)	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	14	14
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	954	954
B1-SS-003-R3	Mollusca	Bivalvia	Veneroida	Mactridae	Mactridae (LPIL)	2	2
B1-SS-003-R3	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	4	4
B1-SS-003-R3	Mollusca	Bivalvia			Bivalvia (LPIL)	20	20

		Haley and Aldrich - NY					
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			Raw Data Table				
Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-003-R3	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	846	846
B1-SS-003-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	6	6
B1-SS-003-R3	Nemertea				Nemertea (LPIL)	20	20
B1-SS-003-R3	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-003-R3	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1
B1-SS-004	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	212	212
B1-SS-004	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	28	28
B1-SS-004	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-004	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	4	4
B1-SS-004	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	4	4
B1-SS-004	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	4	4
B1-SS-004	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	1488	1488
B1-SS-004	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	4	4
B1-SS-004	Nemertea				Nemertea (LPIL)	28	28
B1-SS-004	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-005	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	408	408
B1-SS-005	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	36	36
B1-SS-005	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	76	76
B1-SS-005	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	16	16
B1-SS-005	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-005	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	8	8
B1-SS-005	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	312	312
B1-SS-005	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	12	12
B1-SS-005	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	132	132
B1-SS-005	Arthropoda	Malacostraca	Isopoda	Idoteidae	Synidotea (LPIL)	4	4
B1-SS-005	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	8	8
B1-SS-005	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	8	8
B1-SS-005	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	8	8
B1-SS-005	Mollusca	Bivalvia			Bivalvia (LPIL)	84	84
B1-SS-005	Nemertea				Nemertea (LPIL)	56	56
B1-SS-006	Arthropoda	Malacostraca	Isopoda	Idoteidae	Synidotea sp. E	28	28
B1-SS-006	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia (LPIL)	16	16
B1-SS-006	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	40	40
B1-SS-006	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	20	20
B1-SS-006	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	628	628
B1-SS-006	Arthropoda	Malacostraca	Mysida	Mysidae	Mysidae (LPIL)	4	4
B1-SS-006	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	8	8
B1-SS-006	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	48	48
B1-SS-006	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	12	12
B1-SS-006	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	8	8
B1-SS-006	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	228	228
B1-SS-006	Mollusca	Bivalvia			Bivalvia (LPIL)	24	24
B1-SS-006	Nemertea				Nemertea (LPIL)	20	20
B1-SS-006	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	568	568
B1-SS-006	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	120	120

		Haley and Aldrich - NY					
			October, 2013				
			Raw Data Table				
Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-006	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	44	44
B1-SS-006	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	4	4
B1-SS-006	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	8	8
B1-SS-006	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	12	12
B1-SS-007	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	8	8
B1-SS-007	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	4	4
B1-SS-007	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	8	8
B1-SS-007	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	8	8
B1-SS-007	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	4	4
B1-SS-007	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	796	796
B1-SS-007	Nemertea				Nemertea (LPIL)	20	20
B1-SS-007	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	44	44
B1-SS-007	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	36	36
B1-SS-007	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	8	8
B1-SS-007	Mollusca	Bivalvia	Veneroida	Mactridae	Mactridae (LPIL)	4	4
B1-SS-007	Mollusca	Bivalvia			Bivalvia (LPIL)	8	8
B1-SS-007	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	80	80
B1-SS-007	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	376	376
B1-SS-007	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	8	8
B1-SS-007	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4
B1-SS-007	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-007	Arthropoda	Malacostraca	Mysida	Mysidae	Neomysis americana	4	4
B1-SS-008	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-008	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	122	122
B1-SS-008	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	2	2
B1-SS-008	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	12	12
B1-SS-008	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	26	26
B1-SS-008	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-008	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-008	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	12	12
B1-SS-008	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	2	2
B1-SS-008	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	500	500
B1-SS-008	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	12	12
B1-SS-008	Mollusca	Bivalvia	Veneroida	Mactridae	Rangia cuneata	2	2
B1-SS-008	Mollusca	Bivalvia			Bivalvia (LPIL)	44	44
B1-SS-008	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	42	42
B1-SS-008	Nemertea				Nemertea (LPIL)	14	14
B1-SS-009	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	6	6
B1-SS-009	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	10	10
B1-SS-009	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	828	828
B1-SS-009	Nemertea				Nemertea (LPIL)	22	22
B1-SS-009	Mollusca	Bivalvia	Veneroida	Mactridae	Rangia cuneata	4	4
B1-SS-009	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	4	4
B1-SS-009	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	44	44
B1-SS-009	Mollusca	Bivalvia			Bivalvia (LPIL)	22	22

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Station	Phylum	Class	Order	Family	Taxa or LPIL	Number Rep 1	Total
B1-SS-009	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	4	4
B1-SS-009	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	4	4
B1-SS-009	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	12	12
B1-SS-009	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	90	90
B1-SS-009	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	54	54
B1-SS-009	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	2	2
B1-SS-009	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-009	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-009	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	20	20
B1-SS-010-R1	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	6	6
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	20	20
B1-SS-010-R1	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	140	140
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	4	4
B1-SS-010-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina agilis	32	32
B1-SS-010-R1	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	10	10
B1-SS-010-R1	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	6	6
B1-SS-010-R1	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	974	974
B1-SS-010-R1	Mollusca	Gastropoda			Gastropoda (LPIL)	4	4
B1-SS-010-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellinidae (LPIL)	2	2
B1-SS-010-R1	Mollusca	Bivalvia			Bivalvia (LPIL)	42	42
B1-SS-010-R1	Platyhelminthes	Turbellaria			Turbellaria (LPIL)	4	4
B1-SS-010-R1	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	6	6
B1-SS-010-R1	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-010-R1	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-010-R1	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	28	28
B1-SS-010-R1	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	2	2
B1-SS-010-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	24	24
B1-SS-010-R1	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	14	14
B1-SS-010-R2	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	3	3
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	11	11
B1-SS-010-R2	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	1	1
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	1	1
B1-SS-010-R2	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	160	160
B1-SS-010-R2	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	8	8
B1-SS-010-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina agilis	40	40
B1-SS-010-R2	Mollusca	Bivalvia	Mytiloida	Mytilidae	Mytilidae (LPIL)	1	1
B1-SS-010-R2	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	654	654
B1-SS-010-R2	Mollusca	Bivalvia			Bivalvia (LPIL)	57	57
B1-SS-010-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina (LPIL)	14	14
B1-SS-010-R2	Nemertea				Nemertea (LPIL)	5	5
B1-SS-010-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-010-R2	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	27	27
B1-SS-010-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	5	5
B1-SS-010-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	18	18
B1-SS-010-R2	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	2	2
B1-SS-010-R2	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	2	2
B1-SS-010-R2	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-010-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	1	1
B1-SS-010-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	13	13
B1-SS-010-R3	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	22	22
B1-SS-010-R3	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-010-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	15	15
B1-SS-010-R3	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	1	1
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	2	2
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	12	12
B1-SS-010-R3	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-010-R3	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	72	72
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	1	1
B1-SS-010-R3	Nemertea				Nemertea (LPIL)	12	12
B1-SS-010-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	2	2
B1-SS-010-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina agilis	25	25
B1-SS-010-R3	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	1	1
B1-SS-010-R3	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	383	383
B1-SS-010-R3	Mollusca	Bivalvia			Bivalvia (LPIL)	5	5
B1-SS-010-R3	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	1	1
B1-SS-011	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	1	1
B1-SS-011	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	4	4
B1-SS-011	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	584	584
B1-SS-011	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	1	1
B1-SS-011	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	1	1
B1-SS-011	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	3	3
B1-SS-011	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	4	4
B1-SS-011	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	37	37
B1-SS-011	Mollusca	Bivalvia			Bivalvia (LPIL)	29	29
B1-SS-011	Nemertea				Nemertea (LPIL)	3	3
B1-SS-011	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	1	1
B1-SS-011	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	142	142
B1-SS-011	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-011	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	44	44
B1-SS-011	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-011	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	3	3
B1-SS-011	Annelida	Polychaeta	Scolecida	Capitellidae	Capitellidae (LPIL)	1	1
B1-SS-011	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	2	2
B1-SS-011	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	1	1
B1-SS-011	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-011	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-012	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	1	1
B1-SS-012	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	150	150
B1-SS-012	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	22	22
B1-SS-012	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-012	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	1	1
B1-SS-012	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	5	5
B1-SS-012	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	186	186
B1-SS-012	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	22	22
B1-SS-012	Mollusca	Bivalvia			Bivalvia (LPIL)	18	18
B1-SS-012	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	19	19
B1-SS-012	Mollusca	Gastropoda			Gastropoda (LPIL)	1	1
B1-SS-012	Nemertea				Nemertea (LPIL)	5	5
B1-SS-013	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	4	4
B1-SS-013	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	34	34
B1-SS-013	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	138	138
B1-SS-013	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-013	Arthropoda	Malacostraca	Mysida	Mysidae	Neomysis americana	2	2
B1-SS-013	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	4	4
B1-SS-013	Arthropoda	Malacostraca	Isopoda	Idoteidae	Synidotea (LPIL)	2	2
B1-SS-013	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	566	566
B1-SS-013	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	18	18
B1-SS-013	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	12	12
B1-SS-013	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	6	6
B1-SS-013	Mollusca	Bivalvia			Bivalvia (LPIL)	36	36
B1-SS-013	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	118	118
B1-SS-013	Nemertea				Nemertea (LPIL)	6	6
B1-SS-014-R1	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	206	206
B1-SS-014-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	38	38
B1-SS-014-R1	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-014-R1	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-014-R1	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	8	8
B1-SS-014-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroides	6	6
B1-SS-014-R1	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	820	820
B1-SS-014-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	14	14
B1-SS-014-R1	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	2	2
B1-SS-014-R1	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	256	256
B1-SS-014-R1	Mollusca	Bivalvia			Bivalvia (LPIL)	26	26
B1-SS-014-R1	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	4	4
B1-SS-014-R1	Nemertea				Nemertea (LPIL)	10	10
B1-SS-014-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	76	76
B1-SS-014-R2	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	12	12
B1-SS-014-R2	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	248	248
B1-SS-014-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4
B1-SS-014-R2	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	12	12

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B1-SS-014-R2	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	860	860
B1-SS-014-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	4	4
B1-SS-014-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	4	4
B1-SS-014-R2	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	312	312
B1-SS-014-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	20	20
B1-SS-014-R2	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	8	8
B1-SS-014-R2	Mollusca	Bivalvia			Bivalvia (LPIL)	24	24
B1-SS-014-R2	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	4	4
B1-SS-014-R2	Nemertea				Nemertea (LPIL)	28	28
B1-SS-014-R3	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	142	142
B1-SS-014-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	46	46
B1-SS-014-R3	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	4	4
B1-SS-014-R3	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-014-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-014-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	4	4
B1-SS-014-R3	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	10	10
B1-SS-014-R3	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	6	6
B1-SS-014-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-014-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	2	2
B1-SS-014-R3	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	444	444
B1-SS-014-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	28	28
B1-SS-014-R3	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	8	8
B1-SS-014-R3	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	104	104
B1-SS-014-R3	Mollusca	Bivalvia			Bivalvia (LPIL)	22	22
B1-SS-014-R3	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	2	2
B1-SS-014-R3	Nemertea				Nemertea (LPIL)	10	10
B1-SS-101	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-101	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	4	4
B1-SS-101	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	70	70
B1-SS-101	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	10	10
B1-SS-101	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	16	16
B1-SS-101	Mollusca	Bivalvia			Bivalvia (LPIL)	8	8
B1-SS-101	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	12	12
B1-SS-101	Nemertea				Nemertea (LPIL)	20	20
B1-SS-101	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	592	592
B1-SS-101	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	140	140
B1-SS-101	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4
B1-SS-101	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	2	2
B1-SS-101	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-101	Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae (LPIL)	2	2
B1-SS-101	Annelida	Polychaeta	Terebellida	Pectinariidae	Pectinaria gouldii	2	2
B1-SS-102	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-102	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	4	4
B1-SS-102	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	2	2
B1-SS-102	Arthropoda	Malacostraca	Amphipoda		Amphipoda (LPIL)	2	2

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-102	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	168	168
B1-SS-102	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	34	34
B1-SS-102	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	6	6
B1-SS-102	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	10	10
B1-SS-102	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	2	2
B1-SS-102	Mollusca	Bivalvia			Bivalvia (LPIL)	2	2
B1-SS-102	Nemertea				Nemertea (LPIL)	22	22
B1-SS-102	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	12	12
B1-SS-102	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-102	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	2	2
B1-SS-102	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	410	410
B1-SS-102	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	130	130
B1-SS-102	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2

ATTACHMENT C

LABORATORY REPORTS

(Laboratory issued data reports available upon request)

SECTION 4.3

Sediment Grain Size Data
Sediment Congeners Data

SECTION 4.5

Biota Analytical Data Tables
White Perch Congeners Data Tables
Historical NYSDEC Biota Data Tables

Figure A	**PCB concentrations in Target Fish Adjacent to Site**
Figure B-1 to B-3	**Scatter Plots – Fish Weight vs. Length – Historic and Current Data**
Figure C-1 to C-5	**Histograms – Average Total PCBs and Lipid-normalized PCBs**
Figure D	**Scatter Plot of Fish Weight v. Percent Lipids**
Figure E-1 to E-5	**Scatter Plots – Fish Weight vs. Total PCBs and Lipid-normalized PCBs**

SECTION 4.3

Tables; Sediment Grain Size Data

Tables; Sediment Congeners Data

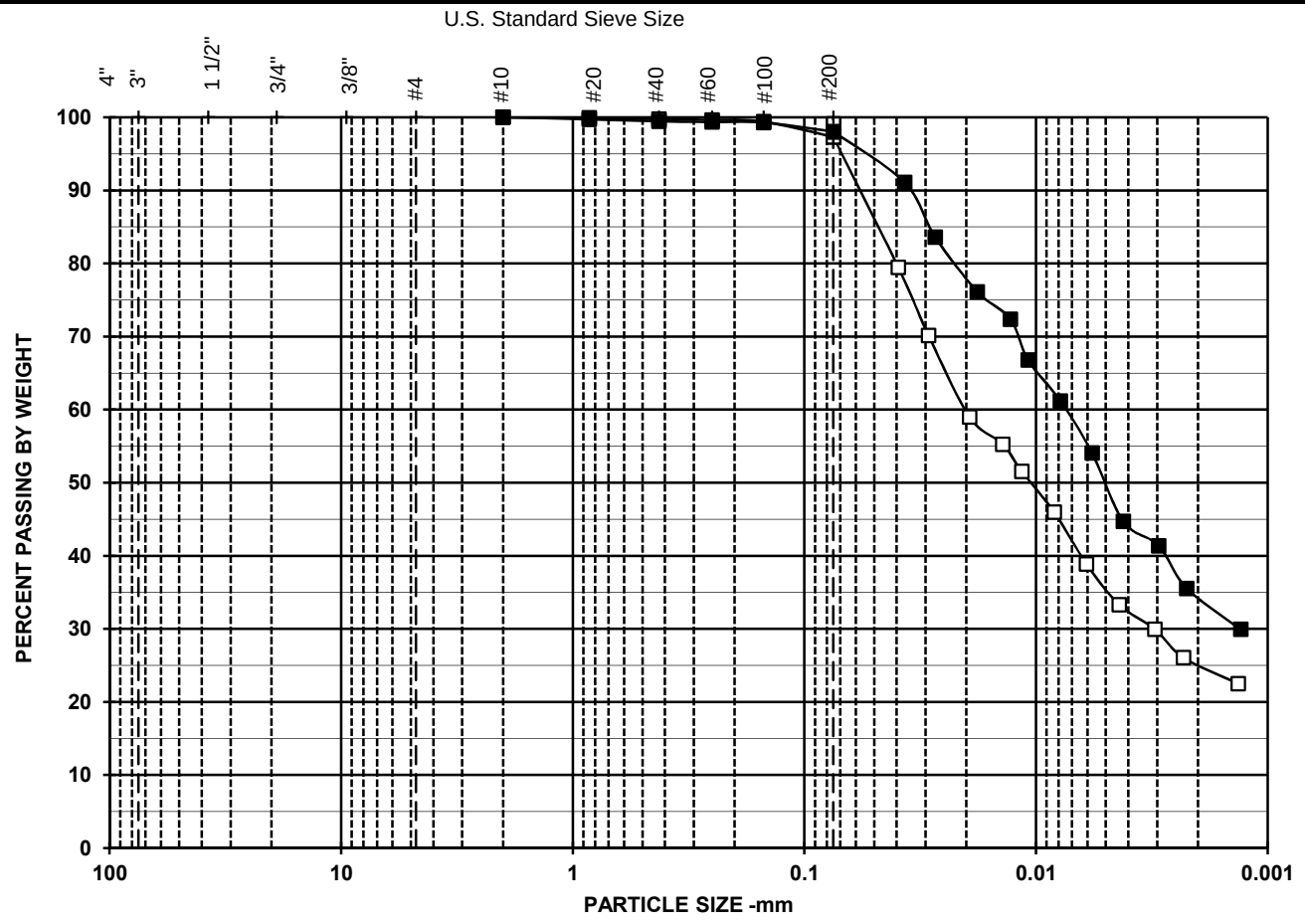
TABLES; SEDIMENT GRAIN SIZE DATA

Haley & Aldrich #28612-317
Former Anaconda Wire and Cable Plant
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS				REMARKS
			WATER CONTENT (%)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDRO. % MINUS 2 μm (%)	
	2242-102013-1155	-005	114.8	OH	97.3	25	
	2242-102013-1240	-006	167.0	OH	98.0	34	
	2242-102013-1540	-004	129.3	OH	96.4	21	
	2242-102013-1640	-009	81.2	OH	80.9	18	
	2242-102113-0810	-014	101.9	OH	93.5	22	
	2242-102113-0840	-102	109.1	OH	93.5	23	
	2242-102113-1222	-010	113.9	OH	98.6	21	
	2242-102113-1602	-013	104.9	OH	96.0	21	
	2242-102113-1528	-012	124.4	OH	93.7	24	
	2242-102113-1357	-008	133.2	OH	93.2	23	
	2242-102113-0933	-011	94.7	OH	88.4	20	
	2242-102113-1438	-007	133.8	OH	93.8	25	
	2242-102213-0812	-101	72.6	OH	92.5	21	
	2242-102213-1245	-001	110.8	OH	92.0	26	
	2242-102213-1136	-002	128.2	OH	98.9	28	
	2242-102213-0951	-003	91.5	OH	96.4	27	

Note: (1) USCS symbol based on visual observation and Sieve reported.

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	114.8				OH	Gray, Organic silt	3/14/2014
■	167.0				OH	Gray, Organic silt	3/14/2014
○							

Symbol	□	■	○
Boring	2242-102013	2242-102013	
Sample	1155	1240	
Depth			
% +3"	0.0	0.0	
% Gravel	0.0	0.0	
% SAND	2.7	2.0	
%C SAND	0.0	0.0	
%M SAND	0.2	0.5	
%F SAND	2.4	1.4	
% FINES	97.3	98.0	
% -2μ	25	34	
D_{100} (mm)	2.00	2.00	
D_{60} (mm)	0.02	0.01	
D_{30} (mm)	0.00	0.00	
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"			
4			
10	100.0	100.0	
20	99.9	99.7	
40	99.8	99.5	
60	99.6	99.4	
100	99.4	99.3	
200	97.3	98.0	

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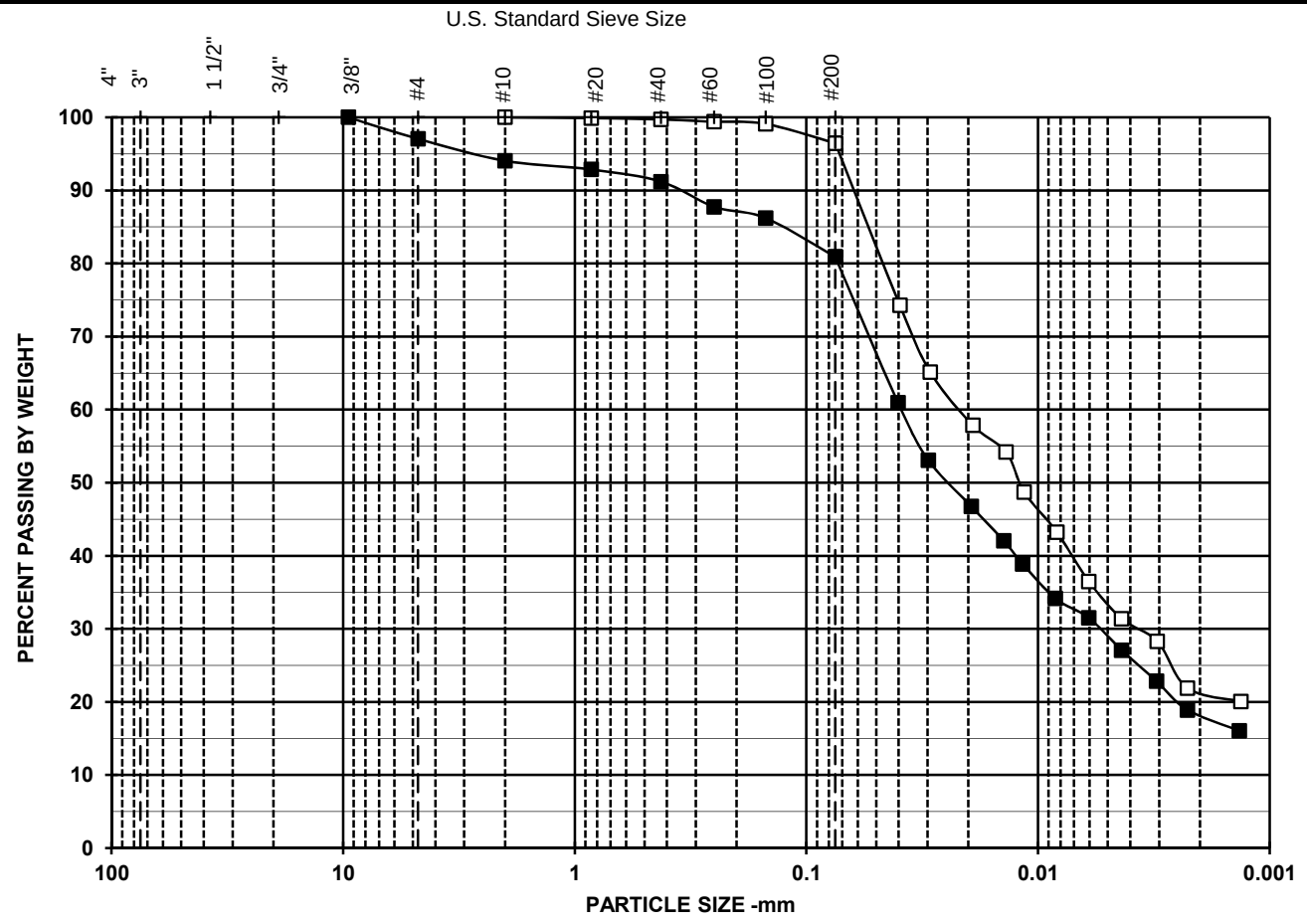
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	129.3				OH	Gray, Organic silt	3/14/2014
■	81.2				OH	Gray, Organic silt with sand	3/14/2014
○							

Symbol	□	■	○
Boring	2242-102013	2242-102013	
Sample	1540	1640	
Depth			
% +3"	0.0	0.0	
% Gravel	0.0	3.0	
% SAND	3.6	16.1	
%C SAND	0.0	3.0	
%M SAND	0.3	2.8	
%F SAND	3.3	10.3	
% FINES	96.4	80.9	
% -2μ	21	18	
D_{100} (mm)	2.00	9.50	
D_{60} (mm)	0.02	0.04	
D_{30} (mm)	0.00	0.01	
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"		100.0	
4		97.0	
10	100.0	94.0	
20	99.9	92.9	
40	99.7	91.2	
60	99.4	87.7	
100	99.1	86.2	
200	96.4	80.9	

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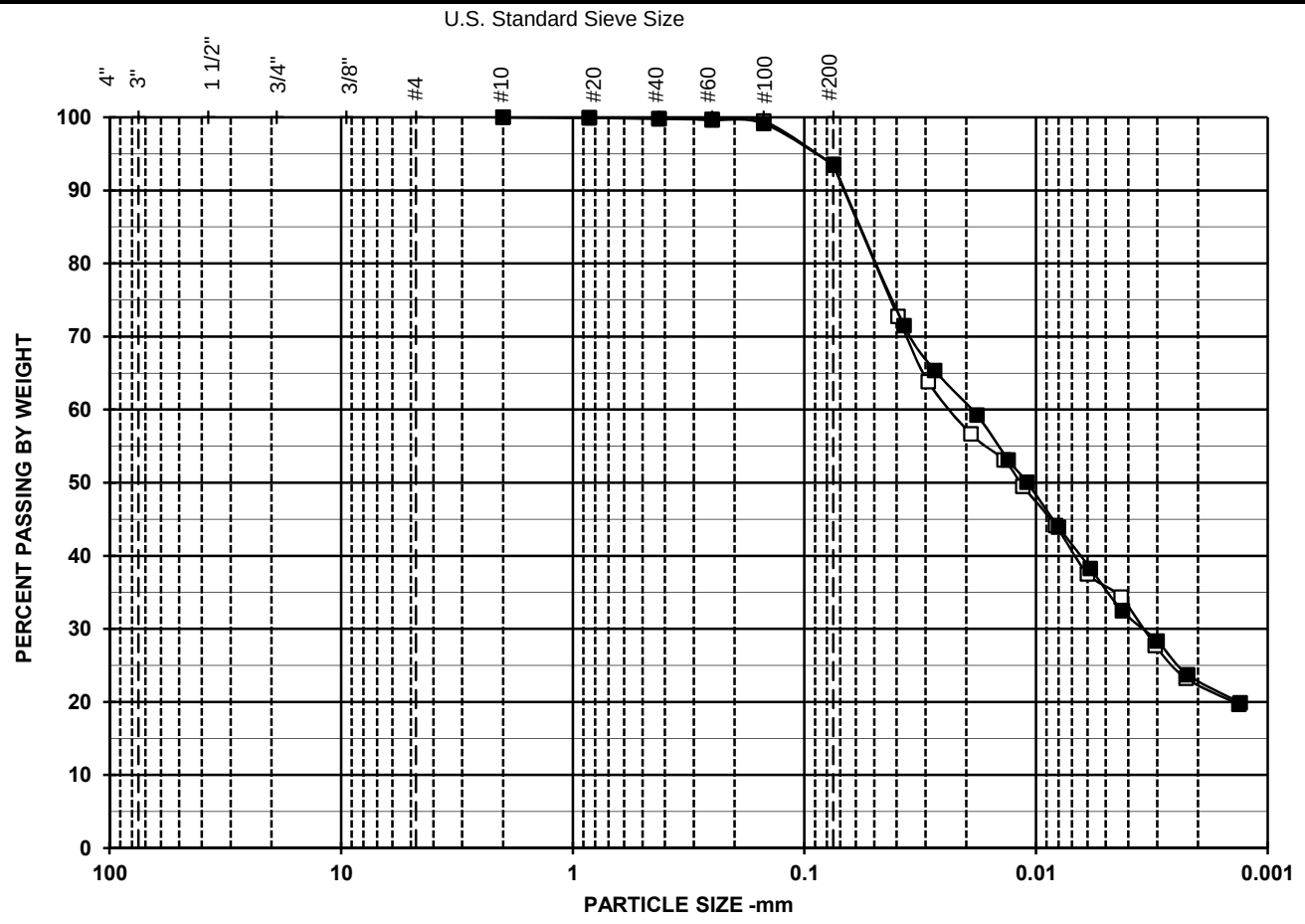
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	101.9				OH	Gray, Organic silt	3/14/2014
■	109.1				OH	Gray, Organic silt	3/14/2014
○							

Symbol	□	■	○
Boring	2242-102113	2242-102113	
Sample	0810	0840	
Depth			
% +3"	0.0	0.0	
% Gravel	0.0	0.0	
% SAND	6.5	6.5	
%C SAND	0.0	0.0	
%M SAND	0.2	0.2	
%F SAND	6.3	6.3	
% FINES	93.5	93.5	
% -2μ	22	23	
D_{100} (mm)	2.00	2.00	
D_{60} (mm)	0.02	0.02	
D_{30} (mm)	0.00	0.00	
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"			
4			
10	100.0	100.0	
20	99.9	99.9	
40	99.8	99.8	
60	99.7	99.6	
100	99.5	99.1	
200	93.5	93.5	

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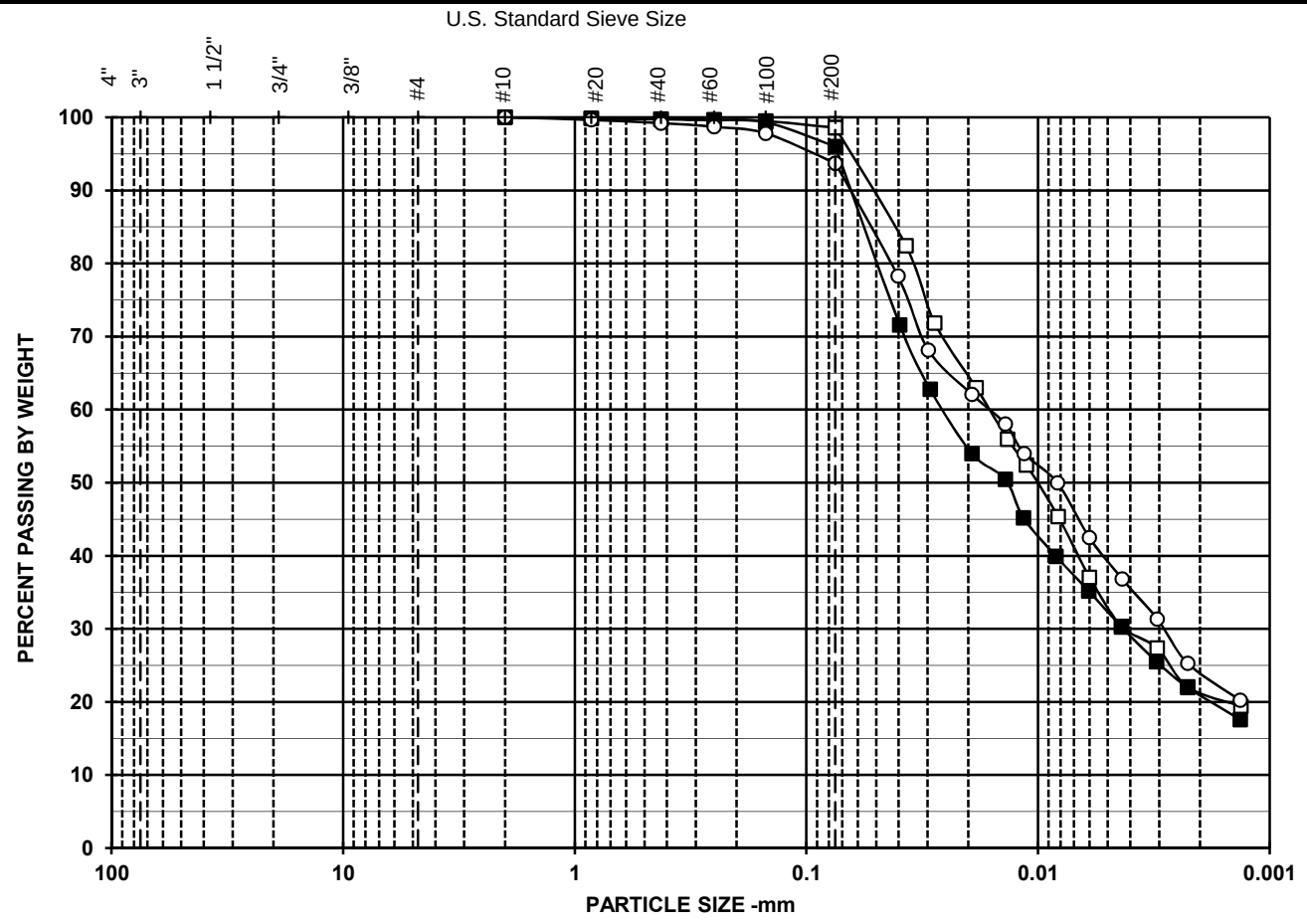
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	113.9				OH	Gray, Organic silt	3/14/2014
■	104.9				OH	Gray, Organic silt	3/14/2014
○	124.4				OH	Gray, Organic silt	3/14/2014

Symbol	□	■	○
Boring	2242-102113	2242-102113	2242-102113
Sample	1222	1602	1528
Depth			
% +3"	0.0	0.0	0.0
% Gravel	0.0	0.0	0.0
% SAND	1.4	4.0	6.3
%C SAND	0.0	0.0	0.0
%M SAND	0.2	0.3	0.8
%F SAND	1.2	3.7	5.5
% FINES	98.6	96.0	93.7
% -2μ	21	21	24
D_{100} (mm)	2.00	2.00	2.00
D_{60} (mm)	0.02	0.03	0.02
D_{30} (mm)	0.00	0.00	0.00
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"			
4			
10	100.0	100.0	100.0
20	99.9	99.8	99.7
40	99.8	99.7	99.2
60	99.7	99.6	98.7
100	99.5	99.3	97.8
200	98.6	96.0	93.7

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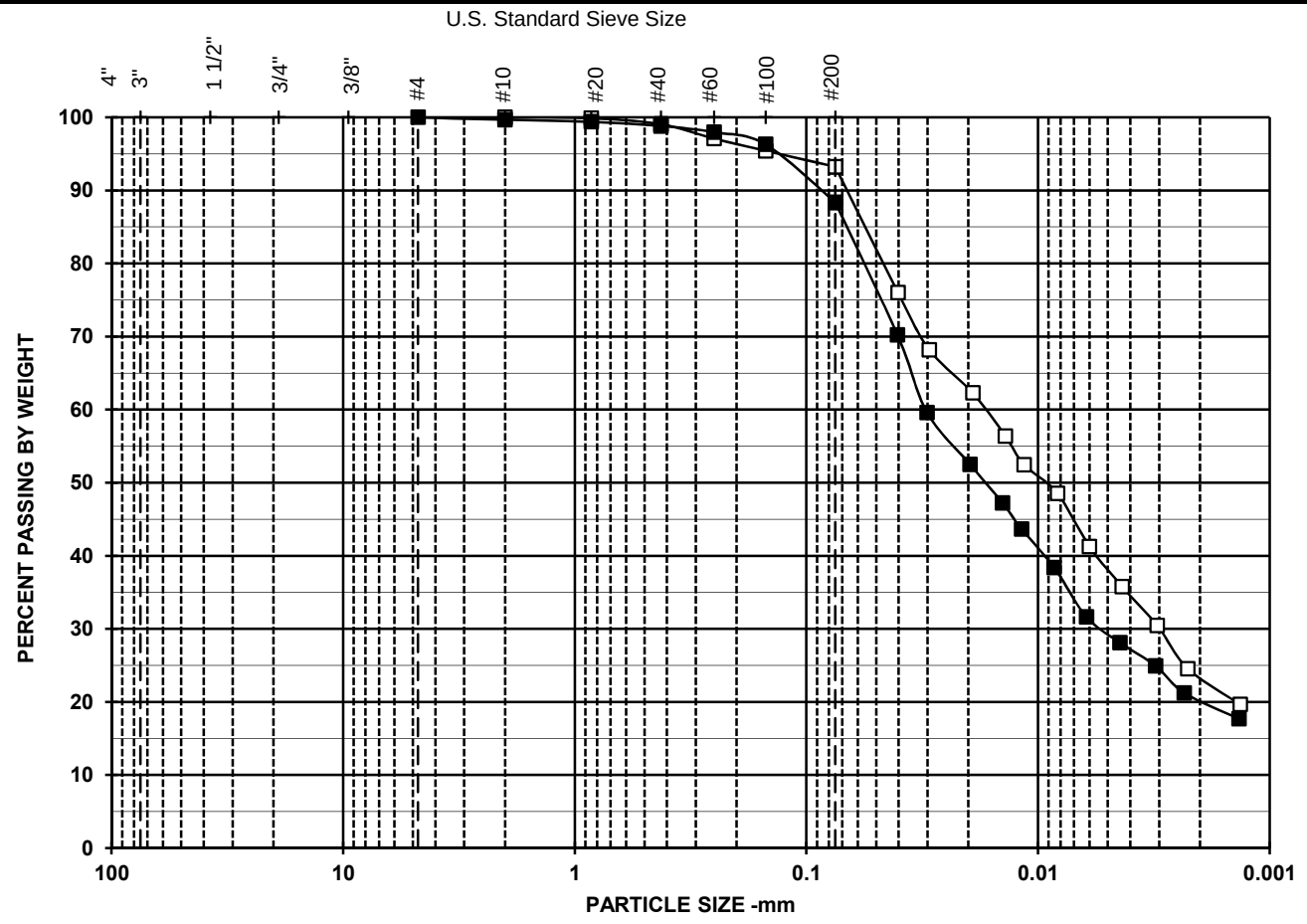
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Symbol	□	■	○
Boring	2242-102113	2242-102113	
Sample	1357	0933	
Depth			
% +3"	0.0	0.0	
% Gravel	0.0	0.0	
% SAND	6.8	11.6	
%C SAND	0.0	0.3	
%M SAND	1.0	0.9	
%F SAND	5.8	10.4	
% FINES	93.2	88.4	
% -2μ	23	20	
D_{100} (mm)	2.00	4.75	
D_{60} (mm)	0.02	0.03	
D_{30} (mm)	0.00	0.01	
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"			
4		100.0	
10	100.0	99.7	
20	99.9	99.4	
40	99.0	98.8	
60	97.1	98.0	
100	95.4	96.3	
200	93.2	88.4	

SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	133.2				OH	Gray, Organic silt	3/14/2014
■	94.7				OH	Gray, Organic silt	3/14/2014
○							

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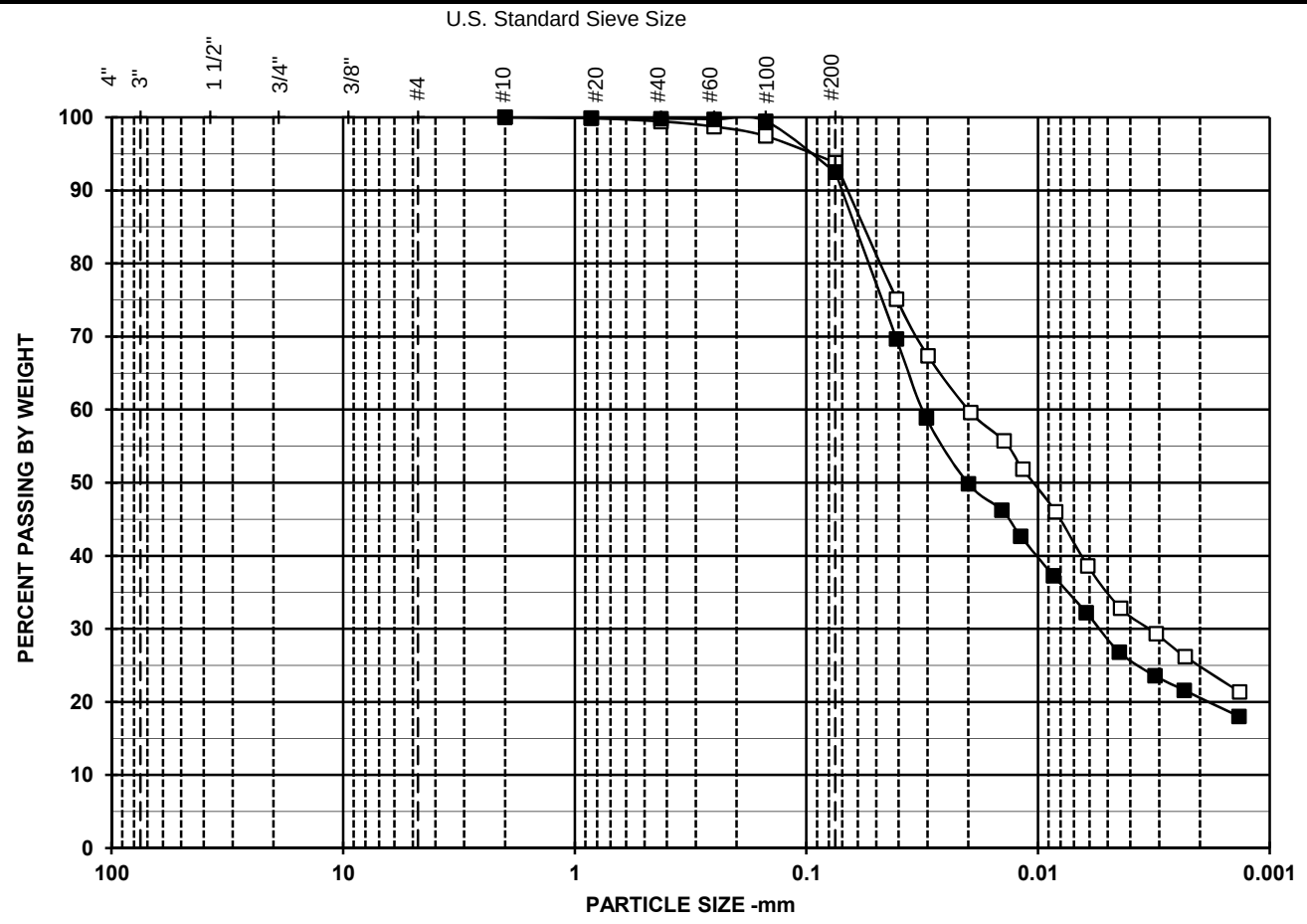
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	133.8				OH	Gray, Organic silt	3/14/2014
■	72.6				OH	Gray, Organic silt	3/14/2014
○							

Symbol	□	■	○
Boring	2242-102113	2242-102213	
Sample	1438	0812	
Depth			
% +3"	0.0	0.0	
% Gravel	0.0	0.0	
% SAND	6.2	7.5	
%C SAND	0.0	0.0	
%M SAND	0.6	0.2	
%F SAND	5.6	7.3	
% FINES	93.8	92.5	
% -2μ	25	21	
D_{100} (mm)	2.00	2.00	
D_{60} (mm)	0.02	0.03	
D_{30} (mm)	0.00	0.01	
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"			
4			
10	100.0	100.0	
20	99.9	99.9	
40	99.4	99.8	
60	98.7	99.7	
100	97.4	99.5	
200	93.8	92.5	

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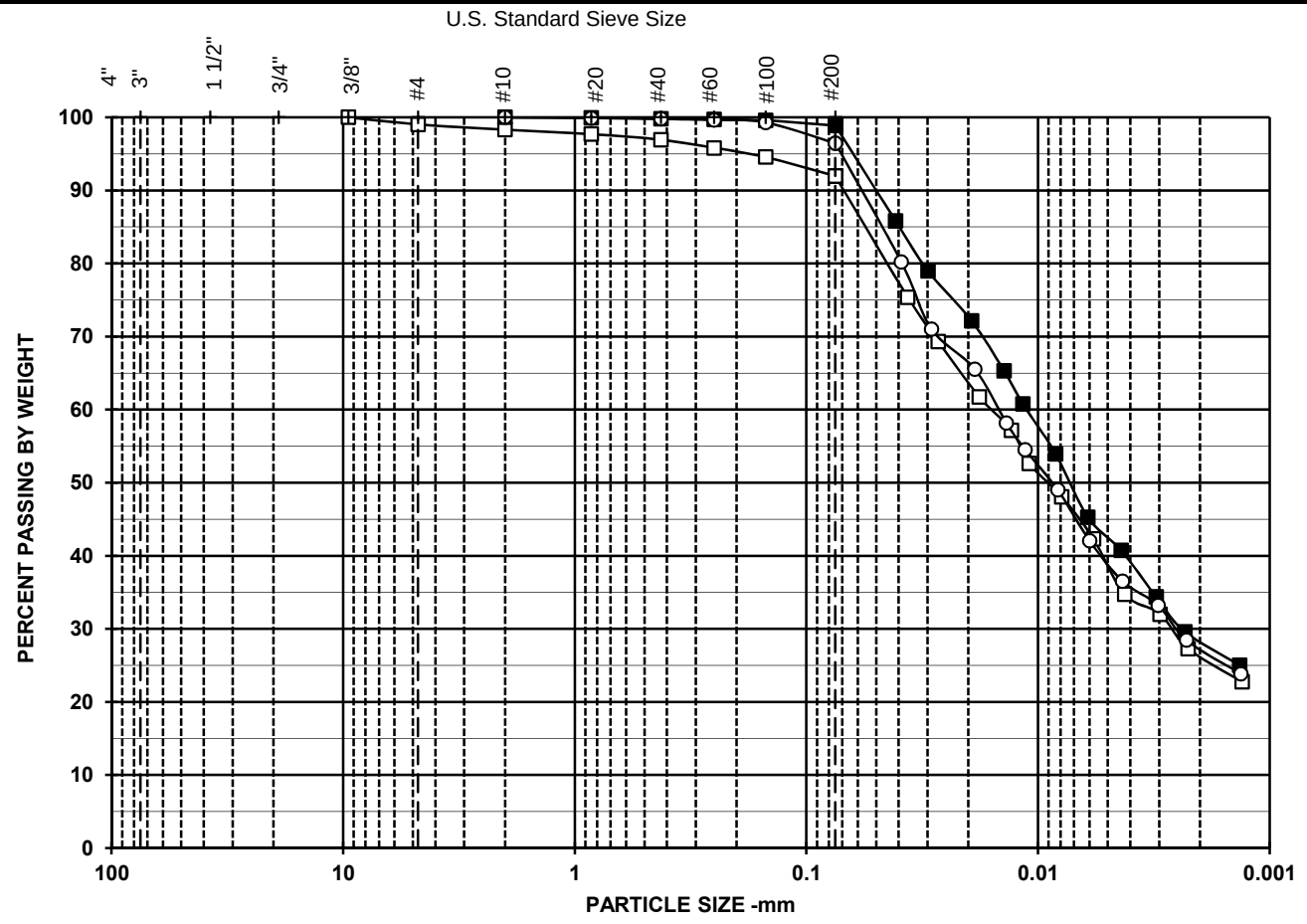
Former Anaconda Wire and Cable Plant

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



SYMBOL	w (%)	LL	PL	PI	USCS	DESCRIPTION AND REMARKS	Date Tested
□	110.8				OH	Gray, Organic silt	3/14/2014
■	128.2				OH	Gray, Organic silt	3/14/2014
○	91.5				OH	Gray, Organic silt	3/14/2014

Symbol	□	■	○
Boring	2242-102213	2242-102213	2242-102213
Sample	1245	1136	0951
Depth			
% +3"	0.0	0.0	0.0
% Gravel	1.0	0.0	0.0
% SAND	7.0	1.1	3.6
%C SAND	0.7	0.0	0.0
%M SAND	1.4	0.2	0.2
%F SAND	5.0	0.9	3.4
% FINES	92.0	98.9	96.4
% -2μ	26	28	27
D_{100} (mm)	9.50	2.00	2.00
D_{60} (mm)	0.02	0.01	0.01
D_{30} (mm)	0.00	0.00	0.00
D_{10} (mm)			
Cc			
Cu			

Particle Size	PERCENT FINER		
(Sieve #)	□	■	○
4"			
3"			
1 1/2"			
3/4"			
3/8"	100.0		
4	99.0		
10	98.3	100.0	100.0
20	97.7	99.9	99.9
40	96.9	99.8	99.8
60	95.8	99.7	99.6
100	94.6	99.6	99.3
200	92.0	98.9	96.4

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Former Anaconda Wire and Cable Plant

Analysis File: 3SV-MasterRev3

sieve1g.xls 3/28/2014

TABLES; SEDIMENT CONGENERS DATA

TABLE - SEDIMENT CONGENERS DATA - 2013
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

		Loc_Sample ID	B1-SS-002			B1-SS-003			B1-SS-007			B1-SS-011			B1-SS-012			B1-SS-013		
		Sample ID	2242-102213-1130			2242-102213-0950			2242-102113-1431			2242-102113-0930			2242-102113-1526			2242-102113-1600		
		Reach Segment	NORTH - UPSTREAM			NORTH - UPSTREAM			ADJACENT - SITE			ADJACENT - SITE			SOUTH - DOWNSTREAM			SOUTH - DOWNSTREAM		
	Results in mg/kg	Aroclor 1248	0.271*			0.243*			2.01*			0.227*			0.265*			0.26*		
		Aroclor 1254	ND(0.121)			ND(0.113)			0.972*			0.133*			0.161*			0.112*		
		Aroclor 1262	ND(0.121)			ND(0.113)			1.04*			0.779*			ND(0.123)			ND(0.108)		
		Total PCBs	0.271			0.243			4.022			1.139			0.426			0.372		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
004	2	2-2	0.015	0.000069		0.017	0.000078		0.034	0.00015		0.0097	0.000044	J	0.015	0.000068		0.0094	0.000042	
006	2	2-3	0.0061	0.000027		0.0059	0.000026		0.011	0.000051	J	0.0064	0.000028	J	0.0059	0.000026		0.004	0.000018	J
008	2	2-4	0.015	0.000066		0.015	0.000066		0.015	0.000067	J	0.014	0.000065		0.014	0.000062		0.011	0.000051	
013	2	3-4	0.0016	0.0000073	J	0.0014	0.0000063	J	ND	-		ND	-		ND	-		0.0011	0.0000049	J
015	2	4-4	0.033	0.00015		0.034	0.00015		0.024	0.00011	J	0.029	0.00013		0.03	0.00013		0.025	0.00011	
016	3	23-2	0.0038	0.000015	J	0.0047	0.000018	J	ND	-		0.0043	0.000017	J	0.005	0.000019		0.004	0.000015	J
017	3	24-2	0.025	0.000096		0.026	0.0001		0.037	0.00014		0.031	0.00012		0.026	0.0001		0.021	0.00008	
018	3	25-2	0.016	0.000063		0.017	0.000066		0.026	0.0001		0.02	0.000077		0.02	0.000077		0.013	0.00005	
019	3	26-2	0.002	0.0000077	J	0.0023	0.0000088	J	0.0089	0.000034	J	0.0024	0.0000095	J	0.0024	0.0000093	J	0.0021	0.0000081	J
020	3	23-3	0.0051	0.00002		0.0056	0.000022		0.009	0.000035	J	0.0057	0.000022	J	0.0056	0.000022		0.0045	0.000017	
022	3	23-4	0.0069	0.000027		0.0083	0.000032		0.0081	0.000032	J	0.0083	0.000032	J	0.0082	0.000032		0.0065	0.000025	
024	3	236-	0.0012	0.0000048	J	0.0011	0.0000042	J	ND	-		ND	-		ND	-		ND	-	
025	3	24-3	0.0053	0.000021		0.006	0.000023		0.02	0.000076	J	0.0059	0.000023	J	0.0057	0.000022		0.0042	0.000016	J
026	3	25-3	0.013	0.000049		0.013	0.000051		0.014	0.000054	J	0.011	0.000044	J	0.012	0.000047		0.0099	0.000038	
027	3	26-3	0.0054	0.000021		0.0053	0.00002		0.014	0.000055	J	0.0083	0.000032	J	0.004	0.000015	J	0.0041	0.000016	J
028	3	24-4	0.051	0.0002		0.056	0.00022		0.09	0.00035		0.057	0.00022		0.056	0.00022		0.045	0.00017	
031	3	25-4	0.042	0.00016		0.045	0.00018		0.052	0.0002		0.045	0.00017		0.045	0.00017		0.036	0.00014	
032	3	26-4	0.0095	0.000037		0.01	0.00004		0.019	0.000074	J	0.01	0.00004	J	0.0099	0.000038		0.0081	0.000031	
033	3	34-2	0.0068	0.000026		0.0074	0.000029		0.009	0.000035	J	0.0069	0.000027	J	0.0079	0.000031		0.006	0.000023	
034	3	35-2	ND	-		0.0011	0.0000041	J	ND	-		0.0026	0.00001	J	ND	-		0.00099	0.0000038	J
037	3	34-4	0.014	0.000054		0.015	0.000057		0.016	0.000061	J	0.012	0.000048		0.015	0.00006		0.012	0.000048	
040	4	23-23	0.0051	0.000017		0.0059	0.00002		0.017	0.00006	J	0.0061	0.000021	J	0.0062	0.000021		0.0045	0.000016	
042	4	23-24	0.0062	0.000021		0.0073	0.000025		0.016	0.000056	J	0.0078	0.000027	J	0.0077	0.000026		0.0058	0.00002	
044	4	23-25	0.02	0.000069		0.023	0.000079		0.097	0.00033		0.027	0.000093		0.025	0.000086		0.018	0.000061	
045	4	236-2	0.0064	0.000022		0.007	0.000024		0.011	0.000039	J	0.0072	0.000024	J	0.007	0.000024		0.0056	0.000019	
046	4	23-26	0.0022	0.0000076	J	0.0025	0.0000087	J	0.013	0.000045	J	0.0042	0.000015	J	0.0028	0.0000096	J	0.0023	0.000008	J
047	4	24-24	0.005	0.000017		0.0058	0.00002		0.024	0.000083	J	0.0068	0.000023	J	0.0063	0.000021		0.0045	0.000015	
048	4	245-2	0.0028	0.0000095	J	0.0029	0.00001	J	ND	-		ND	-		0.0029	0.0000099	J	0.0017	0.0000057	J
049	4	24-25	0.025	0.000087		0.029	0.000099		0.16	0.00054		0.035	0.00012		0.034	0.00012		0.022	0.000077	
051	4	24-26	0.0013	0.0000044	J	0.0014	0.0000048	J	ND	-		ND	-		0.0014	0.0000048	J	0.0011	0.0000038	J
052	4	25-25	0.019	0.000065		0.022	0.000076		0.09	0.00031		0.025	0.000086		0.023	0.00008		0.016	0.000054	
053	4	25-26	0.0063	0.000021		0.0071	0.000024		0.023	0.000079	J	0.007	0.000024	J	0.0067	0.000023		0.0049	0.000017	
054	4	26-26	ND	-		ND	-		0.0052	0.000018	J	ND	-		ND	-		ND	-	
056	4	23-34	0.01	0.000034		0.011	0.000037		0.015	0.000052	J	0.011	0.000038	J	0.012	0.000043		0.0094	0.000032	
059	4	236-3	0.0014	0.0000049	J	0.0053	0.000018		0.0065	0.000022	J	0.0055	0.000019	J	0.0046	0.000016	J	0.0016	0.0000053	J
060	4	234-4	0.0038	0.000013	J	0.0041	0.000014	J	ND	-		0.0043	0.000015	J	0.0052	0.000018		0.0034	0.000012	J
063	4	235-4	0.0015	0.0000053	J	0.0013	0.0000046	J	ND	-		ND	-		0.0017	0.0000058	J	0.0011	0.0000039	J
064	4	236-4	0.0072	0.000025		0.0079	0.000027		0.014	0.000049	J	0.0089	0.000031	J	0.0085	0.000029		0.0059	0.00002	
066	4	24-34	0.019	0.000065		0.021	0.00007		0.044	0.00015		0.021	0.000073		0.022	0.000074		0.017	0.000057	
070	4	25-34	0.014	0.000048		0.016	0.000054		0.037	0.00013		0.017	0.000057		0.017	0.000058		0.013	0.000043	
071	4	26-34	0.0068	0.000023		0.008	0.000027		0.023	0.00008	J	0.0082	0.000028	J	0.0083	0.000028		0.0061	0.000021	

Notes:

* Aroclor with asterisk is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.

(1) J - Qualifier denotes concentration reported is less than the Practical Quantitaion Limit (PQL) but greater than the Method Detection Limit (MDL);
B- Qualifier indicates an estimated value. The following analytes were detected in the associated blank at a level exceeding the Practical Quantitation Limit(PQL).

(2) ND -Denotes analyte not detected (concentration less than the MDL)

(3) PQL and MDL for IUPAC #s 1, 2, and 3 are 5 times higher than all other Congeners

(4) The above listed IUPAC numbers and congener names are consistent with the CAS numbering system. Note that G. Frame's 1996 PCB publication used Guitart's proposed renumbering for congeners 107,108, and 109, which has not to date been adopted by CAS, Ballschmiter or IUPAC.

(5) Only detected analytes are shown

TABLE - SEDIMENT CONGENERS DATA - 2013
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

		Loc_Sample ID	B1-SS-002			B1-SS-003			B1-SS-007			B1-SS-011			B1-SS-012			B1-SS-013		
		Sample ID	2242-102213-1130			2242-102213-0950			2242-102113-1431			2242-102113-0930			2242-102113-1526			2242-102113-1600		
		Reach Segment	NORTH - UPSTREAM			NORTH - UPSTREAM			ADJACENT - SITE			ADJACENT - SITE			SOUTH - DOWNSTREAM			SOUTH - DOWNSTREAM		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
072	4	25-35	ND	-		0.00097	0.0000033	J	0.0059	0.00002	J	ND	-		0.0011	0.0000039	J	0.0011	0.0000038	J
074	4	245-4	0.0066	0.000022		0.0074	0.000025		0.018	0.00006	J	0.0079	0.000027	J	0.008	0.000027		0.0059	0.00002	
075	4	246-4	0.0014	0.0000048	J	ND	-		ND	-		ND	-		ND	-		0.0012	0.0000041	J
082	5	234-23	0.0012	0.0000038	J	0.0011	0.0000034	J	0.0072	0.000022	J	ND	-		0.002	0.0000062	J	0.0019	0.0000057	J
083	5	235-23	ND	-		ND	-		0.015	0.000045	J	ND	-		0.0012	0.0000036	J	0.0013	0.000004	J
084	5	236-23	0.01	0.000032		0.012	0.000037		0.027	0.000083		0.013	0.000041		0.013	0.000039		0.01	0.000032	
085	5	234-24	0.0018	0.0000054	J	0.0019	0.0000058	J	0.01	0.000032	J	ND	-		0.0022	0.0000068	J	0.002	0.000006	J
087	5	234-25	0.0027	0.0000081	J	0.0034	0.00001	J	0.029	0.000089		0.0046	0.000014	J	0.0042	0.000013	J	0.0035	0.000011	J
091	5	236-24	0.0021	0.0000064	J	0.0024	0.0000075	J	0.017	0.000053	J	0.0044	0.000013	J	0.0031	0.0000094	J	0.002	0.0000062	J
092	5	235-25	0.0025	0.0000078	J	0.0029	0.000009	J	0.025	0.000076	J	0.0057	0.000017	J	0.0039	0.000012	J	0.0028	0.0000087	J
095	5	236-25	0.0075	0.000023		0.009	0.000028		0.097	0.0003		0.017	0.000051		0.013	0.00004		0.0087	0.000027	
097	5	245-23	0.0035	0.000011	J	0.0038	0.000012	J	0.032	0.000098		0.0063	0.000019	J	0.0049	0.000015		0.0033	0.00001	J
099	5	245-24	0.0069	0.000021		0.0077	0.000024		0.095	0.00029		0.013	0.00004		0.011	0.000032		0.0076	0.000023	
101	5	245-25	0.011	0.000033		0.012	0.000037		0.12	0.00036		0.019	0.000058		0.016	0.000048		0.012	0.000036	
102	5	245-26	0.0017	0.0000052	J	0.0026	0.0000081	J	0.0057	0.000017	J	0.0039	0.000012	J	0.0039	0.000012	J	0.0016	0.000005	J
105	5	234-34	0.0047	0.000014	J	0.0049	0.000015		0.031	0.000095		0.0093	0.000029	J	0.0069	0.000021		0.0052	0.000016	
110	5	236-34	0.011	0.000034		0.013	0.000039		0.09	0.00028		0.018	0.000054		0.015	0.000047		0.011	0.000035	
118	5	245-34	0.011	0.000034		0.012	0.000035		0.069	0.00021		0.016	0.00005		0.014	0.000043		0.011	0.000033	
128	6	234-234	0.0015	0.0000041	J	0.0019	0.0000053	J	0.011	0.00003	J	0.0026	0.0000073	J	0.0023	0.0000065	J	0.0015	0.0000042	J
129	6	2345-23	ND	-		ND	-		0.008	0.000022	J	ND	-		0.00098	0.0000027	J	ND	-	
131	6	2346-23	0.0011	0.000003	J	0.0013	0.0000036	J	ND	-		ND	-		0.0014	0.0000038	J	0.0012	0.0000032	J
132	6	234-236	0.0031	0.0000085	J	0.0039	0.000011	J	0.039	0.00011		0.0075	0.000021	J	0.0044	0.000012	J	0.0036	0.00001	J
135	6	235-236	0.0016	0.0000044	J	0.0017	0.0000048	J	ND	-		0.013	0.000035		0.0032	0.0000089	J	0.0016	0.0000046	J
136	6	236-236	ND	-		ND	-		0.021	0.000059	J	ND	-		0.0017	0.0000047	J	0.0019	0.0000052	J
138	6	234-245	0.0087	0.000024		0.0098	0.000027		0.11	0.0003		0.019	0.000052		0.013	0.000036		0.012	0.000032	
139	6	2346-24	0.0048	0.000013	J	0.0053	0.000015		0.0056	0.000016	J	0.0056	0.000016	J	0.0069	0.000019		0.0041	0.000011	J
141	6	2345-25	0.0016	0.0000044	J	0.0014	0.0000039	J	0.036	0.000099		0.0041	0.000011	J	0.0022	0.000006	J	0.0026	0.0000073	J
144	6	2346-25	ND	-		ND	-		0.0066	0.000018	J	ND	-		ND	-		ND	-	
146	6	235-245	0.001	0.0000028	J	0.0011	0.000003	J	0.0068	0.000019	J	ND	-		0.0015	0.0000042	J	0.0011	0.0000031	J
147	6	2356-24	ND	-		ND	-		0.005	0.000014	J	ND	-		ND	-		ND	-	
149	6	236-245	0.0073	0.00002		0.0088	0.000024		0.16	0.00045		0.024	0.000068		0.013	0.000035		0.013	0.000035	
151	6	2356-25	0.0056	0.000016		0.0055	0.000015		0.058	0.00016		0.013	0.000036		0.0064	0.000018		0.008	0.000022	
153	6	245-245	0.0085	0.000024		0.01	0.000028		0.18	0.00049		0.028	0.000078		0.014	0.000038		0.016	0.000045	
158	6	2346-34	ND	-		0.001	0.0000028	J	0.012	0.000033	J	ND	-		ND	-		0.0011	0.000003	J
163	6	2356-34	0.0015	0.0000042	J	0.0017	0.0000048	J	0.019	0.000052	J	0.0033	0.0000091	J	0.0023	0.0000063	J	0.002	0.0000057	J
164	6	236-345	ND	-		0.0016	0.0000044	J	0.0087	0.000024	J	ND	-		ND	-		ND	-	
170	7	2345-234	0.002	0.000005	J	0.0024	0.000006	J	0.057	0.00014		0.0083	0.000021	J	0.0035	0.0000089	J	0.0055	0.000014	
171	7	2346-234	ND	-		ND	-		0.015	0.000039	J	ND	-		ND	-		0.0015	0.0000039	J
172	7	2345-235	ND	-		ND	-		0.011	0.000028	J	0.0024	0.000006	J	ND	-		0.0012	0.000003	J
174	7	2345-236	0.0021	0.0000053	J	0.0031	0.0000077	J	ND	-		0.021	0.000053		0.0059	0.000015		0.013	0.000032	
176	7	2346-236	ND	-		ND	-		0.013	0.000034	J	ND	-		ND	-		0.0014	0.0000035	J
177	7	2356-234	0.0015	0.0000039	J	0.0015	0.0000038	J	0.045	0.00011		0.0073	0.000019	J	0.0023	0.0000059	J	0.0048	0.000012	
178	7	2356-235	ND	-		0.0011	0.0000029	J	0.029	0.000074		0.0051	0.000013	J	0.0011	0.0000028	J	0.0031	0.0000079	J
179	7	2356-236	ND	-		0.0017	0.0000044	J	0.063	0.00016		0.0099	0.000025	J	0.0023	0.0000057	J	0.007	0.000018	
180	7	2345-245	0.0054	0.000014		0.0083	0.000021		0.24	0.0006		0.043	0.00011		0.011	0.000029		0.03	0.000075	

Notes:

* Aroclor with asterisk is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.

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B- Qualifier indicates an estimated value. The following analytes were detected in the associated blank at a level exceeding the Practical Quantitation Limit(PQL).

(2) ND -Denotes analyte not detected (concentration less than the MDL)

(3) PQL and MDL for IUPAC #s 1, 2, and 3 are 5 times higher than all other Congeners

(4) The above listed IUPAC numbers and congener names are consistent with the CAS numbering system. Note that G. Frame's 1996 PCB publication used Guitart's proposed renumbering for congeners 107,108, and 109, which has not to date been adopted by CAS, Ballschmiter or IUPAC.

(5) Only detected analytes are shown

TABLE - SEDIMENT CONGENERS DATA - 2013
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

		Loc_Sample ID	B1-SS-002			B1-SS-003			B1-SS-007			B1-SS-011			B1-SS-012			B1-SS-013		
		Sample ID	2242-102213-1130			2242-102213-0950			2242-102113-1431			2242-102113-0930			2242-102113-1526			2242-102113-1600		
		Reach Segment	NORTH - UPSTREAM			NORTH - UPSTREAM			ADJACENT - SITE			ADJACENT - SITE			SOUTH - DOWNSTREAM			SOUTH - DOWNSTREAM		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
182	7	2345-246	ND	-		ND	-		0.011	0.000027	J	ND	-		ND	-		ND	-	
183	7	2346-245	0.0012	0.000003	J	0.0023	0.0000058	J	0.069	0.00018		0.011	0.000027	J	0.0023	0.0000057	J	0.0078	0.00002	
185	7	23456-25	ND	-		ND	-		0.013	0.000034	J	0.0026	0.0000065	J	ND	-		0.0019	0.0000049	J
187	7	2356-245	0.0035	0.0000088	J	0.0061	0.000015		0.22	0.00055		0.035	0.000087		0.0092	0.000023		0.024	0.00006	
190	7	23456-34	ND	-		ND	-		0.013	0.000032	J	ND	-		ND	-		0.0014	0.0000037	J
193	7	2356-345	ND	-		ND	-		0.012	0.000031	J	ND	-		ND	-		0.0016	0.000004	J
194	8	2345-2345	0.001	0.0000023	J	0.0035	0.0000081	J	0.099	0.00023		0.022	0.000051		0.004	0.0000093	J	0.017	0.00004	
195	8	23456-234	ND	-		ND	-		0.029	0.000069		0.0071	0.000016	J	0.0015	0.0000034	J	0.0043	0.0000099	J
196	8	2345-2346	ND	-		0.0019	0.0000044	J	0.06	0.00014		0.014	0.000033		0.0024	0.0000057	J	0.0091	0.000021	
198	8	23456-235	ND	-		ND	-		0.007	0.000016	J	ND	-		ND	-		0.0013	0.0000031	J
199	8	2345-2356	0.0024	0.0000055	J	0.0055	0.000013		0.13	0.00031		0.032	0.000075		0.0062	0.000014		0.025	0.000059	
200	8	23456-236	ND	-		ND	-		0.017	0.000041	J	0.0041	0.0000096	J	ND	-		0.0026	0.0000061	J
201	8	2346-2356	ND	-		0.0011	0.0000026	J	0.093	0.00022		0.008	0.000019	J	0.002	0.0000047	J	0.0039	0.000009	J
203	8	23456-245	0.0012	0.0000028	J	0.003	0.0000071	J	0.093	0.00022		0.024	0.000055		0.0042	0.0000097	J	0.017	0.00004	
206	9	23456-2345	0.0022	0.0000048	J	0.0046	0.00001	J	0.076	0.00016		0.024	0.000052		0.0054	0.000012		0.018	0.00004	
208	9	23456-2356	0.0022	0.0000047	J	0.0028	0.0000061	J	0.066	0.00014		0.011	0.000023	J	0.004	0.0000086	J	0.006	0.000013	
209	10	23456-23456	0.0026	0.0000053	J	0.0026	0.0000052	J	0.015	0.000029	J	0.0079	0.000016	J	0.0033	0.0000066	J	0.0046	0.0000092	
TOTAL			0.6	0.0021		0.69	0.0024		3.9	0.011		1	0.0033		0.76	0.0026		0.75	0.0024	

Notes:

* Aroclor with asterisk is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.

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B- Qualifier indicates an estimated value. The following analytes were detected in the associated blank at a level exceeding the Practical Quantitation Limit(PQL).

(2) ND -Denotes analyte not detected (concentration less than the MDL)

(3) PQL and MDL for IUPAC #s 1, 2, and 3 are 5 times higher than all other Congeners

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(5) Only detected analytes are shown

SECTION 4.5

Tables; Biota Analytical Data

Tables; White Perch Congener Data

Tables; Historical NYSDEC Biota Data

TABLES; BIOTA ANALYTICAL DATA

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
American Eel	AMEL-BT02E-001	2E	9/18/2013	Fillet	ND (0.489)	4.94	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.193	0.246	ND (0.1)	2.79	ND (0.1)	3.229
American Eel	AMEL-BT02E-001	2E	9/18/2013	Offal	ND (0.502)	6.69	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	0.238	0.306	ND (0.2)	3.72	ND (0.2)	4.264
American Eel	AMEL-BT02E-002	2E	9/18/2013	Fillet	ND (0.504)	4.32	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	1.95	ND (0.1)	2.98	ND (0.1)	4.930
American Eel	AMEL-BT02E-002	2E	9/18/2013	Offal	ND (0.491)	6.67	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	2.8	ND (0.15)	3.99	ND (0.15)	6.790
American Eel	AMEL-BT02B-004	2B	9/18/2013	Fillet	ND (0.499)	1.42	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0521	ND (0.05)	0.237	ND (0.05)	0.289
American Eel	AMEL-BT02B-004	2B	9/18/2013	Offal	ND (0.487)	2.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0984	ND (0.05)	0.427	ND (0.05)	0.525
American Eel	AMEL-BT02B-005	2B	9/18/2013	Fillet	ND (0.498)	3.43	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.129	0.081	ND (0.05)	0.585	ND (0.05)	0.795
American Eel	AMEL-BT02B-005	2B	9/18/2013	Offal	ND (0.508)	8.02	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.288	0.187	ND (0.05)	1.43	ND (0.05)	1.905
American Eel	AMEL-BT02A-006	2A	9/18/2013	Fillet	ND (0.482)	14.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.69	0.879	ND (0.05)	1.3	ND (0.05)	2.869
American Eel	AMEL-BT02A-006	2A	9/18/2013	Offal	ND (0.484)	11.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.519	0.687	ND (0.05)	1.01	ND (0.05)	2.216
American Eel	AMEL-BT02C-003	2C	9/18/2013	Fillet	ND (0.477)	13.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.237	0.232	ND (0.05)	1.85	ND (0.05)	2.319
American Eel	AMEL-BT02C-003	2C	9/18/2013	Offal	ND (0.488)	8.71	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.163	0.187	ND (0.05)	1.12	ND (0.05)	1.470
American Eel	AMEL-BT02H-002	2H	9/18/2013	Fillet	ND (0.467)	5.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.384	0.526	ND (0.05)	1.35	ND (0.05)	2.260
American Eel	AMEL-BT02H-002	2H	9/18/2013	Offal	ND (0.497)	4.72	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.334	0.445	ND (0.05)	1.08	ND (0.05)	1.859
American Eel	AMEL-BT02H-001	2H	9/18/2013	Fillet	ND (0.482)	19.9	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.596	0.827	ND (0.05)	0.805	ND (0.05)	2.228
American Eel	AMEL-BT02H-001	2H	9/18/2013	Offal	ND (0.493)	14.6	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.4	0.583	ND (0.05)	0.559	ND (0.05)	1.542
American Eel	AMEL-BT03B-001	3B	9/18/2013	Fillet	ND (0.507)	0.322	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.106	ND (0.05)	0.106
American Eel	AMEL-BT03B-001	3B	9/18/2013	Offal	0.522	1.45	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.122	ND (0.05)	0.638	ND (0.05)	0.760
American Eel	AMEL-BT03B-002	3B	9/18/2013	Fillet	ND (0.514)	5.86	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.207	0.446	ND (0.05)	0.612	ND (0.05)	1.265
American Eel	AMEL-BT03B-002	3B	9/18/2013	Offal	0.574	4.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.154	0.33	ND (0.05)	0.443	ND (0.05)	0.927
American Eel	AMEL-BT03A-003	3A	9/19/2013	Fillet	ND (0.478)	11.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.436	0.674	ND (0.05)	1.17	ND (0.05)	2.280
American Eel	AMEL-BT03A-003	3A	9/19/2013	Offal	ND (0.514)	8.33	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.292	0.469	ND (0.05)	0.805	ND (0.05)	1.566
American Eel	AMEL-BT03B-004	3B	9/19/2013	Fillet	ND (0.498)	0.436	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.131	ND (0.05)	0.131
American Eel	AMEL-BT03B-004	3B	9/19/2013	Offal	ND (0.479)	2.6	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0861	0.154	ND (0.05)	0.801	ND (0.05)	1.041
American Eel	AMEL-BT03B-005	3B	9/19/2013	Fillet	ND (0.494)	16.9	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.433	0.557	ND (0.05)	1.12	ND (0.05)	2.110
American Eel	AMEL-BT03B-005	3B	9/19/2013	Offal	ND (0.517)	9.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.207	0.275	ND (0.05)	0.515	ND (0.05)	0.997
American Eel	AMEL-BT02F-003	2F	9/19/2013	Fillet	ND (0.492)	2.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.158	ND (0.05)	0.267	ND (0.05)	0.425
American Eel	AMEL-BT02F-003	2F	9/19/2013	Offal	ND (0.487)	4.31	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.291	ND (0.05)	0.414	ND (0.05)	0.705
American Eel	AMEL-BT02G-005	2G	9/19/2013	Fillet	ND (0.496)	6.81	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.475	ND (0.05)	0.807	ND (0.05)	1.282
American Eel	AMEL-BT02G-005	2G	9/19/2013	Offal	ND (0.485)	4.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.262	ND (0.05)	0.426	ND (0.05)	0.688
American Eel	AMEL-BT02G-004	2G	9/19/2013	Fillet	ND (0.493)	7.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.751	ND (0.05)	1.37	ND (0.05)	2.121
American Eel	AMEL-BT02G-004	2G	9/19/2013	Offal	ND (0.509)	7.09	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.613	ND (0.05)	1.14	ND (0.05)	1.753
American Eel	AMEL-BT03D-001	3D	9/19/2013	Fillet	ND (0.478)	3.06	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.253	0.306	ND (0.05)	0.568	ND (0.05)	1.127
American Eel	AMEL-BT03D-001	3D	9/19/2013	Offal	ND (0.501)	4.78	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.377	0.447	ND (0.05)	0.693	ND (0.05)	1.517
American Eel	AMEL-BT03D-003	3D	9/19/2013	Fillet	ND (0.478)	11.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.517	0.62	ND (0.05)	1.18	ND (0.05)	2.317
American Eel	AMEL-BT03D-003	3D	9/19/2013	Offal	ND (0.468)	11	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.539	0.566	ND (0.05)	1.04	ND (0.05)	2.145
American Eel	AMEL-BT03D-002	3D	9/19/2013	Fillet	ND (0.499)	2.24	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.146	0.165	ND (0.05)	0.342	ND (0.05)	0.653
American Eel	AMEL-BT03D-002	3D	9/19/2013	Offal	ND (0.502)	9.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.56	0.75	ND (0.05)	1.37	ND (0.05)	2.680
American Eel	AMEL-BT01C-001	1C	9/19/2013	Fillet	ND (0.5)	2.81	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0987	0.0631	ND (0.05)	0.27	ND (0.05)	0.432
American Eel	AMEL-BT01C-001	1C	9/19/2013	Offal	ND (0.481)	2.98	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0977	0.0646	ND (0.05)	0.257	ND (0.05)	0.419
American Eel	AMEL-BT01A-002	1A	9/20/2013	Fillet	ND (0.492)	3.37	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.144	0.154	ND (0.05)	0.508	ND (0.05)	0.806
American Eel	AMEL-BT01A-002	1A	9/20/2013	Offal	ND (0.477)	6.73	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.26	0.287	ND (0.05)	0.859	ND (0.05)	1.406
American Eel	AMEL-BT01A-003	1A	9/20/2013	Fillet	ND (0.483)	15.7	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.718	0.92	ND (0.1)	1.12	ND (0.1)	2.758

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
American Eel	AMEL-BT01A-003	1A	9/20/2013	Offal	ND (0.468)	16.5	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.573	0.775	ND (0.1)	0.946	ND (0.1)	2.294
American Eel	AMEL-BT01B-004	1B	9/20/2013	Fillet	ND (0.505)	0.585	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.142	ND (0.05)	0.142
American Eel	AMEL-BT01B-004	1B	9/20/2013	Offal	ND (0.478)	0.857	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0632	0.0856	ND (0.05)	0.385	ND (0.05)	0.534
American Eel	AMEL-BT01E-002	1E	9/20/2013	Fillet	ND (0.463)	2.33	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.21	0.329	ND (0.05)	0.556	ND (0.05)	1.095
American Eel	AMEL-BT01E-002	1E	9/20/2013	Offal	ND (0.459)	5.9	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.488	0.795	ND (0.1)	1.3	ND (0.1)	2.583
American Eel	AMEL-BT01E-001	1E	9/20/2013	Fillet	ND (0.467)	17.3	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.567	0.532	ND (0.1)	1.02	ND (0.1)	2.119
American Eel	AMEL-BT01E-001	1E	9/20/2013	Offal	ND (0.502)	12.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.282	0.293	ND (0.05)	0.515	ND (0.05)	1.090
American Eel	AMEL-BT01E-003	1E	9/20/2013	Fillet	ND (0.487)	2.28	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.114	0.127	ND (0.05)	0.373	ND (0.05)	0.614
American Eel	AMEL-BT01E-003	1E	9/20/2013	Offal	ND (0.469)	4.12	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.19	0.252	ND (0.05)	0.684	ND (0.05)	1.126
American Eel	AMEL-BT01D-004	1D	9/20/2013	Fillet	ND (0.492)	0.91	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0495	ND (0.05)	0.182	ND (0.05)	0.232
American Eel	AMEL-BT01D-004	1D	9/20/2013	Offal	ND (0.453)	5.16	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.292	0.406	ND (0.1)	1.32	ND (0.1)	2.018
American Eel	AMEL-BT03D-004	3D	9/20/2013	Fillet	ND (0.498)	0.212	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
American Eel	AMEL-BT03D-004	3D	9/20/2013	Offal	ND (0.47)	0.807	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.27	ND (0.05)	0.270
American Eel	AMEL-BT03D-005	3D	9/20/2013	Fillet	ND (0.481)	1.44	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0699	0.085	ND (0.05)	0.378	ND (0.05)	0.533
American Eel	AMEL-BT03D-005	3D	9/20/2013	Offal	ND (0.468)	3.83	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.194	0.337	ND (0.05)	1.29	ND (0.05)	1.821
American Eel	AMEL-BT01D-005	1D	9/20/2013	Fillet	ND (0.475)	1.37	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.191	0.189	ND (0.05)	0.519	ND (0.05)	0.899
American Eel	AMEL-BT01D-005	1D	9/20/2013	Offal	ND (0.512)	3.21	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.513	0.497	ND (0.1)	1.15	ND (0.1)	2.160
American Eel	AMEL-BT01B-005	1B	9/23/2013	Fillet	ND (0.478)	5.29	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.266	0.457	ND (0.05)	0.622	ND (0.05)	1.345
American Eel	AMEL-BT01B-005	1B	9/23/2013	Offal	ND (0.49)	6.37	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.37	0.524	ND (0.05)	0.681	ND (0.05)	1.575
American Eel	AMEL-BT01B-006	1B	9/23/2013	Fillet	ND (0.499)	1.51	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.114	ND (0.05)	0.114
American Eel	AMEL-BT01B-006	1B	9/23/2013	Offal	ND (0.477)	4.19	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.101	0.146	ND (0.05)	0.496	ND (0.05)	0.743
American Eel	AMEL-BT02D-007	2D	9/23/2013	Fillet	ND (0.479)	3.17	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.114	0.124	ND (0.05)	0.66	ND (0.05)	0.898
American Eel	AMEL-BT02D-007	2D	9/23/2013	Offal	ND (0.465)	4.15	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.143	0.175	ND (0.05)	0.862	ND (0.05)	1.180
American Eel	AMEL-BT03B-006	3B	9/23/2013	Fillet	ND (0.481)	2.49	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.133	0.196	ND (0.05)	0.5	ND (0.05)	0.829
American Eel	AMEL-BT03B-006	3B	9/23/2013	Offal	ND (0.501)	3.33	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.18	0.267	ND (0.05)	0.647	ND (0.05)	1.094
American Eel	AMEL-BT03C-007	3C	9/23/2013	Fillet	ND (0.508)	0.186	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.115	ND (0.05)	0.115
American Eel	AMEL-BT03C-007	3C	9/23/2013	Offal	ND (0.511)	0.391	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0713	ND (0.05)	0.333	ND (0.05)	0.404
American Eel	AMEL-BT02B-008	2B	9/24/2013	Fillet	ND (0.474)	1.18	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.86	ND (0.05)	1.860
American Eel	AMEL-BT02B-008	2B	9/24/2013	Offal	ND (0.457)	3.63	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	4.71	ND (0.2)	4.710
American Eel	AMEL-BT02F-006	2F	9/25/2013	Fillet	ND (0.468)	4.42	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.43	0.651	ND (0.05)	0.881	ND (0.05)	1.962
American Eel	AMEL-BT02F-006	2F	9/25/2013	Offal	ND (0.496)	4.66	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.456	0.687	ND (0.05)	0.903	ND (0.05)	2.046
American Eel	AMEL-BT02F-007	2F	9/25/2013	Fillet	ND (0.463)	3.31	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.167	0.233	ND (0.05)	0.456	ND (0.05)	0.856
American Eel	AMEL-BT02F-007	2F	9/25/2013	Offal	ND (0.46)	5.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.261	0.378	ND (0.05)	0.675	ND (0.05)	1.314
American Eel	AMEL-BT02F-008	2F	9/25/2013	Fillet	ND (0.509)	1.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0819	0.163	ND (0.05)	0.304	ND (0.05)	0.549
American Eel	AMEL-BT02F-008	2F	9/25/2013	Offal	ND (0.509)	3.56	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.226	0.434	ND (0.05)	0.758	ND (0.05)	1.418
American Eel	AMEL-BT02F-009	2F	9/25/2013	Fillet	ND (0.483)	6.64	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.308	0.487	ND (0.05)	0.763	ND (0.05)	1.558
American Eel	AMEL-BT02F-009	2F	9/25/2013	Offal	ND (0.474)	7.08	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.294	0.481	ND (0.05)	0.687	ND (0.05)	1.462
American Eel	AMEL-BT02G-010	2G	9/25/2013	Fillet	ND (0.507)	8.07	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.832	1.73	ND (0.15)	3.02	ND (0.15)	5.582
American Eel	AMEL-BT02G-010	2G	9/25/2013	Offal	ND (0.496)	13.9	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	1.08	2.25	ND (0.15)	3.89	ND (0.15)	7.220
American Eel	AMEL-BT02G-011	2G	9/25/2013	Fillet	ND (0.502)	2.28	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0755	0.0775	ND (0.05)	0.182	ND (0.05)	0.335
American Eel	AMEL-BT02G-011	2G	9/25/2013	Offal	ND (0.491)	5.44	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.192	0.207	ND (0.05)	0.434	ND (0.05)	0.833
American Eel	AMEL-BT02G-012	2G	9/25/2013	Fillet	ND (0.495)	2.25	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.117	0.19	ND (0.05)	0.511	ND (0.05)	0.818
American Eel	AMEL-BT02G-012	2G	9/25/2013	Offal	ND (0.495)	5.12	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.283	0.517	ND (0.05)	1.37	ND (0.05)	2.170

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
American Eel	AMEL-BT02G-013	2G	9/25/2013	Fillet	ND (0.469)	3.48	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.155	0.679	ND (0.15)	3.46	ND (0.15)	4.294
American Eel	AMEL-BT02G-013	2G	9/25/2013	Offal	1.12	5.5	ND (0.25)	ND (0.25)	ND (0.25)	ND (0.25)	0.297	1.06	ND (0.25)	5.47	ND (0.25)	6.827
American Eel	AMEL-BT02H-014	2H	9/25/2013	Fillet	ND (0.493)	15.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.764	1.09	ND (0.05)	1.96	ND (0.05)	3.814
American Eel	AMEL-BT02H-014	2H	9/25/2013	Offal	0.815	11.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.476	0.683	ND (0.05)	1.2	ND (0.05)	2.359
American Eel	AMEL-BT02C-009	2C	9/25/2013	Fillet	ND (0.496)	3.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.133	0.173	ND (0.05)	0.37	ND (0.05)	0.676
American Eel	AMEL-BT02C-009	2C	9/25/2013	Offal	ND (0.466)	4.27	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.194	0.28	ND (0.05)	0.616	ND (0.05)	1.090
American Eel	AMEL-BT02C-010	2C	9/25/2013	Fillet	ND (0.509)	6.05	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.311	0.472	ND (0.05)	1.83	ND (0.05)	2.613
American Eel	AMEL-BT02C-010	2C	9/25/2013	Offal	ND (0.491)	4.97	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.272	0.392	ND (0.05)	1.38	ND (0.05)	2.044
American Eel	AMEL-BT02H-015	2H	9/25/2013	Fillet	ND (0.472)	4.52	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.196	0.224	ND (0.05)	0.375	ND (0.05)	0.795
American Eel	AMEL-BT02H-015	2H	9/25/2013	Offal	ND (0.497)	4.76	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.186	0.232	ND (0.05)	0.358	ND (0.05)	0.776
American Eel	AMEL-BT02D-011	2D	9/25/2013	Fillet	ND (0.51)	15.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.417	0.766	ND (0.05)	1.7	ND (0.05)	2.883
American Eel	AMEL-BT02D-011	2D	9/25/2013	Offal	ND (0.477)	12.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.314	0.539	ND (0.05)	1.2	ND (0.05)	2.053
American Eel	AMEL-BT02H-016	2H	9/26/2013	Fillet	ND (0.478)	10.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.674	0.971	ND (0.05)	1.43	ND (0.05)	3.075
American Eel	AMEL-BT02H-016	2H	9/26/2013	Offal	ND (0.49)	4.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.27	0.399	ND (0.05)	0.56	ND (0.05)	1.229
American eel	AMEL-BT03D-001	3D	9/16/2014	Fillet	-	6.27	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.255	ND (0.05)	0.535	ND (0.05)	0.79
American eel	AMEL-BT03D-001	3D	9/16/2014	Offal	-	6.6	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.247	ND (0.05)	0.542	ND (0.05)	0.789
American eel	AMEL-BT03D-002	3D	9/16/2014	Fillet	-	6.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.208	ND (0.05)	0.293	ND (0.05)	0.501
American eel	AMEL-BT03D-002	3D	9/16/2014	Offal	-	6.88	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.215	ND (0.05)	0.325	ND (0.05)	0.54
American eel	AMEL-BT03D-003	3D	9/16/2014	Fillet	-	4.17	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.169	ND (0.05)	0.456	ND (0.05)	0.625
American eel	AMEL-BT03D-003	3D	9/16/2014	Offal	-	5.84	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.219	ND (0.05)	0.628	ND (0.05)	0.847
American eel	AMEL-BT03D-004	3D	9/16/2014	Fillet	-	2.98	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.318	ND (0.05)	0.553	ND (0.05)	0.871
American eel	AMEL-BT03D-004	3D	9/16/2014	Offal	-	5.04	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.463	ND (0.05)	0.679	ND (0.05)	1.142
American eel	AMEL-BT03D-005	3D	9/16/2014	Fillet	-	5.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.187	ND (0.05)	0.733	ND (0.05)	0.92
American eel	AMEL-BT03D-005	3D	9/16/2014	Offal	-	7.72	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.238	ND (0.05)	0.887	ND (0.05)	1.125
American eel	AMEL-BT03A-002	3A	9/16/2014	Fillet	-	13.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.503	ND (0.05)	0.727	ND (0.05)	1.23
American eel	AMEL-BT03A-002	3A	9/16/2014	Offal	-	13.8	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.475	ND (0.05)	0.687	ND (0.05)	1.162
American eel	AMEL-BT02H-003	2H	9/16/2014	Fillet	-	10.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.51	ND (0.05)	1.41	ND (0.05)	1.92
American eel	AMEL-BT02H-003	2H	9/16/2014	Offal	-	8.41	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.38	ND (0.05)	1.05	ND (0.05)	1.43
American eel	AMEL-BT02H-005	2H	9/16/2014	Fillet	-	11.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.483	ND (0.05)	0.858	ND (0.05)	1.341
American eel	AMEL-BT02H-005	2H	9/16/2014	Offal	-	11.6	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.499	ND (0.05)	0.886	ND (0.05)	1.385
American eel	AMEL-BT02G-003	2G	9/16/2014	Fillet	-	12.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.858	ND (0.05)	1.11	ND (0.05)	1.968
American eel	AMEL-BT02G-003	2G	9/16/2014	Offal	-	12.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.733	ND (0.05)	0.989	ND (0.05)	1.722
American eel	AMEL-BT02F-001	2F	9/16/2014	Fillet	-	12	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.27	ND (0.05)	1.95	ND (0.05)	3.22
American eel	AMEL-BT02F-001	2F	9/16/2014	Offal	-	10.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.09	ND (0.05)	1.68	ND (0.05)	2.77
American eel	AMEL-BT02C-001	2C	9/16/2014	Fillet	-	9.53	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.366	ND (0.05)	1.6	ND (0.05)	1.966
American eel	AMEL-BT02C-001	2C	9/16/2014	Offal	-	10.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.338	ND (0.05)	1.62	ND (0.05)	1.958
American eel	AMEL-BT02C-003	2C	9/16/2014	Fillet	-	12	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.67	ND (0.05)	2.2	ND (0.05)	2.87
American eel	AMEL-BT02C-003	2C	9/16/2014	Offal	-	9.75	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.426	ND (0.05)	1.43	ND (0.05)	1.856
American eel	AMEL-BT02D-001	2D	9/16/2014	Fillet	-	11.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.651	ND (0.05)	2.21	ND (0.05)	2.861
American eel	AMEL-BT02D-001	2D	9/16/2014	Offal	-	14.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.49	ND (0.05)	1.59	ND (0.05)	2.08
American eel	AMEL-BT03A-003	3A	9/17/2014	Fillet	-	1.06	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.15	ND (0.05)	0.379	ND (0.05)	0.529
American eel	AMEL-BT03A-003	3A	9/17/2014	Offal	-	3.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.397	ND (0.05)	0.845	ND (0.05)	1.242
American eel	AMEL-BT02H-006	2H	9/17/2014	Fillet	-	5.57	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	2.83	ND (0.1)	2.83

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
American eel	AMEL-BT02H-006	2H	9/17/2014	Offal	-	7.21	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	3.43	ND (0.15)	3.43
American eel	AMEL-BT02G-004	2G	9/17/2014	Fillet	-	12	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.16	ND (0.05)	1.18	ND (0.05)	2.34
American eel	AMEL-BT02G-004	2G	9/17/2014	Offal	-	13.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.857	ND (0.05)	0.855	ND (0.05)	1.712
American eel	AMEL-BT02G-005	2G	9/17/2014	Fillet	-	6.87	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.298	ND (0.05)	0.444	ND (0.05)	0.742
American eel	AMEL-BT02G-005	2G	9/17/2014	Offal	-	6.99	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.289	ND (0.05)	0.42	ND (0.05)	0.709
American eel	AMEL-BT02F-002	2F	9/17/2014	Fillet	-	1.74	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.215	ND (0.05)	0.891	ND (0.05)	1.106
American eel	AMEL-BT02F-002	2F	9/17/2014	Offal	-	3.13	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.323	ND (0.05)	1.14	ND (0.05)	1.463
American eel	AMEL-BT02F-004	2F	9/17/2014	Fillet	-	7.06	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.436	ND (0.05)	1.12	ND (0.05)	1.556
American eel	AMEL-BT02F-004	2F	9/17/2014	Offal	-	8.89	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.553	ND (0.05)	1.51	ND (0.05)	2.063
American eel	AMEL-BT02C-004	2C	9/17/2014	Fillet	-	1.11	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.684	ND (0.05)	0.684
American eel	AMEL-BT02C-004	2C	9/17/2014	Offal	-	4.83	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	1.89	ND (0.1)	1.89
American eel	AMEL-BT01B-001	1B	9/17/2014	Fillet	-	1.78	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.268	ND (0.05)	0.268
American eel	AMEL-BT01B-001	1B	9/17/2014	Offal	-	3.02	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.11	ND (0.05)	0.494	ND (0.05)	0.604
American eel	AMEL-BT01C-001	1C	9/17/2014	Fillet	-	0.933	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.211	ND (0.05)	0.211
American eel	AMEL-BT01C-001	1C	9/17/2014	Offal	-	3.8	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.085	ND (0.05)	0.559	ND (0.05)	0.644
American eel	AMEL-BT03B-003	3B	9/18/2014	Fillet	-	1.24	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.157	ND (0.05)	0.431	ND (0.05)	0.588
American eel	AMEL-BT03B-003	3B	9/18/2014	Offal	-	3.45	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.424	ND (0.05)	1.14	ND (0.05)	1.564
American eel	AMEL-BT03C-001	3C	9/18/2014	Fillet	-	2.63	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.165	ND (0.05)	0.317	ND (0.05)	0.482
American eel	AMEL-BT03C-001	3C	9/18/2014	Offal	-	5.73	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.363	ND (0.05)	0.719	ND (0.05)	1.082
American eel	AMEL-BT03C-003	3C	9/18/2014	Fillet	-	2.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.322	ND (0.05)	0.612	ND (0.05)	0.934
American eel	AMEL-BT03C-003	3C	9/18/2014	Offal	-	3.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.449	ND (0.05)	0.825	ND (0.05)	1.274
American eel	AMEL-BT03C-005	3C	9/18/2014	Fillet	-	1.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.24	ND (0.05)	0.632	ND (0.05)	0.872
American eel	AMEL-BT03C-005	3C	9/18/2014	Offal	-	2.8	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.369	ND (0.05)	0.993	ND (0.05)	1.362
American eel	AMEL-BT01C-002	1C	9/18/2014	Fillet	-	4.26	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.322	ND (0.05)	0.722	ND (0.05)	1.044
American eel	AMEL-BT01C-002	1C	9/18/2014	Offal	-	5.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.388	ND (0.05)	0.796	ND (0.05)	1.184
American eel	AMEL-BT01D-002	1D	9/18/2014	Fillet	-	0.897	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0717	ND (0.05)	0.242	ND (0.05)	0.3137
American eel	AMEL-BT01D-002	1D	9/18/2014	Offal	-	1.67	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.238	ND (0.05)	0.806	ND (0.05)	1.044
American eel	AMEL-BT01D-003	1D	9/18/2014	Fillet	-	0.813	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0528	ND (0.05)	0.202	ND (0.05)	0.2548
American eel	AMEL-BT01D-003	1D	9/18/2014	Offal	-	1.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.234	ND (0.05)	0.814	ND (0.05)	1.048
American eel	AMEL-BT01D-004	1D	9/18/2014	Fillet	-	3.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.263	ND (0.05)	0.498	ND (0.05)	0.761
American eel	AMEL-BT01D-004	1D	9/18/2014	Offal	-	4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.262	ND (0.05)	0.497	ND (0.05)	0.759
American eel	AMEL-BT01D-005	1D	9/18/2014	Fillet	-	0.932	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0542	ND (0.05)	0.243	ND (0.05)	0.2972
American eel	AMEL-BT01D-005	1D	9/18/2014	Offal	-	2.77	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.267	ND (0.05)	0.928	ND (0.05)	1.195
American eel	AMEL-BT02E-002	2E	9/18/2014	Fillet	-	2.93	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.28	ND (0.1)	2.7	ND (0.1)	2.98
American eel	AMEL-BT02E-002	2E	9/18/2014	Offal	-	5.24	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	0.504	ND (0.2)	5.23	ND (0.2)	5.734
American eel	AMEL-BT02E-003	2E	9/18/2014	Fillet	-	3.49	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.209	ND (0.05)	1.38	ND (0.05)	1.589
American eel	AMEL-BT02E-003	2E	9/18/2014	Offal	-	5.35	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.241	ND (0.05)	1.54	ND (0.05)	1.781
American eel	AMEL-BT03B-004	3B	9/19/2014	Fillet	-	0.382	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.118	ND (0.05)	0.118
American eel	AMEL-BT03B-004	3B	9/19/2014	Offal	-	1.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0827	ND (0.05)	0.697	ND (0.05)	0.7797
American eel	AMEL-BT01A-001	1A	9/19/2014	Fillet	-	1.45	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0474	ND (0.05)	0.594	ND (0.05)	0.6414
American eel	AMEL-BT01A-001	1A	9/19/2014	Offal	-	2.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0834	ND (0.05)	0.983	ND (0.05)	1.0664
American eel	AMEL-BT01E-001	1E	9/19/2014	Fillet	-	14.6	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.747	ND (0.05)	0.712	ND (0.05)	1.459
American eel	AMEL-BT01E-001	1E	9/19/2014	Offal	-	12.9	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.623	ND (0.05)	0.605	ND (0.05)	1.228

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
American eel	AMEL-BT02B-001	2B	9/23/2014	Fillet	-	7.77	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.549	ND (0.05)	1.23	ND (0.05)	1.779
American eel	AMEL-BT02B-001	2B	9/23/2014	Offal	-	8.01	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.357	0.525	ND (0.05)	1.3	ND (0.05)	2.182
American eel	AMEL-BT02B-003	2B	9/23/2014	Fillet	-	0.587	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0346	ND (0.05)	0.322	ND (0.05)	0.3566
American eel	AMEL-BT02B-003	2B	9/23/2014	Offal	-	1.49	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.139	0.577	ND (0.15)	4.04	ND (0.15)	4.756
American eel	AMEL-BT02B-004	2B	9/23/2014	Fillet	-	16.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.999	ND (0.05)	1.54	ND (0.05)	2.54
American eel	AMEL-BT02B-004	2B	9/23/2014	Offal	-	11.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.475	0.664	ND (0.05)	1.01	ND (0.05)	2.149
American eel	AMEL-BT02D-002	2D	9/23/2014	Fillet	-	3.37	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.352	ND (0.05)	1.21	ND (0.05)	1.562
American eel	AMEL-BT02D-002	2D	9/23/2014	Offal	-	6.53	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.371	0.552	ND (0.05)	1.9	ND (0.05)	2.823
American eel	AMEL-BT02E-005	2E	9/23/2014	Fillet	-	4.47	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.198	ND (0.05)	0.589	ND (0.05)	0.787
American eel	AMEL-BT02E-005	2E	9/23/2014	Offal	-	5.62	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.207	0.285	ND (0.05)	0.716	ND (0.05)	1.208
American eel	AMEL-BT03B-005	3B	9/23/2014	Fillet	-	1.25	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.238	ND (0.05)	0.238
American eel	AMEL-BT03B-005	3B	9/23/2014	Offal	-	4.07	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.131	0.114	ND (0.05)	0.852	ND (0.05)	1.097
American eel	AMEL-BT01E-002	1E	9/23/2014	Fillet	-	3.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.242	ND (0.05)	0.454	ND (0.05)	0.696
American eel	AMEL-BT01E-002	1E	9/23/2014	Offal	-	7.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.365	0.555	ND (0.05)	0.988	ND (0.05)	1.908
American eel	AMEL-BT02D-004	2D	9/24/2014	Fillet	-	6.24	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.468	ND (0.05)	1.79	ND (0.05)	2.258
American eel	AMEL-BT02D-004	2D	9/24/2014	Offal	-	8.22	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.22	0.366	ND (0.05)	1.34	ND (0.05)	1.926
American eel	AMEL-BT03A-005	3A	9/24/2014	Fillet	-	0.926	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0493	ND (0.05)	0.294	ND (0.05)	0.3433
American eel	AMEL-BT03A-005	3A	9/24/2014	Offal	-	2.72	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.142	0.181	ND (0.05)	0.916	ND (0.05)	1.239
American eel	AMEL-BT01C-003	1C	9/24/2014	Fillet	-	3.53	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.264	ND (0.05)	0.657	ND (0.05)	0.921
American eel	AMEL-BT01C-003	1C	9/24/2014	Offal	-	5.8	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.269	0.397	ND (0.05)	0.877	ND (0.05)	1.543
American eel	AMEL-BT01C-005	1C	9/24/2014	Fillet	-	1.77	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0325	ND (0.05)	0.183	ND (0.05)	0.2155
American eel	AMEL-BT01C-005	1C	9/24/2014	Offal	-	3.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.134	0.127	ND (0.05)	0.444	ND (0.05)	0.705
American eel	AMEL-BT01A-002	1A	9/25/2014	Fillet	-	7.76	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.378	ND (0.05)	0.49	ND (0.05)	0.868
American eel	AMEL-BT01A-002	1A	9/25/2014	Offal	-	9.48	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.42	ND (0.05)	0.563	ND (0.05)	0.983
American eel	AMEL-BT02A-001	2A	9/25/2014	Fillet	-	8.61	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.76	ND (0.05)	0.906	ND (0.05)	1.666
American eel	AMEL-BT02A-001	2A	9/25/2014	Offal	-	6.71	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.541	ND (0.05)	0.667	ND (0.05)	1.208
American eel	AMEL-BT02A-002	2A	9/25/2014	Fillet	-	14.3	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.841	ND (0.15)	3.2	ND (0.15)	4.041
American eel	AMEL-BT02A-002	2A	9/25/2014	Offal	-	13.4	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.68	ND (0.1)	2.78	ND (0.1)	3.46
American eel	AMEL-BT01B-002	1B	9/26/2014	Fillet	-	1.51	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.099	ND (0.05)	0.315	ND (0.05)	0.414
American eel	AMEL-BT01B-002	1B	9/26/2014	Offal	-	2.88	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0818	0.166	ND (0.05)	0.499	ND (0.05)	0.7468
American eel	AMEL-BT01B-003	1B	9/26/2014	Fillet	-	16.8	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.702	ND (0.05)	0.783	ND (0.05)	1.485
American eel	AMEL-BT01B-003	1B	9/26/2014	Offal	-	13.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.336	0.429	ND (0.05)	0.488	ND (0.05)	1.253
American eel	AMEL-BT02A-003	2A	9/26/2014	Fillet	-	3.36	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.251	ND (0.05)	1.24	ND (0.05)	1.491
American eel	AMEL-BT02A-003	2A	9/26/2014	Offal	-	5.29	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.213	0.345	ND (0.05)	1.51	ND (0.05)	2.068
Blue Crab	BCRAB-BT02B-001	2B	9/18/2013	Hepatopancreas	ND (0.484)	5.91	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	1.85	ND (0.103)	1.850
Blue Crab	BCRAB-BT02B-001	2B	9/18/2013	Leg	ND (0.476)	0.604	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0276	ND (0.05)	0.028
Blue Crab	BCRAB-BT02A,B-COMP	2A,B	9/18/2013	Whole	ND (0.51)	2.51	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0872	ND (0.05)	0.087
Blue Crab	BCRAB-BT02A-002	2A	9/18/2013	Hepatopancreas	ND (0.503)	10.8	ND (0.205)	ND (0.205)	ND (0.205)	ND (0.205)	0.383	0.202	ND (0.205)	0.822	ND (0.205)	1.407
Blue Crab	BCRAB-BT02A-002	2A	9/18/2013	Leg	ND (0.491)	0.463	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT02D-003	2D	9/18/2013	Whole	ND (0.504)	0.786	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0679	ND (0.05)	0.068
Blue Crab	BCRAB-BT02D-004	2B	9/18/2013	Hepatopancreas	ND (0.501)	5.04	ND (0.247)	ND (0.247)	ND (0.247)	ND (0.247)	ND (0.247)	ND (0.247)	ND (0.247)	0.663	ND (0.247)	0.663
Blue Crab	BCRAB-BT02D-004	2B	9/18/2013	Leg	ND (0.472)	0.479	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT01B-001	1B	9/18/2013	Hepatopancreas	ND (0.505)	11.6	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	0.912	ND (0.16)	0.912

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
Blue Crab	BCRAB-BT01B-001	1B	9/18/2013	Leg	ND (0.485)	0.596	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT02A-005	2A	9/19/2013	Whole	ND (0.509)	2.14	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0845	ND (0.05)	0.085
Blue Crab	BCRAB-BT02E-006	2E	9/19/2013	Hepatopancreas	ND (0.473)	1.72	ND (0.163)	ND (0.163)	ND (0.163)	ND (0.163)	ND (0.163)	ND (0.163)	ND (0.163)	0.522	ND (0.163)	0.522
Blue Crab	BCRAB-BT02E-006	2E	9/19/2013	Leg	ND (0.499)	0.47	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0413	ND (0.05)	0.041
Blue Crab	BCRAB-BT01D-001	1D	9/19/2013	Hepatopancreas	ND (0.51)	2.15	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)
Blue Crab	BCRAB-BT01D-001	1D	9/19/2013	Leg	ND (0.464)	0.915	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT03C-001	3C	9/19/2013	Hepatopancreas	ND (0.496)	10.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.186	0.0527	ND (0.05)	0.537	ND (0.05)	0.776
Blue Crab	BCRAB-BT03C-001	3C	9/19/2013	Leg	ND (0.497)	0.865	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT01A-003	1A	9/19/2013	Hepatopancreas	ND (0.506)	11.3	ND (0.094)	ND (0.094)	ND (0.094)	ND (0.094)	ND (0.094)	ND (0.094)	ND (0.094)	0.273	ND (0.094)	0.273
Blue Crab	BCRAB-BT01A-003	1A	9/19/2013	Leg	ND (0.482)	0.99	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)
Blue Crab	BCRAB-BT01A-002	1A	9/19/2013	Hepatopancreas	ND (0.498)	9.09	ND (0.132)	ND (0.132)	ND (0.132)	ND (0.132)	ND (0.132)	ND (0.132)	ND (0.132)	0.459	ND (0.132)	0.459
Blue Crab	BCRAB-BT01A-002	1A	9/19/2013	Leg	ND (0.487)	0.786	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT01C-003	1C	9/19/2013	Whole	ND (0.473)	2.05	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0513	ND (0.05)	0.051
Blue Crab	BCRAB-BT01C-005	1C	9/19/2013	Hepatopancreas	ND (0.497)	14.2	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)	0.537	ND (0.103)	0.537
Blue Crab	BCRAB-BT01C-005	1C	9/19/2013	Leg	ND (0.481)	0.792	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)
Blue Crab	BCRAB-BT01C-004	1C	9/19/2013	Whole	ND (0.492)	1.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT03C-002	3C	9/21/2013	Whole	ND (0.5)	1.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0492	ND (0.05)	0.049
Blue Crab	BCRAB-BT03C-003	3C	9/21/2013	Whole	ND (0.506)	1.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT03B-004	3B	9/21/2013	Whole	ND (0.5)	2.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0313	ND (0.05)	ND (0.05)	0.0618	ND (0.05)	0.093
Blue Crab	BCRAB-BT01D-002	1D	9/21/2013	Hepatopancreas	ND (0.49)	15.4	ND (0.0696)	ND (0.0696)	ND (0.0696)	ND (0.0696)	0.134	0.0734	ND (0.0696)	0.413	ND (0.0696)	0.620
Blue Crab	BCRAB-BT01D-002	1D	9/21/2013	Leg	ND (0.493)	0.934	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT01D-003	1D	9/21/2013	Whole	ND (0.508)	0.703	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0271	ND (0.05)	0.027
Blue Crab	BCRAB-BT01E-004	1E	9/23/2013	Hepatopancreas	ND ()	4.82	ND (0.207)	ND (0.207)	ND (0.207)	ND (0.207)	ND (0.207)	ND (0.207)	ND (0.207)	0.723	ND (0.207)	0.723
Blue Crab	BCRAB-BT01E-004	1E	9/23/2013	Leg	ND (0.491)	0.702	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT01E-005	1E	9/23/2013	Whole	ND (0.486)	1.24	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0319	ND (0.05)	0.032
Blue Crab	BCRAB-BT03B-005	3B	9/23/2013	Whole	ND (0.508)	2.37	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.066	ND (0.05)	0.066
Blue Crab	BCRAB-BT03D-001	3D	9/23/2013	Hepatopancreas	ND (0.5)	3.98	ND (0.118)	ND (0.118)	ND (0.118)	ND (0.118)	ND (0.118)	ND (0.118)	ND (0.118)	1.06	ND (0.118)	1.060
Blue Crab	BCRAB-BT03D-001	3D	9/23/2013	Leg	ND (0.492)	0.198	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT02D-006	2D	9/24/2013	Hepatopancreas	1.08	11	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)
Blue Crab	BCRAB-BT02D-006	2D	9/24/2013	Leg	ND (0.475)	0.819	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)
Blue Crab	BCRAB-BT02B-008	2B	9/25/2013	Hepatopancreas	ND (0.499)	9.85	ND (0.0975)	ND (0.0975)	ND (0.0975)	ND (0.0975)	0.787	0.577	ND (0.0975)	2.36	ND (0.0975)	3.724
Blue Crab	BCRAB-BT02B-008	2B	9/25/2013	Leg	ND (0.494)	0.801	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0927	ND (0.05)	0.093
Blue Crab	BCRAB-BT02E-009	2E	9/25/2013	Hepatopancreas	ND (0.475)	5.32	ND (0.173)	ND (0.173)	ND (0.173)	ND (0.173)	ND (0.173)	ND (0.173)	ND (0.173)	1.19	ND (0.173)	1.190
Blue Crab	BCRAB-BT02E-009	2E	9/25/2013	Leg	ND (0.474)	0.763	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue Crab	BCRAB-BT02E-010	2E	9/26/2013	Hepatopancreas	ND (0.494)	11.7	ND (0.0914)	ND (0.0914)	ND (0.0914)	ND (0.0914)	ND (0.0914)	ND (0.0914)	ND (0.0914)	1.27	ND (0.0914)	1.270
Blue Crab	BCRAB-BT02E-010	2E	9/26/2013	Leg	ND (0.504)	0.592	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT03D-001	3D	9/16/2014	Hepatopancreas	-	7.33	ND (0.083)	ND (0.083)	ND (0.083)	ND (0.083)	ND (0.083)	ND (0.083)	ND (0.083)	0.724	ND (0.083)	0.724
Blue crab	BCRAB-BT03D-001	3D	9/16/2014	Leg	-	0.485	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)
Blue crab	BCRAB-BT03C-001	3C	9/16/2014	Whole	-	2.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.08	ND (0.05)	0.08
Blue crab	BCRAB-BT01D-001	1D	9/16/2014	Hepatopancreas	-	5.3	ND (0.0541)	ND (0.0541)	ND (0.0541)	ND (0.0541)	ND (0.0541)	ND (0.0541)	ND (0.0541)	0.417	ND (0.0541)	0.417
Blue crab	BCRAB-BT01D-001	1D	9/16/2014	Leg	-	0.307	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)
Blue crab	BCRAB-BT01C-001	1C	9/16/2014	Whole	-	1.76	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0563	ND (0.05)	0.0563
Blue crab	BCRAB-BT02D-001	2D	9/17/2014	Hepatopancreas	-	3.78	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.424	ND (0.05)	0.424

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
Blue crab	BCRAB-BT02D-001	2D	9/17/2014	Leg	-	0.538	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)
Blue crab	BCRAB-BT01E-002	1E	9/17/2014	Hepatopancreas	-	2.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.214	ND (0.05)	0.214
Blue crab	BCRAB-BT01E-002	1E	9/17/2014	Leg	-	0.588	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)
Blue crab	BCRAB-BT01A-002	1A	9/17/2014	Whole	-	0.474	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT01C-002	1C	9/17/2014	Whole	-	0.807	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0316	ND (0.05)	0.0316
Blue crab	BCRAB-BT01C-003	1C	9/17/2014	Hepatopancreas	-	2.09	ND (0.084)	ND (0.084)	ND (0.084)	ND (0.084)	ND (0.084)	ND (0.084)	ND (0.084)	0.0951	ND (0.084)	0.0951
Blue crab	BCRAB-BT01C-003	1C	9/17/2014	Leg	-	0.337	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)
Blue crab	BCRAB-BT03A-002	3A	9/18/2014	Hepatopancreas	-	6.47	ND (0.0694)	ND (0.0694)	ND (0.0694)	ND (0.0694)	ND (0.0694)	ND (0.0694)	ND (0.0694)	0.709	ND (0.0694)	0.709
Blue crab	BCRAB-BT03A-002	3A	9/18/2014	Leg	-	0.429	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)
Blue crab	BCRAB-BT03B-001	3B	9/18/2014	Whole	-	2.16	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.089	ND (0.05)	0.089
Blue crab	BCRAB-BT03C-003	3C	9/18/2014	Hepatopancreas	-	5.38	ND (0.0848)	ND (0.0848)	ND (0.0848)	ND (0.0848)	ND (0.0848)	ND (0.0848)	ND (0.0848)	0.213	ND (0.0848)	0.213
Blue crab	BCRAB-BT03C-003	3C	9/18/2014	Leg	-	ND (0.3)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)
Blue crab	BCRAB-BT03D-002	3D	9/18/2014	Hepatopancreas	-	6.83	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.201	ND (0.05)	0.201
Blue crab	BCRAB-BT03D-002	3D	9/18/2014	Leg	-	0.647	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT01A-003	1A	9/18/2014	Whole	-	1.57	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0672	ND (0.05)	0.0672
Blue crab	BCRAB-BT01B-002	1B	9/18/2014	Hepatopancreas	-	4.86	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	0.233	ND (0.0679)	0.233
Blue crab	BCRAB-BT01B-002	1B	9/18/2014	Leg	-	0.343	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0403	ND (0.05)	0.0403
Blue crab	BCRAB-BT01B-003	1B	9/18/2014	Whole	-	2.69	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0743	ND (0.05)	0.0743
Blue crab	BCRAB-BT01C-004	1C	9/18/2014	Hepatopancreas	-	6.73	ND (0.0663)	ND (0.0663)	ND (0.0663)	ND (0.0663)	ND (0.0663)	ND (0.0663)	ND (0.0663)	0.507	ND (0.0663)	0.507
Blue crab	BCRAB-BT01C-004	1C	9/18/2014	Leg	-	0.339	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)
Blue crab	BCRAB-BT01D-002	1D	9/18/2014	Whole	-	0.673	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT02C-002	2C	9/18/2014	Whole	-	0.866	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0766	ND (0.05)	0.0766
Blue crab	BCRAB-BT02F-001	2F	9/18/2014	Whole	-	1.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0383	ND (0.05)	0.0383
Blue crab	BCRAB-BT02F-002	2F	9/18/2014	Hepatopancreas	-	4.35	ND (0.088)	ND (0.088)	ND (0.088)	ND (0.088)	ND (0.088)	ND (0.088)	ND (0.088)	0.123	ND (0.088)	0.123
Blue crab	BCRAB-BT02F-002	2F	9/18/2014	Leg	-	0.455	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Blue crab	BCRAB-BT02H-001	2H	9/18/2014	Whole	-	2.22	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0532	ND (0.05)	0.0532
Blue crab	BCRAB-BT02H-002	2H	9/18/2014	Hepatopancreas	-	4.19	ND (0.0793)	ND (0.0793)	ND (0.0793)	ND (0.0793)	ND (0.0793)	ND (0.0793)	ND (0.0793)	0.501	ND (0.0793)	0.501
Blue crab	BCRAB-BT02H-002	2H	9/18/2014	Leg	-	0.638	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)
Blue crab	BCRAB-BT02E-003	2E	9/18/2014	Whole	-	1.74	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.137	ND (0.05)	0.137
Blue crab	BCRAB-BT03B-002	3B	9/19/2014	Hepatopancreas	-	6.22	ND (0.0876)	ND (0.0876)	ND (0.0876)	ND (0.0876)	ND (0.0876)	ND (0.0876)	ND (0.0876)	0.527	ND (0.0876)	0.527
Blue crab	BCRAB-BT03B-002	3B	9/19/2014	Leg	-	ND (0.3)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)
Blue crab	BCRAB-BT03D-003	3D	9/19/2014	Whole	-	2.03	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.071	ND (0.05)	0.071
Blue crab	BCRAB-BT01A-004	1A	9/19/2014	Hepatopancreas	-	1.88	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.269	ND (0.05)	0.269
Blue crab	BCRAB-BT01A-004	1A	9/19/2014	Leg	-	0.442	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0395	ND (0.05)	0.0395
Blue crab	BCRAB-BT01B-005	1B	9/19/2014	Hepatopancreas	-	7.28	ND (0.0613)	ND (0.0613)	ND (0.0613)	ND (0.0613)	ND (0.0613)	ND (0.0613)	ND (0.0613)	0.284	ND (0.0613)	0.284
Blue crab	BCRAB-BT01B-005	1B	9/19/2014	Leg	-	0.551	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)
Blue crab	BCRAB-BT01E-004	1E	9/19/2014	Hepatopancreas	-	1.14	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	0.0696	ND (0.0605)	0.0696
Blue crab	BCRAB-BT01E-004	1E	9/19/2014	Leg	-	ND (0.3)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)
Blue crab	BCRAB-BT03C-006	3C	9/19/2014	Whole	-	1.42	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0388	ND (0.05)	0.0388
Blue crab	BCRAB-BT02A-001	2A	9/23/2014	Hepatopancreas	-	0.388	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)
Blue crab	BCRAB-BT02A-001	2A	9/23/2014	Leg	-	ND (0.3)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)
Blue crab	BCRAB-BT02B-001	2B	9/23/2014	Whole	-	2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.444	ND (0.05)	0.444
Blue crab	BCRAB-BT02E-005	2E	9/23/2014	Hepatopancreas	-	5.96	ND (0.0664)	ND (0.0664)	ND (0.0664)	ND (0.0664)	ND (0.0664)	ND (0.0664)	ND (0.0664)	0.521	ND (0.0664)	0.521

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
Blue crab	BCRAB-BT02E-005	2E	9/23/2014	Leg	-	0.425	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT03A-004	3A	9/23/2014	Whole	-	2.03	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.112	ND (0.05)	0.112
Blue crab	BCRAB-BT03B-004	3B	9/23/2014	Hepatopancreas	-	5.36	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.288	ND (0.05)	0.288
Blue crab	BCRAB-BT03B-004	3B	9/23/2014	Leg	-	0.968	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT03B-005	3B	9/23/2014	Whole	-	1.77	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0706	ND (0.05)	0.0706
Blue crab	BCRAB-BT02A-002	2A	9/23/2014	Hepatopancreas	-	4.33	ND (0.107)	ND (0.107)	ND (0.107)	ND (0.107)	ND (0.107)	ND (0.107)	ND (0.107)	0.508	ND (0.107)	0.508
Blue crab	BCRAB-BT02A-002	2A	9/23/2014	Leg	-	0.398	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)
Blue crab	BCRAB-BT02A-003	2A	9/23/2014	Whole	-	1.92	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0619	ND (0.05)	0.0619
Blue crab	BCRAB-BT03A-005	3A	9/24/2014	Hepatopancreas	-	9.04	ND (0.0577)	ND (0.0577)	ND (0.0577)	ND (0.0577)	ND (0.0577)	ND (0.0577)	ND (0.0577)	0.557	ND (0.0577)	0.557
Blue crab	BCRAB-BT03A-005	3A	9/24/2014	Leg	-	0.303	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)
Blue crab	BCRAB-BT02D-005	2D	9/25/2014	Whole	-	2.03	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0674	ND (0.05)	0.0674
Blue crab	BCRAB-BT03D-004	3D	9/26/2014	Hepatopancreas	-	4.63	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)	0.746	ND (0.0679)	0.746
Blue crab	BCRAB-BT03D-004	3D	9/26/2014	Leg	-	0.466	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0392	ND (0.05)	0.0392
Blue crab	BCRAB-BT03D-005	3D	9/26/2014	Whole	-	1.18	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0836	ND (0.05)	0.0836
Blue crab	BCRAB-BT01D-005	1D	9/26/2014	Whole	-	1.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0734	ND (0.05)	0.0734
Blue crab	BCRAB-BT02C-005	2C	9/27/2014	Hepatopancreas	-	2.81	ND (0.0755)	ND (0.0755)	ND (0.0755)	ND (0.0755)	ND (0.0755)	ND (0.0755)	ND (0.0755)	0.396	ND (0.0755)	0.396
Blue crab	BCRAB-BT02C-005	2C	9/27/2014	Leg	-	0.381	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Blue crab	BCRAB-BT02G-003	2G	9/27/2014	Hepatopancreas	-	2.8	ND (0.0667)	ND (0.0667)	ND (0.0667)	ND (0.0667)	ND (0.0667)	ND (0.0667)	ND (0.0667)	0.331	ND (0.0667)	0.331
Blue crab	BCRAB-BT02G-003	2G	9/27/2014	Leg	-	ND (0.3)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)
Hogchoker	HOGCH-BT02H-001	2H	9/19/2013	Whole	ND (0.486)	1.41	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.106	0.118	ND (0.05)	0.356	ND (0.05)	0.580
Hogchoker	HOGCH-BT03D-001	3D	9/20/2013	Whole	ND (0.476)	1.35	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0767	0.112	ND (0.05)	0.205	ND (0.05)	0.394
Hogchoker	HOGCH-BT03D-002	3D	9/20/2013	Whole	ND (0.47)	1.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0754	0.0585	ND (0.05)	0.106	ND (0.05)	0.240
Hogchoker	HOGCH-BT02G-002	2G	9/20/2013	Whole	ND (0.504)	1.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.324	ND (0.05)	0.324
Hogchoker	HOGCH-BT02F-004	2F	9/20/2013	Whole	ND (0.508)	0.93	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0935	0.144	ND (0.05)	0.386	ND (0.05)	0.624
Hogchoker	HOGCH-BT01D-001	1D	9/23/2013	Whole	ND (0.467)	1.47	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.106	0.0943	ND (0.05)	0.139	ND (0.05)	0.339
Hogchoker	HOGCH-BT02G-005	2G	9/25/2013	Whole	ND (0.498)	2.91	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.106	0.0957	ND (0.05)	0.154	ND (0.05)	0.356
Hogchoker	HOGCH-BT02G-006	2G	9/25/2013	Whole	ND (0.504)	2.06	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0677	0.0736	ND (0.05)	0.0873	ND (0.05)	0.229
Hogchoker	HOGCH-BT02G-007	2G	9/25/2013	Whole	ND (0.505)	1.86	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0508	0.0434	ND (0.05)	0.06	ND (0.05)	0.154
Hogchoker	HOGCH-BT02G-008	2G	9/25/2013	Whole	ND (0.51)	1.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0299	0.0454	ND (0.05)	0.0561	ND (0.05)	0.131
Hogchoker	HOGCH-BT03D-004	3D	9/26/2013	Whole	ND (0.488)	2.53	ND (0.0693)	ND (0.0693)	ND (0.0693)	ND (0.0693)	0.131	0.102	ND (0.0693)	0.0752	ND (0.0693)	0.308
Hogchoker	HOGCH-BT02H-009	2H	9/26/2013	Whole	ND (0.497)	1.99	ND (0.0684)	ND (0.0684)	ND (0.0684)	ND (0.0684)	0.135	0.142	ND (0.0684)	0.382	ND (0.0684)	0.659
Hogchoker	HOGCH-BT03D-001	3D	9/17/2014	Whole	-	0.437	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0517	0.0591	ND (0.05)	0.118	ND (0.05)	0.2288
Hogchoker	HOGCH-BT02H-002	2H	9/17/2014	Whole	-	0.643	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.044	0.0486	ND (0.05)	0.075	ND (0.05)	0.1676
Hogchoker	HOGCH-BT02H-003	2H	9/17/2014	Whole	-	0.612	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0278	ND (0.05)	0.0362	ND (0.05)	0.064
Hogchoker	HOGCH-BT02F-002	2F	9/17/2014	Whole	-	1.34	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0839	0.0514	ND (0.05)	0.0637	ND (0.05)	0.199
Hogchoker	HOGCH-BT03D-002	3D	9/18/2014	Whole	-	0.495	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hogchoker	HOGCH-BT02F-003	2F	9/18/2014	Whole	-	0.612	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0564	0.0361	ND (0.05)	0.0588	ND (0.05)	0.1513
Hogchoker	HOGCH-BT02F-005	2F	9/18/2014	Whole	-	ND (0.3)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hogchoker	HOGCH-BT02H-005	2H	9/18/2014	Whole	-	0.412	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0299	ND (0.05)	0.0299
Hogchoker	HOGCH-BT02G-003	2G	9/19/2014	Whole	-	0.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0527	0.0458	ND (0.05)	0.0781	ND (0.05)	0.1766
Hogchoker	HOGCH-BT02G-005	2G	9/23/2014	Whole	-	0.618	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0394	0.111	ND (0.05)	0.223	ND (0.05)	0.3734
Hogchoker	HOGCH-BT03D-003	3D	9/23/2014	Whole	-	4.59	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.351	0.369	ND (0.05)	0.244	ND (0.05)	0.964
Hogchoker	HOGCH-BT03D-004	3D	9/23/2014	Whole	-	0.578	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0353	ND (0.05)	0.0673	ND (0.05)	0.1026

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
Hogchoker	HOGCH-BT03D-005	3D	9/23/2014	Whole	-	1.64	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.23	0.233	ND (0.05)	0.137	ND (0.05)	0.6
Hogchoker	HOGCH-BT01E-003	1E	9/23/2014	Whole	-	0.934	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0621	0.0545	ND (0.05)	0.0629	ND (0.05)	0.1795
Hogchoker	HOGCH-BT01E-004	1E	9/24/2014	Whole	-	0.397	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0478	0.121	ND (0.05)	0.249	ND (0.05)	0.4178
Hogchoker	HOGCH-BT01E-005	1E	9/24/2014	Whole	-	3.67	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.188	0.184	ND (0.05)	0.17	ND (0.05)	0.542
Hogchoker	HOGCH-BT01E-006	1E	9/25/2014	Whole	-	1.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.11	0.121	ND (0.05)	0.42	ND (0.05)	0.651
Hogchoker	HOGCH-BT02G-006	2G	9/26/2014	Whole	-	0.437	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hogchoker	HOGCH-BT01E-007	1E	9/26/2014	Whole	-	1.28	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0714	0.04	ND (0.05)	0.0347	ND (0.05)	0.1461
Hogchoker	HOGCH-BT01D-001	1D	9/26/2014	Whole	-	2.85	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.158	0.128	ND (0.05)	0.147	ND (0.05)	0.433
Oyster Toadfish	OYTD-BT02B-001	2B	9/18/2013	Fillet	ND (0.499)	0.33	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02B-001	2B	9/18/2013	Offal	ND (0.507)	0.818	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.111	ND (0.05)	0.111
Oyster Toadfish	OYTD-BT03D-001	3D	9/18/2013	Fillet	ND (0.503)	0.538	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0845	ND (0.05)	0.085
Oyster Toadfish	OYTD-BT03D-001	3D	9/18/2013	Offal	1.11	0.872	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.331	ND (0.05)	0.331
Oyster Toadfish	OYTD-BT02B-002	2B	9/19/2013	Fillet	ND (0.471)	0.475	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.11	ND (0.05)	0.110
Oyster Toadfish	OYTD-BT02B-002	2B	9/19/2013	Offal	ND (0.497)	0.292	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0656	ND (0.05)	0.066
Oyster Toadfish	OYTD-BT03A-001	3A	9/19/2013	Fillet	ND (0.493)	0.0886	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03A-001	3A	9/19/2013	Offal	ND (0.488)	1.83	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0567	0.0632	ND (0.05)	0.254	ND (0.05)	0.374
Oyster Toadfish	OYTD-BT03B-002	3B	9/19/2013	Fillet	ND (0.501)	0.372	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03B-002	3B	9/19/2013	Offal	ND (0.5)	0.825	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.057	ND (0.05)	0.057
Oyster Toadfish	OYTD-BT01D-001	1D	9/19/2013	Fillet	ND (0.504)	0.0828	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01D-001	1D	9/19/2013	Offal	ND (0.497)	0.601	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.269	ND (0.05)	0.269
Oyster Toadfish	OYTD-BT01D-002	1D	9/19/2013	Fillet	ND (0.509)	0.285	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01D-002	1D	9/19/2013	Offal	ND (0.509)	0.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.192	ND (0.05)	0.192
Oyster Toadfish	OYTD-BT01E-003	1E	9/19/2013	Fillet	ND (0.477)	0.495	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.215	ND (0.05)	0.215
Oyster Toadfish	OYTD-BT01E-003	1E	9/19/2013	Offal	ND (0.482)	0.405	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.234	ND (0.05)	0.234
Oyster Toadfish	OYTD-BT03C-003	3C	9/19/2013	Fillet	ND (0.484)	0.447	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03C-003	3C	9/19/2013	Offal	ND (0.484)	1.14	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0998	ND (0.05)	0.100
Oyster Toadfish	OYTD-BT03C-004	3C	9/19/2013	Fillet	ND (0.503)	0.351	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03C-004	3C	9/19/2013	Offal	ND (0.489)	0.816	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0323	ND (0.05)	0.273	ND (0.05)	0.305
Oyster Toadfish	OYTD-BT01A-001	1A	9/19/2013	Fillet	ND (0.503)	0.479	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01A-001	1A	9/19/2013	Offal	ND (0.509)	1.09	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.217	ND (0.05)	0.217
Oyster Toadfish	OYTD-BT01B-002	1B	9/19/2013	Fillet	ND (0.503)	0.0502	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01B-002	1B	9/19/2013	Offal	ND (0.506)	0.424	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.155	ND (0.05)	0.155
Oyster Toadfish	OYTD-BT01A-004	1A	9/20/2013	Fillet	ND (0.487)	0.222	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01A-004	1A	9/20/2013	Offal	ND (0.489)	0.625	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0622	ND (0.05)	0.062
Oyster Toadfish	OYTD-BT01A-003	1A	9/20/2013	Fillet	ND (0.504)	0.227	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01A-003	1A	9/20/2013	Offal	ND (0.506)	0.58	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.133	ND (0.05)	0.133
Oyster Toadfish	OYTD-BT01B-005	1B	9/20/2013	Fillet	ND (0.485)	0.273	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01B-005	1B	9/20/2013	Offal	ND (0.501)	0.767	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.127	ND (0.05)	0.127
Oyster Toadfish	OYTD-BT01E-004	1E	9/20/2013	Fillet	ND (0.505)	0.354	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01E-004	1E	9/20/2013	Offal	ND (0.49)	1.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0496	0.0543	ND (0.05)	0.297	ND (0.05)	0.401
Oyster Toadfish	OYTD-BT03C-005	3C	9/20/2013	Fillet	ND (0.497)	0.0427	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03C-005	3C	9/20/2013	Offal	ND (0.485)	0.466	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0446	ND (0.05)	0.045
Oyster Toadfish	OYTD-BT03D-002	3D	9/20/2013	Fillet	ND (0.481)	0.407	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
Oyster Toadfish	OYTD-BT03D-002	3D	9/20/2013	Offal	ND (0.469)	0.724	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.072	ND (0.05)	0.072
Oyster Toadfish	OYTD-BT03D-003	3D	9/20/2013	Fillet	ND (0.502)	0.121	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03D-003	3D	9/20/2013	Offal	ND (0.495)	1.36	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.146	ND (0.05)	0.146
Oyster Toadfish	OYTD-BT03C-006	3C	9/21/2013	Fillet	ND (0.466)	0.0507	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03C-006	3C	9/21/2013	Offal	ND (0.5)	1.11	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0289	ND (0.05)	0.117	ND (0.05)	0.146
Oyster Toadfish	OYTD-BT01E-005	1E	9/21/2013	Fillet	ND (0.497)	0.277	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT01E-005	1E	9/21/2013	Offal	ND (0.509)	0.605	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0482	ND (0.05)	0.048
Oyster Toadfish	OYTD-BT02G-001	2G	9/21/2013	Fillet	ND (0.486)	0.131	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02G-001	2G	9/21/2013	Offal	ND (0.508)	0.352	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0508	ND (0.05)	0.051
Oyster Toadfish	OYTD-BT02G-002	2G	9/21/2013	Fillet	ND (0.501)	0.0628	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02G-002	2G	9/21/2013	Offal	ND (0.493)	0.724	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.341	ND (0.05)	0.341
Oyster Toadfish	OYTC-BT02H-003	2H	9/23/2013	Fillet	ND (0.495)	0.102	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTC-BT02H-003	2H	9/23/2013	Offal	ND (0.49)	0.16	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT03D-004	3D	9/23/2013	Fillet	ND (0.476)	0.522	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0576	ND (0.05)	0.058
Oyster Toadfish	OYTD-BT03D-004	3D	9/23/2013	Offal	ND (0.494)	0.969	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.379	ND (0.05)	0.379
Oyster Toadfish	OYTD-BT03D-005	3D	9/23/2013	Fillet	ND (0.473)	0.324	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0343	ND (0.05)	0.034
Oyster Toadfish	OYTD-BT03D-005	3D	9/23/2013	Offal	ND (0.494)	0.74	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.189	ND (0.05)	0.189
Oyster Toadfish	OYTD-BT02G-004	2G	9/24/2013	Fillet	ND (0.508)	0.406	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02G-004	2G	9/24/2013	Offal	ND (0.509)	0.742	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.048	ND (0.05)	0.048
Oyster Toadfish	OYTD-BT02H-005	2H	9/24/2013	Fillet	ND (0.474)	0.46	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02H-005	2H	9/24/2013	Offal	ND (0.469)	0.503	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0271	ND (0.05)	0.027
Oyster Toadfish	OYTD-BT02F-006	2F	9/25/2013	Fillet	ND (0.477)	0.113	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02F-006	2F	9/25/2013	Offal	ND (0.503)	0.623	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0848	ND (0.05)	0.085
Oyster Toadfish	OYTD-BT02B-003	2B	9/25/2013	Fillet	ND (0.459)	0.0642	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02B-003	2B	9/25/2013	Offal	ND (0.477)	1.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.301	ND (0.05)	0.301
Oyster Toadfish	OYTD-BT02G-007	2G	9/25/2013	Fillet	ND (0.491)	0.0415	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.025	ND (0.05)	0.025
Oyster Toadfish	OYTD-BT02G-007	2G	9/25/2013	Offal	ND (0.492)	0.388	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.248	ND (0.05)	0.248
Oyster Toadfish	OYTD-BT02G-008	2G	9/25/2013	Fillet	ND (0.487)	0.516	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0541	ND (0.05)	0.054
Oyster Toadfish	OYTD-BT02G-008	2G	9/25/2013	Offal	ND (0.489)	0.821	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.243	ND (0.05)	0.243
Oyster Toadfish	OYTD-BT02D-004	2D	9/25/2013	Fillet	ND (0.486)	0.115	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02D-004	2D	9/25/2013	Offal	ND (0.469)	0.688	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0936	ND (0.05)	0.094
Oyster Toadfish	OYTD-BT02H-009	2H	9/25/2013	Fillet	ND (0.496)	0.129	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02H-009	2H	9/25/2013	Offal	ND (0.473)	0.42	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0426	ND (0.05)	0.043
Oyster Toadfish	OYTD-BT02E-005	2E	9/26/2013	Fillet	ND (0.478)	0.18	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Oyster Toadfish	OYTD-BT02E-005	2E	9/26/2013	Offal	ND (0.501)	0.69	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0753	ND (0.05)	0.075
Oyster toadfish	OYTD-BT03D-001	3D	9/16/2014	Whole	-	1.65	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.166	ND (0.05)	0.166
Oyster toadfish	OYTD-BT02F-001	2F	9/16/2014	Whole	-	1.22	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0583	ND (0.05)	0.249	ND (0.05)	0.3073
Oyster toadfish	OYTD-BT02H-001	2H	9/17/2014	Whole	-	1.01	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0857	ND (0.05)	0.0857
Oyster toadfish	OYTD-BT02G-001	2G	9/17/2014	Whole	-	0.879	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0803	ND (0.05)	0.0803
Oyster toadfish	OYTD-BT02A-001	2A	9/17/2014	Whole	-	1.45	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.309	ND (0.05)	0.309
Oyster toadfish	OYTD-BT01E-001	1E	9/17/2014	Whole	-	1.13	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.413	ND (0.05)	0.413
Oyster toadfish	OYTD-BT01E-002	1E	9/17/2014	Whole	-	0.936	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.151	ND (0.05)	0.151
Oyster toadfish	OYTD-BT03C-001	3C	9/18/2014	Whole	-	1.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.268	ND (0.05)	0.268

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
Oyster toadfish	OYTD-BT03C-002	3C	9/18/2014	Whole	-	1.51	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0547	ND (0.05)	0.154	ND (0.05)	0.2087
Oyster toadfish	OYTD-BT03D-003	3D	9/19/2014	Whole	-	1.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.134	ND (0.05)	0.134
Oyster toadfish	OYTD-BT02D-001	2D	9/23/2014	Whole	-	1.78	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.105	0.192	ND (0.05)	0.773	ND (0.05)	1.07
Oyster toadfish	OYTD-BT02F-006	2F	9/23/2014	Whole	-	0.935	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.157	ND (0.05)	0.157
Oyster toadfish	OYTD-BT03D-004	3D	9/23/2014	Whole	-	1.71	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0598	0.0426	ND (0.05)	0.155	ND (0.05)	0.2574
Oyster toadfish	OYTD-BT03D-006	3D	9/23/2014	Whole	-	1.33	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.131	ND (0.05)	0.131
Oyster toadfish	OYTD-BT01E-003	1E	9/23/2014	Whole	-	1.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.268	ND (0.05)	0.268
Oyster toadfish	OYTD-BT01D-001	1D	9/23/2014	Whole	-	1.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0311	ND (0.05)	0.147	ND (0.05)	0.1781
Oyster toadfish	OYTD-BT01B-001	1B	9/24/2014	Whole	-	1.24	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0329	0.0314	ND (0.05)	0.187	ND (0.05)	0.2513
Oyster toadfish	OYTD-BT02D-002	2D	9/25/2014	Whole	-	1.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0665	0.0515	ND (0.05)	0.257	ND (0.05)	0.375
Oyster toadfish	OYTD-BT02D-003	2D	9/25/2014	Whole	-	1.88	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0369	0.0416	ND (0.05)	0.306	ND (0.05)	0.3845
Oyster toadfish	OYTD-BT03A-001	3A	9/25/2014	Whole	-	1.56	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.062	ND (0.05)	0.231	ND (0.05)	0.293
Oyster toadfish	OYTD-BT01A-001	1A	9/25/2014	Whole	-	1.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.217	ND (0.05)	0.217
Oyster toadfish	OYTD-BT03D-007	3D	9/26/2014	Whole	-	1.15	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.032	ND (0.05)	ND (0.05)	0.144	ND (0.05)	0.176
Oyster toadfish	OYTD-BT01D-002	1D	9/26/2014	Whole	-	1.33	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.179	ND (0.05)	0.179
Oyster toadfish	OYTD-BT02G-005	2G	9/26/2014	Whole	-	0.686	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.16	ND (0.05)	0.16
Spot	SPOT-BT02C-001	2C	9/18/2013	Whole	ND (0.482)	3.83	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.139	0.188	ND (0.05)	0.152	ND (0.05)	0.479
Spot	SPOT-BT02C-002	2C	9/19/2013	Whole	ND (0.502)	1.22	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0772	0.189	ND (0.05)	0.109	ND (0.05)	0.375
Spot	SPOT-BT03B-001	3B	9/21/2013	Whole	ND (0.504)	4.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.149	0.161	ND (0.05)	0.146	ND (0.05)	0.456
Spot	SPOT-BT03B-002	3B	9/21/2013	Whole	ND (0.474)	8.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.267	0.289	ND (0.05)	0.161	ND (0.05)	0.717
Spot	SPOT-BT03B-003	3B	9/21/2013	Whole	ND (0.501)	4.44	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.232	0.355	ND (0.05)	0.181	ND (0.05)	0.768
Spot	SPOT-BT03B-004	3B	9/21/2013	Whole	ND (0.487)	2.28	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0838	0.0892	ND (0.05)	0.0547	ND (0.05)	0.228
Spot	SPOT-BT03B-005	3B	9/21/2013	Whole	ND (0.47)	4.27	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.205	0.22	ND (0.05)	0.138	ND (0.05)	0.563
Spot	SPOT- BT02A-003	2A	9/24/2013	Whole	ND (0.492)	2.54	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.112	0.136	ND (0.05)	0.103	ND (0.05)	0.351
Spot	SPOT-BT02A-004	2A	9/24/2013	Whole	0.516	8.81	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.436	0.454	ND (0.05)	0.419	ND (0.05)	1.309
Spot	SPOT-BT02D-005	2D	9/24/2013	Whole	ND (0.51)	8.43	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.387	0.323	ND (0.05)	0.27	ND (0.05)	0.980
Spot	SPOT-BT01C-001	1C	9/24/2013	Whole	ND (0.499)	4.64	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.173	0.139	ND (0.05)	0.0788	ND (0.05)	0.391
Spot	SPOT-BT01C-002	1C	9/25/2013	Whole	ND (0.505)	7.75	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.283	0.248	ND (0.05)	0.182	ND (0.05)	0.713
Spot	SPOT-BT01B-003	1B	9/26/2013	Whole	ND (0.47)	9.63	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.266	0.216	ND (0.05)	0.13	ND (0.05)	0.612
White Perch	WP-BT02A-001	2A	9/19/2013	Whole	ND (0.508)	4.02	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.238	0.274	ND (0.05)	0.521	ND (0.05)	1.033
White Perch	WP-BT02A-004	2A	9/19/2013	Whole	ND (0.477)	3.41	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.381	0.351	ND (0.05)	0.388	ND (0.05)	1.120
White Perch	WP-BT02A-005	2A	9/19/2013	Whole	ND (0.499)	5.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.541	0.549	ND (0.05)	0.519	ND (0.05)	1.609
White Perch	WP-BT02A-002	2A	9/19/2013	Whole	ND (0.496)	5.61	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.545	0.566	ND (0.1)	1.14	ND (0.1)	2.251
White Perch	WP-BT02A-003	2A	9/19/2013	Whole	ND (0.495)	1.41	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.208	0.241	ND (0.05)	0.376	ND (0.05)	0.825
White Perch	WP-BT01B-001	1B	9/19/2013	Whole	ND (0.491)	3.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.305	0.32	ND (0.05)	0.422	ND (0.05)	1.047
White Perch	WP-BT03C-001	3C	9/21/2013	Whole	ND (0.497)	3.8	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.524	0.749	ND (0.05)	0.528	ND (0.05)	1.801
White Perch	WP-BT03B-002	3B	9/21/2013	Whole	ND (0.497)	4.39	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.377	0.291	ND (0.05)	0.212	ND (0.05)	0.880
White Perch	WP-BT03B-003	3B	9/21/2013	Whole	ND (0.505)	3.84	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.429	0.44	ND (0.05)	0.458	ND (0.05)	1.327
White Perch	WP-BT03B-004	3B	9/21/2013	Whole	ND (0.493)	5.46	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.422	0.4	ND (0.05)	0.296	ND (0.05)	1.118
White Perch	WP-BT-03B-005	3B	9/21/2013	Whole	ND (0.467)	5.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.553	0.559	ND (0.05)	0.433	ND (0.05)	1.545
White Perch	WP-BT01C-002	1C	9/23/2013	Whole	ND (0.509)	5.14	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.275	0.264	ND (0.05)	0.187	ND (0.05)	0.726
White Perch	WP-BT01C-003	1C	9/23/2013	Whole	ND (0.508)	3.86	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.396	0.391	ND (0.05)	0.334	ND (0.05)	1.121
White Perch	WP-BT01B-004	1B	9/23/2013	Whole	ND (0.503)	5.08	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.552	0.523	ND (0.05)	0.509	ND (0.05)	1.584

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
White Perch	WP-BT01B-005	1B	9/23/2013	Whole	ND (0.471)	5.26	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.445	0.526	ND (0.05)	1.22	ND (0.05)	2.191
White Perch	WP-BT02E-006	2E	9/25/2013	Whole	ND (0.507)	4.75	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.702	0.677	ND (0.05)	0.457	ND (0.05)	1.836
White perch	WP-BT03B-001	3B	9/17/2014	Whole	-	5.68	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.678	0.712	ND (0.05)	0.731	ND (0.05)	2.121
White perch	WP-BT03B-002	3B	9/17/2014	Whole	-	3.73	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.49	0.402	ND (0.05)	0.25	ND (0.05)	1.142
White perch	WP-BT01A-001	1A	9/18/2014	Whole	-	5.38	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.314	0.234	ND (0.05)	0.248	ND (0.05)	0.796
White perch	WP-BT01A-002	1A	9/18/2014	Whole	-	8.85	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.724	0.598	ND (0.05)	0.458	ND (0.05)	1.78
White perch	WP-BT01A-003	1A	9/18/2014	Whole	-	10.5	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.648	0.488	ND (0.05)	0.383	ND (0.05)	1.519
White perch	WP-BT01A-004	1A	9/18/2014	Whole	-	9.22	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.604	0.489	ND (0.05)	0.398	ND (0.05)	1.491
White perch	WP-BT01A-005	1A	9/18/2014	Whole	-	8.08	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.892	0.876	ND (0.1)	0.794	ND (0.1)	2.562
White perch	WP-BT02C-001	2C	9/18/2014	Whole	-	6.79	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	1.28	0.994	ND (0.2)	2.55	ND (0.2)	4.824
White perch	WP-BT03B-003	3B	9/18/2014	Whole	-	8.28	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.896	1.02	ND (0.1)	0.684	ND (0.1)	2.6
White perch	WP-BT03B-004	3B	9/18/2014	Whole	-	8.94	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.783	0.728	ND (0.05)	0.47	ND (0.05)	1.981
White perch	WP-BT03B-005	3B	9/18/2014	Whole	-	8.45	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.752	0.757	ND (0.05)	0.442	ND (0.05)	1.951
White perch	WP-BT03C-001	3C	9/19/2014	Whole	-	9.2	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.947	1.17	ND (0.05)	0.672	ND (0.05)	2.789
White perch	WP-BT03C-002	3C	9/19/2014	Whole	-	4.41	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.479	0.571	ND (0.05)	0.367	ND (0.05)	1.417
White perch	WP-BT03C-003	3C	9/19/2014	Whole	-	6.83	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.631	0.768	ND (0.05)	0.566	ND (0.05)	1.965
White perch	WP-BT03C-004	3C	9/19/2014	Fillet	-	4.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.583	0.781	ND (0.05)	0.48	ND (0.05)	1.844
White perch	WP-BT03C-004	3C	9/19/2014	Offal	-	11.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.38	1.81	ND (0.05)	1.18	ND (0.05)	4.37
White perch	WP-BT03C-005	3C	9/19/2014	Fillet	-	1.96	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.243	0.24	ND (0.05)	0.164	ND (0.05)	0.647
White perch	WP-BT03C-005	3C	9/19/2014	Offal	-	5.71	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.696	0.69	ND (0.05)	0.47	ND (0.05)	1.856
White perch	WP-BT02A-001	2A	9/23/2014	Whole	-	8.54	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	1.33	1.05	ND (0.1)	2.28	ND (0.1)	4.66
White perch	WP-BT02A-002	2A	9/23/2014	Whole	-	7.75	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.925	0.835	ND (0.1)	1.71	ND (0.1)	3.47
White perch	WP-BT02A-003	2A	9/23/2014	Whole	-	7.4	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.784	0.672	ND (0.05)	0.811	ND (0.05)	2.267
White perch	WP-BT02E-001	2E	9/23/2014	Whole	-	8.12	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.983	0.802	ND (0.05)	1.23	ND (0.05)	3.015
White perch	WP-BT02A-004	2A	9/23/2014	Whole	-	7.28	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	1	0.752	ND (0.1)	1.95	ND (0.1)	3.702
White perch	WP-BT01A-006	1A	9/23/2014	Whole	-	7.44	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.704	0.623	ND (0.05)	0.516	ND (0.05)	1.843
White perch	WP-BT01A-007	1A	9/23/2014	Whole	-	8.7	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.772	0.586	ND (0.05)	0.36	ND (0.05)	1.718
White perch	WP-BT01A-008	1A	9/23/2014	Whole	-	8.25	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.664	0.511	ND (0.05)	0.334	ND (0.05)	1.509
White perch	WP-BT02C-002	2C	9/23/2014	Whole	-	7.32	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.698	0.66	ND (0.05)	0.67	ND (0.05)	2.028
White perch	WP-BT02C-003	2C	9/23/2014	Whole	-	8.13	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.707	0.67	ND (0.05)	0.6	ND (0.05)	1.977
White perch	WP-BT02C-004	2C	9/23/2014	Whole	-	7.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.682	0.536	ND (0.05)	0.377	ND (0.05)	1.595
White perch	WP-BT02C-005	2C	9/23/2014	Fillet	-	2.85	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.453	0.348	ND (0.05)	0.575	ND (0.05)	1.376
White perch	WP-BT02C-005	2C	9/23/2014	Offal	-	9.74	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.31	1.04	ND (0.05)	1.72	ND (0.05)	4.07
White perch	WP-BT03A-001	3A	9/24/2014	Fillet	-	4.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.536	0.466	ND (0.05)	0.362	ND (0.05)	1.364
White perch	WP-BT03A-001	3A	9/24/2014	Offal	-	8.04	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.968	0.895	ND (0.05)	0.731	ND (0.05)	2.594
White perch	WP-BT03A-002	3A	9/24/2014	Fillet	-	4.59	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.437	0.509	ND (0.05)	0.486	ND (0.05)	1.432
White perch	WP-BT03A-002	3A	9/24/2014	Offal	-	9.61	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.912	1.06	ND (0.05)	1.2	ND (0.05)	3.172
White perch	WP-BT02D-001	2D	9/24/2014	Fillet	-	3.76	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.327	0.224	ND (0.05)	0.262	ND (0.05)	0.813
White perch	WP-BT02D-001	2D	9/24/2014	Offal	-	11.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.897	0.695	ND (0.05)	0.727	ND (0.05)	2.319
White perch	WP-BT02D-002	2D	9/24/2014	Whole	-	4.71	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.679	0.605	ND (0.05)	0.522	ND (0.05)	1.806
White perch	WP-BT02D-003	2D	9/24/2014	Whole	-	10.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.656	0.613	ND (0.05)	0.59	ND (0.05)	1.859
White perch	WP-BT02D-004	2D	9/24/2014	Fillet	-	3.16	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.358	0.286	ND (0.05)	0.285	ND (0.05)	0.929
White perch	WP-BT02D-004	2D	9/24/2014	Offal	-	8.78	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.973	0.86	ND (0.05)	0.897	ND (0.05)	2.73

TABLE - BIOTA ANALYTICAL DATA
FORMER ANACONDA CABLE & WIRE PLANT SITE, HASTINGS-ON-HUDSON, NEW YORK
OCTOBER 2015

Species	Parent Sample ID	Location ID	Date	Process	Lead (mg/kg)	Lipids (%)	Aroclor 1016 (mg/kg)	Aroclor 1221 (mg/kg)	Aroclor 1232 (mg/kg)	Aroclor 1242 (mg/kg)	Aroclor 1248 (mg/kg)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	Aroclor 1262 (mg/kg)	Aroclor 1268 (mg/kg)	Total PCBs (mg/kg)
White perch	WP-BT02D-005	2D	9/24/2014	Whole	-	7.18	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.819	0.649	ND (0.1)	0.428	ND (0.1)	1.896
White perch	WP-BT03A-003	3A	9/24/2014	Whole	-	8.01	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.406	0.376	ND (0.05)	0.317	ND (0.05)	1.099
White perch	WP-BT03A-004	3A	9/24/2014	Whole	-	9.14	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.957	1.02	ND (0.1)	0.903	ND (0.1)	2.88
White perch	WP-BT02E-002	2E	9/24/2014	Whole	-	11.1	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	1.04	1.39	ND (0.1)	1.52	ND (0.1)	3.95
White perch	WP-BT03A-005	3A	9/25/2014	Fillet	-	2.72	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.26	0.221	ND (0.05)	0.188	ND (0.05)	0.669
White perch	WP-BT03A-005	3A	9/25/2014	Offal	-	7.23	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.656	0.598	ND (0.05)	0.558	ND (0.05)	1.812
White perch	WP-BT01C-001	1C	9/25/2014	Whole	-	7.79	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.876	0.706	ND (0.05)	0.493	ND (0.05)	2.075
White perch	WP-BT02E-003	2E	9/25/2014	Fillet	-	1.21	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.146	0.155	ND (0.05)	0.164	ND (0.05)	0.465
White perch	WP-BT02E-003	2E	9/25/2014	Offal	-	5.09	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.677	0.634	ND (0.05)	0.756	ND (0.05)	2.067
White perch	WP-BT02E-004	2E	9/25/2014	Whole	-	10.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.903	0.797	ND (0.05)	0.799	ND (0.05)	2.499
White perch	WP-BT02E-005	2E	9/25/2014	Fillet	-	4.43	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.443	0.405	ND (0.05)	0.428	ND (0.05)	1.276
White perch	WP-BT02E-005	2E	9/25/2014	Offal	-	9.82	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.998	0.903	ND (0.05)	1.04	ND (0.05)	2.94
White perch	WP-BT01B-001	1B	9/25/2014	Whole	-	8.44	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.749	0.578	ND (0.05)	0.385	ND (0.05)	1.712
White perch	WP-BT02B-001	2B	9/27/2014	Whole	-	8.17	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1.88	1.45	ND (0.5)	4.6	ND (0.5)	7.93

TABLES; WHITE PERCH CONGENER DATA

TABLE - WHITE PERCH ANALYTICAL DATA - PCB CONGENERS - 2013
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

	Loc_Sample ID	WP-BT01C-003			WP-BT01B-005			WP-BT02A-003			WP-BT02A-002			WP-BT03B-002			WP-BT03C-001		
	Sample ID	2242-092313-1535			2242-092313-1541			2242-091913-1607			2242-091913-1606			2242-092113-0925			2242-092113-0910		
	Reach Segment	NORTH - REACH 1			NORTH - REACH 1			ADJACENT - REACH 2			ADJACENT - REACH 2			SOUTH - REACH 3			SOUTH - REACH 3		
	Aroclor 1248 (mg/kg)	0.40			0.45			0.21			0.55			0.38			0.52		
	Aroclor 1254 (mg/kg)	0.39			0.53			0.24			0.57			0.29			0.75		
	Aroclor 1262 (mg/kg)	0.33			1.20			0.38			1.10			0.21			0.53		
	Total PCB (mg/kg)	1.1			2.2			0.83			2.3			0.88			1.8		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
004	2	2-2	0.0021	0.0000094		0.0035	0.000016	J	0.0054	0.000024		0.015	0.000067	J	0.002	0.0000088		0.0033	0.000015	
008	2	2-4	0.0005	0.0000022	J	ND	-		0.00043	0.0000019	J	ND	-		0.00059	0.0000027	J	0.00068	0.0000031	J
010	2	26-	0.00045	0.000002	J	ND	-		0.00065	0.0000029	J	ND	-		0.00061	0.0000027	J	0.00091	0.0000041	J
015	2	4-4	0.00037	0.0000017	J	ND	-		0.00089	0.000004	J	ND	-		0.00075	0.0000033	J	0.002	0.0000091	J
016	3	23-2	0.00082	0.0000032	J	ND	-		0.00068	0.0000026	J	ND	-		0.00093	0.0000036	J	0.0017	0.0000065	J
017	3	24-2	0.0075	0.000029		0.011	0.000043		0.0062	0.000024		0.037	0.00014		0.0088	0.000034		0.018	0.000069	
018	3	25-2	0.0056	0.000022		0.0093	0.000036		0.0046	0.000018		0.034	0.00013		0.0063	0.000024		0.0094	0.000036	
019	3	26-2	0.0022	0.0000085		0.0051	0.00002	J	0.0053	0.00002		0.022	0.000087	J	0.0034	0.000013		0.0062	0.000024	
020	3	23-3	0.0011	0.0000043	J	0.0016	0.0000061	J	0.0011	0.0000043	J	0.0053	0.000021	J	0.0011	0.0000042	J	0.0023	0.0000091	J
022	3	23-4	0.00085	0.0000033	J	ND	-		0.00087	0.0000034	J	ND	-		0.00093	0.0000036	J	0.002	0.0000078	J
023	3	235-	0.00097	0.0000038	J	0.0019	0.0000075	J	0.00079	0.0000031	J	0.0066	0.000026	J	0.00076	0.000003	J	0.0018	0.0000072	J
025	3	24-3	0.0031	0.000012		0.0043	0.000017	J	0.0033	0.000013		0.02	0.000079	J	0.0031	0.000012		0.0062	0.000024	
026	3	25-3	0.0027	0.00001		0.0033	0.000013	J	0.0024	0.0000093		0.011	0.000041	J	0.0026	0.00001		0.0043	0.000017	
027	3	26-3	0.0025	0.0000095		0.004	0.000016	J	0.002	0.0000076		0.014	0.000054	J	0.0026	0.00001		0.005	0.000019	
028	3	24-4	0.011	0.000043		0.016	0.000061		0.011	0.000043		0.053	0.00021		0.011	0.000042		0.023	0.000091	
031	3	25-4	0.0064	0.000025		0.0082	0.000032		0.0054	0.000021		0.025	0.000097	J	0.0066	0.000026		0.011	0.000043	
032	3	26-4	0.0023	0.0000089		0.0034	0.000013	J	0.0021	0.0000081		0.012	0.000046	J	0.0029	0.000011		0.005	0.00002	
033	3	34-2	0.0014	0.0000054		0.0013	0.000005	J	0.0011	0.0000043	J	0.0067	0.000026	J	0.0013	0.0000051		0.0024	0.0000091	J
035	3	34-3	0.00055	0.0000021	J	ND	-		0.00049	0.0000019	J	ND	-		0.00051	0.000002	J	0.00099	0.0000038	J
037	3	34-4	0.00066	0.0000025	J	ND	-		0.00061	0.0000024	J	ND	-		0.00051	0.000002	J	0.00099	0.0000039	J
040	4	23-23	0.0057	0.000019		0.0081	0.000028		0.005	0.000017		0.023	0.000079	J	0.0052	0.000018		0.01	0.000035	
041	4	234-2	0.00059	0.000002	J	ND	-		0.0006	0.0000021	J	ND	-		0.00055	0.0000019	J	0.0011	0.0000036	J
042	4	23-24	0.007	0.000024		0.0095	0.000033		0.0064	0.000022		0.026	0.00009		0.0061	0.000021		0.012	0.000041	
043	4	235-2	0.0021	0.0000072		0.0028	0.0000097	J	0.0015	0.0000051		0.0095	0.000032	J	0.0016	0.0000056		0.0032	0.000011	
044	4	23-25	0.029	0.0001		0.042	0.00014		0.025	0.000087		0.13	0.00045		0.024	0.000083		0.055	0.00019	
045	4	236-2	0.0014	0.0000047		0.002	0.0000067	J	0.0014	0.0000047		0.0066	0.000023	J	0.0013	0.0000046		0.0029	0.00001	
046	4	23-26	0.0018	0.0000063		0.0041	0.000014	J	0.0016	0.0000053		0.0095	0.000033	J	0.0021	0.0000073		0.0032	0.000011	
047	4	24-24	0.0073	0.000025		0.01	0.000036		0.0063	0.000022		0.033	0.00011		0.006	0.000021		0.014	0.000047	
048	4	245-2	0.0022	0.0000076		0.0028	0.0000094	J	0.0023	0.0000079		0.0091	0.000031	J	0.002	0.000007		0.0049	0.000017	
049	4	24-25	0.041	0.00014		0.057	0.0002		0.034	0.00012		0.17	0.00057		0.034	0.00012		0.066	0.00022	
051	4	24-26	0.00028	0.00000095	J	ND	-		0.00028	0.00000095	J	ND	-		0.00027	0.00000092	J	0.00058	0.000002	J
052	4	25-25	0.034	0.00012		0.049	0.00017		0.028	0.000096		0.15	0.00052		0.028	0.000094		0.066	0.00023	
053	4	25-26	0.0037	0.000013		0.0051	0.000017	J	0.0039	0.000013		0.024	0.000081	J	0.0036	0.000012		0.0073	0.000025	
054	4	26-26	0.00079	0.0000027	J	ND	-		0.0015	0.0000053		ND	-		0.00099	0.0000034	J	0.0013	0.0000044	J
055	4	234-3	0.00074	0.0000025	J	0.0019	0.0000065	J	0.00063	0.0000022	J	0.0076	0.000026	J	0.00094	0.0000032	J	0.0031	0.000011	
056	4	23-34	0.0039	0.000013		0.0089	0.000031		0.004	0.000014		0.03	0.0001		0.0032	0.000011		0.0094	0.000032	
059	4	236-3	0.0041	0.000014		0.0051	0.000018	J	0.0032	0.000011		0.013	0.000044	J	0.0031	0.000011		0.0059	0.00002	
060	4	234-4	0.0015	0.0000051		0.0029	0.0000099	J	0.0011	0.0000038	J	0.0057	0.00002	J	0.0011	0.0000038	J	0.0026	0.0000087	
063	4	235-4	0.0018	0.000006		0.0023	0.0000079	J	0.0014	0.0000049		0.0059	0.00002	J	0.0017	0.0000057		0.0027	0.0000091	
064	4	236-4	0.0085	0.000029		0.011	0.000037		0.0065	0.000022		0.028	0.000097		0.0067	0.000023		0.014	0.000046	
066	4	24-34	0.0087	0.00003		0.011	0.000039		0.0077	0.000026		0.037	0.00013		0.0063	0.000022		0.022	0.000075	
067	4	245-3	0.0014	0.0000047		0.0021	0.0000073	J	0.0014	0.0000048		0.0088	0.00003	J	0.0013	0.0000044		0.0031	0.000011	

Notes:

(1) J - Qualifier denotes concentration reported is less than the Practical Quantitaion Limit (PQL) but greater than the Method Detection Limit (MDL);
B- Qualifier indicates an estimated value. The following analytes were detected in the associated blank at a level exceeding the Practical Quantitation Limit(PQL).
(2) ND -Denotes analyte not detected (concentration less than the MDL)
(3) PQL and MDL for IUPAC #s 1, 2, and 3 are 5 times higher than all other Congeners
(4) The above listed IUPAC numbers and congener names are consistent with the CAS numbering system. Note that G. Frame's 1996 PCB publication used Guitart's proposed renumbering for congeners 107,108, and 109, which has not to date been adopted by CAS, Ballschmiter or IUPAC.
(5) Only detected analytes are shown

TABLE - WHITE PERCH ANALYTICAL DATA - PCB CONGENERS - 2013
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

		Loc_Sample ID	WP-BT01C-003			WP-BT01B-005			WP-BT02A-003			WP-BT02A-002			WP-BT03B-002			WP-BT03C-001		
		Sample ID	2242-092313-1535			2242-092313-1541			2242-091913-1607			2242-091913-1606			2242-092113-0925			2242-092113-0910		
		Reach Segment	NORTH - REACH 1			NORTH - REACH 1			ADJACENT - REACH 2			ADJACENT - REACH 2			SOUTH - REACH 3			SOUTH - REACH 3		
Congener IUPAC #	No. of Cl's	Structure unprime-prime	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
070	4	25-34	0.012	0.00004		0.015	0.000051		0.0094	0.000032		0.048	0.00016		0.0084	0.000029		0.025	0.000086	
071	4	26-34	0.0076	0.000026		0.011	0.000037		0.0067	0.000023		0.031	0.00011		0.007	0.000024		0.014	0.000047	
072	4	25-35	0.0028	0.0000096		0.0038	0.000013	J	0.0026	0.000009		0.013	0.000044	J	0.002	0.0000067		0.0043	0.000015	
074	4	245-4	0.0055	0.000019		0.007	0.000024		0.0044	0.000015		0.023	0.000077	J	0.004	0.000014		0.012	0.000041	
075	4	246-4	0.0012	0.0000041	J	0.0017	0.0000058	J	0.00092	0.0000031	J	ND	-		0.00094	0.0000032	J	0.0017	0.0000058	J
077	4	34-34	0.00058	0.000002	J	0.0018	0.0000062	J	0.0007	0.0000024	J	ND	-		0.00041	0.0000014	J	0.0011	0.0000037	J
082	5	234-23	0.0025	0.0000078		0.003	0.0000091	J	0.0025	0.0000077		0.012	0.000038	J	ND	-		0.0058	0.000018	
083	5	235-23	0.0027	0.0000084		0.0054	0.000017	J	0.0027	0.0000083		0.015	0.000046	J	0.0019	0.0000059		0.0055	0.000017	
084	5	236-23	0.0086	0.000026		0.016	0.000049		0.0074	0.000023		0.038	0.00012		0.0061	0.000019		0.02	0.000061	
085	5	234-24	0.006	0.000018		0.0078	0.000024		0.0059	0.000018		0.024	0.000074	J	0.0039	0.000012		0.012	0.000038	
087	5	234-25	0.0067	0.000021		0.0099	0.00003		0.0065	0.00002		0.031	0.000096		0.0045	0.000014		0.023	0.00007	
089	5	234-26	0.00047	0.0000014	J	ND	-		0.0004	0.0000012	J	ND	-		0.0006	0.0000018	J	0.002	0.0000061	J
091	5	236-24	0.0083	0.000026		0.011	0.000033		0.0067	0.000021		0.032	0.000098		0.0054	0.000017		0.015	0.000044	
092	5	235-25	0.013	0.000041		0.018	0.000054		0.011	0.000034		0.047	0.00014		0.0079	0.000024		0.026	0.000079	
094	5	235-26	0.0022	0.0000069		0.0022	0.0000066	J	0.0014	0.0000042		0.0074	0.000023	J	0.0015	0.0000047		0.003	0.000009	
095	5	236-25	0.029	0.000088		0.045	0.00014		0.025	0.000076		0.14	0.00042		0.02	0.000061		0.07	0.00022	
096	5	236-26	0.00026	0.0000008	J	ND	-		ND	-		ND	-		ND	-		ND	-	
097	5	245-23	0.0096	0.000029		0.013	0.000039		0.0092	0.000028		0.043	0.00013		0.0065	0.00002		0.023	0.000072	
099	5	245-24	0.027	0.000083		0.035	0.00011		0.026	0.000081		0.13	0.0004		0.016	0.000049		0.057	0.00017	
101	5	245-25	0.035	0.00011		0.068	0.00021		0.036	0.00011		0.18	0.00054		0.024	0.000074		0.09	0.00028	
102	5	245-26	0.0056	0.000017		0.0079	0.000024		0.005	0.000015		0.029	0.000088		0.0043	0.000013		0.011	0.000034	
105	5	234-34	0.014	0.000043		0.026	0.000081		0.016	0.00005		0.076	0.00023		0.007	0.000022		0.03	0.000091	
107	5	235-34	0.00049	0.0000015	J	ND	-		0.00048	0.0000015	J	ND	-		0.00031	0.00000096	J	0.0013	0.000004	J
110	5	236-34	0.025	0.000078		0.036	0.00011		0.022	0.000066		0.11	0.00034		0.016	0.00005		0.062	0.00019	
112	5	2356-3	0.00034	0.000001	J	ND	-		0.0003	0.00000093	J	ND	-		0.00025	0.00000077	J	ND	-	
114	5	2345-4	0.00038	0.0000012	J	ND	-		0.00045	0.0000014	J	ND	-		ND	-		0.001	0.0000032	J
115	5	2346-4	0.00052	0.0000016	J	ND	-		0.00044	0.0000013	J	ND	-		0.00033	0.000001	J	0.0013	0.0000039	J
117	5	2356-4	0.0011	0.0000032	J	0.0014	0.0000042	J	0.001	0.0000032	J	ND	-		0.00069	0.0000021	J	0.0022	0.0000067	J
118	5	245-34	0.018	0.000056		0.027	0.000083		0.019	0.000058		0.097	0.0003		0.011	0.000032		0.057	0.00018	
119	5	246-34	0.0003	0.00000093	J	ND	-		0.00029	0.00000089	J	ND	-		ND	-		0.00074	0.0000023	J
121	5	246-35	0.00081	0.0000025	J	ND	-		0.00088	0.0000027	J	ND	-		0.001	0.0000031	J	0.0018	0.0000055	J
123	5	345-24	ND	-		0.0017	0.0000053	J	0.00061	0.0000019	J	0.0052	0.000016	J	0.0003	0.0000009	J	0.0019	0.0000058	J
124	5	345-25	0.00039	0.0000012	J	ND	-		0.00038	0.0000012	J	ND	-		ND	-		0.001	0.0000032	J
128	6	234-234	0.0062	0.000017		0.0097	0.000027		0.0068	0.000019		0.024	0.000065	J	0.0033	0.000009		0.012	0.000033	
129	6	2345-23	0.0026	0.0000072		0.0076	0.000021		0.0033	0.0000091		0.015	0.000042	J	0.0015	0.0000042		0.0055	0.000015	
130	6	234-235	0.0023	0.0000064		0.0039	0.000011	J	0.0018	0.0000051		0.0092	0.000025	J	0.0014	0.0000038		0.0042	0.000012	
131	6	2346-23	0.0032	0.0000089		0.0036	0.0000099	J	0.0025	0.000007		0.0094	0.000026	J	0.0014	0.0000038		0.0055	0.000015	
132	6	234-236	0.0072	0.00002		0.016	0.000044		0.0061	0.000017		0.035	0.000098		0.0054	0.000015		0.017	0.000046	
133	6	235-235	0.0033	0.0000092		0.0091	0.000025		0.0046	0.000013		0.031	0.000085		0.0021	0.0000057		0.0051	0.000014	
134	6	2356-23	0.0019	0.0000054		0.0029	0.0000079	J	0.0013	0.0000037		0.0068	0.000019	J	0.001	0.0000029	J	0.0041	0.000011	
135	6	235-236	0.0055	0.000015		0.0058	0.000016	J	0.0078	0.000022		0.045	0.00013		ND	-		0.0084	0.000023	
136	6	236-236	0.0039	0.000011		0.0078	0.000021		0.0039	0.000011		0.022	0.00006	J	0.0028	0.0000077		0.0078	0.000022	
137	6	2345-24	0.0022	0.0000061		0.0025	0.0000068	J	0.0026	0.0000072		0.01	0.000029	J	0.0011	0.0000032	J	0.0052	0.000014	
138	6	234-245	0.035	0.000096		0.1	0.00028		0.044	0.00012		0.2	0.00056		0.02	0.000056		0.074	0.0002	
139	6	2346-24	0.0094	0.000026		0.013	0.000035		0.0091	0.000025		0.044	0.00012		0.0073	0.00002		0.016	0.000043	
141	6	2345-25	0.0082	0.000023		0.032	0.000089		0.0091	0.000025		0.043	0.00012		0.0044	0.000012		0.016	0.000044	
144	6	2346-25	0.0013	0.0000035		0.0067	0.000018		0.002	0.0000055		0.0091	0.000025	J	0.00098	0.0000027	J	0.0032	0.000009	

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FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

		Loc_Sample ID	WP-BT01C-003			WP-BT01B-005			WP-BT02A-003			WP-BT02A-002			WP-BT03B-002			WP-BT03C-001		
		Sample ID	2242-092313-1535			2242-092313-1541			2242-091913-1607			2242-091913-1606			2242-092113-0925			2242-092113-0910		
		Reach Segment	NORTH - REACH 1			NORTH - REACH 1			ADJACENT - REACH 2			ADJACENT - REACH 2			SOUTH - REACH 3			SOUTH - REACH 3		
Congener IUPAC #	No. of Cl's	Structure unprime-prime	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
146	6	235-245	0.0031	0.0000085		0.0058	0.000016	J	0.0035	0.0000098		0.017	0.000047	J	0.0015	0.0000043		0.0065	0.000018	
147	6	2356-24	0.00088	0.0000024	J	0.0026	0.0000072	J	0.001	0.0000028	J	0.0059	0.000016	J	0.00058	0.0000016	J	0.0019	0.0000053	J
149	6	236-245	0.028	0.000078		0.084	0.00023		0.033	0.000091		0.19	0.00053		0.019	0.000052		0.061	0.00017	
151	6	2356-25	0.014	0.000039		0.043	0.00012		0.017	0.000046		0.091	0.00025		0.0098	0.000027		0.026	0.000072	
153	6	245-245	0.015	0.000043		0.07	0.00019		0.025	0.000068		0.13	0.00035		0.026	0.000071		0.035	0.000096	
154	6	245-246	0.00035	0.00000098	J	ND	-		0.0005	0.0000014	J	ND	-		ND	-		0.00054	0.0000015	J
156	6	2345-34	0.0039	0.000011		0.0086	0.000024		0.0051	0.000014		0.022	0.000061	J	0.002	0.0000055		0.0088	0.000024	
158	6	2346-34	0.003	0.0000084		0.009	0.000025		0.0039	0.000011		0.016	0.000045	J	0.0015	0.000004		0.0071	0.00002	
163	6	2356-34	0.0061	0.000017		0.018	0.000049		0.0077	0.000021		0.035	0.000097		0.0035	0.0000098		0.013	0.000036	
164	6	236-345	0.0024	0.0000066		0.0068	0.000019		0.0022	0.0000062		0.009	0.000025	J	0.0013	0.0000036		0.0047	0.000013	
167	6	245-345	0.0014	0.0000039		0.0033	0.0000092	J	0.0016	0.0000044		0.0053	0.000015	J	0.00066	0.0000018	J	0.0035	0.0000098	
170	7	2345-234	0.0074	0.000019		0.043	0.00011		0.012	0.000031		0.061	0.00015		0.0041	0.00001		0.013	0.000033	
171	7	2346-234	0.0024	0.0000061		0.012	0.000031		0.0039	0.0000099		0.019	0.000047	J	0.0014	0.0000036		0.004	0.00001	
172	7	2345-235	0.0019	0.0000048		0.011	0.000027		0.0028	0.0000071		0.017	0.000042	J	0.001	0.0000026	J	0.0036	0.000009	
173	7	23456-23	ND	-		ND	-		0.0003	0.00000075	J	ND	-		ND	-		ND	-	
174	7	2345-236	0.0048	0.000012		0.024	0.000061		0.0079	0.00002		0.056	0.00014		0.0041	0.00001		0.008	0.00002	
175	7	2346-235	0.00036	0.00000091	J	0.0021	0.0000053	J	0.00059	0.0000015	J	ND	-		ND	-		0.00065	0.0000016	J
176	7	2346-236	0.00065	0.0000017	J	0.0039	0.0000099	J	0.0013	0.0000034		0.0098	0.000025	J	0.0006	0.0000015	J	0.0014	0.0000036	J
177	7	2356-234	0.0027	0.0000068		0.012	0.00003		0.0035	0.0000089		0.027	0.00007		0.0023	0.0000057		0.0039	0.0000098	
178	7	2356-235	0.0043	0.000011		0.015	0.000037		0.0065	0.000016		0.041	0.0001		0.0024	0.0000061		0.007	0.000018	
179	7	2356-236	0.0016	0.0000041		0.0058	0.000015	J	0.0034	0.0000086		0.014	0.000034	J	0.0016	0.0000041		0.0027	0.0000068	
180	7	2345-245	0.023	0.000059		0.14	0.00036		0.045	0.00011		0.31	0.00079		0.014	0.000035		0.047	0.00012	
182	7	2345-246	0.00027	0.00000069	J	ND	-		0.00027	0.00000067	J	ND	-		ND	-		ND	-	
183	7	2346-245	0.0083	0.000021		0.039	0.0001		0.016	0.000041		0.1	0.00025		0.0054	0.000014		0.015	0.000039	
185	7	23456-25	0.00089	0.0000023	J	0.0048	0.000012	J	0.0021	0.0000053		0.013	0.000034	J	0.00073	0.0000018	J	0.0018	0.0000046	J
187	7	2356-245	0.021	0.000054		0.095	0.00024		0.038	0.000097		0.27	0.00068		0.014	0.000034		0.043	0.00011	
190	7	23456-34	0.0018	0.0000045		0.01	0.000026		0.0032	0.0000081		0.019	0.000048	J	ND	-		0.0029	0.0000074	
191	7	2346-345	ND	-		0.0015	0.0000037	J	0.00037	0.00000093	J	ND	-		ND	-		ND	-	
192	7	23456-35	0.0081	0.00002		ND	-		0.0096	0.000024		0.039	0.000097		0.0038	0.0000096		0.011	0.000027	
193	7	2356-345	0.0012	0.0000031	J	0.0075	0.000019		0.0024	0.000006		0.016	0.000041	J	0.00074	0.0000019	J	0.0024	0.0000062	J
194	8	2345-2345	0.0065	0.000015		0.021	0.000049		0.012	0.000029		0.1	0.00024		0.0034	0.0000079		0.015	0.000035	
195	8	23456-234	0.0016	0.0000038		0.0098	0.000023		0.0044	0.00001		0.034	0.000079		0.0012	0.0000028	J	0.004	0.0000093	
196	8	2345-2346	0.0035	0.0000083		0.012	0.000028		0.0083	0.000019		0.061	0.00014		0.0024	0.0000057		0.0072	0.000017	
197	8	2346-2346	0.00056	0.0000013	J	ND	-		0.00072	0.0000017	J	ND	-		0.00028	0.00000066	J	0.0012	0.0000029	J
198	8	23456-235	0.0004	0.00000093	J	0.0014	0.0000032	J	0.00077	0.0000018	J	0.0074	0.000017	J	0.00035	0.00000081	J	0.00092	0.0000022	J
199	8	2345-2356	0.0076	0.000018		0.026	0.00006		0.015	0.000034		0.14	0.00033		0.0066	0.000015		0.018	0.000041	
200	8	23456-236	ND	-		ND	-		0.00043	0.00000099	J	ND	-		0.00026	0.0000006	J	ND	-	
201	8	2346-2356	0.0012	0.0000027	J	0.0035	0.0000082	J	0.0023	0.0000054		0.022	0.000051	J	0.00084	0.000002	J	0.0024	0.0000055	J
203	8	23456-245	0.0061	0.000014		0.016	0.000038		0.013	0.000031		0.11	0.00026		0.0037	0.0000085		0.014	0.000033	
205	8	23456-345	ND	-		ND	-		0.00055	0.0000013	J	ND	-		ND	-		0.00056	0.0000013	J
206	9	23456-2345	0.0052	0.000011		0.0084	0.000018		0.0092	0.00002		0.087	0.00019		0.0034	0.0000073		0.015	0.000031	
208	9	23456-2356	0.0019	0.000004		0.0089	0.000019		0.0024	0.0000051		0.041	0.000089		0.0019	0.0000042		0.004	0.0000087	
209	10	23456-23456	0.0031	0.0000062		0.003	0.000006	J	0.0033	0.0000066		0.023	0.000047	J	0.0019	0.0000039		0.0077	0.000015	
Total	-	-	0.77	0.0023		1.7	0.0049		0.87	0.0026		4.8	0.014		0.56	0.0017		1.6	0.0049	

Notes:

(1) J - Qualifier denotes concentration reported is less than the Practical Quantitaion Limit (PQL) but greater than the Method Detection Limit (MDL);
B- Qualifier indicates an estimated value. The following analytes were detected in the associated blank at a level exceeding the Practical Quantitation Limit(PQL).
(2) ND -Denotes analyte not detected (concentration less than the MDL)
(3) PQL and MDL for IUPAC #s 1, 2, and 3 are 5 times higher than all other Congeners
(4) The above listed IUPAC numbers and congener names are consistent with the CAS numbering system. Note that G. Frame's 1996 PCB publication used Guitart's proposed renumbering for congeners 107,108, and 109, which has not to date been adopted by CAS, Ballschmiter or IUPAC.
(5) Only detected analytes are shown

TABLE - WHITE PERCH ANALYTICAL DATA - PCB CONGENERS - 2014
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

		Loc_Sample ID	WP-BT01A-005			WP-BT01C-001			WP-BT02B-001			WP-BT02C-001			WP-BT03A-004			WP-BT03C-001		
		Sample ID	4117-091814-1329			4117-092514-1416			4117-092714-0947			4117-091814-1617			4117-092414-1646			4117-091914-1004		
		Reach Segment	NORTH - REACH 1			NORTH - REACH 1			ADJACENT - REACH 2			ADJACENT - REACH 2			SOUTH - REACH 3			SOUTH - REACH 3		
		Aroclor 1248 (mg/kg)	0.89			0.88			1.9			1.3			0.96			0.95		
		Aroclor 1254 (mg/kg)	0.88			0.71			1.5			0.99			1			1.2		
		Aroclor 1262 (mg/kg)	0.79			0.49			4.6			2.6			0.9			0.67		
		Total PCB (mg/kg)	2.6			2.1			7.9			4.8			2.9			2.8		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
004	2	2-2	0.0017	0.0000078	J	0.0027	0.000012	J	ND	-		ND	-		0.0034	0.000015	J	0.0044	0.00002	J
008	2	2-4	0.0026	0.000012	J	0.0019	0.0000087	J	ND	-		ND	-		0.0016	0.000007	J	0.002	0.000009	J
016	3	23-2	0.0028	0.000011	J	0.0036	0.000014	J	ND	-		ND	-		0.0023	0.000009	J	0.0039	0.000015	J
017	3	24-2	0.047	0.00018		0.038	0.00015		0.036	0.00014		0.021	0.000082		0.021	0.000081		0.039	0.00015	
018	3	25-2	0.016	0.000062		0.019	0.000073		0.025	0.000097		0.018	0.000071		0.017	0.000064		0.021	0.00008	
019	3	26-2	0.0061	0.000024	J	0.005	0.000019	J	0.0091	0.000035	J	0.007	0.000027	J	0.0048	0.000019	J	0.01	0.000039	
020	3	23-3	0.0029	0.000011	J	0.0033	0.000013	J	0.013	0.00005		0.011	0.000041	J	0.0037	0.000014	J	0.005	0.00002	J
022	3	23-4	0.0022	0.0000085	J	0.0021	0.000008	J	ND	-		ND	-		0.0017	0.0000067	J	0.0027	0.00001	J
023	3	235-	0.002	0.0000079	J	0.0014	0.0000054	J	ND	-		ND	-		0.0034	0.000013	J	0.0022	0.0000085	J
025	3	24-3	0.0088	0.000034		0.0093	0.000036		0.048	0.00019		0.033	0.00013		0.011	0.000044		0.014	0.000056	
026	3	25-3	0.0072	0.000028		0.0072	0.000028		0.03	0.00012		0.013	0.000049		0.0091	0.000035		0.0097	0.000038	
027	3	26-3	0.0081	0.000031		0.0071	0.000028		0.015	0.00006		0.007	0.000027	J	0.0068	0.000026		0.012	0.000045	
028	3	24-4	0.029	0.00011		0.033	0.00013		0.13	0.0005		0.11	0.00041		0.037	0.00014		0.05	0.0002	
031	3	25-4	0.018	0.000071		0.018	0.00007		0.027	0.0001		0.019	0.000072		0.019	0.000073		0.023	0.00009	
032	3	26-4	0.0074	0.000029		0.0077	0.00003		0.018	0.000068		0.011	0.000043	J	0.007	0.000027		0.011	0.000044	
033	3	34-2	0.0036	0.000014	J	0.0042	0.000016	J	0.0036	0.000014	J	0.0037	0.000014	J	0.0034	0.000013	J	0.0054	0.000021	J
035	3	34-3	0.0013	0.0000049	J	0.0016	0.0000061	J	ND	-		ND	-		0.0013	0.000005	J	0.0022	0.0000084	J
037	3	34-4	ND	-		ND	-		ND	-		ND	-		0.0022	0.0000086	J	0.0013	0.0000052	J
040	4	23-23	0.013	0.000045		0.016	0.000055		0.021	0.000073		0.017	0.000058		0.013	0.000045		0.022	0.000076	
041	4	234-2	ND	-		ND	-		ND	-		ND	-		ND	-		0.0018	0.0000062	J
042	4	23-24	0.015	0.000053		0.019	0.000064		0.026	0.00009		0.02	0.000067		0.016	0.000053		0.021	0.000073	
043	4	235-2	0.0038	0.000013	J	0.0042	0.000014	J	0.0033	0.000011	J	0.0037	0.000013	J	0.0036	0.000012	J	0.0065	0.000022	
044	4	23-25	0.062	0.00021		0.069	0.00024		0.2	0.0007		0.15	0.00053		0.079	0.00027		0.1	0.00035	
045	4	236-2	0.0037	0.000013	J	0.0041	0.000014	J	0.016	0.000055		0.013	0.000045		0.0046	0.000016	J	0.0063	0.000022	
046	4	23-26	0.0049	0.000017	J	0.0066	0.000023		0.011	0.000038	J	0.0076	0.000026	J	0.0047	0.000016	J	0.0068	0.000023	
047	4	24-24	0.016	0.000053		0.017	0.000059		0.051	0.00018		0.039	0.00013		0.02	0.000067		0.025	0.000087	
048	4	245-2	0.007	0.000024		0.0079	0.000027		ND	-		ND	-		0.0077	0.000026		0.014	0.000047	
049	4	24-25	0.083	0.00029		0.095	0.00033		0.29	0.001		0.21	0.00071		0.11	0.00037		0.12	0.0004	
051	4	24-26	ND	-		ND	-		0.0032	0.000011	J	0.0027	0.0000091	J	ND	-		0.0013	0.0000043	J
052	4	25-25	0.076	0.00026		0.087	0.0003		0.24	0.00082		0.17	0.0006		0.098	0.00033		0.12	0.0004	
053	4	25-26	0.01	0.000035		0.011	0.000038		0.056	0.00019		0.038	0.00013		0.013	0.000046		0.017	0.000058	
054	4	26-26	0.0017	0.0000059	J	0.0014	0.0000046	J	0.013	0.000045		0.013	0.000044		0.0028	0.0000097	J	0.0027	0.0000092	J
055	4	234-3	0.0079	0.000027		0.0065	0.000022		0.0048	0.000016	J	0.0081	0.000028	J	0.0072	0.000025		0.011	0.000037	
056	4	23-34	0.023	0.000079		0.019	0.000066		0.019	0.000066		0.024	0.000083		0.024	0.000082		0.027	0.000094	
059	4	236-3	0.0095	0.000032		0.012	0.000042		0.0099	0.000034	J	0.0084	0.000029	J	0.0076	0.000026		0.01	0.000036	
060	4	234-4	0.0028	0.0000097	J	0.0024	0.0000082	J	ND	-		ND	-		0.003	0.00001	J	0.0036	0.000012	J
063	4	235-4	0.0035	0.000012	J	0.0035	0.000012	J	0.004	0.000014	J	ND	-		0.004	0.000014	J	0.0051	0.000017	J
064	4	236-4	0.018	0.00006		0.02	0.000067		0.02	0.000069		0.018	0.000063		0.018	0.000063		0.022	0.000076	
066	4	24-34	0.022	0.000076		0.022	0.000074		0.043	0.00015		0.027	0.000092		0.026	0.000087		0.039	0.00013	
067	4	245-3	0.0052	0.000018	J	0.0059	0.00002	J	0.021	0.000071		0.013	0.000046		0.0061	0.000021	J	0.011	0.000037	
070	4	25-34	0.023	0.00008		0.024	0.000082		0.04	0.00014		0.028	0.000097		0.029	0.000098		0.042	0.00014	
071	4	26-34	0.018	0.00006		0.022	0.000074		0.029	0.000098		0.023	0.000078		0.018	0.00006		0.03	0.0001	
072	4	25-35	0.0066	0.000023		0.0067	0.000023		0.048	0.00016		0.034	0.00012		0.013	0.000044		0.0099	0.000034	
074	4	245-4	0.011	0.000038		0.011	0.000038		0.019	0.000065		0.013	0.000045		0.014	0.000046		0.02	0.000067	

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FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

		Loc_Sample ID	WP-BT01A-005			WP-BT01C-001			WP-BT02B-001			WP-BT02C-001			WP-BT03A-004			WP-BT03C-001		
		Sample ID	4117-091814-1329			4117-092514-1416			4117-092714-0947			4117-091814-1617			4117-092414-1646			4117-091914-1004		
		Reach Segment	NORTH - REACH 1			NORTH - REACH 1			ADJACENT - REACH 2			ADJACENT - REACH 2			SOUTH - REACH 3			SOUTH - REACH 3		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
075	4	246-4	0.0024	0.0000082	J	0.0023	0.0000078	J	0.0097	0.000033	J	0.0068	0.000023	J	0.0033	0.000011	J	0.0036	0.000012	J
077	4	34-34	0.0015	0.0000052	J	ND	-		0.0049	0.000017	J	0.0031	0.000011	J	0.0016	0.0000053	J	0.0019	0.0000064	J
082	5	234-23	0.0057	0.000017	J	0.005	0.000015	J	0.024	0.000072		0.016	0.000048		0.0073	0.000022		0.01	0.000031	
083	5	235-23	0.0059	0.000018	J	0.006	0.000019	J	0.021	0.000063		0.016	0.00005		0.0064	0.00002		0.0086	0.000026	
084	5	236-23	0.018	0.000056		0.02	0.00006		0.031	0.000096		0.024	0.000072		0.021	0.000065		0.034	0.0001	
085	5	234-24	0.013	0.00004		0.01	0.000032		0.013	0.000041		0.014	0.000043		0.014	0.000043		0.019	0.000059	
087	5	234-25	0.014	0.000043		0.011	0.000035		0.014	0.000043		0.017	0.000053		0.016	0.00005		0.032	0.000099	
089	5	234-26	0.005	0.000015	J	0.0042	0.000013	J	0.0031	0.0000094	J	0.0052	0.000016	J	0.0046	0.000014	J	0.0069	0.000021	
091	5	236-24	0.019	0.000057		0.02	0.000061		0.078	0.00024		0.05	0.00015		0.024	0.000073		0.027	0.000082	
092	5	235-25	0.029	0.000089		0.025	0.000077		0.065	0.0002		0.046	0.00014		0.034	0.0001		0.043	0.00013	
094	5	235-26	0.0038	0.000011	J	0.0042	0.000013	J	0.016	0.00005		0.011	0.000034	J	0.006	0.000018	J	0.0076	0.000023	
095	5	236-25	0.057	0.00017		0.059	0.00018		0.21	0.00064		0.17	0.00053		0.078	0.00024		0.1	0.00031	
097	5	245-23	0.022	0.000066		0.019	0.000058		0.045	0.00014		0.032	0.000097		0.025	0.000077		0.037	0.00011	
099	5	245-24	0.069	0.00021		0.057	0.00017		0.17	0.00051		0.11	0.00034		0.085	0.00026		0.11	0.00034	
101	5	245-25	0.09	0.00028		0.08	0.00024		0.23	0.00069		0.16	0.00049		0.11	0.00034		0.15	0.00047	
102	5	245-26	0.0075	0.000023		0.0058	0.000018	J	0.017	0.000051		0.013	0.000041		0.0069	0.000021		0.0089	0.000027	
104	5	246-26	ND	-		ND	-		0.022	0.000067		0.021	0.000063		ND	-		ND	-	
105	5	234-34	0.032	0.000099		0.023	0.00007		0.11	0.00033		0.065	0.0002		0.038	0.00012		0.046	0.00014	
107	5	235-34	0.0014	0.0000043	J	ND	-		ND	-		ND	-		0.0016	0.000005	J	0.0031	0.0000094	J
110	5	236-34	0.053	0.00016		0.051	0.00016		0.098	0.0003		0.071	0.00022		0.062	0.00019		0.099	0.0003	
114	5	2345-4	ND	-		ND	-		ND	-		ND	-		ND	-		0.0017	0.0000053	J
115	5	2346-4	ND	-		ND	-		ND	-		ND	-		0.0013	0.0000039	J	0.002	0.0000062	J
117	5	2356-4	0.0023	0.000007	J	0.0018	0.0000056	J	ND	-		ND	-		0.0025	0.0000075	J	0.0034	0.00001	J
118	5	245-34	0.04	0.00012		0.03	0.000091		0.084	0.00026		0.056	0.00017		0.052	0.00016		0.094	0.00029	
122	5	345-23	ND	-		ND	-		0.024	0.000073		0.016	0.000049		0.0035	0.000011	J	ND	-	
123	5	345-24	0.0016	0.0000048	J	0.0013	0.0000039	J	ND	-		ND	-		0.0016	0.0000048	J	0.0023	0.0000071	J
124	5	345-25	ND	-		ND	-		ND	-		ND	-		0.0013	0.0000039	J	0.0024	0.0000074	J
128	6	234-234	0.014	0.00004		0.0097	0.000027		0.01	0.000028	J	0.013	0.000036		0.013	0.000036		0.021	0.000057	
129	6	2345-23	0.0068	0.000019		0.0047	0.000013	J	0.0081	0.000022	J	0.0086	0.000024	J	0.0069	0.000019		0.0092	0.000026	
130	6	234-235	0.0053	0.000015	J	0.005	0.000014	J	0.006	0.000017	J	0.0067	0.000018	J	0.0053	0.000015	J	0.009	0.000025	
131	6	2346-23	0.0067	0.000019		0.0049	0.000014	J	0.0077	0.000021	J	0.0067	0.000018	J	0.0071	0.00002		0.011	0.000031	
132	6	234-236	0.018	0.000049		0.017	0.000046		0.02	0.000055		0.023	0.000064		0.017	0.000047		0.031	0.000086	
133	6	235-235	0.0057	0.000016	J	0.0038	0.000011	J	0.032	0.000087		0.024	0.000065		0.0064	0.000018		0.0045	0.000012	J
134	6	2356-23	0.0046	0.000013	J	0.0042	0.000012	J	0.0071	0.00002	J	0.0056	0.000016	J	0.0057	0.000016	J	0.0082	0.000023	
135	6	235-236	0.019	0.000051		0.013	0.000037		0.33	0.00091		0.22	0.0006		0.052	0.00014		0.019	0.000054	
136	6	236-236	0.0085	0.000024		0.0087	0.000024		0.03	0.000082		0.024	0.000065		0.0093	0.000026		0.012	0.000034	
137	6	2345-24	0.0046	0.000013	J	0.0032	0.0000088	J	0.0075	0.000021	J	0.0056	0.000016	J	0.0047	0.000013	J	0.0079	0.000022	
138	6	234-245	0.091	0.00025		0.063	0.00017		0.11	0.0003		0.11	0.00032		0.091	0.00025		0.12	0.00034	
139	6	2346-24	0.016	0.000044		0.015	0.00004		0.016	0.000045		0.016	0.000044		0.014	0.000038		0.018	0.00005	
141	6	2345-25	0.016	0.000044		0.0094	0.000026		0.015	0.000042		0.021	0.000059		0.014	0.000038		0.02	0.000055	
144	6	2346-25	0.0032	0.000009	J	0.0023	0.0000063	J	0.0035	0.0000097	J	0.0053	0.000015	J	0.0032	0.0000088	J	0.0047	0.000013	J
146	6	235-245	0.0071	0.00002		0.005	0.000014	J	0.023	0.000065		0.014	0.00004		0.0083	0.000023		0.01	0.000028	
147	6	2356-24	0.0023	0.0000064	J	0.002	0.0000054	J	0.01	0.000028	J	0.0069	0.000019	J	0.0029	0.000008	J	0.0032	0.0000087	J
149	6	236-245	0.075	0.00021		0.063	0.00018		0.33	0.00092		0.22	0.00062		0.093	0.00026		0.1	0.00028	
151	6	2356-25	0.036	0.0001		0.028	0.000078		0.12	0.00032		0.075	0.00021		0.037	0.0001		0.045	0.00012	
153	6	245-245	0.13	0.00035		0.083	0.00023		0.32	0.00088		0.25	0.0007		0.13	0.00037		0.14	0.00038	
154	6	245-246	ND	-		ND	-		0.021	0.000058		0.014	0.000038		0.0033	0.0000091	J	ND	-	
156	6	2345-34	0.0089	0.000025		0.0064	0.000018		0.022	0.00006		0.016	0.000044		0.01	0.000028		0.016	0.000043	
158	6	2346-34	0.0062	0.000017	J	0.0046	0.000013	J	0.009	0.000025	J	0.0082	0.000023	J	0.0071	0.00002		0.012	0.000034	

Notes:

(1) J - Qualifier denotes concentration reported is less than the Practical Quantitaion Limit (PQL) but greater than the Method Detection Limit (MDL);
B- Qualifier indicates an estimated value. The following analytes were detected in the associated blank at a level exceeding the Practical Quantitation Limit(PQL).
(2) ND -Denotes analyte not detected (concentration less than the MDL)
(3) PQL and MDL for IUPAC #s 1, 2, and 3 are 5 times higher than all other Congeners
(4) The above listed IUPAC numbers and congener names are consistent with the CAS numbering system. Note that G. Frame's 1996 PCB publication used Guitart's proposed renumbering for congeners 107,108, and 109, which has not to date been adopted by CAS, Ballschmiter or IUPAC.
(5) Only detected analytes are shown

TABLE - WHITE PERCH ANALYTICAL DATA - PCB CONGENERS - 2014
FORMER ANACONDA CABLE AND WIRE COMPANY - HASTINGS-ON-HUDSON, NEW YORK
AUGUST 2015

		Loc_Sample ID	WP-BT01A-005			WP-BT01C-001			WP-BT02B-001			WP-BT02C-001			WP-BT03A-004			WP-BT03C-001		
		Sample ID	4117-091814-1329			4117-092514-1416			4117-092714-0947			4117-091814-1617			4117-092414-1646			4117-091914-1004		
		Reach Segment	NORTH - REACH 1			NORTH - REACH 1			ADJACENT - REACH 2			ADJACENT - REACH 2			SOUTH - REACH 3			SOUTH - REACH 3		
Congener IUPAC #	No. of Cl's	Structure	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.	Result (mg/Kg)	umoles/g	Qual.
163	6	2356-34	0.016	0.000044		0.011	0.000031		0.019	0.000052		0.02	0.000055		0.016	0.000044		0.022	0.00006	
164	6	236-345	0.0053	0.000015	J	0.004	0.000011	J	0.0094	0.000026	J	0.0075	0.000021	J	0.0055	0.000015	J	0.008	0.000022	
167	6	245-345	0.0035	0.0000096	J	0.0024	0.0000068	J	0.0042	0.000012	J	0.0033	0.0000092	J	0.0032	0.0000089	J	0.0054	0.000015	J
170	7	2345-234	0.019	0.000049		0.013	0.000034		0.044	0.00011		0.036	0.000091		0.017	0.000043		0.021	0.000052	
171	7	2346-234	0.0058	0.000015	J	0.004	0.00001	J	0.013	0.000033		0.012	0.00003	J	0.0062	0.000016	J	0.0059	0.000015	J
172	7	2345-235	0.0053	0.000014	J	0.0034	0.0000085	J	0.019	0.000048		0.013	0.000033		0.0051	0.000013	J	0.0048	0.000012	J
174	7	2345-236	0.013	0.000033		0.011	0.000029		0.084	0.00021		0.054	0.00014		0.016	0.00004		0.016	0.00004	
175	7	2346-235	ND	-		ND	-		0.0057	0.000014	J	0.0038	0.0000096	J	0.0013	0.0000032	J	ND	-	
176	7	2346-236	0.0023	0.0000059	J	0.0023	0.0000059	J	0.017	0.000043		0.011	0.000028	J	0.0028	0.0000071	J	0.003	0.0000076	J
177	7	2356-234	0.0084	0.000021		0.0079	0.00002		0.049	0.00012		0.03	0.000076		0.011	0.000027		0.011	0.000028	
178	7	2356-235	0.012	0.00003		0.0084	0.000021		0.12	0.00029		0.069	0.00018		0.019	0.000049		0.012	0.000031	
179	7	2356-236	0.0092	0.000023		0.0091	0.000023		0.12	0.00031		0.061	0.00016		0.016	0.000041		0.014	0.000035	
180	7	2345-245	0.065	0.00016		0.043	0.00011		0.31	0.00079		0.23	0.00059		0.071	0.00018		0.064	0.00016	
183	7	2346-245	0.02	0.000051		0.014	0.000035		0.11	0.00027		0.085	0.00021		0.025	0.000063		0.02	0.000051	
185	7	23456-25	0.0022	0.0000056	J	0.0016	0.0000039	J	0.014	0.000036		0.01	0.000026	J	0.0023	0.0000057	J	0.0021	0.0000054	J
187	7	2356-245	0.059	0.00015		0.041	0.0001		0.5	0.0013		0.33	0.00085		0.09	0.00023		0.06	0.00015	
190	7	23456-34	0.0046	0.000012	J	0.003	0.0000075	J	0.015	0.000037		0.011	0.000027	J	0.0046	0.000012	J	0.0045	0.000012	J
193	7	2356-345	0.0034	0.0000087	J	0.0023	0.0000057	J	0.016	0.000042		0.012	0.000031	J	0.0037	0.0000095	J	0.0033	0.0000085	J
194	8	2345-2345	0.022	0.00005		0.014	0.000032		0.26	0.00062		0.16	0.00036		0.031	0.000073		0.02	0.000047	
195	8	23456-234	0.0054	0.000013	J	0.0032	0.0000075	J	0.071	0.00017		0.043	0.0001		0.0095	0.000022		0.0053	0.000012	J
196	8	2345-2346	0.0081	0.000019		0.0066	0.000015		0.16	0.00038		0.1	0.00023		0.018	0.000041		0.0098	0.000023	
197	8	2346-2346	0.0013	0.0000029	J	ND	-		0.0031	0.0000072	J	ND	-		0.0014	0.0000033	J	0.0022	0.0000051	J
198	8	23456-235	ND	-		ND	-		0.02	0.000046		0.012	0.000028	J	0.0024	0.0000055	J	0.0013	0.000003	J
199	8	2345-2356	0.022	0.00005		0.017	0.00004		0.38	0.00088		0.23	0.00053		0.045	0.00011		0.024	0.000057	
200	8	23456-236	ND	-		ND	-		0.033	0.000076		0.013	0.00003		0.002	0.0000047	J	0.0013	0.0000031	J
201	8	2346-2356	0.0033	0.0000077	J	0.0029	0.0000068	J	0.068	0.00016		0.041	0.000096		0.0082	0.000019		0.0046	0.000011	J
202	8	2356-2356	0.0091	0.000021		0.0074	0.000017		0.13	0.00031		0.08	0.00019		0.017	0.00004		0.01	0.000023	
203	8	23456-245	0.014	0.000033		0.011	0.000026		0.28	0.00066		0.19	0.00043		0.033	0.000076		0.017	0.00004	
205	8	23456-345	ND	-		ND	-		0.018	0.000043		0.0079	0.000018	J	0.0017	0.0000039	J	ND	-	
206	9	23456-2345	0.016	0.000034		0.012	0.000027		0.29	0.00063		0.19	0.00041		0.036	0.000077		0.018	0.000038	
208	9	23456-2356	0.0086	0.000019		0.0055	0.000012	J	0.083	0.00018		0.054	0.00012		0.015	0.000033		0.0071	0.000015	
209	10	23456-23456	ND	-		0.0061	0.000012	J	0.019	0.000038		0.024	0.000048		0.0075	0.000015		0.0068	0.000014	
Total	-	-	2.0	0.0059	-	1.7	0.0053	-	7.6	0.021	-	5.3	0.015	-	2.4	0.0071	-	2.8	0.0086	-

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(2) ND -Denotes analyte not detected (concentration less than the MDL)
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(5) Only detected analytes are shown

TABLES; HISTORICAL NYSDEC BIOTA DATA

HISTORICAL NYSDEC BIOTA DATA
HASTINGS-ON-HUDSON AND REFERENCE LOCATIONS
AMERICAN EEL

LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	DATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
HASTINGS NORTH SLIP	21.2	4538644	593676	9640675	AMEL	9-24-1999	M	1	774	1064		62.4	20.3	0.22	0.44	0.28	1.14	2.08
HASTINGS NORTH SLIP	21.2	4538644	593676	HHNS001A	AMEL	9-3-1998	U	1	225	58.3		-9	1.59	-1	-1	-1	6.3	6.8
HASTINGS NORTH SLIP	21.2	4538644	593676	HHNS001C	AMEL	9-3-1998	U	1	225	58.3		-9	2.04	-0.75	-0.75	-0.75	4	4.375
HASTINGS NORTH SLIP	21.2	4538644	593676	HHNS001B	AMEL	9-3-1998	U	1	225	58.3		-9	4.12	-1.3	-1.3	-1.3	7.8	8.45
HASTINGS NORTH SLIP	21.2	4538644	593676	9640693	AMEL	9-23-1999	M	1	529	318		59.6	16.2	0.21	0.44	0.48	2.55	3.68
PIERMONT	24.8	4543629	591957	0261698	AMEL	6-2-2011	U	1	417	170		71.9	8.83	0.16	0.52	0.81	1.06	2.55
PIERMONT	24.8	4543629	591957	0261692	AMEL	6-2-2011	U	1	674	740		68.4	11.2	0.14	0.11	0.65	0.83	1.73
PIERMONT	24.8	4543629	591957	0003576	AMEL	5-25-2004	U	1	552	338		64.5	15.8	0.18	0.22	0.86	0.7	1.96
PIERMONT	24.8	4543629	591957	0003577	AMEL	5-25-2004	U	1	633	508		66.9	9.89	0.043	-0.01	0.54	0.75	1.333
PIERMONT	24.8	4543629	591957	0003578	AMEL	5-25-2004	U	1	631	450		62.1	21.2	0.24	0.34	1.13	1.07	2.78
PIERMONT	24.8	4543629	591957	0003579	AMEL	5-25-2004	U	1	488	210		66.8	14.1	0.15	0.38	0.8	1.07	2.4
PIERMONT	24.8	4543629	591957	0003580	AMEL	5-25-2004	U	1	578	392		74.7	3.05	-0.01	-0.01	0.44	0.88	1.325
PIERMONT	24.8	4543629	591957	0003581	AMEL	5-25-2004	U	1	629	498		67.1	14.1	0.12	0.021	1.15	1.82	3.111
PIERMONT	24.8	4543629	591957	0003582	AMEL	5-25-2004	U	1	679	506		69.1	12	0.12	0.011	0.98	1.3	2.411
PIERMONT	24.8	4543629	591957	0003583	AMEL	5-25-2004	U	1	577	336		77	3.1	-0.01	-0.01	0.41	0.66	1.075
PIERMONT	24.8	4543629	591957	0003584	AMEL	5-25-2004	U	1	440	156		75.7	3.05	0.036	-0.01	0.43	0.59	1.056
PIERMONT	24.8	4543629	591957	0003585	AMEL	5-25-2004	U	1	574	404		66.9	11.6	0.16	0.34	0.94	0.91	2.35
PIERMONT	24.8	4543629	591957	0261700	AMEL	6-2-2011	U	1	730	830		66.1	16.5	0.15	0.3	0.72	0.98	2.15
PIERMONT	24.8	4543629	591957	0261691	AMEL	6-2-2011	U	1	616	623		72.6	10.4	0.059	0.078	0.38	0.55	1.067
PIERMONT	24.8	4543629	591957	0261693	AMEL	6-2-2011	U	1	524	310		67.6	13.5	0.16	0.16	0.75	1.11	2.18
PIERMONT	24.8	4543629	591957	0261694	AMEL	6-2-2011	U	1	427	190		74.7	5.69	0.062	-0.01	0.42	0.63	1.112
PIERMONT	24.8	4543629	591957	0261695	AMEL	6-2-2011	U	1	475	217		76.7	3.8	0.049	-0.01	0.34	0.93	1.319
PIERMONT	24.8	4543629	591957	0261696	AMEL	6-2-2011	U	1	539	325		73.7	5.34	0.048	-0.01	0.28	0.67	0.998
PIERMONT	24.8	4543629	591957	0261697	AMEL	6-2-2011	U	1	566	420		69.1	8.7	0.087	-0.01	0.49	0.53	1.107
PIERMONT	24.8	4543629	591957	0261699	AMEL	6-2-2011	U	1	416	195		71.5	5.18	0.082	0.26	0.5	0.94	1.782
PIERMONT	24.8	4543629	591957	0261690	AMEL	6-2-2011	U	1	634	605		68.3	10.5	0.27	0.31	1.3	0.93	2.81
PIERMONT	24.8	4543629	591957	0380136	AMEL	5-17-2006	M	1	306	58		67.3	14.6	0.081	0.14	0.66	0.93	1.811
PIERMONT	24.8	4543629	591957	0380133	AMEL	5-17-2006	M	1	777	1058		78.4	3.67	0.2	0.26	0.46	0.77	1.69
PIERMONT	24.8	4543629	591957	0380135	AMEL	5-17-2006	F	1	347	70		70.5	10.2	0.075	0.18	0.96	0.62	1.835
PIERMONT	24.8	4543629	591957	0380137	AMEL	5-17-2006	F	1	312	52		70.3	7.91	0.11	0.34	1.16	0.57	2.18
PIERMONT	24.8	4543629	591957	0380134	AMEL	5-17-2006	M	1	572	536		59.2	26.6	0.24	0.26	1.62	1.05	3.17
PIERMONT	24.8	4543629	591957	135721	AMEL	6-27-2002	M	1	346	80.5		80.2	1.49	-0.01	-0.01	0.34	0.33	0.675
PIERMONT	24.8	4543629	591957	0003316	AMEL	7-11-2003	U	1	592	456		77.9	4.08	0.033	-0.01	0.34	0.69	1.063
PIERMONT	24.8	4543629	591957	0003317	AMEL	7-11-2003	U	1	648	526		75.5	5.8	-0.01	-0.01	0.47	0.87	1.345
PIERMONT	24.8	4543629	591957	0003318	AMEL	7-11-2003	U	1	402	158		79.6	2.3	-0.01	-0.01	0.084	0.22	0.309
PIERMONT	24.8	4543629	591957	0003319	AMEL	7-11-2003	U	1	529	310		79.3	2.73	-0.01	-0.01	0.22	0.46	0.685
PIERMONT	24.8	4543629	591957	0003320	AMEL	7-11-2003	U	1	470	194		70.9	10.3	0.071	0.18	0.35	0.51	1.111
PIERMONT	24.8	4543629	591957	0003321	AMEL	7-11-2003	U	1	443	156		80.6	5.54	0.19	0.22	1.1	1.03	2.54
PIERMONT	24.8	4543629	591957	0003322	AMEL	7-11-2003	U	1	374	120		79.2	3.19	0.095	-0.01	0.15	0.2	0.445
PIERMONT	24.8	4543629	591957	0003314	AMEL	7-11-2003	U	1	687	684		64.5	13.5	0.1	-0.01	0.86	0.88	1.84
PIERMONT	24.8	4543629	591957	0003313	AMEL	7-11-2003	U	1	694	720		73.2	5.91	0.048	-0.01	0.43	0.61	1.088
PIERMONT	24.8	4543629	591957	135723	AMEL	6-27-2002	M	1	357	99.4		80.3	1.66	0.016	-0.01	0.24	0.23	0.486
PIERMONT	24.8	4543629	591957	0003315	AMEL	7-11-2003	U	1	654	628		69.9	11.6	0.11	-0.01	0.88	1.2	2.19
PIERMONT	24.8	4543629	591957	135720	AMEL	6-27-2002	U	1	291	48.8		77	9.37	0.2	0.14	0.82	0.57	1.73
PIERMONT	24.8	4543629	591957	0003312	AMEL	7-11-2003	U	1	670	678		77.7	2.61	0.013	-0.01	0.18	0.48	0.673
PIERMONT	24.8	4543629	591957	9639598	AMEL	5-27-2005	M	1	344	88		78.3	2.12	-0.01	-0.01	0.43	0.29	0.725
PIERMONT	24.8	4543629	591957	135722	AMEL	6-27-2002	U	1	224	19.3		81.3	2.2	0.063	-0.01	0.4	0.26	0.723
PIERMONT	24.8	4543629	591957	9639595	AMEL	5-27-2005	M	1	496	226		75.5	2.02	-0.01	-0.01	0.38	0.38	0.765
PIERMONT	24.8	4543629	591957	9639597	AMEL	5-27-2005	M	1	426	146		77.2	0.96	-0.01	-0.01	0.17	0.24	0.415
PIERMONT	24.8	4543629	591957	9639599	AMEL	5-27-2005	M	1	465	458		73.6	5.28	-0.01	-0.01	0.44	0.8	1.245
PIERMONT	24.8	4543629	591957	9639600	AMEL	5-27-2005	M	1	560	320		73.9	2.64	-0.01	-0.01	0.16	0.32	0.485

Provided by W. Richter of NYSDEC via email, February 2014

LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	DATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
PIERMONT	24.8	4543629	591957	9639596	AMEL	5-27-2005	M	1	373	84		76.7	2.76	-0.01	-0.01	0.49	0.64	1.135
PIERMONT	24.8	4543629	591957	135719	AMEL	6-27-2002	M	1	703	724		65.8	16.3	0.13	-0.01	1.6	1.36	3.09
PIERMONT	24.8	4543629	591957	135718	AMEL	6-27-2002	M	1	447	170.4		79.4	1.9	-0.01	-0.01	0.25	0.3	0.555
PIERMONT	24.8	4543629	591957	135717	AMEL	6-27-2002	U	1	304	59.7		69.5	11.3	0.11	0.22	0.58	0.73	1.64
PIERMONT	24.8	4543629	591957	135716	AMEL	6-27-2002	M	1	531	286		73.7	3.54	0.073	0.27	0.8	0.52	1.663
PIERMONT	24.8	4543629	591957	135715	AMEL	6-27-2002	M	1	648	538		77.2	3.27	0.099	0.028	0.46	0.65	1.237
PIERMONT	24.8	4543629	591957	0384162	AMEL	6-5-2008	U	1	456	212		71.9	9.02	0.074	0.264	0.72	0.75	1.808
PIERMONT	24.8	4543629	591957	0384156	AMEL	6-5-2008	U	1	670	716		68.6	4.7	0.045	0.328	0.63	0.87	1.873
PIERMONT	24.8	4543629	591957	0384157	AMEL	6-5-2008	U	1	455	188		72.2	8.95	0.06	0.228	0.54	0.7	1.528
PIERMONT	24.8	4543629	591957	0384158	AMEL	6-5-2008	U	1	636	496		78.2	7.33	0.036	0.068	0.84	0.7	1.644
PIERMONT	24.8	4543629	591957	0384159	AMEL	6-5-2008	U	1	577	374		72.4	6.78	0.03	0.138	0.6	0.8	1.568
PIERMONT	24.8	4543629	591957	0384161	AMEL	6-5-2008	U	1	548	338		77.2	5.11	0.029	0.084	0.63	0.6	1.343
PIERMONT	24.8	4543629	591957	0384163	AMEL	6-5-2008	U	1	562	386		73.3	4.15	-0.01	0.034	0.4	0.95	1.384
PIERMONT	24.8	4543629	591957	0384164	AMEL	6-5-2008	U	1	434	164		73.6	9.33	0.021	0.204	0.56	0.7	1.485
PIERMONT	24.8	4543629	591957	0384165	AMEL	6-5-2008	U	1	644	552		77.3	2.49	-0.01	-0.01	0.37	0.6	0.975
PIERMONT	24.8	4543629	591957	0384160	AMEL	6-5-2008	U	1	425	128		75.7	9.68	0.054	0.284	0.75	0.9	1.988
PIERMONT	24.8	4543629	591957	9649076	AMEL	10-8-1999	M	1	502	232		75.9	3.75	0.05	0.032	0.38	0.5	0.962
PIERMONT	24.8	4543629	591957	9647427	AMEL	6-11-2001	M	1	655	554		77.3	3.88	-0.01	-0.01	0.34	0.38	0.725
PIERMONT	24.8	4543629	591957	9647428	AMEL	6-11-2001	M	1	781	964		64.1	17.8	0.073	0.055	0.63	0.92	1.678
PIERMONT	24.8	4543629	591957	9649075	AMEL	10-8-1999	M	1	624	578		72.7	7.58	0.18	0.088	0.62	0.7	1.588
PIERMONT	24.8	4543629	591957	9647424	AMEL	6-11-2001	U	1	344	54		77.1	5.84	0.1	0.3	0.74	1.03	2.17
PIERMONT	24.8	4543629	591957	9649077	AMEL	10-8-1999	M	1	364	112		65.5	15.5	0.27	0.57	0.72	0.75	2.31
PIERMONT	24.8	4543629	591957	9649078	AMEL	10-8-1999	M	1	587	544		68.6	13.5	0.16	0.38	0.8	0.78	2.12
PIERMONT	24.8	4543629	591957	9649079	AMEL	10-8-1999	M	1	530	296		75.1	5.75	0.083	-0.01	0.69	0.92	1.693
PIERMONT	24.8	4543629	591957	9649074	AMEL	10-8-1999	M	1	722	782		70.9	10.9	0.17	0.087	0.55	0.53	1.337
PIERMONT	24.8	4543629	591957	9647426	AMEL	6-11-2001	M	1	646	590		69.4	11.6	0.12	0.12	0.68	0.64	1.56
PIERMONT	24.8	4543629	591957	9647425	AMEL	6-11-2001	U	1	294	50		70.6	13.8	0.19	0.59	0.7	1.01	2.49
PIERMONT	24.8	4543629	591957	9647416	AMEL	6-11-2001	F	1	521	238		77.8	1.18	0.029	-0.01	0.35	0.7	1.079
PIERMONT	24.8	4543629	591957	9647417	AMEL	6-11-2001	U	1	333	74		72	13.4	0.16	0.5	0.63	1.15	2.44
PIERMONT	24.8	4543629	591957	9647418	AMEL	6-11-2001	U	1	427	132		76.4	1.08	0.017	-0.01	0.16	0.49	0.667
PIERMONT	24.8	4543629	591957	9647419	AMEL	6-11-2001	U	1	396	104		80	3.01	0.05	0.031	0.51	1.05	1.641
PIERMONT	24.8	4543629	591957	9647420	AMEL	6-11-2001	M	1	487	204		80.2	1.52	0.02	-0.01	0.3	0.6	0.92
PIERMONT	24.8	4543629	591957	9647421	AMEL	6-11-2001	F	1	630	420		75.2	3.62	0.067	0.11	0.53	0.93	1.637
PIERMONT	24.8	4543629	591957	9647422	AMEL	6-11-2001	U	1	349	70		73.9	7.24	0.13	0.4	0.34	0.43	1.3
PIERMONT	24.8	4543629	591957	9647423	AMEL	6-11-2001	U	1	317	62		80	3.14	0.036	0.12	0.38	0.58	1.116
PIERMONT	24.8	4543629	591957	0383069	AMEL	6-6-2007	M	1	645	652		62.7	21.2	0.17	0.42	1	1.44	3.03
PIERMONT	24.8	4543629	591957	9746461	AMEL	6-8-2000	M	1	718	800		70.7	7.72	0.11	-0.01	0.52	0.7	1.33
PIERMONT	24.8	4543629	591957	9746462	AMEL	6-8-2000	F	1	520	380		74.9	3.61	0.032	-0.01	0.42	0.73	1.182
PIERMONT	24.8	4543629	591957	9746464	AMEL	6-8-2000	M	1	560	360		77.1	3.85	0.055	-0.01	0.74	1.06	1.855
PIERMONT	24.8	4543629	591957	9746465	AMEL	6-8-2000	M	1	738	900		63.7	18.1	0.29	0.17	1.05	1.39	2.9
PIERMONT	24.8	4543629	591957	9746466	AMEL	6-8-2000	M	1	593	440		75.8	3.17	0.051	-0.01	0.43	0.72	1.201
PIERMONT	24.8	4543629	591957	9746467	AMEL	6-8-2000	M	1	690	660		67.1	14.6	0.23	-0.01	1.42	2.33	3.98
PIERMONT	24.8	4543629	591957	0383072	AMEL	6-6-2007	M	1	633	448		73.6	5.44	0.071	0.11	0.5	0.66	1.341
PIERMONT	24.8	4543629	591957	9746468	AMEL	6-8-2000	M	1	620	460		69.7	9.54	0.12	-0.01	0.75	1.03	1.9
PIERMONT	24.8	4543629	591957	9746469	AMEL	6-8-2000	M	1	569	380		65.2	14.1	0.18	-0.01	1.26	1.62	3.06
PIERMONT	24.8	4543629	591957	0383071	AMEL	6-6-2007	M	1	625	510		64	18.2	0.26	0.49	1.36	1.25	3.36
PIERMONT	24.8	4543629	591957	0383070	AMEL	6-6-2007	M	1	620	586		65.6	18.1	0.075	0.5	0.7	1.01	2.285
PIERMONT	24.8	4543629	591957	9746463	AMEL	6-8-2000	M	1	596	320		68.5	10.5	0.24	0.23	1.12	1.14	2.73
PIERMONT	24.8	4543629	591957	9746470	AMEL	6-8-2000	M	1	513	220		82.2	0.81	-0.01	-0.01	0.2	0.46	0.665
PIERMONT	24.8	4543629	591957	0383075	AMEL	6-6-2007	F	1	618	468		75.1	4.53	0.01	0.24	0.38	0.68	1.31
PIERMONT	24.8	4543629	591957	0383074	AMEL	6-6-2007	F	1	663	636		66.5	15.5	0.13	0.31	0.7	0.95	2.09

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HISTORICAL NYSDEC BIOTA DATA
HASTINGS-ON-HUDSON AND REFERENCE LOCATIONS
AMERICAN EEL

LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	DATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
PIERMONT	24.8	4543629	591957	0383073	AMEL	6-6-2007	M	1	686	770		64.3	18.6	0.057	0.47	0.56	0.83	1.917
PIERMONT	24.8	4543629	591957	0383078	AMEL	6-6-2007	M	1	467	164		72.1	9.21	0.12	0.26	0.95	0.98	2.31
PIERMONT	24.8	4543629	591957	0383076	AMEL	6-6-2007	F	1	606	480		77.9	2.96	-0.01	0.25	0.38	0.69	1.32
PIERMONT	24.8	4543629	591957	0383077	AMEL	6-6-2007	M	1	466	178		80.9	0.62	-0.01	0.047	0.15	0.33	0.527
TAPPAN ZEE BRIDGE	27	4547123	591533	9746791	AMEL	6-15-1999	U	1	505	280		75	2.96	0.058	0.042	0.38	0.56	1.04
TAPPAN ZEE BRIDGE	27	4547123	591533	9746790	AMEL	6-15-1999	U	1	645	640		66.2	15.3	0.17	0.11	0.88	1.28	2.44
TAPPAN ZEE BRIDGE	27	4547123	591533	9746784	AMEL	6-9-1999	M	1	714	700		70.8	7.49	0.07	0.019	0.69	1	1.779
TAPPAN ZEE BRIDGE	27	4547123	591533	9746782	AMEL	6-9-1999	M	1	512	240		68.7	15.2	0.18	0.13	1.37	1.4	3.08
TAPPAN ZEE BRIDGE	27	4547123	591533	9746783	AMEL	6-9-1999	M	1	646	580		74.3	5.07	0.048	-0.005	0.68	0.91	1.638

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LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640757	WP	19990924	U	1	94	12		78.6	3.2	0.21	0.45	0.24	0.7	1.6
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640754	WP	19990924	U	1	94	11		76.9	3.75	0.18	0.4	0.19	0.62	1.39
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640756	WP	19990924	U	1	86	9		74.2	3.08	0.18	0.4	0.16	0.65	1.39
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640758	WP	19990924	U	1	96	12		79.2	3.6	0.19	0.5	0.23	0.88	1.8
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640759	WP	19990924	U	1	82	7		76.4	2.9	0.18	0.42	0.19	0.58	1.37
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640755	WP	19990924	U	1	83	8		73.8	2.84	0.18	0.49	0.22	0.69	1.58
HASTINGS NORTH SLIP	21.2	4538644	593676	9640653	WP	19990924	U	1	215	184		72.6	6.67	0.41	0.57	1.29	1.02	3.29
HASTINGS NORTH SLIP	21.2	4538644	593676	9640654	WP	19990924	U	1	210	185		71.5	5.7	0.25	0.41	0.23	1.04	1.93
HASTINGS NORTH SLIP	21.2	4538644	593676	9640698	WP	19990923	U	1	200	134		73	5.69	0.37	0.51	0.35	0.65	1.88
HASTINGS NORTH SLIP	21.2	4538644	593676	9640697	WP	19990923	M	1	210	166		74.9	5.97	0.25	0.53	0.11	1.21	2.1
HASTINGS NORTH SLIP	21.2	4538644	593676	9640696	WP	19990923	M	1	190	108		78.3	2.9	0.2	0.38	0.23	0.4	1.21
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640730	WP	19990924	U	5	88.6	8		78.4	2.84	0.28	0.82	-0.01	2.45	3.55
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640729	WP	19990924	U	5	94	9.3		74.7	2.98	0.28	0.84	-0.01	2.76	3.88
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640732	WP	19990924	U	5	84.8	6.6		77.8	1.89	0.23	0.81	-0.01	3.09	4.13
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640731	WP	19990924	U	5	81.6	5.9		76.3	2.22	0.28	1.1	-0.01	4.69	6.07
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640682	WP	19990923	M	1	210	150		70.6	5.21	0.25	0.44	0.18	1.17	2.04
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640669	WP	19990924	U	1	250	260		72.6	6.98	0.4	0.66	0.26	1.69	3.01
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640668	WP	19990924	U	1	245	230		71	6.55	0.45	1.21	-0.01	3.64	5.3
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640667	WP	19990924	U	1	243	214		67.1	7.92	0.42	0.69	0.19	2	3.3
HASTINGS ABAN. MARINA	21.3	4538959	593726	MA001	WP	19980903	U	1	150	140		-9	6.14	-0.35	0.74	1.3	1.7	3.74
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649339	WP	19990927	U	2	182	82		71.9	3.89	0.46	0.82	0.76	1.06	3.1
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649342	WP	19990927	U	1	229	220		71	10.6	0.37	0.67	0.44	0.72	2.2
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649341	WP	19990927	U	2	201	125		70.2	6.88	0.46	0.76	0.57	0.66	2.45
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649340	WP	19990927	U	2	185	97		72.1	6.98	0.81	1.3	0.72	0.88	3.71
DOBBS FERRY	23.1	4540825	593939	9649351	WP	19990927	U	1	191	96		66	7.4	1.069	1.269	0.704	0.515	3.557
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649319	WP	19990927	U	3	179.3	84		66.6	6.3	0.56	0.81	0.58	0.55	2.5
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649320	WP	19990927	U	4	189	101		65.6	7.66	0.62	0.71	0.77	0.85	2.95
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649317	WP	19990927	U	2	158	56		69.7	6.47	0.61	0.75	0.57	0.61	2.54
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649318	WP	19990927	U	3	171	72.7		68.7	7.43	0.79	1.12	0.74	0.7	3.35
PIERMONT	24.8	4543629	591957	0262007	WP	20110602	M	1	228	154		86.6	0.306	0.045	0.068	0.061	0.1	0.274
PIERMONT	24.8	4543629	591957	0262011	WP	20110602	M	1	233	172		82.9	0.404	0.013	0.11	0.077	0.19	0.39
PIERMONT	24.8	4543629	591957	0262010	WP	20110602	M	1	234	184		80.7	1.06	0.1	0.18	0.24	0.45	0.97
PIERMONT	24.8	4543629	591957	0262009	WP	20110602	M	1	216	128		82.7	0.214	0.019	0.015	0.022	0.067	0.123
PIERMONT	24.8	4543629	591957	0262008	WP	20110602	M	1	312	428		79.7	0.582	0.015	0.11	0.074	0.2	0.399
PIERMONT	24.8	4543629	591957	0003575	WP	20040525	U	1	246	192		79.7	0.31	0.024	0.099	0.078	0.096	0.297
PIERMONT	24.8	4543629	591957	0262006	WP	20110602	M	1	219	132		83.2	0.39	0.059	0.068	0.14	0.2	0.467
PIERMONT	24.8	4543629	591957	0262020	WP	20110602	M	1	213	126		93.4	0.276	-0.01	-0.01	0.12	0.13	0.255
PIERMONT	24.8	4543629	591957	0262001	WP	20110602	F	1	287	314		84.4	0.225	0.054	0.049	0.051	0.098	0.252
PIERMONT	24.8	4543629	591957	0262002	WP	20110602	U	1	190	90		80.4	0.588	0.056	0.092	0.13	0.23	0.508
PIERMONT	24.8	4543629	591957	0262003	WP	20110602	M	1	223	166		81.8	0.34	0.026	0.1	0.053	0.12	0.299
PIERMONT	24.8	4543629	591957	0262004	WP	20110602	M	1	225	150		83	0.122	-0.01	0.06	0.02	0.055	0.135
PIERMONT	24.8	4543629	591957	0262005	WP	20110602	M	1	203	108		83.7	0.353	0.026	0.089	0.12	0.31	0.545
PIERMONT	24.8	4543629	591957	0380631	WP	20050527	M	1	187	83.2		79.6	1.31	0.082	0.24	0.2	0.2	0.722
PIERMONT	24.8	4543629	591957	0380148	WP	20060517	F	1	244	188		81.6	0.2	-0.01	0.038	0.041	0.11	0.189
PIERMONT	24.8	4543629	591957	0380149	WP	20060517	F	1	218	142.6		76.9	0.82	-0.01	0.029	0.052	0.13	0.211
PIERMONT	24.8	4543629	591957	0380150	WP	20060517	M	1	229	182.1		80.8	0.4	-0.01	0.036	0.057	0.072	0.165
PIERMONT	24.8	4543629	591957	0380151	WP	20060517	F	1	200	98.7		76.6	1.83	0.14	0.36	0.32	0.45	1.27
PIERMONT	24.8	4543629	591957	0380152	WP	20060517	F	1	188	90.2		79.1	1.39	0.025	0.12	0.24	0.35	0.735
PIERMONT	24.8	4543629	591957	0380153	WP	20060517	M	1	185	82		80.1	0.88	0.087	0.28	0.25	0.32	0.937
PIERMONT	24.8	4543629	591957	0380154	WP	20060517	M	1	187	90.5		77.5	1.98	0.12	0.35	0.32	0.34	1.13
PIERMONT	24.8	4543629	591957	0380155	WP	20060517	M	1	159	54.2		79.3	0.94	0.042	0.18	0.16	0.19	0.572

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LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
PIERMONT	24.8	4543629	591957	0262018	WP	20110602	U	1	198	116		77.1	2.1	0.037	0.22	0.22	0.41	0.887
PIERMONT	24.8	4543629	591957	0380157	WP	20060517	M	1	152	47.9		76.2	1.85	0.053	0.2	0.28	0.27	0.803
PIERMONT	24.8	4543629	591957	0380145	WP	20060517	M	1	270	278		77.7	0.39	0.014	0.066	0.09	0.24	0.41
PIERMONT	24.8	4543629	591957	0380633	WP	20050527	M	1	183	74.3		78.7	0.81	0.11	0.24	0.2	0.33	0.88
PIERMONT	24.8	4543629	591957	0380635	WP	20050527	M	1	165	58.5		81.5	0.71	0.037	0.16	0.14	0.18	0.517
PIERMONT	24.8	4543629	591957	0380636	WP	20050527	M	1	234	156.7		80.7	1.32	0.19	0.39	0.27	0.33	1.18
PIERMONT	24.8	4543629	591957	0380637	WP	20050527	M	1	227	158.5		76.4	1.62	0.18	0.35	0.23	0.26	1.02
PIERMONT	24.8	4543629	591957	0380638	WP	20050527	M	1	200	96.7		81.3	0.58	0.06	0.17	0.13	0.24	0.6
PIERMONT	24.8	4543629	591957	0380639	WP	20050527	M	1	277	252		76.4	0.46	0.034	0.073	0.12	0.23	0.457
PIERMONT	24.8	4543629	591957	0380640	WP	20050527	F	1	186	83.4		78.2	0.64	0.069	0.21	0.14	0.36	0.779
PIERMONT	24.8	4543629	591957	0380641	WP	20050527	F	1	206	103.4		79.2	0.15	-0.01	-0.01	0.037	0.089	0.131
PIERMONT	24.8	4543629	591957	0380642	WP	20050527	M	1	170	59.9		80.6	0.43	0.05	0.2	0.2	0.33	0.78
PIERMONT	24.8	4543629	591957	0380156	WP	20060517	F	1	176	78.7		75	1.24	0.028	0.17	0.15	0.22	0.568
PIERMONT	24.8	4543629	591957	0262013	WP	20110602	M	1	263	244		81.4	0.238	0.013	0.066	0.062	0.11	0.251
PIERMONT	24.8	4543629	591957	0262014	WP	20110602	M	1	233	176		81.4	0.225	0.017	0.086	0.042	0.088	0.233
PIERMONT	24.8	4543629	591957	0262015	WP	20110602	M	1	221	150		82.6	0.25	-0.01	0.06	0.025	0.07	0.155
PIERMONT	24.8	4543629	591957	0262016	WP	20110602	M	1	207	120		82.8	0.194	0.012	0.073	0.031	0.091	0.207
PIERMONT	24.8	4543629	591957	0262017	WP	20110602	U	1	188	78		80.3	0.378	-0.01	-0.01	0.086	0.13	0.221
PIERMONT	24.8	4543629	591957	0003574	WP	20040525	U	1	220	140		78.7	0.8	0.078	0.26	0.14	0.18	0.658
PIERMONT	24.8	4543629	591957	0262019	WP	20110602	M	1	202	98		84.5	0.256	0.012	0.061	0.029	0.098	0.2
PIERMONT	24.8	4543629	591957	135693	WP	20020627	M	1	179	71		80	0.75	0.19	0.48	0.46	0.46	1.59
PIERMONT	24.8	4543629	591957	0380147	WP	20060517	M	1	252	224		82	0.34	-0.01	0.043	0.065	0.14	0.248
PIERMONT	24.8	4543629	591957	0380146	WP	20060517	M	1	208	115.9		80	1.24	0.12	0.3	0.19	0.16	0.77
PIERMONT	24.8	4543629	591957	0380138	WP	20060517	M	1	232	156.5		81.8	0.85	0.022	0.13	0.099	0.28	0.531
PIERMONT	24.8	4543629	591957	0380139	WP	20060517	F	1	245	222		78	0.6	-0.01	0.044	0.067	0.13	0.241
PIERMONT	24.8	4543629	591957	0380140	WP	20060517	M	1	228	161.9		80.5	2.02	0.07	0.14	0.18	0.18	0.57
PIERMONT	24.8	4543629	591957	0380141	WP	20060517	F	1	273	312		81.6	0.3	-0.01	0.013	0.016	0.093	0.122
PIERMONT	24.8	4543629	591957	0380142	WP	20060517	M	1	254	234		83.1	0.52	-0.01	0.055	0.026	0.16	0.241
PIERMONT	24.8	4543629	591957	0380143	WP	20060517	F	1	247	204		77.8	0.4	-0.01	0.043	0.054	0.13	0.227
PIERMONT	24.8	4543629	591957	0380144	WP	20060517	F	1	257	210		81.3	0.23	0.05	0.029	0.043	0.046	0.168
PIERMONT	24.8	4543629	591957	0262012	WP	20110602	M	1	234	176		79.8	0.451	-0.01	0.17	0.021	0.14	0.331
PIERMONT	24.8	4543629	591957	0003557	WP	20040525	U	1	196	110		79.4	1.07	0.1	0.25	0.18	0.28	0.81
PIERMONT	24.8	4543629	591957	0003556	WP	20040525	U	1	187	90		78.2	1.02	0.056	0.14	0.24	0.45	0.886
PIERMONT	24.8	4543629	591957	0003558	WP	20040525	U	1	187	90		71.6	1.76	0.08	0.2	0.17	0.27	0.72
PIERMONT	24.8	4543629	591957	0003559	WP	20040525	U	1	225	148		80.8	0.37	0.03	0.082	0.065	0.16	0.337
PIERMONT	24.8	4543629	591957	0003560	WP	20040525	U	1	186	100		81	0.48	0.081	0.12	0.14	0.18	0.521
PIERMONT	24.8	4543629	591957	0003562	WP	20040525	U	1	182	86		78.3	1.72	0.1	0.22	0.25	0.3	0.87
PIERMONT	24.8	4543629	591957	0003563	WP	20040525	U	1	205	118		81.5	0.71	0.16	0.29	0.28	0.39	1.12
PIERMONT	24.8	4543629	591957	0003564	WP	20040525	U	1	201	112		81.4	0.59	0.031	0.078	0.055	0.12	0.284
PIERMONT	24.8	4543629	591957	0003565	WP	20040525	U	1	212	122		79.1	1.01	0.11	0.23	0.2	0.44	0.98
PIERMONT	24.8	4543629	591957	135691	WP	20020627	M	1	189	83		79	1.99	0.11	0.25	0.28	0.29	0.93
PIERMONT	24.8	4543629	591957	0003555	WP	20040525	U	1	264	270		77.3	5.47	0.42	0.65	0.78	0.86	2.71
PIERMONT	24.8	4543629	591957	0003303	WP	20030711	M	1	212	150		81.6	1.96	0.094	0.15	0.1	0.14	0.484
PIERMONT	24.8	4543629	591957	0003293	WP	20030711	M	1	257	230		80.9	0.3	0.025	0.043	0.052	0.085	0.205
PIERMONT	24.8	4543629	591957	0003294	WP	20030711	M	1	218	132		80.8	0.46	0.042	0.098	0.26	0.39	0.79
PIERMONT	24.8	4543629	591957	0003295	WP	20030711	M	1	256	228		76.8	1.41	0.092	0.11	0.14	0.19	0.532
PIERMONT	24.8	4543629	591957	0003296	WP	20030711	M	1	198	114		80.7	1.36	0.13	0.3	0.24	0.31	0.98
PIERMONT	24.8	4543629	591957	0003297	WP	20030711	M	1	212	126		81.5	2.07	0.082	0.14	0.13	0.25	0.602
PIERMONT	24.8	4543629	591957	0003298	WP	20030711	F	1	207	118		81.7	0.83	0.048	0.098	0.22	0.48	0.846
PIERMONT	24.8	4543629	591957	0003299	WP	20030711	F	1	227	162		83.6	0.43	0.024	0.033	0.077	0.2	0.334
PIERMONT	24.8	4543629	591957	0003300	WP	20030711	F	1	214	126		79	0.95	0.062	0.13	0.095	0.16	0.447

Provided by W. Richter of NYSDEC via email, February 2014

LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
PIERMONT	24.8	4543629	591957	0003302	WP	20030711	M	1	227	160		78.2	2.61	0.13	0.23	0.13	0.2	0.69
PIERMONT	24.8	4543629	591957	0003304	WP	20030711	F	1	204	106		80.1	1.84	0.14	0.28	0.12	0.2	0.74
PIERMONT	24.8	4543629	591957	0003305	WP	20030711	M	1	207	114		80	0.7	0.032	0.069	0.05	0.088	0.239
PIERMONT	24.8	4543629	591957	0003306	WP	20030711	F	1	226	164		81.8	0.73	0.031	0.051	0.076	0.086	0.244
PIERMONT	24.8	4543629	591957	0003307	WP	20030711	M	1	205	118		81.1	0.79	0.06	0.14	0.13	0.16	0.49
PIERMONT	24.8	4543629	591957	0003308	WP	20030711	M	1	221	146		79.7	1.51	0.1	0.16	0.11	0.17	0.54
PIERMONT	24.8	4543629	591957	0003309	WP	20030711	F	1	196	100		82	0.87	0.046	0.1	0.092	0.16	0.398
PIERMONT	24.8	4543629	591957	0003310	WP	20030711	M	1	217	140		82.8	0.82	0.07	0.12	0.11	0.21	0.51
PIERMONT	24.8	4543629	591957	0003311	WP	20030711	M	1	213	132		80	0.73	0.038	0.091	0.13	0.2	0.459
PIERMONT	24.8	4543629	591957	0003301	WP	20030711	M	1	260	246		79.7	0.89	0.052	0.081	0.11	0.16	0.403
PIERMONT	24.8	4543629	591957	135696	WP	20020627	F	1	175	63.7		82.2	0.24	0.027	0.062	0.31	0.39	0.789
PIERMONT	24.8	4543629	591957	135695	WP	20020627	F	1	191	96.9		77.3	3.38	0.32	0.59	0.43	0.38	1.72
PIERMONT	24.8	4543629	591957	135694	WP	20020627	M	1	291	382		79	0.86	0.048	0.089	0.18	0.32	0.637
PIERMONT	24.8	4543629	591957	0380634	WP	20050527	M	1	194	83		80.9	0.96	0.11	0.28	0.23	0.22	0.84
PIERMONT	24.8	4543629	591957	135692	WP	20020627	M	1	184	77.6		77.7	1.89	0.21	0.54	0.36	0.32	1.43
PIERMONT	24.8	4543629	591957	0380643	WP	20050527	M	1	157	60.3		75.3	4.66	0.18	0.43	0.33	0.45	1.39
PIERMONT	24.8	4543629	591957	135698	WP	20020627	F	1	218	148		76.3	3.95	0.31	0.67	0.52	0.65	2.15
PIERMONT	24.8	4543629	591957	135699	WP	20020627	M	1	192	98		77.6	0.88	0.21	-0.01	0.47	0.58	1.26
PIERMONT	24.8	4543629	591957	0003566	WP	20040525	U	1	201	116		79.7	0.58	0.061	0.18	0.1	0.24	0.581
PIERMONT	24.8	4543629	591957	0003567	WP	20040525	U	1	240	190		78.4	2.28	0.11	0.25	0.2	0.39	0.95
PIERMONT	24.8	4543629	591957	0003568	WP	20040525	U	1	319	448		77.9	0.6	-0.01	0.054	0.15	0.23	0.434
PIERMONT	24.8	4543629	591957	0003569	WP	20040525	U	1	180	70		76.6	2	0.15	0.36	0.46	0.79	1.76
PIERMONT	24.8	4543629	591957	0003570	WP	20040525	U	1	221	134		76.1	0.76	0.086	0.24	0.15	0.34	0.816
PIERMONT	24.8	4543629	591957	0003571	WP	20040525	U	1	206	122		77.8	2.83	0.16	-0.01	0.37	0.73	1.26
PIERMONT	24.8	4543629	591957	0003572	WP	20040525	U	1	205	130		80.5	0.6	-0.01	0.034	0.058	0.09	0.182
PIERMONT	24.8	4543629	591957	135709	WP	20020627	F	1	215	124.3		80.8	0.46	0.05	0.23	0.22	0.44	0.94
PIERMONT	24.8	4543629	591957	135714	WP	20020627	M	1	171	67		80.3	1.6	0.24	0.62	0.49	0.67	2.02
PIERMONT	24.8	4543629	591957	135713	WP	20020627	M	1	193	102.8		77.4	3.18	0.51	0.73	0.95	1.22	3.41
PIERMONT	24.8	4543629	591957	135712	WP	20020627	M	1	200	108		81.5	0.76	0.11	0.47	0.4	0.93	1.91
PIERMONT	24.8	4543629	591957	135697	WP	20020627	F	1	218	122.1		79.4	1.08	0.2	0.4	0.42	0.5	1.52
PIERMONT	24.8	4543629	591957	135710	WP	20020627	M	1	155	54.5		76.3	2.31	0.14	0.31	0.3	0.21	0.96
PIERMONT	24.8	4543629	591957	0003573	WP	20040525	U	1	189	90		78.5	1.64	0.22	0.43	0.34	0.47	1.46
PIERMONT	24.8	4543629	591957	135708	WP	20020627	F	1	193	98		78.9	1.97	0.14	0.34	0.29	0.4	1.17
PIERMONT	24.8	4543629	591957	135707	WP	20020627	U	1	137	36.7		79.4	2.46	0.12	0.13	0.26	0.22	0.73
PIERMONT	24.8	4543629	591957	135706	WP	20020627	F	1	238	178.7		79.5	0.42	0.089	0.33	0.39	0.87	1.679
PIERMONT	24.8	4543629	591957	135705	WP	20020627	F	1	188	92.7		81.1	1.16	0.081	0.22	0.22	0.31	0.831
PIERMONT	24.8	4543629	591957	135704	WP	20020627	F	1	174	70.8		78.9	2.89	0.28	0.67	0.44	0.31	1.7
PIERMONT	24.8	4543629	591957	135703	WP	20020627	F	1	182	77.9		80.6	1.73	0.17	0.32	0.46	0.44	1.39
PIERMONT	24.8	4543629	591957	135702	WP	20020627	F	1	190	90.2		80.4	1.82	0.32	0.53	0.56	0.84	2.25
PIERMONT	24.8	4543629	591957	135701	WP	20020627	F	1	193	82.6		78.3	1.64	0.24	0.56	0.45	0.58	1.83
PIERMONT	24.8	4543629	591957	135700	WP	20020627	F	1	195	98.6		76.4	2.36	0.27	0.71	0.46	0.49	1.93
PIERMONT	24.8	4543629	591957	135711	WP	20020627	M	1	181	77.8		81.6	0.57	0.063	0.27	0.24	0.46	1.033
PIERMONT	24.8	4543629	591957	9746303	WP	20000608	F	1	278	300		79.4	3.03	0.4	0.55	0.42	0.99	2.36
PIERMONT	24.8	4543629	591957	9746302	WP	20000608	F	1	228	160		79.2	1.17	0.19	0.37	0.14	0.4	1.1
PIERMONT	24.8	4543629	591957	9746301	WP	20000608	F	1	234	180		82.1	0.61	0.061	0.15	0.12	0.27	0.601
PIERMONT	24.8	4543629	591957	0384155	WP	20080605	M	1	224	158		82.3	0.99	0.018	0.188	0.25	0.32	0.776
PIERMONT	24.8	4543629	591957	9647402	WP	20010611	F	1	205	112		76.6	1.61	0.12	0.28	0.18	0.42	1
PIERMONT	24.8	4543629	591957	9746306	WP	20000608	M	1	197	100		80.5	0.56	0.14	0.42	0.25	0.57	1.38
PIERMONT	24.8	4543629	591957	9647396	WP	20010611	F	1	271	268		86.2	0.21	0.038	0.062	0.057	0.1	0.257
PIERMONT	24.8	4543629	591957	9647397	WP	20010611	F	1	300	406		81.8	0.27	0.029	0.035	0.026	0.054	0.144
PIERMONT	24.8	4543629	591957	9647398	WP	20010611	M	1	221	140		81.1	0.91	0.16	0.59	0.56	1.22	2.53

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LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
PIERMONT	24.8	4543629	591957	9647399	WP	20010611	F	1	255	206		82.7	0.53	0.053	0.094	0.068	0.21	0.425
PIERMONT	24.8	4543629	591957	9647400	WP	20010611	F	1	243	194		76.5	4.63	0.52	0.95	0.45	0.89	2.81
PIERMONT	24.8	4543629	591957	0384140	WP	20080605	M	1	207	124		80.7	0.57	-0.01	0.098	0.12	0.08	0.298
PIERMONT	24.8	4543629	591957	0384152	WP	20080605	M	1	205	126		80.6	0.79	0.068	0.188	0.26	0.26	0.776
PIERMONT	24.8	4543629	591957	0384141	WP	20080605	M	1	219	142		81.9	0.61	-0.01	0.118	0.12	0.11	0.348
PIERMONT	24.8	4543629	591957	0384142	WP	20080605	M	1	204	104		81.3	0.94	-0.01	0.148	0.13	0.16	0.438
PIERMONT	24.8	4543629	591957	0384143	WP	20080605	M	1	242	206		83.6	0.34	-0.01	0.016	0.025	0.042	0.083
PIERMONT	24.8	4543629	591957	0384144	WP	20080605	M	1	238	192		79.7	0.66	-0.01	0.068	0.064	0.12	0.252
PIERMONT	24.8	4543629	591957	0384145	WP	20080605	M	1	197	102		82	0.59	0.018	0.218	0.29	0.23	0.756
PIERMONT	24.8	4543629	591957	0384146	WP	20080605	M	1	239	174		82.2	0.33	-0.01	0.013	0.033	0.057	0.103
PIERMONT	24.8	4543629	591957	0384147	WP	20080605	M	1	229	160		81.7	0.61	-0.01	-0.01	0.085	0.15	0.24
PIERMONT	24.8	4543629	591957	0384148	WP	20080605	F	1	196	102		83.4	0.95	-0.01	0.158	0.14	0.16	0.458
PIERMONT	24.8	4543629	591957	0384149	WP	20080605	U	1	188	84		82.1	0.27	-0.01	0.088	0.14	0.082	0.31
PIERMONT	24.8	4543629	591957	9746304	WP	20000608	F	1	255	240		79.5	0.6	0.053	0.11	0.071	0.23	0.464
PIERMONT	24.8	4543629	591957	0384151	WP	20080605	M	1	230	170		80.9	0.68	-0.01	-0.01	0.054	0.088	0.147
PIERMONT	24.8	4543629	591957	9746305	WP	20000608	F	1	206	160		81.3	1.46	0.24	0.5	0.33	0.82	1.89
PIERMONT	24.8	4543629	591957	0384153	WP	20080605	M	1	230	158		81.2	0.64	0.018	0.118	0.14	0.21	0.486
PIERMONT	24.8	4543629	591957	0384154	WP	20080605	M	1	190	88		79.9	0.93	0.057	0.268	0.31	0.18	0.815
PIERMONT	24.8	4543629	591957	0380644	WP	20050527	F	1	220	118.3		80.7	0.44	0.017	0.12	0.092	0.18	0.409
PIERMONT	24.8	4543629	591957	9746311	WP	20000608	M	1	190	80		81.4	0.77	0.29	0.66	0.35	0.74	2.04
PIERMONT	24.8	4543629	591957	0380632	WP	20050527	M	1	238	178.4		81.7	0.54	0.013	0.079	0.11	0.22	0.422
PIERMONT	24.8	4543629	591957	9746309	WP	20000608	F	1	213	100		82.7	0.81	0.12	0.25	0.14	0.39	0.9
PIERMONT	24.8	4543629	591957	9746308	WP	20000608	F	1	226	160		79.6	0.42	0.073	0.2	0.091	0.34	0.704
PIERMONT	24.8	4543629	591957	9746307	WP	20000608	M	1	200	80		80	1.18	0.52	1.04	0.45	0.92	2.93
PIERMONT	24.8	4543629	591957	9647403	WP	20010611	F	1	219	134		83.3	0.41	0.057	0.13	0.094	0.23	0.511
PIERMONT	24.8	4543629	591957	0384150	WP	20080605	M	1	204	100		81.4	1.84	-0.01	0.088	0.096	0.12	0.304
PIERMONT	24.8	4543629	591957	9649058	WP	19991008	F	1	291	414		76.5	3.99	0.17	0.24	0.2	0.3	0.91
PIERMONT	24.8	4543629	591957	9649059	WP	19991008	F	1	278	386		77.2	4.63	0.23	0.35	0.31	0.51	1.4
PIERMONT	24.8	4543629	591957	9649060	WP	19991008	F	1	271	302		69.7	3.76	0.18	0.32	0.24	0.39	1.13
PIERMONT	24.8	4543629	591957	9649061	WP	19991008	F	1	263	298		76.4	3.97	0.19	0.33	0.32	0.46	1.3
PIERMONT	24.8	4543629	591957	9649062	WP	19991008	F	1	253	254		77.6	4.53	0.2	0.35	0.29	0.39	1.23
PIERMONT	24.8	4543629	591957	9649063	WP	19991008	F	1	223	194		77.6	4.88	0.32	0.48	0.34	0.54	1.68
PIERMONT	24.8	4543629	591957	9647401	WP	20010611	M	1	215	132		78.2	0.94	0.069	0.24	0.39	0.86	1.559
PIERMONT	24.8	4543629	591957	9647415	WP	20010611	F	1	158	44		78.6	3.19	0.29	0.63	0.24	0.37	1.53
PIERMONT	24.8	4543629	591957	9647404	WP	20010611	F	1	203	130		78.2	1.15	0.15	0.33	0.16	0.37	1.01
PIERMONT	24.8	4543629	591957	9647405	WP	20010611	F	1	244	206		73	2.18	0.2	0.49	0.29	0.69	1.67
PIERMONT	24.8	4543629	591957	9647406	WP	20010611	F	1	192	80		79	0.75	0.074	0.16	0.12	0.29	0.644
PIERMONT	24.8	4543629	591957	9647407	WP	20010611	M	1	209	106		76.6	2.01	0.4	1.19	0.95	2.03	4.57
PIERMONT	24.8	4543629	591957	9647408	WP	20010611	F	1	202	114		77	2.79	0.22	0.44	0.33	0.75	1.74
PIERMONT	24.8	4543629	591957	9647409	WP	20010611	M	1	209	116		73.7	0.65	0.22	0.58	0.62	0.95	2.37
PIERMONT	24.8	4543629	591957	9647410	WP	20010611	F	1	182	74		79.9	1.18	0.081	0.17	0.15	0.2	0.601
PIERMONT	24.8	4543629	591957	9647411	WP	20010611	F	1	184	74		79.2	0.95	0.11	0.24	0.15	0.29	0.79
PIERMONT	24.8	4543629	591957	9647412	WP	20010611	F	1	168	62		81	1.74	0.17	0.4	0.36	0.42	1.35
PIERMONT	24.8	4543629	591957	9647414	WP	20010611	F	1	149	46		81.2	0.7	0.051	0.14	0.13	0.28	0.601
PIERMONT	24.8	4543629	591957	9746312	WP	20000608	F	1	205	120		80.1	1.04	0.16	0.37	0.19	0.4	1.12
PIERMONT	24.8	4543629	591957	9647413	WP	20010611	F	1	163	58		79.5	2.29	0.15	0.29	0.14	0.28	0.86
PIERMONT	24.8	4543629	591957	9746478	WP	20000608	F	1	219	140		79.7	1.24	0.23	0.29	0.27	0.49	1.28
PIERMONT	24.8	4543629	591957	0383062	WP	20070606	M	1	165	64		78.7	1.02	0.022	0.09	0.12	0.16	0.392
PIERMONT	24.8	4543629	591957	0383063	WP	20070606	M	1	249	160		84.2	0.36	0.028	0.04	0.081	0.13	0.279
PIERMONT	24.8	4543629	591957	0383064	WP	20070606	F	1	248	210		78.4	0.2	-0.01	0.004	0.035	0.071	0.11
PIERMONT	24.8	4543629	591957	0383065	WP	20070606	M	1	215	134		80.7	0.42	0.15	0.09	0.08	0.26	0.58

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LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
PIERMONT	24.8	4543629	591957	0383066	WP	20070606	M	1	205	114		80	0.33	0.015	0.04	0.051	0.12	0.226
PIERMONT	24.8	4543629	591957	0383067	WP	20070606	M	1	162	44		84	0.43	-0.01	0.009	0.081	0.17	0.26
PIERMONT	24.8	4543629	591957	9746479	WP	20000608	F	1	253	220		79.9	0.4	0.055	0.12	0.14	0.28	0.595
PIERMONT	24.8	4543629	591957	9746477	WP	20000608	F	1	235	160		80.6	1.77	0.31	0.58	0.45	0.81	2.15
PIERMONT	24.8	4543629	591957	9746476	WP	20000608	F	1	229	180		80.1	1.36	0.29	0.37	0.27	0.52	1.45
PIERMONT	24.8	4543629	591957	9746475	WP	20000608	F	1	245	200		81.1	0.5	0.13	0.19	0.14	0.31	0.77
PIERMONT	24.8	4543629	591957	9746474	WP	20000608	F	1	247	200		79.3	1	0.2	0.35	0.25	0.55	1.35
PIERMONT	24.8	4543629	591957	9746473	WP	20000608	F	1	234	180		80.4	1	0.2	0.3	0.2	0.44	1.14
PIERMONT	24.8	4543629	591957	0383068	WP	20070606	M	1	156	44		84.7	0.36	0.022	0.13	0.29	0.21	0.652
PIERMONT	24.8	4543629	591957	9746480	WP	20000608	F	1	228	160		80.1	1.72	0.26	0.62	0.25	0.72	1.85
PIERMONT	24.8	4543629	591957	9746310	WP	20000608	F	1	234	180		81.8	0.46	0.086	0.22	0.11	0.36	0.776
PIERMONT	24.8	4543629	591957	0384139	WP	20080605	M	1	238	180		81	0.67	0.023	0.242	0.22	0.18	0.665
PIERMONT	24.8	4543629	591957	0383054	WP	20070606	M	1	248	208		76	0.85	0.058	0.14	0.12	0.26	0.578
PIERMONT	24.8	4543629	591957	0380650	WP	20050527	M	1	156	57.9		76.6	1	0.04	0.18	0.15	0.29	0.66
PIERMONT	24.8	4543629	591957	0380649	WP	20050527	F	1	193	84.2		81.2	0.48	-0.01	0.099	0.091	0.2	0.39
PIERMONT	24.8	4543629	591957	0380648	WP	20050527	M	1	242	184		84.3	0.26	-0.01	0.12	0.18	0.4	0.7
PIERMONT	24.8	4543629	591957	0380647	WP	20050527	F	1	196	99.9		79.8	0.49	-0.01	0.061	0.065	0.18	0.306
PIERMONT	24.8	4543629	591957	0383049	WP	20070606	M	1	258	288		81.6	0.52	0.018	0.066	0.047	0.091	0.222
PIERMONT	24.8	4543629	591957	0380646	WP	20050527	M	1	195	96.2		80.1	0.69	0.025	0.17	0.17	0.27	0.635
PIERMONT	24.8	4543629	591957	0383061	WP	20070606	M	1	197	104		81.5	0.54	-0.01	0.005	0.062	0.14	0.207
PIERMONT	24.8	4543629	591957	0380645	WP	20050527	M	1	188	89.8		78.7	1.49	0.14	0.33	0.25	0.55	1.27
PIERMONT	24.8	4543629	591957	0383050	WP	20070606	M	1	278	288		76	0.83	0.053	0.143	0.12	0.27	0.586
PIERMONT	24.8	4543629	591957	0383051	WP	20070606	M	1	227	132		83.4	0.28	-0.01	-0.01	0.038	0.087	0.13
PIERMONT	24.8	4543629	591957	0383053	WP	20070606	M	1	251	200		83.5	0.29	-0.01	0.049	0.068	0.1	0.217
PIERMONT	24.8	4543629	591957	0384138	WP	20080605	M	1	224	162		81.3	1.06	-0.01	0.102	0.12	0.16	0.382
PIERMONT	24.8	4543629	591957	0384137	WP	20080605	M	1	285	316		82.1	0.63	-0.01	0.025	0.089	0.17	0.284
PIERMONT	24.8	4543629	591957	0384136	WP	20080605	M	1	264	244		80.8	0.43	-0.01	-0.01	0.074	0.12	0.199
PIERMONT	24.8	4543629	591957	0384135	WP	20080605	M	1	210	132		80.5	1.21	-0.01	0.132	0.16	0.17	0.462
PIERMONT	24.8	4543629	591957	0383060	WP	20070606	M	1	240	168		81.4	0.26	0.015	-0.01	0.069	0.27	0.354
PIERMONT	24.8	4543629	591957	0383052	WP	20070606	M	1	247	230		83.3	0.33	-0.01	0.025	0.068	0.24	0.333
PIERMONT	24.8	4543629	591957	0384134	WP	20080605	M	1	289	340		82.4	0.4	-0.01	0.027	0.073	0.13	0.23
PIERMONT	24.8	4543629	591957	0383058	WP	20070606	M	1	245	184		80.6	0.39	-0.01	0.003	0.03	0.069	0.102
PIERMONT	24.8	4543629	591957	0383057	WP	20070606	M	1	170	60		79.6	1.23	0.032	0.12	0.12	0.15	0.422
PIERMONT	24.8	4543629	591957	0383056	WP	20070606	M	1	193	86		80.8	0.51	0.019	0.09	0.14	0.16	0.409
PIERMONT	24.8	4543629	591957	0003292	WP	20030711	M	1	271	308		80.3	0.64	0.051	0.083	0.072	0.13	0.336
PIERMONT	24.8	4543629	591957	0383055	WP	20070606	M	1	261	236		82.5	0.29	0.02	0.06	0.057	0.089	0.226
PIERMONT	24.8	4543629	591957	0383059	WP	20070606	M	1	224	138		84.8	0.32	0.018	0.07	0.087	0.15	0.325
TAPPAN ZEE BRIDGE	27	4547123	591533	9746880	WP	19990608	M	1	187	100		76.4	5.28	0.8	1.43	0.85	1.01	4.09
TAPPAN ZEE BRIDGE	27	4547123	591533	9746879	WP	19990608	M	1	236	180		74.8	1.73	0.19	0.27	0.5	0.63	1.59
TAPPAN ZEE BRIDGE	27	4547123	591533	9746747	WP	19990608	M	1	240	200		77.4	1.39	0.13	0.35	0.25	0.39	1.12
TAPPAN ZEE BRIDGE	27	4547123	591533	9746746	WP	19990608	M	1	214	140		75.8	3.03	0.32	0.58	0.29	0.54	1.73
TAPPAN ZEE BRIDGE	27	4547123	591533	9746745	WP	19990608	M	1	198	120		75.9	2.86	0.14	0.3	0.23	0.48	1.15
TAPPAN ZEE BRIDGE	27	4547123	591533	9746744	WP	19990608	M	1	190	100		78.1	2.75	0.27	0.44	0.37	0.66	1.74
TAPPAN ZEE BRIDGE	27	4547123	591533	9746743	WP	19990608	M	1	192	110		73.2	4.04	0.82	1.64	1.09	1.28	4.83
TAPPAN ZEE BRIDGE	27	4547123	591533	9746742	WP	19990608	M	1	212	120		76.4	3.9	0.85	1.31	2.87	3.53	8.56
TAPPAN ZEE BRIDGE	27	4547123	591533	9746741	WP	19990608	F	1	184	90		77.9	1.66	0.1	0.24	0.19	0.35	0.88
TAPPAN ZEE BRIDGE	27	4547123	591533	9746750	WP	19990608	M	1	182	100		77.5	2.07	0.26	0.58	0.52	0.78	2.14
TAPPAN ZEE BRIDGE	27	4547123	591533	9746760	WP	19990609	M	1	223	150		77	1.93	0.28	0.45	0.22	0.42	1.37
TAPPAN ZEE BRIDGE	27	4547123	591533	9746748	WP	19990608	M	1	191	110		77.4	2.83	0.26	0.5	0.38	0.49	1.63
TAPPAN ZEE BRIDGE	27	4547123	591533	9746749	WP	19990608	M	1	185	100		78.5	2.91	0.17	0.46	0.33	0.46	1.42
TAPPAN ZEE BRIDGE	27	4547123	591533	9746759	WP	19990609	M	1	301	420		79	1.28	0.15	0.2	0.26	0.46	1.07

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HISTORICAL NYSDEC BIOTA DATA
HASTINGS-ON-HUDSON AND REFERENCE LOCATIONS
WHITE PERCH

LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
TAPPAN ZEE BRIDGE	27	4547123	591533	9746758	WP	19990608	M	1	165	80		79.4	1.08	0.14	0.2	0.22	0.31	0.87
TAPPAN ZEE BRIDGE	27	4547123	591533	9746757	WP	19990608	M	1	151	70		79.9	2.87	0.16	0.45	0.29	0.29	1.19
TAPPAN ZEE BRIDGE	27	4547123	591533	9746756	WP	19990608	M	1	156	80		77.3	2.96	0.13	0.28	0.19	0.24	0.84
TAPPAN ZEE BRIDGE	27	4547123	591533	9746755	WP	19990608	F	1	169	80		81.7	1.13	0.14	0.26	0.16	0.22	0.78
TAPPAN ZEE BRIDGE	27	4547123	591533	9746754	WP	19990608	F	1	180	80		80.3	1.43	0.21	0.4	0.22	0.35	1.18
TAPPAN ZEE BRIDGE	27	4547123	591533	9746753	WP	19990608	F	1	164	80		76.1	3.33	0.21	0.45	0.33	0.4	1.39
TAPPAN ZEE BRIDGE	27	4547123	591533	9746752	WP	19990608	M	1	173	90		73.4	3.45	0.31	0.69	0.4	0.58	1.98
TAPPAN ZEE BRIDGE	27	4547123	591533	9746751	WP	19990608	M	1	173	90		78.6	2.91	0.19	0.37	0.2	0.31	1.07

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LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
HASTINGS SOUTH SLIP	21.1	4538352	593689	HHSS001	BCRAB	19980903	U	3	80	66.7		-9	1.43	-0.5	-0.05	0.11	0.11	0.47
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640761	BCRAB	19990924	U	2	45.5	7.1		75.3	0.83	0.021	-0.01	0.068	0.25	0.339
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640762	BCRAB	19990924	U	2	41	5.4		78.4	2.1	0.049	0.013	0.069	0.59	0.721
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640662	BCRAB	19990924	U	1	96	52		64.2	2.74	0.12	0.14	0.15	0.17	0.58
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640661	BCRAB	19990924	U	1	88	42		66.9	1.06	0.094	0.025	0.064	0.067	0.25
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640660L	BCRAB	19990924	M	1	128	124		80	0.15	-0.01	-0.01	0.015	-0.01	0.02
HASTINGS SOUTH SLIP	21.1	4538352	593689	9640660P	BCRAB	19990924	M	1	128	124		64.3	15.9	0.66	0.23	1.75	0.79	3.43
HASTINGS NORTH SLIP	21.2	4538644	593676	9640646P	BCRAB	19990924	M	1	159	204		77.9	7.11	0.53	0.36	0.52	0.34	1.75
HASTINGS NORTH SLIP	21.2	4538644	593676	9640644P	BCRAB	19990924	M	1	111	80		65	12.6	0.57	0.42	0.23	0.32	1.54
HASTINGS NORTH SLIP	21.2	4538644	593676	9640647L	BCRAB	19990924	M	1	118	114		81.7	0.22	-0.01	-0.01	-0.01	-0.01	0.01
HASTINGS NORTH SLIP	21.2	4538644	593676	HHNS005	BCRAB	19980903	U	3	95	75		-9	1.96	-0.5	-0.05	0.19	0.33	0.77
HASTINGS NORTH SLIP	21.2	4538644	593676	9640646L	BCRAB	19990924	M	1	159	204		80.6	0.09	-0.01	-0.01	-0.01	-0.01	0.01
HASTINGS NORTH SLIP	21.2	4538644	593676	9640647P	BCRAB	19990924	M	1	118	114		84.9	2.28	0.13	0.12	0.42	0.5	1.17
HASTINGS NORTH SLIP	21.2	4538644	593676	9640645L	BCRAB	19990924	M	1	147	154		81	0.32	-0.01	-0.01	0.016	-0.01	0.021
HASTINGS NORTH SLIP	21.2	4538644	593676	9640657	BCRAB	19990924	U	1	38	3.6		61.4	1.3	0.059	0.09	0.091	0.1	0.34
HASTINGS NORTH SLIP	21.2	4538644	593676	9640645P	BCRAB	19990924	M	1	147	154		76.8	9.49	0.46	0.44	0.42	0.54	1.86
HASTINGS NORTH SLIP	21.2	4538644	593676	9640643P	BCRAB	19990924	M	1	136	142		79.6	1.98	0.16	0.031	0.28	0.32	0.791
HASTINGS NORTH SLIP	21.2	4538644	593676	9640642P	BCRAB	19990924	M	1	111	76		67.3	11.4	0.29	-0.01	0.41	0.34	1.04
HASTINGS NORTH SLIP	21.2	4538644	593676	9640641P	BCRAB	19990924	M	1	116	88		72.5	10.3	0.56	0.36	0.46	0.36	1.74
HASTINGS NORTH SLIP	21.2	4538644	593676	9640677L	BCRAB	19990924	M	1	126	166		80.9	0.19	-0.01	-0.01	-0.01	-0.01	0.01
HASTINGS NORTH SLIP	21.2	4538644	593676	9640641L	BCRAB	19990924	M	1	116	88		79.5	0.18	0.011	-0.01	-0.01	-0.01	0.016
HASTINGS NORTH SLIP	21.2	4538644	593676	9640642L	BCRAB	19990924	M	1	111	76		77.9	0.33	-0.01	-0.01	-0.01	-0.01	0.01
HASTINGS NORTH SLIP	21.2	4538644	593676	9640643L	BCRAB	19990924	M	1	136	142		81.8	0.18	-0.01	-0.01	0.01	-0.01	0.015
HASTINGS NORTH SLIP	21.2	4538644	593676	9640644L	BCRAB	19990924	M	1	111	80		76.4	0.56	0.013	-0.01	-0.01	-0.01	0.018
HASTINGS NORTH SLIP	21.2	4538644	593676	9640680P	BCRAB	19990924	M	1	132	152		69.2	10.2	0.7	0.39	0.78	0.52	2.39
HASTINGS NORTH SLIP	21.2	4538644	593676	9640680L	BCRAB	19990924	M	1	132	152		78.6	0.31	0.017	-0.01	0.017	-0.01	0.034
HASTINGS NORTH SLIP	21.2	4538644	593676	9640679P	BCRAB	19990924	M	1	154	208		71.4	16.1	0.37	0.21	0.51	0.38	1.47
HASTINGS NORTH SLIP	21.2	4538644	593676	9640679L	BCRAB	19990924	M	1	154	208		80.1	0.34	0.028	-0.01	0.016	-0.01	0.044
HASTINGS NORTH SLIP	21.2	4538644	593676	9640678P	BCRAB	19990924	M	1	119	122		73.6	7.14	0.32	0.12	0.79	0.6	1.83
HASTINGS NORTH SLIP	21.2	4538644	593676	9640678L	BCRAB	19990924	M	1	119	122		79.7	0.34	0.016	-0.01	0.022	-0.01	0.038
HASTINGS NORTH SLIP	21.2	4538644	593676	9640677P	BCRAB	19990924	M	1	126	166		72	16.1	0.84	0.51	0.97	0.67	2.99
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640740	BCRAB	19990924	U	5	-9	12.4	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	66.6	1.24	0.051	0.098	-0.01	1.04	1.189
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640741	BCRAB	19990924	U	8	-9	13.6	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	68.2	1.02	0.041	0.088	-0.01	0.96	1.089
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640742	BCRAB	19990924	U	3	-9	17.8	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	64.7	1.61	0.039	0.035	0.031	0.39	0.495
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640745	BCRAB	19990924	U	14	-9	10.8	WGT LISTED IS TOTAL WEIGHT OF COMPOSITE	70.9	1.75	0.059	0.12	-0.01	1.18	1.359
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640666P	BCRAB	19990924	M	1	96	64		54.4	13.9	0.45	0.12	1.41	2.52	4.5
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640686	BCRAB	19990923	U	1	55	8.4		67	2.46	0.093	-0.01	0.086	0.15	0.329
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640663L	BCRAB	19990924	M	1	127	126		78.2	0.41	0.027	-0.01	0.018	0.01	0.055
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640665P	BCRAB	19990924	M	1	149	184		69	12.4	0.75	0.4	1.54	0.86	3.55
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640665L	BCRAB	19990924	M	1	149	184		79.6	0.17	0.023	-0.01	0.019	-0.01	0.042
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640664P	BCRAB	19990924	M	1	134	104		60.9	10.9	0.48	0.25	0.87	0.88	2.48
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640664L	BCRAB	19990924	M	1	134	104		80.6	0.32	-0.01	-0.01	0.023	0.011	0.039
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640663P	BCRAB	19990924	M	1	127	126		59.9	14.2	0.65	0.16	1.27	1.04	3.12
HASTINGS ABAN. MARINA	21.3	4538959	593726	9640666L	BCRAB	19990924	M	1	96	64		76.3	0.6	0.025	-0.01	0.031	0.074	0.13
HASTINGS ABAN. MARINA	21.3	4538959	593726	MA004	BCRAB	19980903	U	1	80	90		-9	1.75	-0.5	-0.05	0.18	0.14	0.57
HASTINGS B/T MARINA AND PARK	21.4	4539083	593793	9640716	BCRAB	19990924	U	6	-9	3.6	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	74.8	0.92	0.035	-0.01	0.06	0.092	0.187
HASTINGS B/T MARINA AND PARK	21.4	4539083	593793	9640714	BCRAB	19990924	U	11	-9	3.3	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	68.9	0.85	0.042	0.013	0.057	0.082	0.194
HASTINGS B/T MARINA AND PARK	21.4	4539083	593793	9640719	BCRAB	19990924	U	4	-9	15.2	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	76.5	0.91	0.032	0.01	0.048	0.14	0.23
HASTINGS B/T MARINA AND PARK	21.4	4539083	593793	9640717	BCRAB	19990924	U	8	-9	8.8	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	67.1	1.38	0.042	0.018	0.057	0.11	0.227
HASTINGS B/T MARINA AND PARK	21.4	4539083	593793	9640715	BCRAB	19990924	U	11	-9	5	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	72.5	1.95	0.03	-0.01	0.051	0.13	0.211
HASTINGS B/T MARINA AND PARK	21.4	4539083	593793	9640718	BCRAB	19990924	U	6	-9	12.4	WEIGHT RECORDED IS THE TOTAL FOR THE COMPOSITE	71.9	2.93	0.051	0.026	0.072	0.2	0.349
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649337	BCRAB	19990927	U	3	46.7	7.4		66.6	1.44	0.028	-0.01	0.041	0.079	0.148
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649336	BCRAB	19990927	U	4	27.5	1.8		69.1	1.05	0.032	-0.01	0.044	0.082	0.158
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649335	BCRAB	19990927	U	5	45.4	7.2		65.8	1.45	0.031	-0.01	0.056	0.14	0.227
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649338	BCRAB	19990927	U	3	60	12.9		66.9	1.11	0.025	0.01	0.083	0.11	0.228
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649333L	BCRAB	19990927	M	1	126	126		77.4	0.54	0.039	-0.01	0.028	0.012	0.079
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649333P	BCRAB	19990927	M	1	126	126		63.5	7.38	0.38	0.089	0.78	0.76	2.009
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649334L	BCRAB	19990927	M	1	144	146		78.3	0.38	0.037	-0.01	0.014	-0.01	0.051
HASTINGS ON HUDSON (18E)	22.1	4539416	593806	9649334P	BCRAB	19990927	M	1	144	146		67	9.77	0.43	0.2	0.52	0.45	1.6
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649298	BCRAB	19990927	U	2	60.5	15.3		73.4	1.48	0.07	0.021	0.1	0.089	0.28

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LOCATION	RIVER MILE	NYTMN	NYTME	TAGNO	SPECIES	SDATE	SEX	"N"	LENGTH (mm)	WEIGHT (g)	REMARKS	% MOISTURE	% LIPID	Arochlor 1242	Aroclor 1248	Arochlor 1254	Arochlor 1260	Total PCB
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649299	BCRAB	19990927	U	3	40	4.5		69.6	1.48	0.057	0.019	0.1	0.1	0.276
ABOVE DOBBS FERRY (17E)	23.2	4541635	594302	9649300	BCRAB	19990927	U	2	56	12		66.8	1.44	0.049	0.017	0.087	0.12	0.273
TAPPAN ZEE BRIDGE	27	4547123	591533	9746789P	BCRAB	19990615	M	1	105	80		55.4	21.5	0.9	0.38	1.25	0.9	3.43
TAPPAN ZEE BRIDGE	27	4547123	591533	9746789L	BCRAB	19990615	M	1	105	80		75	0.35	0.018	0.032	-0.01	-0.01	0.055
TAPPAN ZEE BRIDGE	27	4547123	591533	9746788P	BCRAB	19990615	M	1	95	40		58.6	17.7	0.25	0.03	0.76	0.79	1.83
TAPPAN ZEE BRIDGE	27	4547123	591533	9746788L	BCRAB	19990615	M	1	95	40		73.9	0.3	-0.01	-0.01	0.033	0.014	0.052
TAPPAN ZEE BRIDGE	27	4547123	591533	9746787P	BCRAB	19990615	M	1	141	160		55.5	19.7	0.39	0.09	0.96	0.62	2.06
TAPPAN ZEE BRIDGE	27	4547123	591533	9746787L	BCRAB	19990615	M	1	141	160		77.2	0.19	0.013	-0.01	-0.01	-0.01	0.018
TAPPAN ZEE BRIDGE	27	4547123	591533	9746786P	BCRAB	19990615	F	1	132	100		50.8	24.3	0.77	0.59	1.6	0.9	3.86
TAPPAN ZEE BRIDGE	27	4547123	591533	9746786L	BCRAB	19990615	F	1	132	100		76	0.45	0.021	-0.01	0.017	-0.01	0.038
TAPPAN ZEE BRIDGE	27	4547123	591533	9746785P	BCRAB	19990615	M	1	145	200		66.2	21.6	1.11	0.49	2.92	1.85	6.37
TAPPAN ZEE BRIDGE	27	4547123	591533	9746785L	BCRAB	19990615	M	1	145	200		77.9	0.17	-0.01	-0.01	0.011	-0.01	0.016
TAPPAN ZEE BRIDGE	27	4547123	591533	9639509	BCRAB	20041001	M	1	143	148								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639517	BCRAB	20041001	M	1	145	196		-9	0.42	-0.012	-0.012	-0.012	0.018	0.024
TAPPAN ZEE BRIDGE	27	4547123	591533	9639516	BCRAB	20041001	M	1	147	174								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639515	BCRAB	20041001	M	1	127	176								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639514	BCRAB	20041001	M	1	133	142								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639513	BCRAB	20041001	M	1	138	134								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639512	BCRAB	20041001	M	1	165	210		-9	7.94	-0.11	-0.11	-0.11	1.3	1.355
TAPPAN ZEE BRIDGE	27	4547123	591533	9639512	BCRAB	20041001	M	1	165	210		-9	0.4	-0.012	-0.012	-0.012	0.018	0.024
TAPPAN ZEE BRIDGE	27	4547123	591533	9639511	BCRAB	20041001	M	1	147	192		-9	7.19	-0.11	-0.11	-0.11	1.3	1.355
TAPPAN ZEE BRIDGE	27	4547123	591533	9639511	BCRAB	20041001	M	1	147	192		-9	0.51	-0.012	-0.012	-0.012	0.022	0.028
TAPPAN ZEE BRIDGE	27	4547123	591533	9639499	BCRAB	20041001	F	1	122	134								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639510	BCRAB	20041001	M	1	156	192		-9	0.41	-0.012	-0.012	-0.012	-0.012	0.012
TAPPAN ZEE BRIDGE	27	4547123	591533	9639518	BCRAB	20041001	M	1	166	308		-9	9.13	-0.18	-0.18	-0.18	1.9	1.99
TAPPAN ZEE BRIDGE	27	4547123	591533	9639508	BCRAB	20041001	F	1	153	148								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639507	BCRAB	20041001	F	1	148	152								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639506	BCRAB	20041001	F	1	158	184								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639505	BCRAB	20041001	F	1	137	132								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639504	BCRAB	20041001	F	1	152	148								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639503	BCRAB	20041001	F	1	143	120								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639502	BCRAB	20041001	F	1	146	128								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639501	BCRAB	20041001	F	1	166	172								
TAPPAN ZEE BRIDGE	27	4547123	591533	9639510	BCRAB	20041001	M	1	156	192		-9	4.59	-0.097	-0.097	-0.097	0.71	0.759
TAPPAN ZEE BRIDGE	27	4547123	591533	9639517	BCRAB	20041001	M	1	145	196		-9	9.35	-0.28	-0.28	-0.28	3.1	3.24
TAPPAN ZEE BRIDGE	27	4547123	591533	9639518	BCRAB	20041001	M	1	166	308		-9	0.51	-0.015	-0.015	-0.015	0.024	0.032
TAPPAN ZEE BRIDGE	27	4547123	591533	9639500	BCRAB	20041001	F	1	155	174								

Provided by W. Richter of NYSDEC via email, February 2014

Figure A PCB concentrations in Target Fish Adjacent to Site
Figure B-1 to B-3 Scatter Plots – Fish Weight vs. Length – Historic and Current Data
Figure C-1 to C-5 Histograms – Average Total PCBs and Lipid-normalized PCBs
Figure D Scatter Plot of Fish Weight v. Percent Lipids
Figure E-1 to E-5 Scatter Plots – Fish Weight vs. Total PCBs and Lipid-normalized PCBs

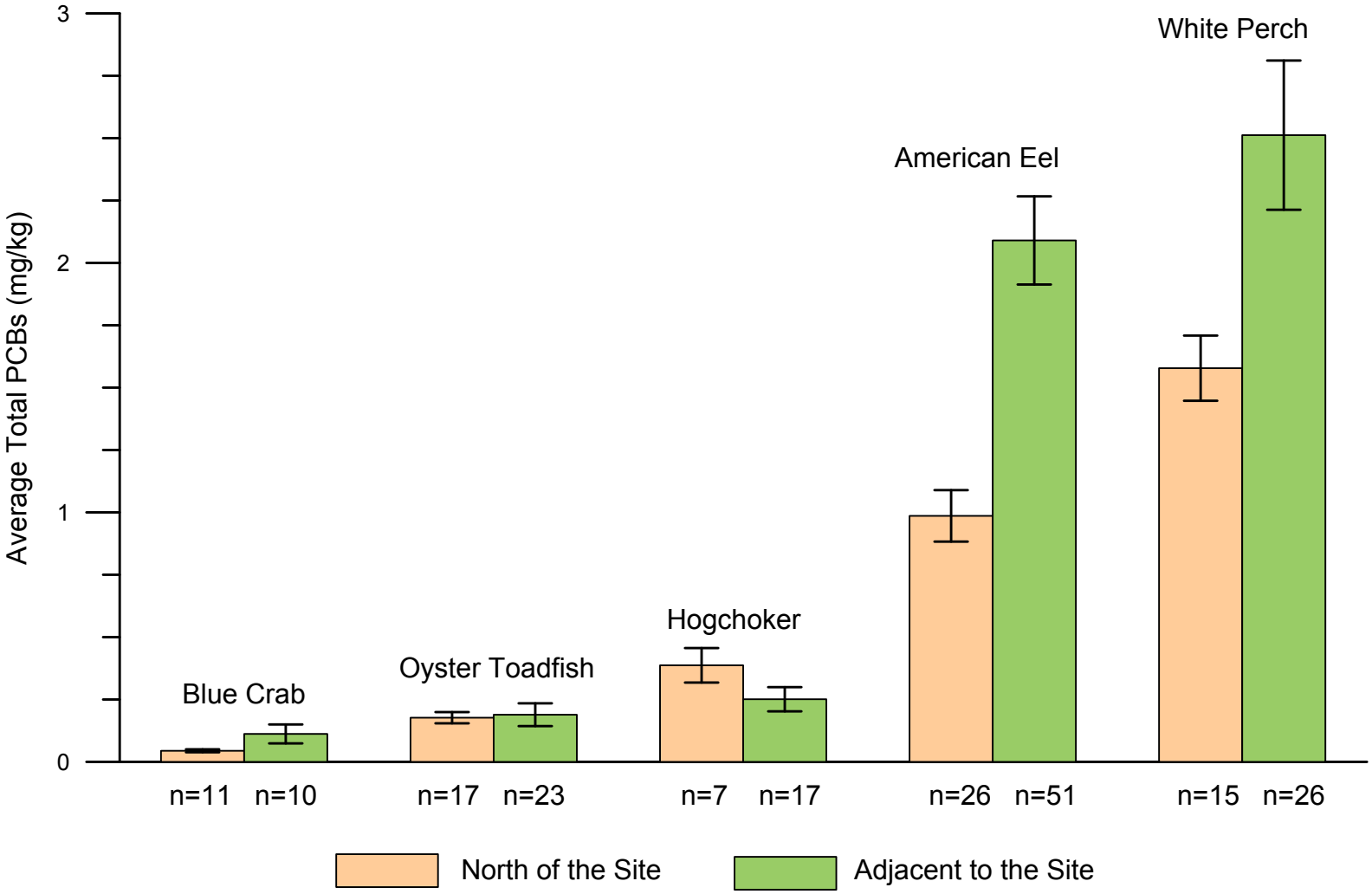
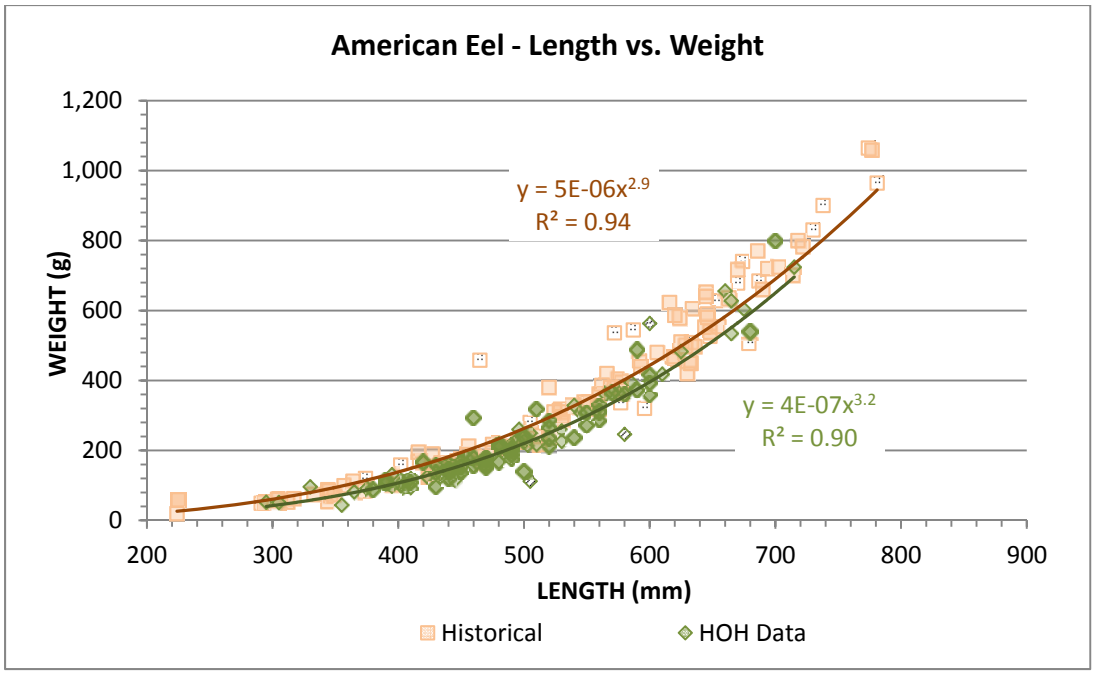


Figure A: Whole body concentrations of total PCBs measured in target fish species caught adjacent to OU-2 (2013 and 2014 data combined). Error bars shown identify the standard error of the population mean.



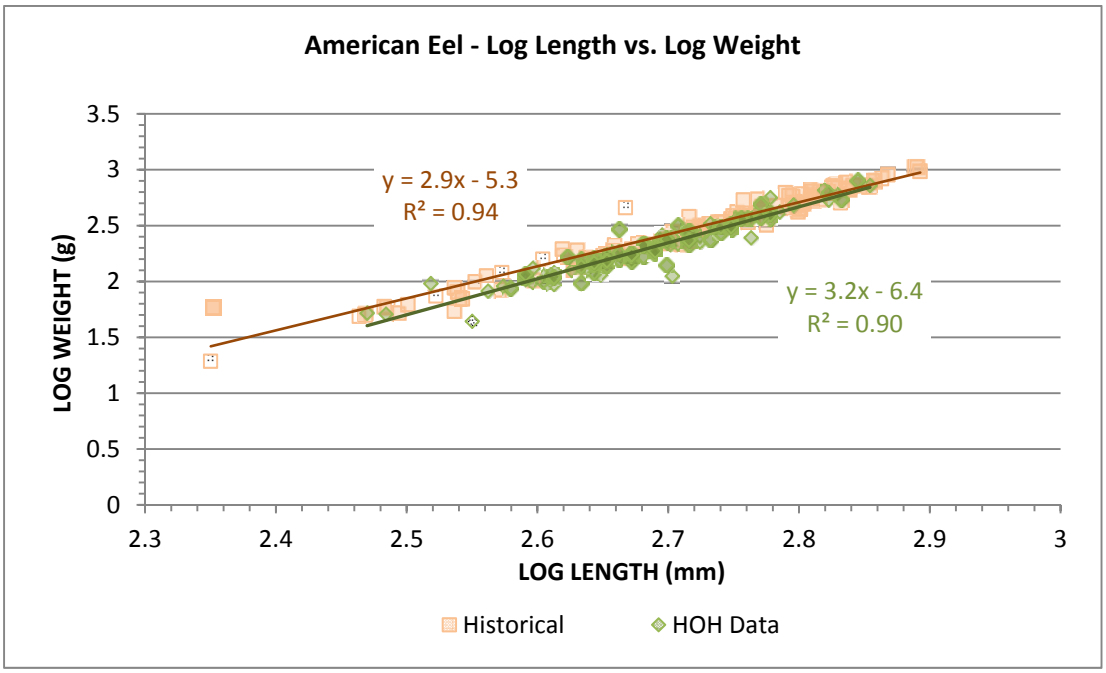
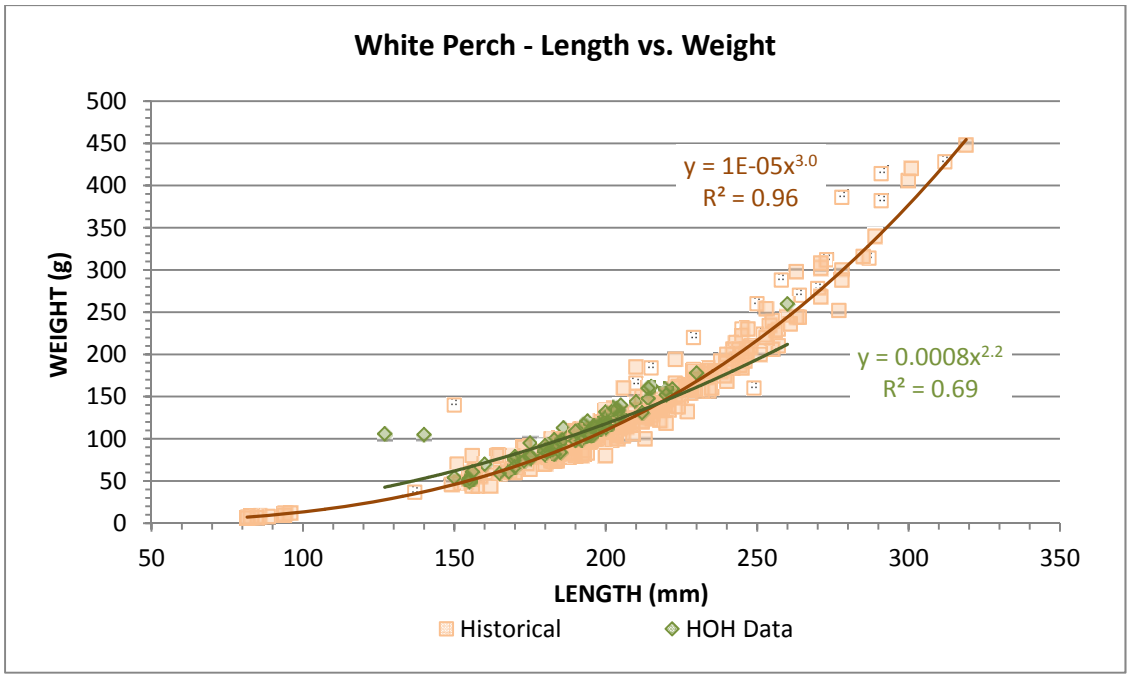


Figure B-1: Scatter plot of weight vs. length for historical Hudson River eel data (provided by the NYSDEC, Attachment D) and individuals caught for this study.



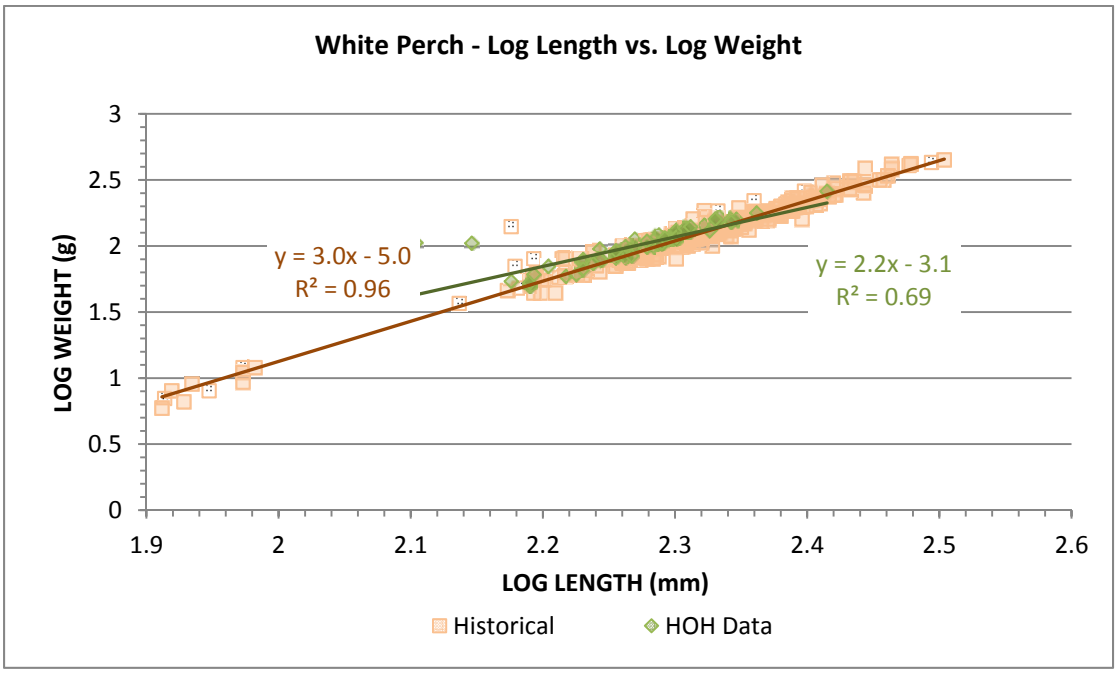
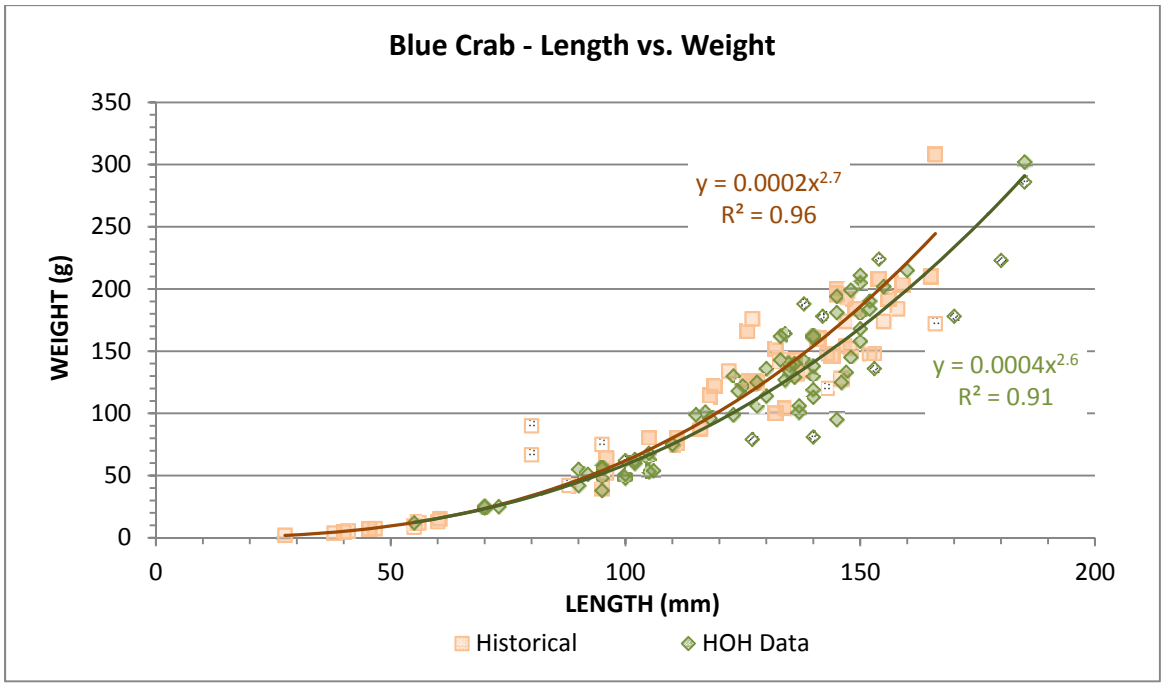


Figure B-2: Scatter plot of weight vs. length for historical Hudson River white perch data (provided by the NYSDEC, Attachment D) and individuals caught for this study.



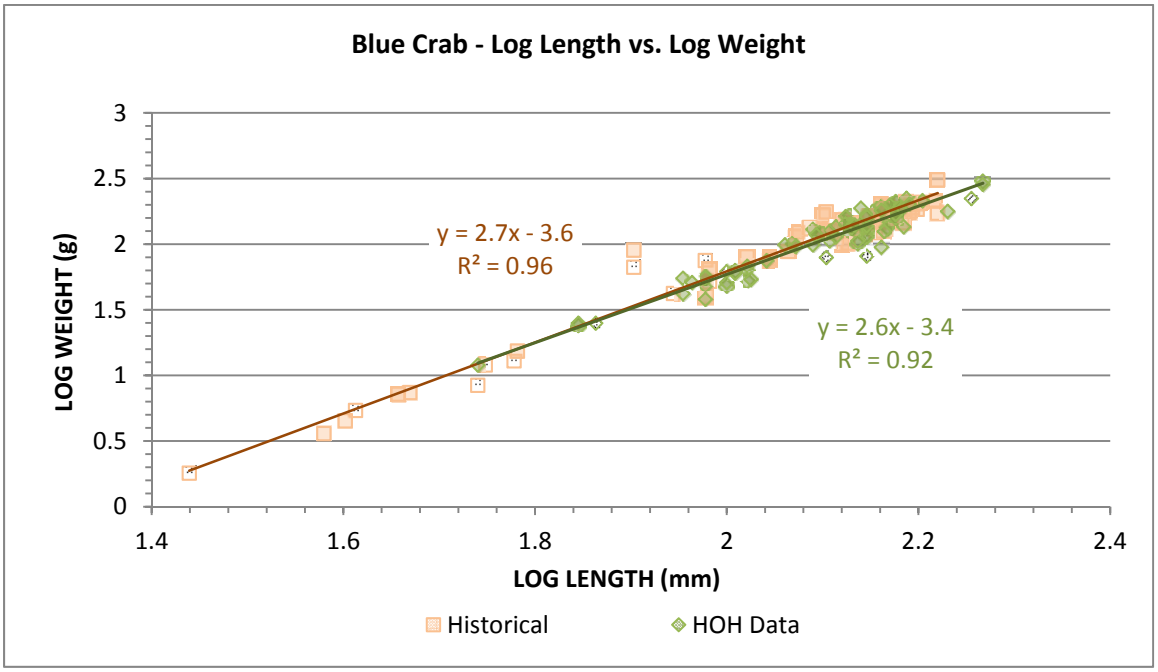
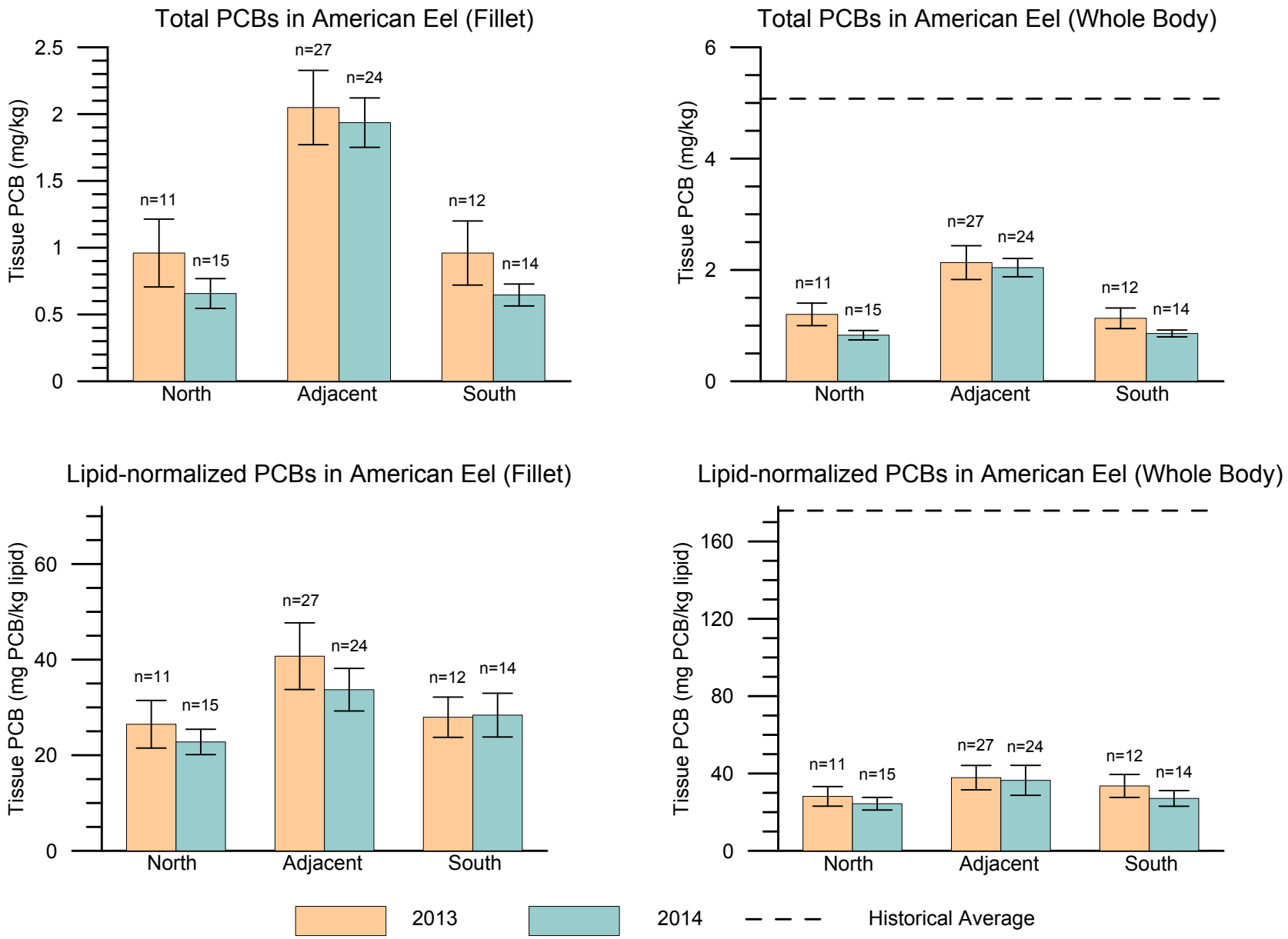
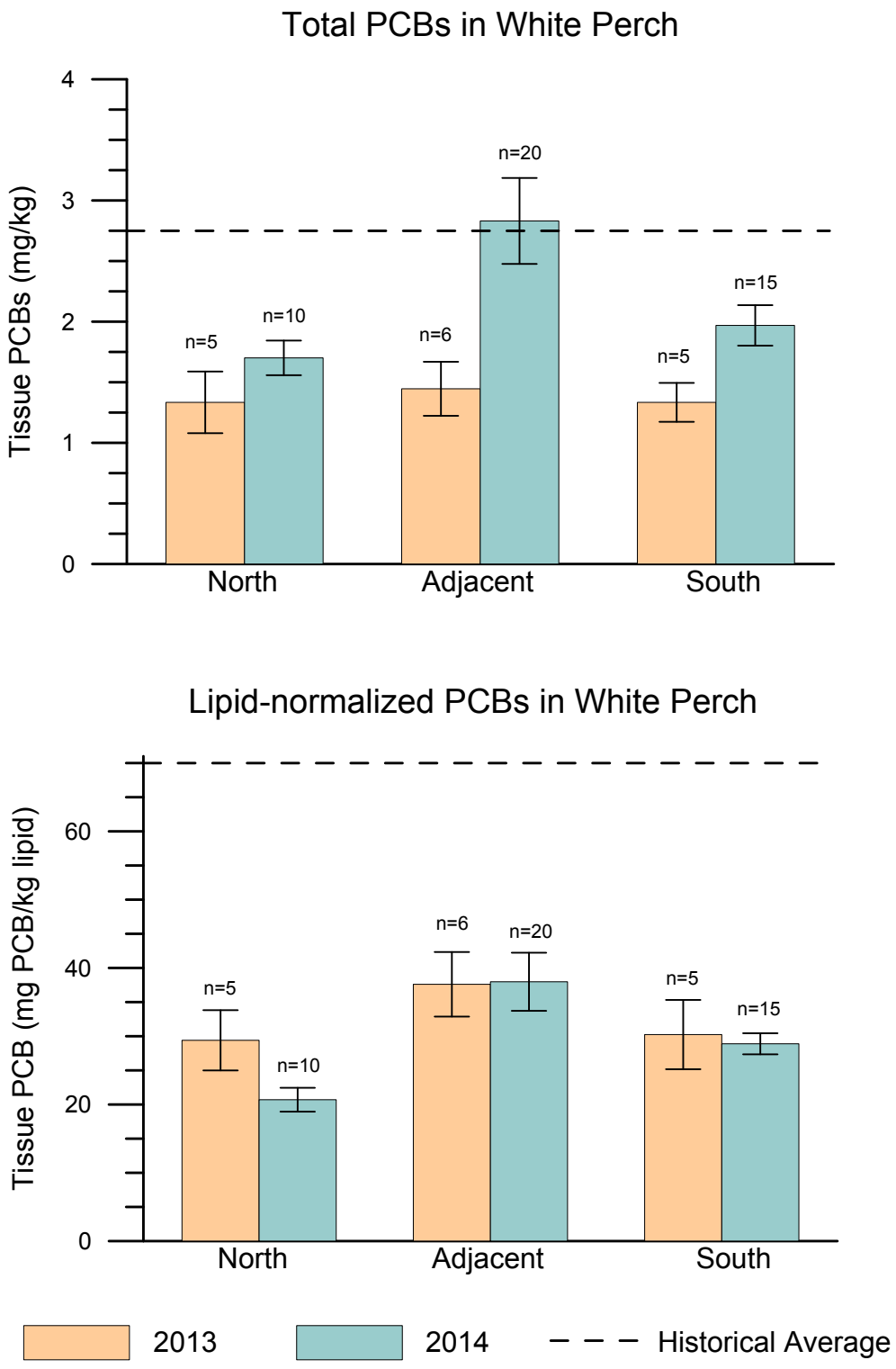


Figure B-3: Scatter plot of weight vs. length for historical Hudson River white perch data (provided by the NYSDEC, Attachment D) and individuals caught for this study.



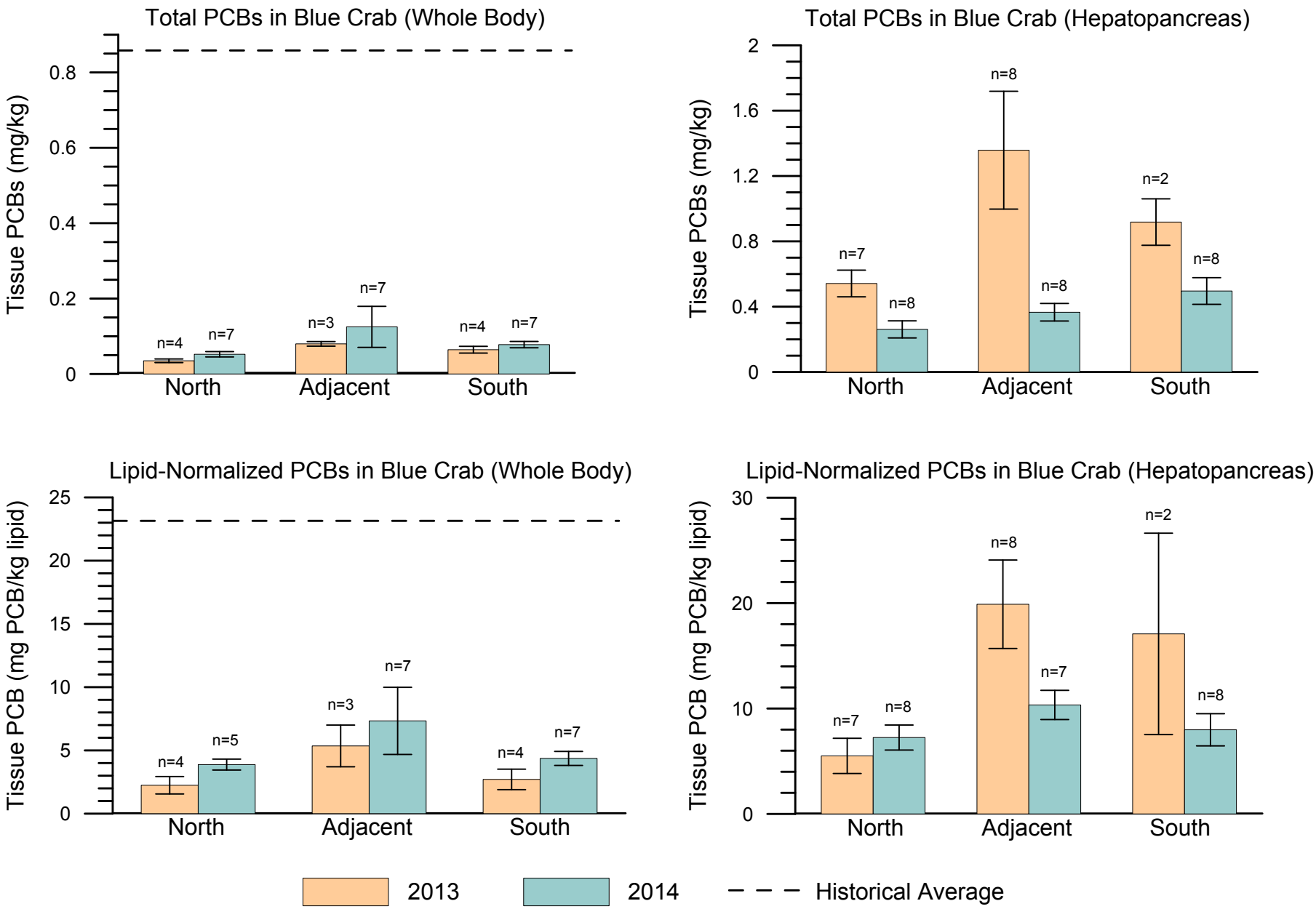
Figures C-1: Average total and lipid normalized PCBs concentration in American eel samples* collected in 2013 and 2014.

*For all samples whole body concentrations were determined from samples processed as fillet and offal.

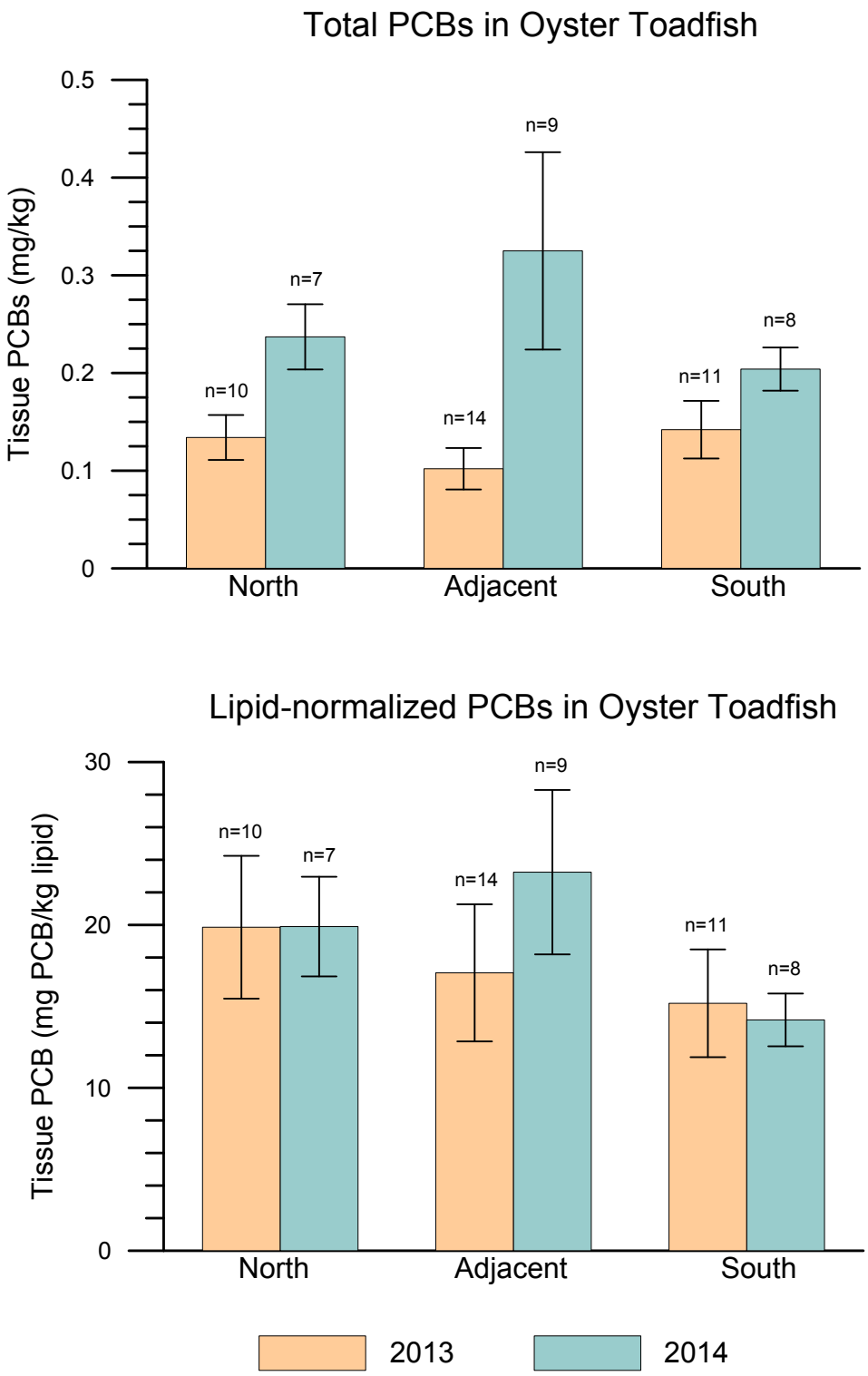


Figures C-2: Average total and lipid normalized PCBs concentration in whole body* white perch samples collected in 2013 and 2014.

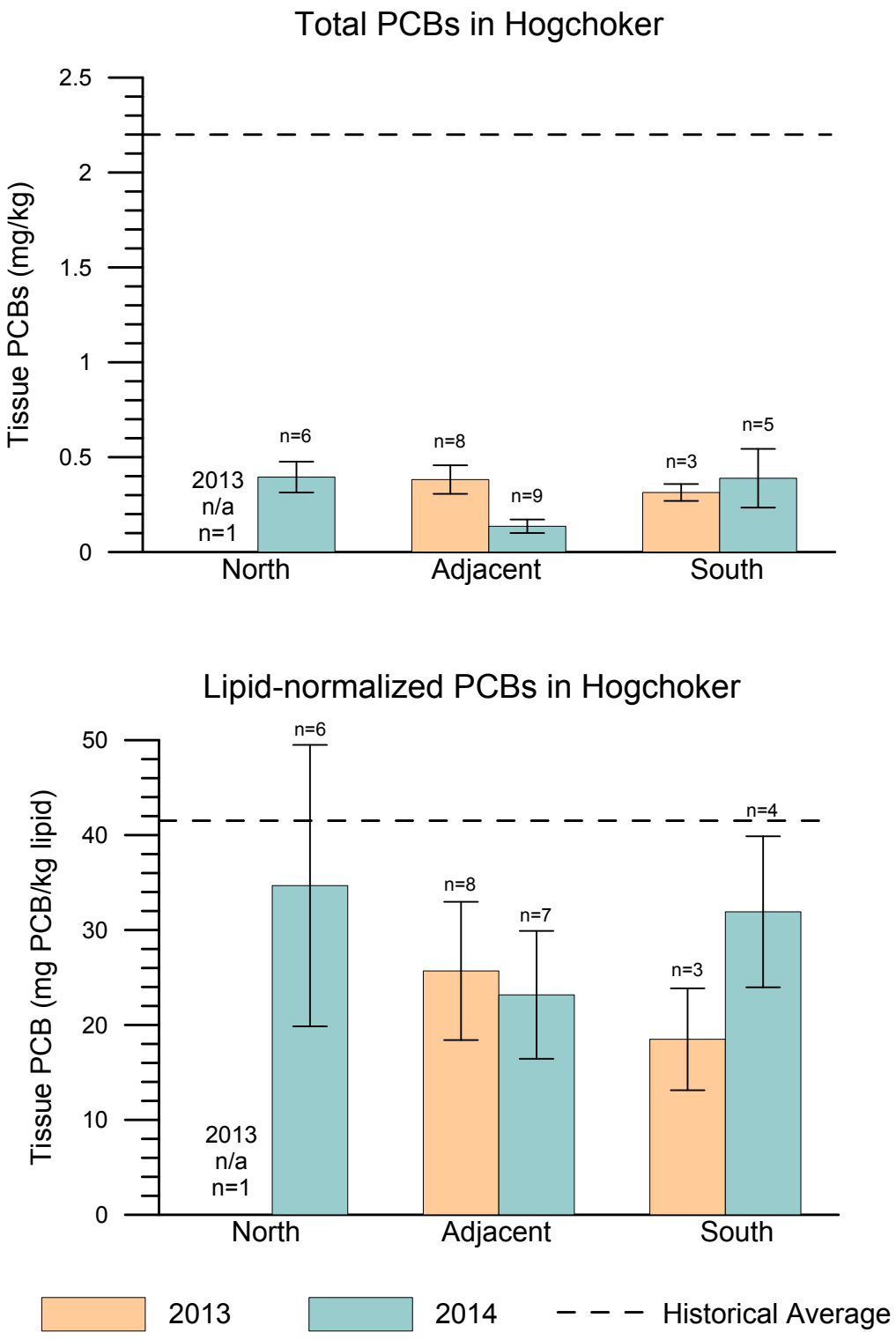
* For some samples whole body concentrations were determined from samples processed as fillet and offal.



Figures C-3: Average total and lipid normalized PCBs concentration in blue crab samples collected in 2013 and 2014.



Figures C-4: Average total and lipid normalized PCBs concentration in whole body oyster toadfish samples collected in 2013 and 2014.



Figures C-5: Average total and lipid normalized PCBs concentration in whole body hogchoker samples collected in 2013 and 2014.

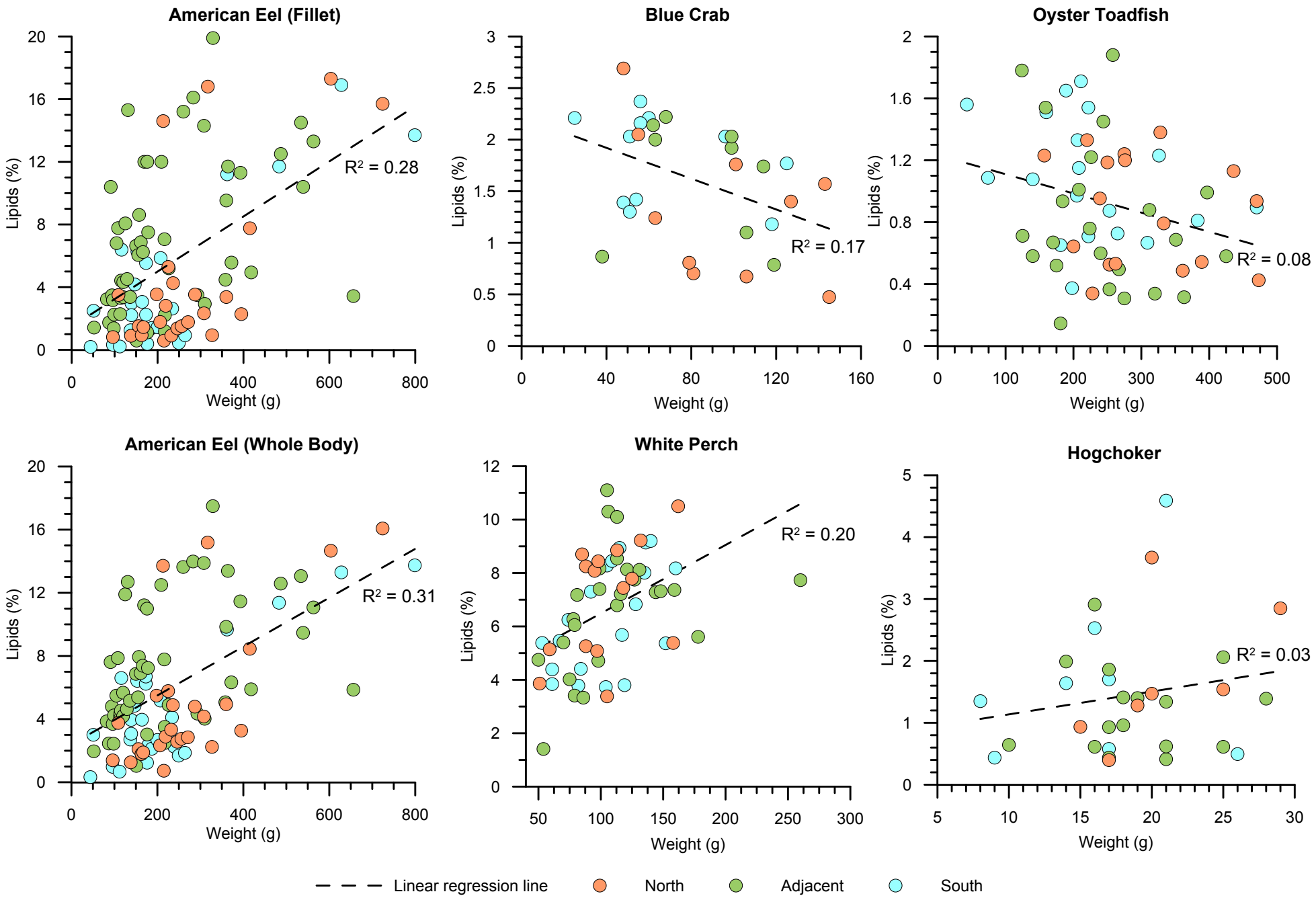


Figure D: Scatter plot of fish weight vs. percent lipids. Data are from individual fish collected in both 2013 and 2014. For some samples, whole body concentrations were mathematically reconstructed from samples dissected and processed as fillet and remaining carcass (offal).

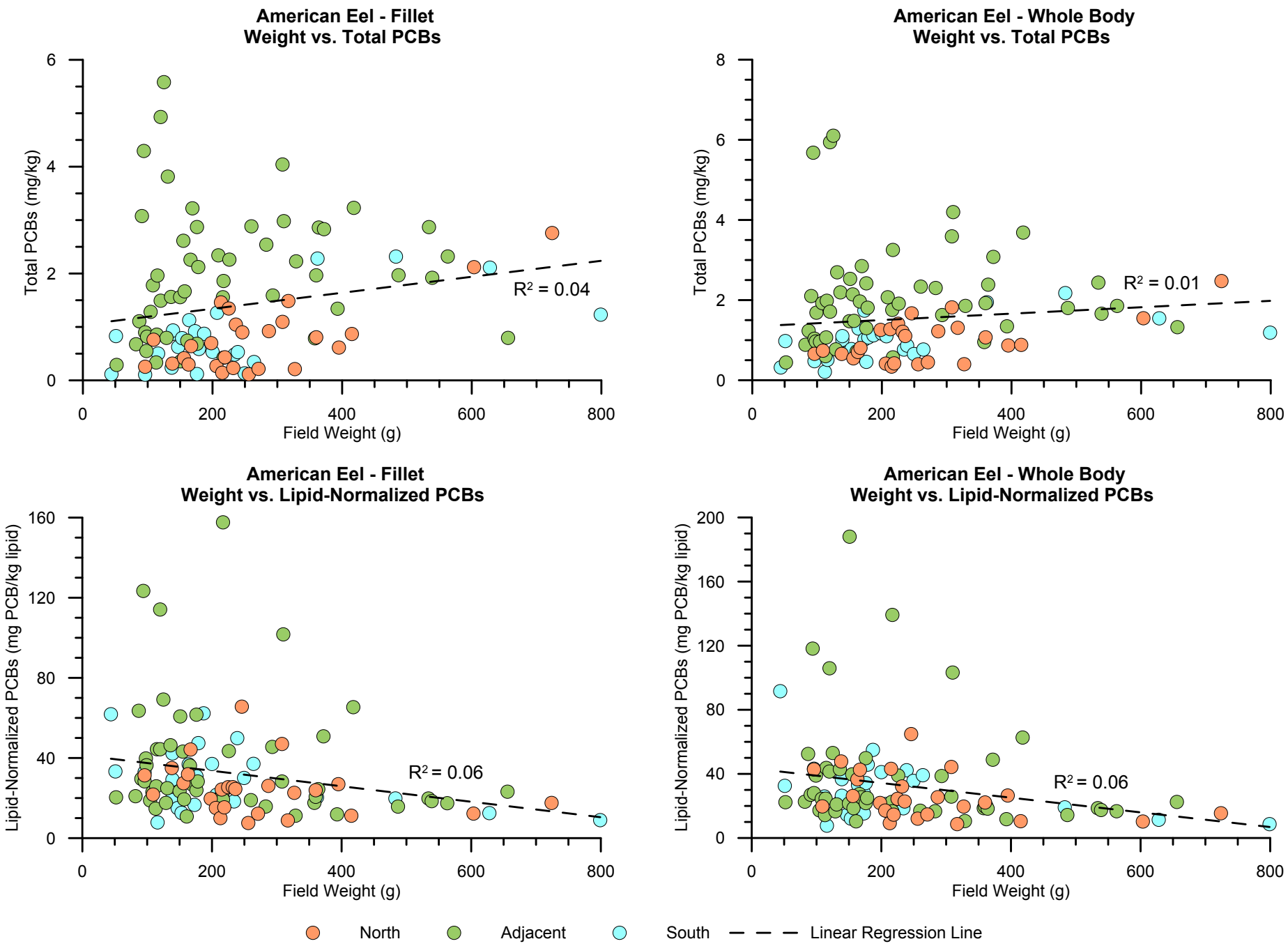


Figure E-1: Scatter plot of fish weight vs. total PCBs (top) and lipid-normalized PCBs (bottom). Data are from individual fish collected in both 2013 and 2014. For all samples, whole body concentrations were mathematically reconstructed from samples dissected and processed as fillet and remaining carcass (offal).

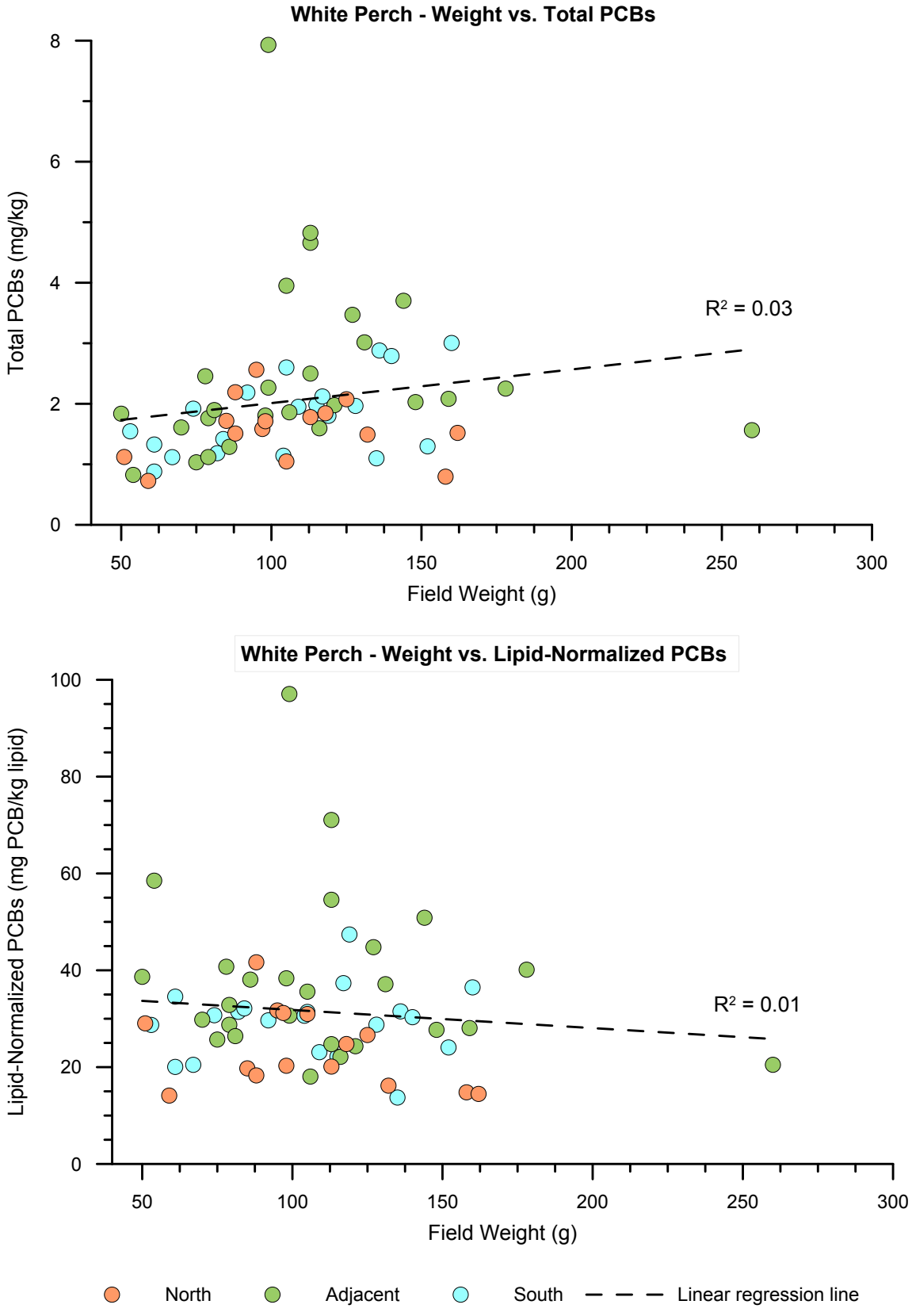


Figure E-2: Scatter plot of fish weight vs. total PCBs (top) and lipid-normalized PCBs (bottom). Data are from individual fish collected in both 2013 and 2014. For some samples, whole body concentrations were mathematically reconstructed from samples dissected and processed as fillet and remaining carcass (offal).

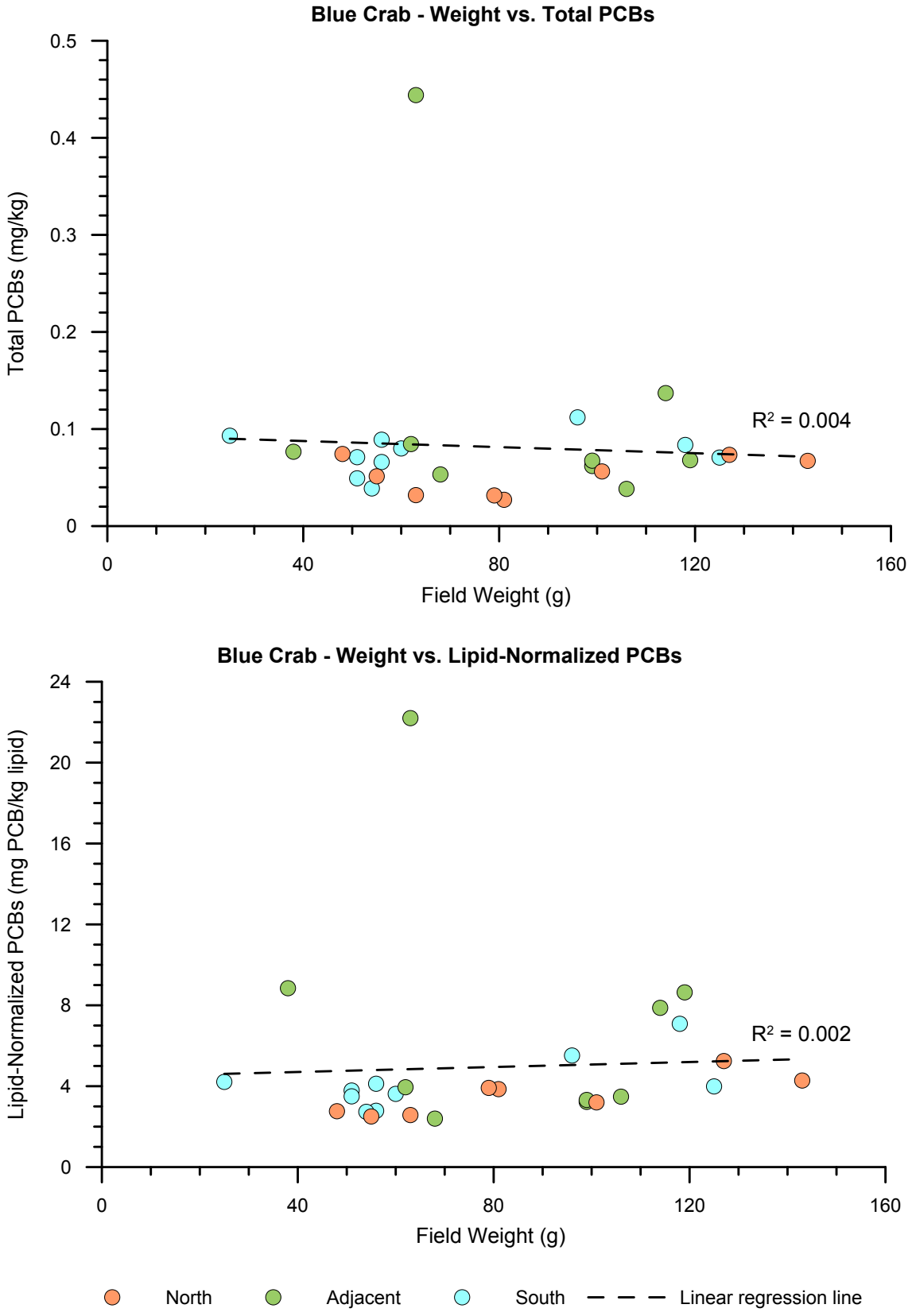


Figure E-3: Scatter plot of blue crab weight vs. total PCBs (top) and lipid-normalized PCBs (bottom). Data are from individual blue crabs collected in both 2013 and 2014.

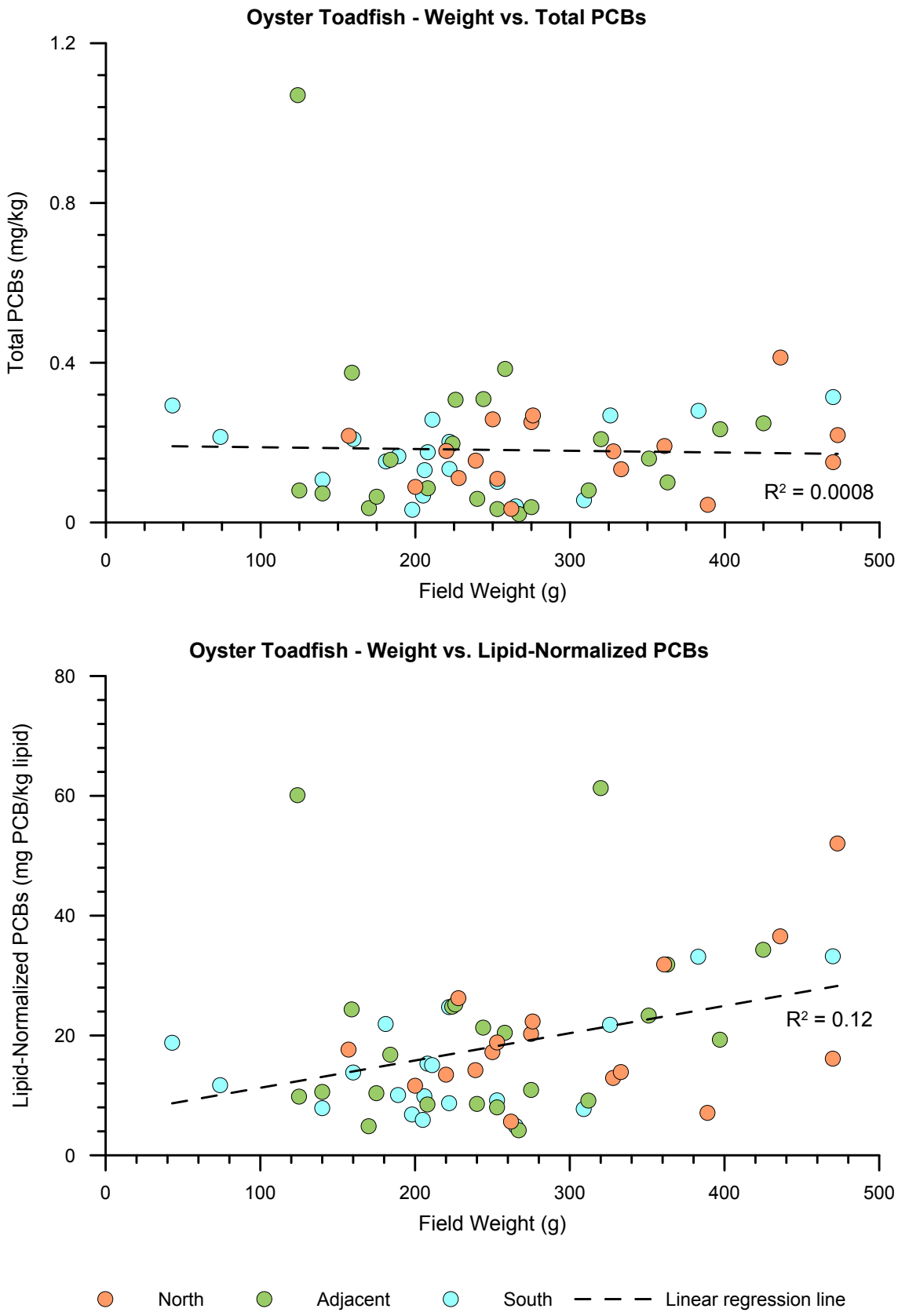


Figure E-4: Scatter plot of fish weight vs. total PCBs (top) and lipid-normalized PCBs (bottom). Data are from individual fish collected in both 2013 and 2014. For some samples, whole body concentrations were mathematically reconstructed from samples dissected and processed as fillet and remaining carcass (offal).

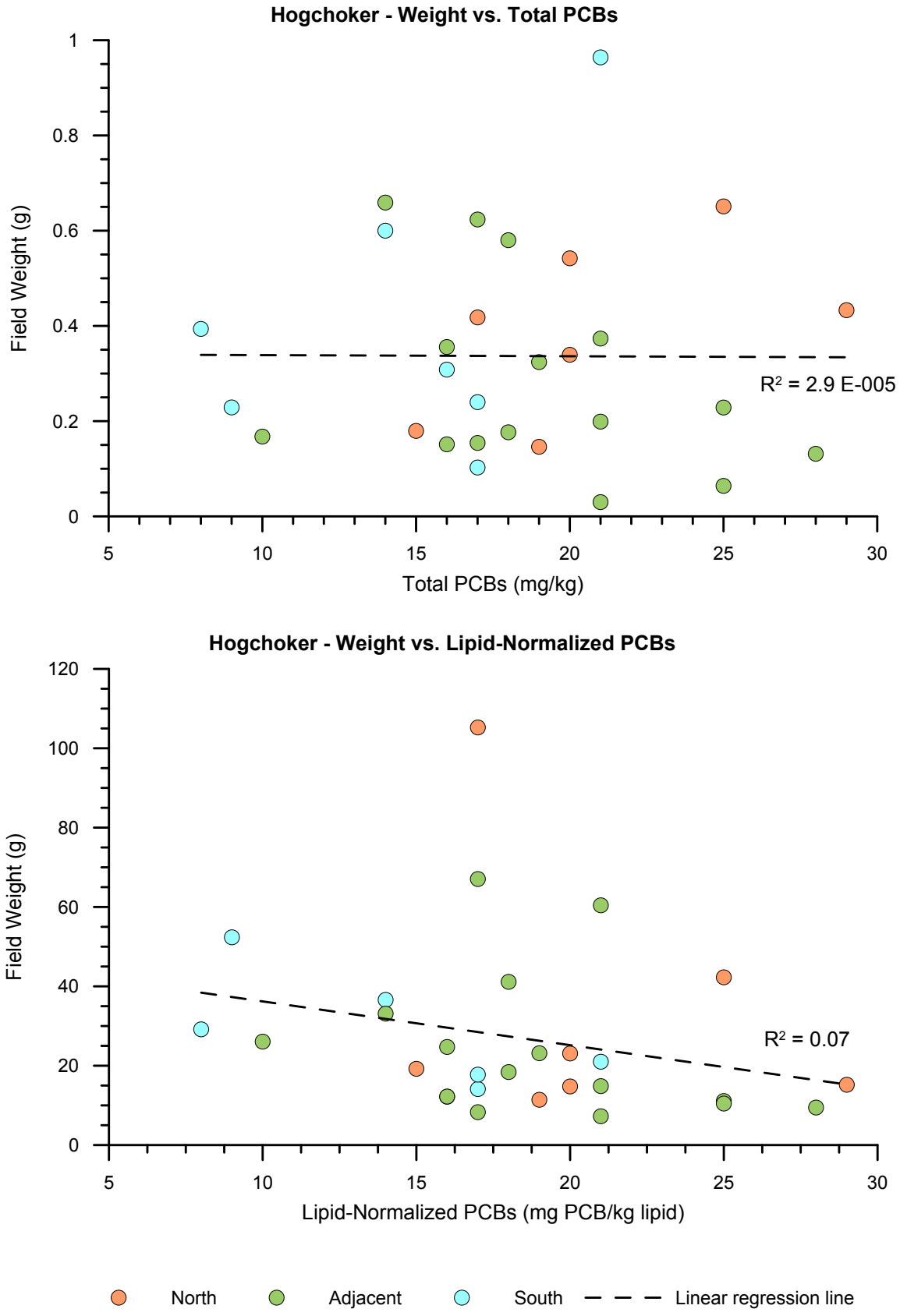


Figure E-5: Scatter plot of fish weight vs. total PCBs (top) and lipid-normalized PCBs (bottom). Data are from individual fish collected in both 2013 and 2014.

ATTACHMENT D

DATA USABILITY REPORTS

Available Upon Request.
As described in Section 5.12, validation of all samples is not complete

HALEY ALDRICH

APPENDIX I

LABORATORY REPORTS

TABLE SUMMARY OF LAB REPORTS

- Soil Analytical Data – PCBs
- Soil Analytical Data – Metals
- Sediment Analytical Data – PCBs
- Sediment Analytical Data – Metals
- Baseline Analytical Results – Porewater, Sediment, Groundwater, and Air
- Baseline Analytical Results – Surface Water
- Baseline Analytical Results – Biota 2013
- Baseline Analytical Results – Biota 2014

LAB REPORTS (AVAILABLE ON DVD ONLY)

TABLE SUMMARY OF LAB REPORTS

- Soil Analytical Data – PCBs
- Soil Analytical Data – Metals
- Sediment Analytical Data – PCBs
- Sediment Analytical Data – Metals
- Baseline Analytical Results – Porewater, Sediment, Groundwater, and Air
- Baseline Analytical Results – Surface Water
- Baseline Analytical Results – Biota 2013
- Baseline Analytical Results – Biota 2014

TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
NA	NA-101	N	13100838		14060022	13100838	13100838	13100838	14100449
		FD	13100838						
	NA-102	N	13100838	14060026	14060023	13100838	13100838	13100838	
		FD		14060070					
	NA-201	N	14060026	14060179	14060026			14100449	
	NA-202	N		14060179	14060026				
	NA-203	N		14060179					
	NA-204	N			14060179		14060179	14100451	
	NA-301	N	14060387						
		FD	14060387						
	NA-302	N	14060385						
NB	NB-001	N				13100838	13100838	14050735	13100838
NC	NC-001	N				13110309	13110309		
	NC-002	N				13110309	13110320	13110320	13110320
		FD				13110309			
	NC-003	N				13110320	13110309		
	NC-004	N		13100422	13100422				
	NC-101	N	13100423						
	NC-102	N	13100423					14060997	
		FD						14060997	
	NC-103	N	13100423						
	NC-104	N	13100423						
	NC-105	N			13100618				
	NC-108	N				13110572	13110572		
	NC-114	N					13110448*	13110448*	
		FD					13110448*		
	NC-115	N					13110448		
		FD					13110448		
	NC-116	N					13110448		
		FD					13110448		
	NC-117	N				13110515	14050735		
		FD				13110515			
	NC-118	N				13110515	14050735	13110515	
		FD				13110515			
	NC-119	N				13110448*			
	NC-120	N				13110572	13110572		
		FD				13110572			
	NC-201	N					14060134	14060179	
	NC-202	N				14060135			
		FD				14060135			
	NC-203	N	14060847			14060135			
	NC-204	N	14060070	14060385					
		FD	14060070						
	NC-205	N	14100374		14060021	14060021	14060024		
		FD			14060021				
ND	ND-101	N			13100759				
	ND-102	N			13100759	13100759			
	ND-103	N			13100759	13100759	13110515		
		FD					13110515		
	ND-104	N			13100759	13100759			
	ND-201	N			14060997	14060997	14070110		
	ND-202	N			14060997	14060997		15060666	

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TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
NE	NE-101	N	13100759	13100759					
	NE-102	N	13100759	13100759					
	NE-103	N	13100759	13100759					
	NE-104	N	13110393	13100759		14060997			
		FD				14060997			
	NE-201	N	14060392	14070304					
	NE-202	N	14060392	14070304					
		FD	14060392						
	NE-203	N	14060997		14070244	14070244	14070341		
	NE-204	N	14060997	14070110	14060997	14070341			
	NE-301	N	14070403						
NF	NF-101	N			13110571			13110571	
		FD			13110571				
	NF-102	N			13110571			13110571	
	NF-202	N	14060024						
		FD	14060024						
NG	NG-001	N						13110246	13110251
	NG-101	N						13110446	
		FD						13110446	
	NG-102	N						13110446	
		FD						13110446	
	NG-103	N						13110391	
		FD						13110391	
	NG-104	N						13110446	
		FD						13110446	
	NG-201	N			14100480	14100771	14110000	14070403	14081680
	NG-202	N				15060666	15070201	14070403	
	NG-203	N						14110568	
	NG-204	N						14110568	14120048
NH	NH-001	N		13100753	13100753				
	NH-002	N		13110518	13110518	13110251	13110246		
		FD		13110517	13110517				
	NH-003	N		13110312	13110393				
		FD			13110390				
	NH-101	N	13100844	13100844					
	NH-105	N	13100844				13100844	13110391	
		FD						13110391	
	NH-106	N	13100753	14060316	13100844		13100844		
	NH-107	N		13110573					
		FD		13110575					
	NH-108	N		13110573					
		FD		13110575					
	NH-109	N		13110575	13110575	13110573			
		FD		13110575					
	NH-110	N		13110575	13110575	13110575			
		FD		13110575					
	NH-111	N		13110573					
		FD		13110575					
	NH-112	N		13110573	13110573				
	NH-113	N	13100753		13100770	13100770	13100770		
	NH-114	N	13100770		13100770		13100770		
	NH-115	N	13100753		13100770	13100770	13100770		
	NH-116	N	13100562		13110517	14100374			

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TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
NH	NH-117	N	13100562	13110518	13110518	13110518	13110518		
		FD				13110517			
	NH-118	N	13100562	13110518	13110518	13110518			
	NH-119	N		13110150	13110150	13110517	13110517	13110517	13110517
		FD				13110517			
	NH-120	N		13110150					
	NH-121	N		13110150					
	NH-201	N			14050721				
	NH-202	N			14050721				
		FD			14050721				
	NH-203	N		14050594	14050594				
		FD			14050594				
	NH-204	N		14050525	14050525				
		FD		14050525					
	NH-205	N	14060134	14060281					
	NH-206	N	14050721	14060322					
	NH-207	N	14060219	14060441	14060219				
		FD	14060219						
	NH-208	N	14060219	14060219	14060441				
	NH-209	N	14060952	14060952	14060316	14100374		14060316	
	NH-210	N		14060316	14060316	14060316	14060599	14060316	
		FD		14060316					
	NH-211	N		14060316	14060316	14060599	14060805	14060316	
		FD						14060316	
	NH-212	N	14060222	14060441	14060222				
		FD	14060222						
	NH-213	N	14060219		14060219	14060441			
		FD			14060219				
	NH-214	N					14060219		
	NH-215	N	14050594	14050635	14050594				
		FD	14050594						
	NH-301	N	14060385						
	NH-302	N	14060385						
	NH-304	N	14060385						
	NH-305	N	14060928	14070110		15060666			
	NH-306	N	14060928	14070110					
	NH-307	N	14060928	14070110					
		FD	14060928						
	NH-308	N	14070244	14070244					
	NH-309	N	14070244	14070244	14070341				
	NH-310	N	14070244	14070341	14070439		15010319		
	NH-311	N				14070244	14070244		
	NH-312	N		14120298	15010045	14070304	14070304		
		FD					14070304		
	NH-313	N	14070541	14070686					
	NH-314	N	14070541	14070541					
	NH-315	N	14100848	14110059					
	NH-316	N		14100756					
		FD		14100756					
	NH-318	N	14110326	14110394	14110450	14110499			
	NH-319	N	14110326	14110394		15060666			
	NH-320	N	14100848	14110326					

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SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
NH	NH-321	N	14100848	14110243					
		FD	14100848						
	NH-322	N	14110326	14110394					
	NH-323	N	14110243						
	NH-324	N	14110243						
	NH-325	N	14110487				14110487		
	NH-326	N	14110487						
NI	NI-001	N						13110391	13110391
		FD							13110391
	NI-002	N		13110312	13110312				
		FD			13110312				
	NI-101	N		14050718	14050718	14050718	14050718		
		FD		14050718					
	NI-102	N			14050630	14070276			
	NI-103	N			14060008	14070276			
	NI-104	N			14060737	14060952	14070110		
	NI-105	N		14050531	14050633				
		FD		14050531					
	NI-106	N		14050387	14050402				
	NI-107	N		14050387	14050403				
	NI-108	N			14060008	14060322			
	NI-201	N		14060832	14060952	14070276			
		FD		14060832					
	NI-202	N		14060928	14070110	15060666	15060666		
		FD		14060928					
	NI-203	N		14060134	14060437				
	NI-204	N		14060134	14061030				
	NI-205	N			14060737				
		FD			14060737				
	NI-206	N			14060737				
	NI-207	N			14060500				
	NI-210	N		14100374	14070304	14070308	15010117		
		FD			14070304				
	NI-301	N		14061041	14070110			14120298	
	NI-302	N		14070576	14070686	14081680	14120298		
	NI-303	N		14070576	14070686	14081680	14090406	14100374	
	NI-304	N		14070576	14070686			14120048	
	NI-305	N			14110001	14110074			
		FD			14110001				
	NI-306	N			14110001	14110074	14110001	14120048	14120298
	NI-307	N			14120048	15010117	14110001	14120048	
	NI-308	N		14120298	15010319				
	NI-309	N		14120298					
	NI-310	N			14110001		14110001	14110185	
		FD			14110001		14110001		
NJ	NJ-001	N		13100617	13100617				
	NJ-101	N		13110393	13100619				
		FD		13110393					
	NJ-102	N		13110447	13100619				
		FD		13110447	13100619				
	NJ-103	N		13110447	13100619				
		FD		13110447					

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SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
NJ	NJ-104	N		13110393	13100617				
		FD		13110393					
	NJ-105	N	13110393	13110035					
	NJ-106	N	13110393	13110035					
	NJ-201	N		14060928	14070110				
	NJ-301	N		14070541					
	NJ-302	N		14070541	14070686		15010117		
	NJ-303	N		14070576	14070686				
		FD		14070576					
	NJ-304	N	14100756	14110243					
	NJ-305	N	14100756	14110243	14110329	14110394			
	NJ-306	N		14110243		15010117	15010117		
	NJ-307	N	14110243	14110329					
	NJ-308	N	14110487						
NK	NK-101	N		13100754	13100754				
	NK-102	N		13100754					
	NK-103	N		13100754	13100754				
	NK-104	N		13100754	13100754				
	NK-201	N		14060832	14061041				
	NK-202	N		14060832	15010319				
	NK-203	N		14050722	14060441				
		FD		14050722					
	NK-204	N		14050531	14050631				
	NK-301	N		14060222					
		FD		14060222					
	NK-302	N		14060222	14060305				
	NK-303	N		14060387	14060693				
NL	NL-001	N		13110394					
		FD		13110394					
	NL-101	N	13110394	13110394					
	NL-102	N	13110394	13110394					
		FD	13110394						
	NL-103	N	13110394	13110394					
	NL-201	N	14050529	14060222					
	NL-202	N	14050529	14060222					
	NL-203	N	14050720						
	NL-204	N	14050529						
	NL-301	N	14060219						
	NL-302	N	14060316	14060737					
	NL-303	N	14060316	14060660					
		FD	14060316						
	NL-304	N	14060737	14060952					
		FD	14060737						
	NL-305	N	14070541						
		FD	14070541						
	NL-306	N	14070541						
	NL-307	N	14100756						
	NL-308	N	14100756						
NM	NM-101	N	13100752						
	NM-102	N	13100752	13100752	13110575	13110575	13110575		
		FD			13110575				
	NM-103	N	13100752						
	NM-104	N	13100752						

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TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
NM	NM-201	N	14050721	14060179		14060660			
		FD				14060660			
	NM-202	N	14050720	14060099	14050721	14060660	14060660		
	NM-203	N	14060322		14060219	14060659			
		FD			14060219				
	NM-204	N			14050720				
		FD			14050720				
	NM-301	N				14060660	14060660		
		FD				14060660			
	NM-302	N			14060952				
	NM-303	N		14100374		14070209			
NN	NN-001	N				13100770	13100770	14060660	14060723
		FD				13100770			
	NN-002	N		13100752	13100752				
	NN-101	N	13110518	13110251					
		FD	13110517						
	NN-102	N				13110321	13110321		
		FD					13110321		
	NN-103	N			13110321		13110321		
	NN-104	N					13110321	14060660	14060667
	NN-105	N	13110518	13110251		13110251			
		FD	13110517						
	NN-201	N	14060660	14060847	14100374				
	NN-202	N				14060660	14060660	14060847	
		FD					14060660		
	NN-301	N	14070301	14070439	14070517				
	NN-302	N	14070304	14070439	14070517	14070638			
		FD	14070304						
	NN-303	N	14070576		14100451				
	NN-304	N	14070576		14120298				
	NN-305	N	14070576	14070686	14120298				
		FD	14070576						
	NN-306	N			14110001	14110074			
	NN-307	N	14100756	14110001	14110144	14110326			
		FD		14110001					
	NN-308	N	14100756	14110001					
		FD	14100756						
	NN-309	N	14100943	14110326	14110326				
	NN-310	N	14100943	14110326	14110326				
		FD	14100943						
NS	NS-001	N			14110568	14110568	14120048		
	NS-101	N			14110568	15010045	15010242		
	NS-102	N			14110568	15010045	15010242		
	NS-103	N			14110568	15010045	15010242	15060666	
	NS-104	N			14110568	15010045	15010242		
PD2	PD2-GL-001	N				13100847**			
	PD2-GL-002	N			13100847**				
PDI2	PDI2-17-01	N	14070305	14070475	14081680		14081680		
		FD	14070305						
	PDI2-17-02	N		14070475	14070475	14070540	14070950	14090406	14100449
	PDI2-FH-01	N			14070950				
	PDI2-POLE-01	N				14070950			

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SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
PDMW	PDMW-22S	N						14020397	
	PDMW-22S-01	N			14110174			14110174	14110332
	PDMW-22S-03	N			14110282	14110329	14110394	14110282	
	PDMW-22S-04	N			15010242		15060666	14110282	
	PDMW-22S-10	N			14110243			14110243	14110332
	PDMW-24S	N				14020397			
SA	SA-001	N		13100253	13100253				
	SA-002	N	13100253	13100253	13100253				
	SA-003	N			13100253	13110152	13110152		
	SA-004	N		13100253	13100253				
	SA-103	N		13100829					
	SA-104	N		13110141					
		FD		13110141					
	SA-105	N			13110141	13110141			
	SA-107	N		13110152					
	SA-108	N		13100829					
		FD		13100829					
	SA-201	N	14060134		14060134	14060392			
		FD			14060134				
	SA-202	N		14060135					
SB	SB-001	N	14060500	14060500	14060500				
		FD		14060500					
	SB-101	N	13100196	13100829	13100829				
	SB-201	N		14060392					
SC	SC-001	N		13110228	13110228				
	SC-101	N			13110228	13110228			
	SC-102	N			13110228				
	SC-103	N			13110228	13110228	14110000		
	SC-201	N			14060387				
		FD			14060387				
	SC-202	N			14060387	14070341			
	SC-203	N			14060387	14060599	14060805		
	SC-204	N			14060392	14060599	14060805		
		FD			14060392				
	SC-205	N			14060392	14060599	14060805		
	SC-301	N				14070095	14100374	14100771	
	SC-302	N				14061060	14070110	14070276	
	SC-303	N				14070095			
	SC-304	N				14070095			
		FD				14070095			
	SC-305	N				14070095			
	SC-306	N				14061060	14070110		
	SC-307	N					14070487	14070540	
	SC-308	N					14070487		
		FD					14070487		
	SC-309	N					14070487		
	SC-310	N				14070487			
	SC-311	N				14070487			
	SC-312	N					14100943	14110096	14110335
	SC-313	N					14100943	14110244	
		FD					14100943		
	SC-314	N				14100943			
	SC-315	N			14100943	14110074		14110244	

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TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
SC	SC-316	N					14100943	14110096	14110335
		FD					14100943		
	SC-317	N					14110169	14110244	
	SC-318	N					14110169	14110244	
	SC-319	N					14110169	14110244	
SE	SE-101	N				14060008		13110030	
		FD						13110030	
	SE-102	N				14060008		13100871	13100871
	SE-103	N						13100825	
	SE-201	N						14050719	
	SE-202	N						14050719	
		FD						14050719	
SG	SG-001	N				14060500	14070487 13110029**		
	SG-002	N				13110229	13110229		
		FD				13110229			
	SG-004	N		13110029**					
	SG-006	N			14070209	14070209			
		FD			14070209				
	SG-101	N		13110029**					
	SG-102	N				13110029**			
		FD				13110029**			
	SG-103	N					13100871		
	SG-104	N		13110030**	13110030**	13110030**			
	SG-201	N			14060500	14060693			
		FD			14060500				
	SG-202	N			14060500	14060693			
	SG-203	N		14060500**					
	SG-301	N			14070098				
	SG-302	N			14070098				
		FD			14070098				
	SG-303	N			14070209				
	SG-304	N			14070209				
SH	SH-001	N		13100751					
	SH-101	N	13100871						
	SH-102	N	13110030						
	SH-103	N	13110030						
	SH-104	N	13110029						
SL	SL-101	N		13100618	13110231				
	SL-102	N		13100618					
	SL-103	N		13100618					
	SL-201	N		14060021					
	SL-202	N		14060021					
		FD		14060021					
	SL-203	N		14050722					
SM	SM-101	N	13100618						
	SM-102	N	13100751	13110572	13110572				
		FD		13110572					
	SM-201	N	14050718		14050722	15010242			
		FD	14050722						
	SM-202	N	14060070		14060027				
	SM-203	N	14060385	14060385	14110629	15010242			
	SM-204	N				14110629	14120048		

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TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
SN	SN-001	N				13110246			
	SN-101	N		13110312	13110312				
	SN-102	N		13110572	13110572				
		FD		13110572					
SO	SO-101	N	13100196						
	SO-102	N	13100196						
	SO-103	N	13100196						
		FD	13100196						
SP	SP-001	N	14060500	13110028	13110028	13110246			
	SP-101	N	13100129	13110027					
	SP-102	N	13100129	13110230					
	SP-103	N	13100129	13110027					
	SP-104	N	13100129						
	SP-105	N	13100129	13110247					
	SP-106	N	13100129						
	SP-201	N	14100945						
SQ	SQ-001	N		13110028					
	SQ-101	N	13110138	13110138					
	SQ-102	N	13110249	13110249	13110249				
		FD	13110249						
	SQ-103	N	13110138	13110138	13110138	14060316			
	SQ-104	N	13110230	13110230	13110230				
	SQ-105	N	13110136	13110136	13110136				
	SQ-106	N	13110136	13110136					
	SQ-201	N			14060693				
	SQ-202	N	14060502		14060693	14070238			
		FD	14060502						
	SQ-203	N	14050531	14050531					
	SQ-204	N	14060500	14060500					
	SQ-301	N			14070341				
	SQ-303	N		14110001					
		FD		14110001					
SS	SS-101	N			14081680		14081680	14090406	14100449
	SS-102	N			14081680	14070625	14070950	14090406	14100449
	SS-103	N			14081680		14081680	14090406	14100449
	SS-104	N			14081680	14070950	14081680	14090406	14100449
	SS-105	N			14081680	14090406	14081680	14100481	
	SS-106	N			14081680	14110329	14081680		
	SS-107	N			14081680	14090406	14081680	14100481	
	SS-201	N			14100945	14110096		14100945	
		FD			14100945				
	SS-202	N			14100945				
	SS-203	N			14100945	14110096	14110230		
		FD			14100945				
	SS-204	N			14100848	14110000	14110244	14100848	
		FD			14100848				
	SS-205	N			14100848	14110000	14110244	14100848	
	SS-206	N			14100848			14100848	14110019
	SS-207	N			14100945			14100945	14110096
		FD			14100945				
	SS-208	N			14110059	14110230	14110282	15070444	
	SS-209	N			14110059	14110230	15060666	15070201	15070444
	SS-210	N			14110059	14110230	14110282	15070444	

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the height of the concrete pad.

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the height of the concrete pad.

TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
SS	SS-211	N			14110059	14110329	14110394	14110230	
	SS-212	N			14110059			14110059	14110335
	SS-213	N			14110061	15010242	15060666	14110061	
	SS-214	N			14110061			14110061	14110335
	SS-215	N			14110061	14110230		14110061	
	SS-216	N			14110169	14110244			
	SS-217	N			14110169	14110329			
	SS-218	N			14110243	15010242		15070444	
	SS-219	N			14110243	15010242		14110243	
	SS-220	N			14110243	14110329	15070201	14110243	
	SS-221	N			14110409	15010242	15060666	14110409	
	SS-222	N			14110409	14110450	15060666	14110409	
	SS-223	N			14110409	14110450	15060666		
	SS-224	N			14110409				
	SS-225	N			14110487				
		FD				15010242			
	SS-226	N			14110487	15010242	15060666		
	SS-227	N			14110487		15070201		
	SS-228	N				14110409	14110487	14110409	
	SS-229	N			14110629	14110629	15060666		
	SS-230	N			14110629	14120048	14120298	15010242	
	SS-231	N			14110629	14120048	15060666		
WA	WA-001	N				13110246	13110249		
	WA-002	N		13110309	13110319				
	WA-101	N					13110572		
	WA-102	N					13100846		
	WA-103	N					13100846		
	WA-104	N					13100846		
	WA-105	N					13100846		
	WA-106	N					13100846		
	WA-106A	N					13100846		
		FD					13100846		
	WA-107	N					13100619		
	WA-108	N					13100619		
	WA-110	N					13100846		
	WA-112	N					13110320		
	WA-113	N	13100422				13110031		
	WA-114	N	13100422				13110031		
	WA-115	N	13100422	14060222			13110031		
	WA-116	N	13100422	14060222	14060441		13110031		
	WA-117	N	13100276	14060222	13100500		13110031		
	WA-118	N	13100503	14060552	14100905		13110031		
		FD	13100503						
	WA-119	N	13100503	14060502			14050735		
	WA-120	N	13100503	14060502	14060805	14070238	13110031		
	WA-121	N	13100503				13110032		
	WA-122	N	13100503				13110032		
	WA-123	N		13100276	14060552	14060558	13110032		
	WA-124	N		13100130	14060552		13110032		
		FD					13110032		
	WA-125	N		13100130			13110032		
	WA-126	N		13110145			13110145		
	WA-127	N		13100130	14060552		13110145		

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the height of the concrete pad.

** Samples collected from this location was adjusted from surrounding grade. Samples were collected at 1.0 ft deeper than interval indicated to ac
the height of the concrete pad.

TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
WA	WA-128	N		13110208		14100905	13110208		
		FD					13110205		
	WA-129	N	13110205		14050596	14060008	13110208		
		FD			14050594				
	WA-130	N		13100071			13110145		
	WA-131	N		13100071			13100563		
	WA-132	N		14110487	14110487		13100563		
	WA-133	N		13110205			13110205		
	WA-134	N		13100071			13100563		
		FD					13100563		
	WA-135	N		13100071			13100563		
	WA-136	N					13100563		
	WA-137	N					13100563		
	WA-138	N					13100502		
	WA-139	N					13100502		
	WA-140	N					13100502		
	WA-141	N		13110205	14050595		13110205		
	WA-142	N			13100502		13100502		
	WA-143	N			13100221		13100221		
	WA-144	N			13100221		13100221		
	WA-145	N					13110205		
	WA-146	N		13100080			13100080		
	WA-147	N		13100080			13100080		
		FD					13100080		
	WA-148	N		13100080			13100080		
	WA-149	N				13100080	13100080		
		FD				13100080			
	WA-152	N			13100128		13100128		
	WA-153	N				13100128	13100128		
	WA-154	N			13100128	13100128	13100128		
	WA-157	N		13110205			13110205		
	WA-158	N					13110205		
		FD		13110205					
	WA-159	N					13110145		
	WA-160	N			13110145		13110145		
		FD			13110145				
	WA-161	N			13110150		13110150		
	WA-162	N			13110150		13110150		
	WA-163	N			13110150	13110150	13110150		
	WA-201	N					14060134		
		FD					14060134		
	WA-202	N	14060222	14060222	14060441		14060599		
	WA-203	N	14060222	14060441					
	WA-204	N	14060222	14060441					
	WA-205	N		14050525					
	WA-206	N				14070686	14060501		
		FD					14060501		
	WA-207	N			14060502		14060502		
		FD			14060502				
	WA-208	N		14050594					
	WA-209	N		14050596			14050596		
		FD		14050596					

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the height of the concrete pad.

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the height of the concrete pad.

TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH						
			0 - 2 (ft)	2 - 4 (ft)	4 - 6 (ft)	6 - 8 (ft)	8 - 10 (ft)	10 - 12 (ft)	12 - 14 (ft)
WA	WA-210	N		14050596			14050596		
	WA-211	N		14060437					
WB	WB-101	N	13110032	13110032	13110032				
	WB-102	N	13110032	13110032	14070686				
	WB-103	N	13110032	13110032	13110032				
	WB-104	N	13110032	13110032					
	WB-201	N	14060133	14060281		14070686			
		FD	14060132						
	WB-202	N	14060134	14060437					
	WB-203	N		14060552					
	WB-204	N			14070686				
	WB-205	N			14070238	14070341			
	WB-206	N	14060134			14070686			
		FD	14060134						
	WB-301	N	14060997	14070110	14070276	14070439	14110059	14110230	14110332
	WB-302	N	14070244						
	WB-303	N		14100672		14110059	14110230	14110282	
		FD		14100672					
WC	WC-001	N		13100130					
	WC-002	N			13100130				
	WC-101	N		13110209					
	WC-102	N		13110211	14060805				
		FD		13110209					
	WC-103	N		13110211	14060805				
	WC-104	N		13110211					
	WC-105	N		13110209					
	WC-201	N	14050596	14050596	14060322	14060599			
	WC-202	N	14100945						
		FD	14100945						
WD	WD-001	N	13100080	13100080	13100080	13100080	13100080		
WE	WE-001	N				13100277	13100277		

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the height of the concrete pad.

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the height of the concrete pad.

TABLE - SUMMARY OF LAB REPORTS
SOIL ANALYTICAL DATA - METALS
OCTOBER 2015

LOCATION		SAMPLE TYPE	COPPER	LEAD	ZINC
SA	SA-001	N	14070095	14070095	14070095
	SA-106	N	14060134	14060134	14060134
	SA-107	N	14070095	14070095	14070095
		FD		14070095	
	SA-201	N	14060134	14060134	14060134
	SA-202	N		14060135	
SI	SI-101	N	13100504	13100504	13100504
	SI-102	N	13100504	13100504	13100504
	SI-103	N	13100504	13100504	13100504
	SI-104	N	13100751	13100751	13100751
	SI-201	N	14060070	14060070	14060070
	SI-202	N	14060070	14060070	14060070
SJ	SJ-101	N	13100501	13100501	13100501
	SJ-102	N	13100501	13100501	13100501
	SJ-103	N	13100501	13100501	13100501
	SJ-104	N	13100501	13100501	13100501
SK	SK-101	N	13100504	13100504	13100504
	SK-102	N	13100775	13100775	13100775
	SK-103	N	13100504	13100504	13100504
	SK-104	N	13100504	13100504	13100504
SR	SR-101	N	14060024	14060024	14060024
	SR-102	N	14060024	14060024	14060024
		FD		14060024	
	SR-103	N		14060024	
	SR-104	N		14060024	
	SR-201	N	14070098	14070098	14070098
	SR-202	N		14070098	
	SR-203	N		14070098	
		FD		14070098	
	SR-204	N	14070098	14070098	14070098
	SR-205	N	14070098	14070098	14070098
	SR-301	N	14070434	14070434	14070434

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH								
			0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	4 - 6 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-101	N	14081503	14081503	14081503	14081503	14081503				
		FD			14081503						
	VC-101A	N		15060578	15060578	15060578	15060578		15060578		
		FD		15060578							
	VC-101B	N		15060578	15060578	15060578	15060578		15060578		
	VC-101C	N		15060578	15060578	15060578	15060578		15060578		
	VC-102	N	14081503	14081503	14081503	14081504	14081504				
	VC-102A	N		15060579	15060579	15060579	15060579		15060579		
		FD		15060579							
	VC-102B	N		15060579	15060579	15060579	15060579		15060579		
	VC-102C	N		15060579	15060579	15060579	15060579		15060579		
		FD			15060579						
	VC-103	N	14081503	14081503	14081503	14081503	14081503		14081503		
		FD	14081503								
	VC-103A	N		15060580	15060580	15060580	15060580		15060580		
	VC-103B	N		15060580	15060580	15060580	15060580		15060580		
	VC-103C	N		15060580	15060580	15060580	15060580		15060580		
	VC-104	N	14081737	14081737	14081720	14081720	14081720				
		FD		14081720							
	VC-105	N	14081635	14081635	14081635	14081635	14081635				
		FD		14081635							
	VC-106	N	14081720	14081720	14081720	14081720	14081720				
		FD					14081720				
	VC-107	N	14081737	14081737	14081737	14081737	14081737				
		FD			14081737						
	VC-108	N	14081720	14081720	14081720	14081720	14081720				
		FD			14081720						
	VC-109	N	14081631	14081631	14081631	14081631	14081631				
		FD		14081631							
	VC-110	N	14081631	14081631	14081631	14081631	14081631		14090101		
	VC-111	N	14081631	14081631	14081631	14081631	14081631				
		FD				14081631					
	VC-112	N	14081635	14081635	14081635	14081635	14081635				
		FD	14081635								
	VC-113	N	14081635	14081635	14081635	14081635	14081635				
	VC-114	N	14081631	14081634	14081634	14081634	14081634				
		FD				14081634					
	VC-115	N	14081615	14081615	14081615	14081615	14081615				
		FD		14081615							
	VC-116	N	14081615	14081615	14081615	14081615	14081615				
	VC-117	N	14081502	14081502	14081502	14081502	14081502				
		FD	14081502								
	VC-118	N	14081615	14081615	14081615	14081615	14081615				
		FD				14081615					
	VC-119	N	14081615	14081618	14081618	14081618	14081618				
		FD					14081618				
	VC-120	N	14081618	14081618	14081618	14081618	14081618				
	VC-121	N	14081501	14081501	14081501	14081501	14081501				
	VC-122	N	14081498	14081498	14081498	14081498	14081498				
	VC-123	N	14081498	14081498	14081499	14081499	14081499		14090101		
	VC-124	N	14081499	14081499	14081499	14081499	14081499				

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH								
			0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	4 - 6 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-125	N	14081500	14081500	14081500	14081500	14081500				
		FD				14081500					
	VC-126	N	14081500	14081500	14081501	14081501	14081501				
		FD		14081500							
	VC-127	N	14090213	14090213	14090213	14090213	14090213				
	VC-128	N	14090213	14090213	14090213	14090213	14090213				
	VC-129	N	14090213	14090213	14090213	14090213	14090213				
	VC-130	N	14090686	14090686	14090686	14090686	14090686		14100104		
		FD			14090686						
	VC-131	N	14100104	14100104	14100104	14100104	14100050				
	VC-132	N	14100104	14100104	14100104	14100104	14100050				
	VC-133	N	14110070	14100055	14100055	14100049	14100044				
		FD				14100049					
	VC-134	N	14110070	14100055	14100055	14100049	14100044				
	VC-135	N	14110070	14100055	14100055	14100049	14100044				
		FD			14100055						
	VC-136	N	14110070	14100055	14100055	14100049	14100044				
	VC-137	N	14090496	14090496	14090496	14090496	14090496				
		FD			14090496						
	VC-138	N	14110070	14100055	14100055	14100049	14100044				
		FD				14100049					
	VC-139	N	14090496	14090496	14090496	14090496	14090496		14090686		
		FD			14090496						
	VC-140	N	14090496	14090496	14090496	14090496	14090496				
		FD	14090496								
	VC-141	N	14110070	14100055	14100055	14100049	14100044				
		FD			14100055						
Deepwater	VC-301	N	14090423	14090423	14090423	14090423					
		FD			14090423						
	VC-302	N	14090387	14090387	14090387	14090387	14090954	14100230			
		FD			14090387						
	VC-303	N	14090387	14090387	14090387	14090387	14090954	14100684		14100873	
		FD				14090387					
	VC-304	N	14090387	14090387	14090387	14090387	14090954	14100230		14100684	14100772
		FD				14090387					
	VC-305	N	14090423	14090423	14090423	14090423	14090954	14100230		14100670	
		FD	14090423								
	VC-306	N	14090380	14090380	14090380	14090382	14100230	14100670		14100670	15010000
		FD			14090382						
	VC-307	N	14090382	14090382	14090382	14090382					
		FD	14090382								
	VC-308	N	14090380	14090380	14090380	14090380					
		FD		14090380							
	VC-309	N	14090419	14090419	14090419	14090419	14090954	14100230		14100670	14100670
		FD				14090419					
	VC-310	N	14090422	14090422	14090422	14090422	14100762	14100762		14100762	
		FD	14090422								
	VC-311	N	14090422	14090422	14090422	14090422	15070526	15070526		14100751	
	VC-312	N	14090382	14090382	14090382	14090383	14090686				
	VC-313	N	14090419	14090419	14090419	14090422	15070444			15070444	
	VC-314	N	14090155	14090156	14090156	14090156		14100863		14100863	
		FD			14090156						

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH								
			0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	4 - 6 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-315	N	14090156	14090156	14090156	14090156	14090156	14090156		14090157	14090157
	VC-316	N	14090157	14090157	14090157	14090157	14090157	14090157		14090157	14090157
	VC-317	N	14090419	14090419	14090419	14090419	14090419	14090419		14090419	14090419
		FD			14090419						
	VC-318	N	14090422	14090422	14090422	14090422	14090422	14090422		14090422	14090422
		FD			14090422						
	VC-319	N	14090158	14090158	14090158	14090158					
		FD		14090158							
	VC-320	N	14090158	14090158	14090159	14090159					
		FD			14090159						
	VC-321	N	14090159	14090159	14090159	14090159					
		FD				14090159					
	VC-322	N	14090159	14090161	14090161	14090161					
		FD	14090159								
	VC-323	N	14090161	14090161	14090161	14090161					
		FD		14090161							
	VC-324	N	14090161	14090161	14090162	14090162					
		FD				14090162					
	VC-325	N	14090162	14090162	14090162	14090162					
	VC-326	N	14090152	14090152	14090152	14090152	14090152	14090152		14090153	14090153
		FD	14090152								
	VC-327	N	14090155	14090155	14090155	14090155	14090155	14090155		14090155	14090155
		FD			14090155						
	VC-328	N	14090153	14090153	14090153	14090153	14090153	14090153		14090153	14090154
		FD				14090153					
	VC-329	N	14090154	14090154	14090154	14090154	14090154	14090154		14090154	14090154
		FD				14090154					
	VC-330	N	14090214	14090214	14090214	14090214	14090686	14100104			
		FD			14090214						
	VC-331	N	14090214	14090214	14090214	14090214	14100104				
		FD			14090214						
	VC-332	N	14090214	14090214	14090214	14090214	14090686	14100104			
		FD	14090214								
	VC-334	N	15010000	15010000	15010000	14100167	14100479	14100863		14100863	
		FD				14100167					
	VC-335	N	15010000	15010000	15010000	14100167	14100762	14100762		14100762	
		FD				14100167					
	VC-336	N	15010000	15010000	15010000	14100167	14100762	14100762		14100762	
		FD				14100167					
	VC-337	N	14100674	14100674	14100674	14100674	14100674	14100674		14100674	
	VC-338	N	14100674	14100674	14100674	14100671	14100674	14100679		14100671	14100674
		FD				14100671					
	VC-339	N				14100684	14100873	14100155		14100772	
		FD						14100155			
	VC-340	N						14100155		14100684	
		FD						14100155			
	VC-341	N	15070526	15070526	15070526	15070526	15070526	14100155		14100751	
	VC-342	N	14100674	14100674	14100674	14100674	14100674	14100671		14100671	14100674
		FD								14100671	

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - PCBs
OCTOBER 2015

			DEPTH								
LOCATION		SAMPLE TYPE	0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	4 - 6 (ft)	5 - 6 (ft)	6 - 8 (ft)
Deepwater	VC-343	N	15010001	15010001	15010001	15010001	15010001	14100479		14100167	
	VC-344	N	15010001	15010001	14100863	15010001	14100167	15010001			
	VC-345	N	14100674	14100674	14100671	14100671	14100671	14100679			
		FD					14100671				
	VC-346	N	15070526	15070526	15070526	14100155	15070526	15070526		14100751	14100772
		FD				14100155					
	VC-347	N	15070526	15070526	15070526	15070526	15070526	14100772		14100155	
		FD								14100155	
	VC-348	N	15010001	15010001	14100863	15010001	14100155				
		FD					14100155				
	VC-349	N		15070444	15070444	15070444	14100155	14100684			
		FD					14100155				
	VC-350	N	14100684	14100684	14100684	14100863	14100155				
		FD					14100155				
	VC-351	N	15010000	15010000	14100457						
	VC-352	N	15010000	15010000	14100457						
		FD			14100457						
	VC-353	N	15010000	14100457	14100457						
		FD		14100457	14100457						
	VC-354	N	15010000	14100457	14100167						
		FD		14100167							
	VC-355	N	14100854	14100854	14100854	14100758	14100754	14100875			
		FD	14100854								
	VC-356	N	14100841	14100841	14100841	14100757	14100757				
		FD			14100841						
	VC-357	N	14100851	14100851	14100849						
	VC-358	N	14100851	14100851	14100849			15070444			
	VC-359	N	14110122	14110122	14110122	14100940	14100940				
	VC-360	N	14110122	14110122	14110122	14100940	14100940				
		FD					14100940				
	VC-361	N	14110122	14110122	14110122	14100940					
	VC-362	N	15050134	15050134	15050134	15050134	15050134	15050134		15050134	
	VC-363	N	15050137	15050137	15050137	15050137	15050137	15050137		15050137	
		FD					15050137				
	VC-364	N	15050134	15050134	15050134	15050134	15050134	15050134		15050134	
	VC-365	N				14100940					
	VC-367	N	15050134	15050134	15050134	15050134	15050134				
		FD					15050134				
	VC-368	N	15050137	15050137	15050137	15050137	15050137				
		FD				15050137					
	VC-370	N	15070599	15070599	15070599	15070599	15070444	15070599			
		FD						15070599			
	VC-372	N					14110231				
		FD					14110231				
	VC-373	N	15010000	15010000	15010000	15010000	14110231				
		FD					14110231				
	VC-375	N	15010001	15010001	15010001	14110231	14110231				
		FD				14110231					

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH								
			0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	4 - 6 (ft)	5 - 6 (ft)	6 - 8 (ft)
Nearshore	VC-401	N	14081736	14081736	14081736	14081736	14081736	14081736		14081736	14081736
		FD	14081736								
	VC-402	N	14090062	14090062	14090062	14090062	14090062	14090062		14090062	14090063
		FD	14090062								
	VC-403	N	14090063	14090063	14090063	14090063	14090063	14090063		14090063	14090063
		FD						14090063			
	VC-404	N	14090064	14090064	14090064	14090064	14090064	14090064		14090064	14090064
		FD				14090064					
	VC-405	N	14090064	14090065	14090065	14090065	14090065	14090065		14090065	14090065
		FD				14090065					
	VC-406	N	14090383	14090383	14090383	14090383	14090383	14090383		14090383	14090383
		FD			14090383						
	VC-407	N	14090067	14090067	14090067	14090067	14090067	14090067		14090067	14090067
		FD				14090067					
	VC-408	N	14090067	14090068	14090068	14090068	14090068	14090068		14090068	14090068
		FD					14090068				
	VC-409	N	14090066	14090066	14090066	14090066	14090066	14090066		14090066	14090066
		FD			14090066						
	VC-410	N	14090385	14090385	14090385	14090385	14090385	14090385		14090385	14090385
		FD		14090385							
	VC-411	N	14100271	14100271	14100271	14100271	14100271	14100271		14100271	14100272
		FD				14100271					
	VC-412	N	14100272	14100272	14100272	14100272	14100272	14100272		14100272	14100272
		FD						14100272			
	VC-413	N	14100273	14100273	14100273	14100273	14100273	14100273		14100273	14100273
	VC-414	N	14100273	14100273	14100274	14100274	14100274	14100274		14100274	14100274
		FD			14100274						
	VC-415	N	14100274	14100274	14100274	14100274	14100274	14100274		15010001	15020280
		FD					14100274				
	VC-416	N	14100859	14100859	14100859	14100859	14100859	14100992		15010001	15020280
		FD						14100992			
	VC-417	N	14100992	14100992	14100992	14100992	14100992	14100992		15010001	15020280
		FD						14100992			
	VC-418	N	14100992	14100993	14100993	14100993	14100993	14100993		15010001	15020280
		FD					14100993				
	VC-419	N	14100841	14100841	14100841	14100841	14100842	14100842		15010001	15020280
		FD					14100842				
	VC-420	N	14100993	14100993	14100993	14100993	14100854	14100854		15010001	15020280
		FD					14100854				
	VC-421	N	14100854	14100854	14100854	14100854	14100854	14100854		15010001	15020280
		FD						14100854			
	VC-422	N	14100841	14100841	14100792	14100757	14100757	14100792		15010001	15020280
		FD			14100792						
Old Marina	VC-501	N	14090421	14090421	14090421	14090421	14090421	14090421		14090421	14090421
		FD									14090421
	VC-502	N	14110070	14100056	14100056	14100056	14100056	14100056		14100056	14100056
	VC-503	N	14110070	14100049	14100049	14100049	14100049	14100049		14100049	14100049
		FD				14100049					
	VC-504	N	14090420	14090420	14090420	14090420	14090420	14090420		14090420	14090420
		FD			14090420						
	VC-505	N	14100168	14100168	14100168	14100168	14100168	14100168		14100168	14100168
		FD								14100168	

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - PCBs
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH								
			0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	4 - 6 (ft)	5 - 6 (ft)	6 - 8 (ft)
Old Marina	VC-506	N	14110070	14100056	14100056	14100056	14100056	14100056		14100056	14100056
		FD			14100056						
	VC-507	N	14100168	14100168	14100168	14100168	14100168	14100168		14100168	14100168
		FD									14100168
	VC-508	N	14090421	14090421	14090421	14090421	14090421	14090421		14090421	14090421
		FD			14090421						
	VC-509	N	14100859	14100859	14100859	14100859	14100794	14100794		14100794	14100794
		FD						14100794			
	VC-510	N	14110070	14100049	14100049	14100049	14100049	14100047		14100047	14100047
		FD								14100047	
	VC-511	N	14100167	14100158	14100158	14100158	14100158	14100158		14100457	14100457
		FD			14100158						
	VC-512	N	14100859	14100859	14100794	14100794	14100754	14100754		14100754	14100794
		FD				14100794					
	VC-513	N	14100859	14100859	14100859	14100859	14100794	14100754		14100754	14100754
		FD									14100754
	VC-514	N	14100850	14100850	14100851	14100851	14100851	14100851		14100851	14100851
		FD								14100851	
	VC-515	N	14100850	14100850	14100850	14100850	14100849	14100849		14100849	14100850
		FD			14100850						
	VC-516	N	14100851	14100851	14100851	14100851	14100851	14100851		14100851	14100851
North Boat Slip	VC-601	N	14100842	14100842	14100842	14100842	14100842	14100842		14100842	14100842
		FD									14100842
	VC-602	N	14110070	14110070	14110070	14110070	14110070	14110070		14110070	14110070
		FD				14110070					
	VC-603	N	14100859	14100859	14100754	14100859	14100754	14100859		14100754	14100859
		FD			14100754						
	VC-604	N	14110122	14110122	14100940	14110122	14100940	14110122		14100940	14110122
	VC-605	N	14110218	14110218	14110218	14110218	14110218	14110218		14110218	14110218
		FD			14110218						

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - METALS
OCTOBER 2015

			DEPTH							
LOCATION		**SAMPLE TYPE**	**0 - 0.5 (ft)**	**0.5 - 1 (ft)**	**1 - 2 (ft)**	**2 - 3 (ft)**	**3 - 4 (ft)**	**4 - 5 (ft)**	**5 - 6 (ft)**	**6 - 8 (ft)**
Nearshore	VC-401	N	14081736	14081736	14081736	14081736	14081736	14081736	14081736	14081736
		FD	14081736							
	VC-402	N	14090062	14090062	14090062	14090062	14090062	14090062	14090062	14090063
		FD	14090062							
	VC-403	N	14090063	14090063	14090063	14090063	14090063	14090063	14090063	14090063
		FD						14090063		
	VC-404	N	14090064	14090064	14090064	14090064	14090064	14090064	14090064	14090064
		FD				14090064				
	VC-405	N	14090064	14090065	14090065	14090065	14090065	14090065	14090065	14090065
		FD				14090065				
	VC-406	N	14090383	14090383	14090383	14090383	14090383	14090383	14090383	14090383
		FD			14090383					
	VC-407	N	14090067	14090067	14090067	14090067	14090067	14090067	14090067	14090067
		FD				14090067				
	VC-408	N	14090067	14090068	14090068	14090068	14090068	14090068	14090068	14090068
		FD					14090068			
	VC-409	N	14090066	14090066	14090066	14090066	14090066	14090066	14090066	14090066
		FD			14090066					
	VC-410	N	14090385	14090385	14090385	14090385	14090385	14090385	14090385	14090385
		FD		14090385						
	VC-411	N	14100271	14100271	14100271	14100271	14100271	14100271	14100271	14100272
		FD				14100271				
	VC-412	N	14100272	14100272	14100272	14100272	14100272	14100272	14100272	14100272
		FD						14100272		
	VC-413	N	14100273	14100273	14100273	14100273	14100273	14100273	14100273	14100273
	VC-414	N	14100273	14100273	14100274	14100274	14100274	14100274	14100274	14100274
		FD			14100274					
	VC-415	N	14100274	14100274	14100274	14100274	14100274	14100274	15010001	15020280
		FD					14100274			
	VC-416	N	14100859	14100859	14100859	14100859	14100859	14100992	15010001	15020280
		FD						14100992		
	VC-417	N	14100992	14100992	14100992	14100992	14100992	14100992	15010001	15020280
		FD						14100992		
	VC-418	N	14100992	14100993	14100993	14100993	14100993	14100993	15010001	15020280
		FD					14100993			
	VC-419	N	14100841	14100841	14100841	14100841	14100842	14100842	15010001	15020280
		FD					14100842			
	VC-420	N	14100993	14100993	14100993	14100993	14100854	14100854	15010001	15020280
		FD					14100854			
	VC-421	N	14100854	14100854	14100854	14100854	14100854	14100854	15010001	15020280
		FD						14100854		
	VC-422	N	14100841	14100841	14100792	14100757	14100757	14100792	15010001	15020280
		FD			14100792					

TABLE - SUMMARY OF LAB REPORTS
SEDIMENT ANALYTICAL DATA - METALS
OCTOBER 2015

LOCATION		SAMPLE TYPE	DEPTH							
			0 - 0.5 (ft)	0.5 - 1 (ft)	1 - 2 (ft)	2 - 3 (ft)	3 - 4 (ft)	4 - 5 (ft)	5 - 6 (ft)	6 - 8 (ft)
Old Marina	VC-501	N	14090421	14090421	14090421	14090421	14090421	14090421	14090421	14090421
		FD								14090421
	VC-502	N	14110070	14100056	14100056	14100056	14100056	14100056	14100056	14100056
	VC-503	N	14110070	14100049	14100049	14100049	14100049	14100049	14100049	14100049
		FD				14100049				
	VC-504	N	14090420	14090420	14090420	14090420	14090420	14090420	14090420	14090420
		FD			14090420					
	VC-505	N	14100168	14100168	14100168	14100168	14100168	14100168	14100168	14100168
		FD							14100168	
	VC-506	N	14110070	14100056	14100056	14100056	14100056	14100056	14100056	14100056
		FD			14100056					
	VC-507	N	14100168	14100168	14100168	14100168	14100168	14100168	14100168	14100168
		FD								14100168
	VC-508	N	14090421	14090421	14090421	14090421	14090421	14090421	14090421	14090421
		FD			14090421					
	VC-509	N	14100859	14100859	14100859	14100859	14100794	14100794	14100794	14100794
		FD						14100794		
	VC-510	N	14110070	14100049	14100049	14100049	14100049	14100047	14100047	14100047
		FD							14100047	
	VC-511	N	14100167	14100158	14100158	14100158	14100158	14100158	14100457	14100457
		FD			14100158					
	VC-512	N	14100859	14100859	14100794	14100794	14100754	14100754	14100754	14100794
		FD				14100794				
	VC-513	N	14100859	14100859	14100859	14100859	14100794	14100754	14100754	14100754
		FD								14100754
	VC-514	N	14100850	14100850	14100851	14100851	14100851	14100851	14100851	14100851
		FD							14100851	
	VC-515	N	14100850	14100850	14100850	14100850	14100849	14100849	14100849	14100850
		FD			14100850					
	VC-516	N	14100851	14100851	14100851	14100851	14100851	14100851	14100851	14100851
North Boat Slip	VC-601	N	14100842	14100842	14100842	14100842	14100842	14100842	14100842	14100842
		FD								14100842
	VC-602	N	14110070	14110070	14110070	14110070	14110070	14110070	14110070	14110070
		FD				14110070				
	VC-603	N	14100859	14100859	14100754	14100859	14100754	14100859	14100754	14100859
		FD			14100754					
	VC-604	N	14110122	14110122	14100940	14110122	14100940	14110122	14100940	14110122
	VC-605	N	14110218	14110218	14110218	14110218	14110218	14110218	14110218	14110218
		FD			14110218					
South Boat Slip	VC-701	N	14110117	14110117	14110117	14110117	14110117			
		FD			14110117					
	VC-702	N	14110117	14110117	14110121	14110121	14110121			
		FD					14110121			
	VC-703	N	14110121	14110121	14110121	14110121	14110121			
	VC-704	N	14110114	14110114	14110114	14110114	14110114			
		FD			14110114					
	VC-705	N	14110114	14110114	14110122	14110122	14110122			
		FD				14110122				

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - POREWATER, SEDIMENT, GROUNDWATER, AND AIR
OCTOBER 2015

POREWATER			
LOCATION	**SAMPLE DATE**	**SAMPLE TYPE**	**Total PCBs, Dissolved Cooper, Dissolved Lead, Dissolved Zinc, Dissolved Organic Carbon (DOC), Total Organic Carbon (TOC)**
PW-001 (SS-001)	10/22/2013	N	13100624
PW-002 (SS-003)	10/22/2013	N	13100624
PW-003 (SS-005)	10/20/2013	N	13100581
PW-004 (SS-006)	10/20/2013	N	13100581
PW-005 (SS-007)	10/21/2013	N	13100624
PW-006 (SS-009)	10/20/2013	N	13100581
PW-007 (SS-011)	10/21/2013	N	13100581

SEDIMENT				
LOCATION	**SAMPLE DATE**	**SAMPLE TYPE**	**Total PCBs, Aluminum, Beryllium, Copper, Iron, Lead, Zinc, Total Organic Carbon (TOC)**	**PCB Congeners**
B1-SS-001	10/22/2013	N	13100616	
B1-SS-002	10/22/2013	N	13100616	14110459
B1-SS-003	10/22/2013	N	13100616	14110459
B1-SS-004	10/20/2013	N	13100564	
B1-SS-005	10/20/2013	N	13100564	
B1-SS-006	10/20/2013	N	13100564	
B1-SS-007	10/21/2013	FD	13100616	
B1-SS-007	10/21/2013	N	13100616	14110459
B1-SS-008	10/21/2013	N	13100616	
B1-SS-009	10/20/2013	N	13100564	
B1-SS-010	10/21/2013	N	13100616	
B1-SS-011	10/21/2013	N	13100616	14110459
B1-SS-012	10/21/2013	N	13100616	14110459
B1-SS-013	10/21/2013	N	13100616	14110459
B1-SS-014	10/22/2013	N	13100616	
B1-SS-101	10/21/2013	N	13100564	
B1-SS-102	10/21/2013	N	13100564	

GROUNDWATER			
LOCATION	**SAMPLE DATE**	**SAMPLE TYPE**	**Total PCBs, Beryllium, Copper, Lead, Zinc**
MW-01A	08/05/2014	N	14081135
MW-05	08/05/2014	N	14081135
MW-09	08/04/2014	FD	14081135
MW-09	08/04/2014	N	14081135
PDMW-16S	08/01/2014	N	14081135
PDMW-19S	08/04/2014	N	14081135
PDMW-20S	08/04/2014	N	14081135
PDMW-27S	12/02/2014	N	14120145

AIR			
SAMPLE ID	**SAMPLE DATE**	**SAMPLE TYPE**	**Total PCBs**
BAM 061915	6/19/2015	N	15060585
BAM062515	6/25/2015	N	15060701
BAM070115	7/1/2015	N	15070060
BAM070715	7/7/2015	N	15070204
BAM071315	7/13/2015	N	15070352
BAM071915	7/19/2015	N	15070495
BAM072515	7/25/2015	N	15070638
BAM673115	7/31/2015	N	15080082
BAM080615	8/6/2015	N	15080250
DB-01	8/12/2015	FD	15080437
BAM20150812	8/12/2015	N	15080438
FB-01	8/12/2015	FB	15080439
BAM081815	8/18/2015	N	15080562

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - SURFACE WATER
OCTOBER 2015

LOCATION	10/25/2013	12/12/2013	04/09/2014	05/07/2014	06/09/2014	07/08/2014	08/05/2014	09/04/2014	10/03/2014	5/12/2015
SW-001	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-002	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-003	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-003 (FD)	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-004	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-005	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-006	13100761	13120275	14040203	14050220	14060397 15010228*	14070404	14081140	15010195 14090215**	14100270	15050234
SW-007				14050220			14081140		14100270	15050234

* For 6/09/2014, PCBs analysis was reanalyzed in 15010228

** For 9/04/2014, DOC was reported in 14090215

Surface water samples were submitted for Dissolved Organic Carbon (DOC), Total Organic Carbon (TOC), Total PCBs, Copper, Lead, Zinc, and Total Suspended Solids

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2013
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCBs, Lead and % Lipids
American Eel	1A	2242-092013-0845 (FILET)	09/20/2013	14030535
American Eel	1A	2242-092013-0845 (OFFAL)	09/20/2013	14030535
American Eel	1A	2242-092013-0846 (FILET)	09/20/2013	14030535
American Eel	1A	2242-092013-0846 (OFFAL)	09/20/2013	14030535
American Eel	1B	2242-092013-0900 (FILET)	09/20/2013	14030535
American Eel	1B	2242-092013-0900 (OFFAL)	09/20/2013	14030535
American Eel	1B	2242-092313-1030 (FILET)	09/23/2013	14030535
American Eel	1B	2242-092313-1030 (OFFAL)	09/23/2013	14030535
American Eel	1B	2242-092313-1031 (FILET)	09/23/2013	14030535
American Eel	1B	2242-092313-1031 (OFFAL)	09/23/2013	14030535
American Eel	1C	2242-091913-1514 (FILET)	09/19/2013	14030535
American Eel	1C	2242-091913-1514 (OFFAL)	09/19/2013	14030535
American Eel	1D	2242-092013-1109 (FILET)	09/20/2013	14030535
American Eel	1D	2242-092013-1109 (OFFAL)	09/20/2013	14030535
American Eel	1D	2242-092013-1350 (FILET)	09/20/2013	14030535
American Eel	1D	2242-092013-1350 (OFFAL)	09/20/2013	14030535
American Eel	1E	2242-092013-0915 (FILET)	09/20/2013	14030535
American Eel	1E	2242-092013-0915 (OFFAL)	09/20/2013	14030535
American Eel	1E	2242-092013-0916 (FILET)	09/20/2013	14030535
American Eel	1E	2242-092013-0916 (OFFAL)	09/20/2013	14030535
American Eel	1E	2242-092013-0918 (FILET)	09/20/2013	14030535
American Eel	1E	2242-092013-0918 (OFFAL)	09/20/2013	14030535
American Eel	2A	2242-091813-1145 (FILET)	09/18/2013	14030531
American Eel	2A	2242-091813-1145 (OFFAL)	09/18/2013	14030531
American Eel	2B	2242-091813-1130 (FILET)	09/18/2013	14030531
American Eel	2B	2242-091813-1130 (OFFAL)	09/18/2013	14030531
American Eel	2B	2242-091813-1115 (FILET)	09/18/2013	14040014
American Eel	2B	2242-091813-1115 (OFFAL)	09/18/2013	14040014
American Eel	2B	2242-092413-1430 (FILET)	09/24/2013	14030536
American Eel	2B	2242-092413-1430 (OFFAL)	09/24/2013	14030536
American Eel	2C	2242-091813-1158 (FILET)	09/18/2013	14030531
American Eel	2C	2242-091813-1158 (OFFAL)	09/18/2013	14030531
American Eel	2C	2242-092513-1030 (FILET)	09/25/2013	14040081
American Eel	2C	2242-092513-1030 (OFFAL)	09/25/2013	14040081
American Eel	2C	2242-092513-1031 (FILET)	09/25/2013	14040081
American Eel	2C	2242-092513-1031 (OFFAL)	09/25/2013	14040081
American Eel	2D	2242-092313-1200 (FILET)	09/23/2013	14030535
American Eel	2D	2242-092313-1200 (OFFAL)	09/23/2013	14030535
American Eel	2D	2242-092513-1345 (FILET)	09/25/2013	14030536
American Eel	2D	2242-092513-1345 (OFFAL)	09/25/2013	14030536
American Eel	2E	2242-091813-1025 (FILET)	09/18/2013	14030531
American Eel	2E	2242-091813-1025 (OFFAL)	09/18/2013	14030531
American Eel	2E	2242-091813-1026 (FILET)	09/18/2013	14040014
American Eel	2E	2242-091813-1026 (OFFAL)	09/18/2013	14040014
American Eel	2F	2242-091913-1045 (FILET)	09/19/2013	14040014
American Eel	2F	2242-091913-1045 (OFFAL)	09/19/2013	14040014
American Eel	2F	2242-092513-0800 (FILET)	09/25/2013	14040081
American Eel	2F	2242-092513-0800 (OFFAL)	09/25/2013	14040081
American Eel	2F	2242-092513-0801 (FILET)	09/25/2013	14040081

*Samples were submitted for PCB Congeners analysis.

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2013
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCBs, Lead and % Lipids
American Eel	2F	2242-092513-0801 (OFFAL)	09/25/2013	14040081
American Eel	2F	2242-092513-0802 (FILET)	09/25/2013	14040081
American Eel	2F	2242-092513-0802 (OFFAL)	09/25/2013	14040081
American Eel	2F	2242-092513-0803 (FILET)	09/25/2013	14040081
American Eel	2F	2242-092513-0803 (OFFAL)	09/25/2013	14040081
American Eel	2G	2242-091913-1100 (FILET)	09/19/2013	14040014
American Eel	2G	2242-091913-1100 (OFFAL)	09/19/2013	14040014
American Eel	2G	2242-091913-1101 (FILET)	09/19/2013	14040014
American Eel	2G	2242-091913-1101 (OFFAL)	09/19/2013	14040014
American Eel	2G	2242-092513-0845 (FILET)	09/25/2013	14040081
American Eel	2G	2242-092513-0845 (OFFAL)	09/25/2013	14040081
American Eel	2G	2242-092513-0846 (FILET)	09/25/2013	14040081
American Eel	2G	2242-092513-0846 (OFFAL)	09/25/2013	14040081
American Eel	2G	2242-092513-0847 (FILET)	09/25/2013	14040081
American Eel	2G	2242-092513-0847 (OFFAL)	09/25/2013	14040081
American Eel	2G	2242-092513-0848 (FILET)	09/25/2013	14040081
American Eel	2G	2242-092513-0848 (OFFAL)	09/25/2013	14040081
American Eel	2H	2242-091813-1536 (FILET)	09/18/2013	14030533
American Eel	2H	2242-091813-1536 (OFFAL)	09/18/2013	14030533
American Eel	2H	2242-091813-1535 (FILET)	09/18/2013	14040016
American Eel	2H	2242-091813-1535 (OFFAL)	09/18/2013	14040016
American Eel	2H	2242-092513-0900 (FILET)	09/25/2013	14040081
American Eel	2H	2242-092513-0900 (OFFAL)	09/25/2013	14040081
American Eel	2H	2242-092513-1330 (FILET)	09/25/2013	14040081
American Eel	2H	2242-092513-1330 (OFFAL)	09/25/2013	14040081
American Eel	2H	2242-092613-0931 (FILET)	09/26/2013	14040002
American Eel	2H	2242-092613-0931 (OFFAL)	09/26/2013	14040002
American Eel	3A	2242-091913-1000 (FILET)	09/19/2013	14030533
American Eel	3A	2242-091913-1000 (OFFAL)	09/19/2013	14030533
American Eel	3B	2242-091813-1602 (FILET)	09/18/2013	14030533
American Eel	3B	2242-091813-1602 (OFFAL)	09/18/2013	14030533
American Eel	3B	2242-091813-1600 (FILET)	09/18/2013	14040016
American Eel	3B	2242-091813-1600 (OFFAL)	09/18/2013	14040016
American Eel	3B	2242-091913-1031 (FILET)	09/19/2013	14030531
American Eel	3B	2242-091913-1031 (OFFAL)	09/19/2013	14030531
American Eel	3B	2242-091913-1015 (FILET)	09/19/2013	14030533
American Eel	3B	2242-091913-1015 (OFFAL)	09/19/2013	14030533
American Eel	3B	2242-092313-1220 (FILET)	09/23/2013	14030535
American Eel	3B	2242-092313-1220 (OFFAL)	09/23/2013	14030535
American Eel	3C	2242-092313-1230 (FILET)	09/23/2013	14030535
American Eel	3C	2242-092313-1230 (OFFAL)	09/23/2013	14030535
American Eel	3D	2242-091913-1210 (FILET)	09/19/2013	14030535
American Eel	3D	2242-091913-1210 (OFFAL)	09/19/2013	14030535
American Eel	3D	2242-091913-1211 (FILET)	09/19/2013	14030535
American Eel	3D	2242-091913-1211 (OFFAL)	09/19/2013	14030535
American Eel	3D	2242-091913-1218 (FILET)	09/19/2013	14030535
American Eel	3D	2242-091913-1218 (OFFAL)	09/19/2013	14030535
American Eel	3D	2242-092013-1255 (FILET)	09/20/2013	14030535
American Eel	3D	2242-092013-1255 (OFFAL)	09/20/2013	14030535

*Samples were submitted for PCB Congeners analysis.

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2013
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCBs, Lead and % Lipids
American Eel	3D	2242-092013-1256 (FILET)	09/20/2013	14030535
American Eel	3D	2242-092013-1256 (OFFAL)	09/20/2013	14030535
Blue Crab	1A	2242-091913-1450 (HEPATOPANCREAS)	09/19/2013	14040014
Blue Crab	1A	2242-091913-1450 (LEG MUSCLE)	09/19/2013	14040014
Blue Crab	1A	2242-091913-1458 (HEPATOPANCREAS)	09/19/2013	14040014
Blue Crab	1A	2242-091913-1458 (LEG MUSCLE)	09/19/2013	14040014
Blue Crab	1B	2242-091813-1440 (HEPATOPANCREAS)	09/18/2013	14040014
Blue Crab	1B	2242-091813-1440 (LEG MUSCLE)	09/18/2013	14040014
Blue Crab	1C	2242-091913-1515	09/19/2013	13090635
Blue Crab	1C	2242-091913-1518	09/19/2013	13090636
Blue Crab	1C	2242-091913-1516 (HEPATOPANCREAS)	09/19/2013	14040014
Blue Crab	1C	2242-091913-1516 (LEG MUSCLE)	09/19/2013	14040014
Blue Crab	1D	2242-091913-1138 (HEPATOPANCREAS)	09/19/2013	14040074
Blue Crab	1D	2242-091913-1138 (LEG MUSCLE)	09/19/2013	14040074
Blue Crab	1D	2242-092113-1030 (HEPATOPANCREAS)	09/21/2013	14040074
Blue Crab	1D	2242-092113-1030 (LEG MUSCLE)	09/21/2013	14040074
Blue Crab	1D	2242-092113-1033 (WHOLE BODY)	09/21/2013	14040074
Blue Crab	1E	2242-092313-1040 (HEPATOPANCREAS)	09/23/2013	14040074
Blue Crab	1E	2242-092313-1040 (LEG MUSCLE)	09/23/2013	14040074
Blue Crab	1E	2242-092313-1041 (WHOLE BODY)	09/23/2013	14040074
Blue Crab	2A	2242-091813-1150 (HEPATOPANCREAS)	09/18/2013	14040016
Blue Crab	2A	2242-091813-1150 (LEG MUSCLE)	09/18/2013	14040016
Blue Crab	2A	2242-091913-0836 (WHOLE BODY)	09/19/2013	14040016
Blue Crab	2A,B	2242-091813-1131	09/18/2013	14040002
Blue Crab	2B	2242-091813-1118 (HEPATOPANCREAS)	09/18/2013	14040016
Blue Crab	2B	2242-091813-1118 (LEG MUSCLE)	09/18/2013	14040016
Blue Crab	2B	2242-091813-1350 (HEPATOPANCREAS)	09/18/2013	14040016
Blue Crab	2B	2242-091813-1350 (LEG MUSCLE)	09/18/2013	14040016
Blue Crab	2B	2242-092513-0820 (HEPATOPANCREAS)	09/25/2013	14040081
Blue Crab	2B	2242-092513-0820 (LEG MUSCLE)	09/25/2013	14040081
Blue Crab	2D	2242-091813-1325 (WHOLE BODY)	09/18/2013	14040016
Blue Crab	2D	2242-092413-1435 (HEPATOPANCREAS)	09/24/2013	14040081
Blue Crab	2D	2242-092413-1435 (LEG MUSCLE)	09/24/2013	14040081
Blue Crab	2E	2242-091913-0930 (HEPATOPANCREAS)	09/19/2013	14040016
Blue Crab	2E	2242-091913-0930 (LEG MUSCLE)	09/19/2013	14040016
Blue Crab	2E	2242-092513-1020 (HEPATOPANCREAS)	09/25/2013	14040081
Blue Crab	2E	2242-092513-1020 (LEG MUSCLE)	09/25/2013	14040081
Blue Crab	2E	2242-092613-1201 (HEPATOPANCREAS)	09/26/2013	14040002
Blue Crab	2E	2242-092613-1201 (LEG MUSCLE)	09/26/2013	14040002
Blue Crab	3B	2242-092113-0920	09/21/2013	13090657
Blue Crab	3B	2242-092313-1215 (WHOLE BODY)	09/23/2013	14040074
Blue Crab	3C	2242-091913-1409 (HEPATOPANCREAS)	09/19/2013	14040074
Blue Crab	3C	2242-091913-1409 (LEG MUSCLE)	09/19/2013	14040074
Blue Crab	3C	2242-092113-0915 (WHOLE BODY)	09/21/2013	14040074
Blue Crab	3C	2242-092113-0918 (WHOLE BODY)	09/21/2013	14040074
Blue Crab	3D	2242-092313-1500 (HEPATOPANCREAS)	09/23/2013	14040074
Blue Crab	3D	2242-092313-1500 (LEG MUSCLE)	09/23/2013	14040074
Hogchoker	1D	2242-092313-1050	09/23/2013	13090689
Hogchoker	2F	2242-092013-1335	09/20/2013	13090689

*Samples were submitted for PCB Congeners analysis.

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2013
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCBs, Lead and % Lipids
Hogchoker	2G	2242-092013-1315	09/20/2013	13090689
Hogchoker	2G	2242-092513-0830	09/25/2013	13090689
Hogchoker	2G	2242-092513-0831	09/25/2013	13090689
Hogchoker	2G	2242-092513-0832	09/25/2013	13090689
Hogchoker	2G	2242-092513-1340	09/25/2013	13090689
Hogchoker	2H	2242-091913-0940	09/19/2013	13090689
Hogchoker	2H	2242-092613-0930	09/26/2013	13100093
Hogchoker	3D	2242-092013-1240	09/20/2013	13090689
Hogchoker	3D	2242-092013-1245	09/20/2013	13090689
Hogchoker	3D	2242-092613-0830	09/26/2013	13100093
Oyster Toadfish	1A	2242-091913-1459 (F)	09/19/2013	14030552
Oyster Toadfish	1A	2242-091913-1459 (O)	09/19/2013	14030552
Oyster Toadfish	1A	2242-092013-0849 (FILET)	09/20/2013	14030535
Oyster Toadfish	1A	2242-092013-0849 (OFFAL)	09/20/2013	14030535
Oyster Toadfish	1A	2242-092013-0843 (F)	09/20/2013	14030552
Oyster Toadfish	1A	2242-092013-0843 (O)	09/20/2013	14030552
Oyster Toadfish	1B	2242-091913-1500 (F)	09/19/2013	14030552
Oyster Toadfish	1B	2242-091913-1500 (O)	09/19/2013	14030552
Oyster Toadfish	1B	2242-092013-0909 (F)	09/20/2013	14030552
Oyster Toadfish	1B	2242-092013-0909 (O)	09/20/2013	14030552
Oyster Toadfish	1D	2242-091913-1135 (F)	09/19/2013	14030552
Oyster Toadfish	1D	2242-091913-1135 (O)	09/19/2013	14030552
Oyster Toadfish	1D	2242-091913-1136 (F)	09/19/2013	14030552
Oyster Toadfish	1D	2242-091913-1136 (O)	09/19/2013	14030552
Oyster Toadfish	1E	2242-091913-1146 (F)	09/19/2013	14030552
Oyster Toadfish	1E	2242-091913-1146 (O)	09/19/2013	14030552
Oyster Toadfish	1E	2242-092013-0917 (F)	09/20/2013	14030552
Oyster Toadfish	1E	2242-092013-0917 (O)	09/20/2013	14030552
Oyster Toadfish	1E	2242-092113-1040 (F)	09/21/2013	14030552
Oyster Toadfish	1E	2242-092113-1040 (O)	09/21/2013	14030552
Oyster Toadfish	2B	2242-091813-1139 (F)	09/18/2013	14030552
Oyster Toadfish	2B	2242-091813-1139 (O)	09/18/2013	14030552
Oyster Toadfish	2B	2242-091913-0905 (F)	09/19/2013	14030552
Oyster Toadfish	2B	2242-091913-0905 (O)	09/19/2013	14030552
Oyster Toadfish	2B	2242-092513-0815 (FILET)	09/25/2013	14040087
Oyster Toadfish	2B	2242-092513-0815 (OFFAL)	09/25/2013	14040087
Oyster Toadfish	2D	2242-092513-1025 (FILET)	09/25/2013	14040087
Oyster Toadfish	2D	2242-092513-1025 (OFFAL)	09/25/2013	14040087
Oyster Toadfish	2E	2242-092613-0835 (FILET)	09/26/2013	14040017
Oyster Toadfish	2E	2242-092613-0835 (OFFAL)	09/26/2013	14040017
Oyster Toadfish	2F	2242-092513-0810 (FILET)	09/25/2013	14040087
Oyster Toadfish	2F	2242-092513-0810 (OFFAL)	09/25/2013	14040087
Oyster Toadfish	2G	2242-092113-1130 (F)	09/21/2013	14030552
Oyster Toadfish	2G	2242-092113-1130 (O)	09/21/2013	14030552
Oyster Toadfish	2G	2242-092113-1135 (F)	09/21/2013	14030552
Oyster Toadfish	2G	2242-092113-1135 (O)	09/21/2013	14030552
Oyster Toadfish	2G	2242-092413-0900 (FILET)	09/24/2013	14040094
Oyster Toadfish	2G	2242-092413-0900 (OFFAL)	09/24/2013	14040094
Oyster Toadfish	2G	2242-092513-0835 (FIELT)	09/25/2013	14040087

*Samples were submitted for PCB Congeners analysis.

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2013
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCBs, Lead and % Lipids
Oyster Toadfish	2G	2242-092513-0835 (OFFAL)	09/25/2013	14040087
Oyster Toadfish	2G	2242-092513-0836 (FILET)	09/25/2013	14040087
Oyster Toadfish	2G	2242-092513-0836 (OFFAL)	09/25/2013	14040087
Oyster Toadfish	2H	2242-092313-1240 (F)	09/23/2013	14030552
Oyster Toadfish	2H	2242-092313-1240 (O)	09/23/2013	14030552
Oyster Toadfish	2H	2242-092413-0910 (FILET)	09/24/2013	14040087
Oyster Toadfish	2H	2242-092413-0910 (OFFAL)	09/24/2013	14040087
Oyster Toadfish	2H	2242-092513-1331 (FILET)	09/25/2013	14040087
Oyster Toadfish	2H	2242-092513-1331 (OFFAL)	09/25/2013	14040087
Oyster Toadfish	3A	2242-091913-1009 (F)	09/19/2013	14030552
Oyster Toadfish	3A	2242-091913-1009 (O)	09/19/2013	14030552
Oyster Toadfish	3B	2242-091913-1016 (F)	09/19/2013	14030552
Oyster Toadfish	3B	2242-091913-1016 (O)	09/19/2013	14030552
Oyster Toadfish	3C	2242-091913-1400 (F)	09/19/2013	14030552
Oyster Toadfish	3C	2242-091913-1400 (O)	09/19/2013	14030552
Oyster Toadfish	3C	2242-091913-1408 (F)	09/19/2013	14030552
Oyster Toadfish	3C	2242-091913-1408 (O)	09/19/2013	14030552
Oyster Toadfish	3C	2242-092013-1030 (F)	09/20/2013	14030552
Oyster Toadfish	3C	2242-092013-1030 (O)	09/20/2013	14030552
Oyster Toadfish	3C	2242-092113-0912 (F)	09/21/2013	14030552
Oyster Toadfish	3C	2242-092113-0912 (O)	09/21/2013	14030552
Oyster Toadfish	3D	2242-091813-1219 (FILET)	09/18/2013	14040074
Oyster Toadfish	3D	2242-091813-1219 (OFFAL)	09/18/2013	14040074
Oyster Toadfish	3D	2242-092013-1258 (FILET)	09/20/2013	14040074
Oyster Toadfish	3D	2242-092013-1258 (OFFAL)	09/20/2013	14040074
Oyster Toadfish	3D	2242-092013-1305 (FILET)	09/20/2013	14040074
Oyster Toadfish	3D	2242-092013-1305 (OFFAL)	09/20/2013	14040074
Oyster Toadfish	3D	2242-092313-1501 (FILET)	09/23/2013	14040074
Oyster Toadfish	3D	2242-092313-1501 (OFFAL)	09/23/2013	14040074
Oyster Toadfish	3D	2242-092313-1502 (FILET)	09/23/2013	14040074
Oyster Toadfish	3D	2242-092313-1502 (OFFAL)	09/23/2013	14040074
Spot	1B	2242-092613-1200	09/26/2013	13100093
Spot	1C	2242-092413-1445	09/24/2013	13090671
Spot	1C	2242-092513-1433	09/25/2013	13090671
Spot	2A	2242-092413-1420	09/24/2013	13090674
Spot	2A	2242-092413-1425	09/24/2013	13090674
Spot	2C	2242-091813-1520	09/18/2013	13090674
Spot	2C	2242-091913-0910	09/19/2013	13090674
Spot	2D	2242-092413-1440	09/24/2013	13090674
Spot	3B	2242-092113-1235	09/21/2013	13090674
Spot	3B	2242-092113-1236	09/21/2013	13090674
Spot	3B	2242-092113-1237	09/21/2013	13090674
Spot	3B	2242-092113-1238	09/21/2013	13090674
Spot	3B	2242-092113-1239	09/21/2013	13090674
White Perch	1B	2242-091920-1509	09/19/2013	13090659
White Perch	1B	2242-092313-1540	09/23/2013	13090657
White Perch	1B	2242-092313-1541	09/23/2013	13090657*
White Perch	1C	2242-092313-1530	09/23/2013	13090657
White Perch	1C	2242-092313-1535	09/23/2013	13090657*

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TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2013
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCBs, Lead and % Lipids
White Perch	2A	2242-091913-0830	09/19/2013	13090635
White Perch	2A	2242-091913-1600	09/19/2013	13090635
White Perch	2A	2242-091913-1605	09/19/2013	13090635
White Perch	2A	2242-091913-1606	09/19/2013	13090635*
White Perch	2A	2242-091913-1607	09/19/2013	13090635*
White Perch	2E	2242-092513-1350	09/25/2013	13090671
White Perch	3B	2242-092113-1240	09/21/2013	13090659
White Perch	3B	2242-092113-1248	09/21/2013	13090659
White Perch	3B	2242-092113-1250	09/21/2013	13090659
White Perch	3B	2242-092113-0925	09/21/2013	13090659*
White Perch	3C	2242-092113-0910	09/21/2013	13090659*

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TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
American eel	1A	4117-091914-1212-Fillet	09/19/2014	15020396
American eel	1A	4117-091914-1212-Offal	09/19/2014	15020546
American eel	1A	4117-092514-1114-Fillet	09/25/2014	15020396
American eel	1A	4117-092514-1114-Offal	09/25/2014	15020546
American eel	1B	4117-091714-1612-Fillet	09/17/2014	15020395
American eel	1B	4117-091714-1612-Offal	09/17/2014	15020542
American eel	1B	4117-092614-1023-Fillet	09/26/2014	15020397
American eel	1B	4117-092614-1024-Fillet	09/26/2014	15020397
American eel	1B	4117-092614-1023-Offal	09/26/2014	15020583
American eel	1B	4117-092614-1024-Offal	09/26/2014	15020583
American eel	1C	4117-091714-1616-Fillet	09/17/2014	15020395
American eel	1C	4117-091714-1616-Offal	09/17/2014	15020542
American eel	1C	4117-091814-1333-Fillet	09/18/2014	15020396
American eel	1C	4117-091814-1333-Offal	09/18/2014	15020546
American eel	1C	4117-092414-1650-Fillet	09/24/2014	15020397
American eel	1C	4117-092414-1652-Fillet	09/24/2014	15020397
American eel	1C	4117-092414-1650-Offal	09/24/2014	15020583
American eel	1C	4117-092414-1652-Offal	09/24/2014	15020583
American eel	1D	4117-091814-1336-Fillet	09/18/2014	15020396
American eel	1D	4117-091814-1337-Fillet	09/18/2014	15020396
American eel	1D	4117-091814-1338-Fillet	09/18/2014	15020396
American eel	1D	4117-091814-1339-Fillet	09/18/2014	15020396
American eel	1D	4117-091814-1336-Offal	09/18/2014	15020546
American eel	1D	4117-091814-1337-Offal	09/18/2014	15020546
American eel	1D	4117-091814-1338-Offal	09/18/2014	15020546
American eel	1D	4117-091814-1339-Offal	09/18/2014	15020546
American eel	1E	4117-091914-1218-Fillet	09/19/2014	15020396
American eel	1E	4117-091914-1218-Offal	09/19/2014	15020546
American eel	1E	4117-092314-1612-Fillet	09/23/2014	15020397
American eel	1E	4117-092314-1612-Offal	09/23/2014	15020583
American eel	2A	4117-092514-1115-Fillet	09/25/2014	15020396
American eel	2A	4117-092514-1116-Fillet	09/25/2014	15020396
American eel	2A	4117-092514-1115-Offal	09/25/2014	15020546
American eel	2A	4117-092514-1116-Offal	09/25/2014	15020546
American eel	2A	4117-092614-1025-Fillet	09/26/2014	15020397
American eel	2A	4117-092614-1025-Offal	09/26/2014	15020583
American eel	2B	4117-092314-1154-Fillet	09/23/2014	15020397
American eel	2B	4117-092314-1156-Fillet	09/23/2014	15020397
American eel	2B	4117-092314-1157-Fillet	09/23/2014	15020397
American eel	2B	4117-092314-1154-Offal	09/23/2014	15020583
American eel	2B	4117-092314-1156-Offal	09/23/2014	15020583
American eel	2B	4117-092314-1157-Offal	09/23/2014	15020583
American eel	2C	4117-091614-1233-Fillet	09/16/2014	15020395

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BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
American eel	2C	4117-091614-1235-Fillet	09/16/2014	15020395
American eel	2C	4117-091614-1233-Offal	09/16/2014	15020542
American eel	2C	4117-091614-1235-Offal	09/16/2014	15020542
American eel	2C	4117-091714-1311-Fillet	09/17/2014	15020395
American eel	2C	4117-091714-1311-Offal	09/17/2014	15020542
American eel	2D	4117-091614-1236-Fillet	09/16/2014	15020395
American eel	2D	4117-091614-1236-Offal	09/16/2014	15020542
American eel	2D	4117-092314-1202-Fillet	09/23/2014	15020397
American eel	2D	4117-092314-1202-Offal	09/23/2014	15020583
American eel	2D	4117-092414-1011-Fillet	09/24/2014	15020397
American eel	2D	4117-092414-1011-Offal	09/24/2014	15020583
American eel	2E	4117-091814-1618-Fillet	09/18/2014	15020396
American eel	2E	4117-091814-1619-Fillet	09/18/2014	15020396
American eel	2E	4117-091814-1618-Offal	09/18/2014	15020546
American eel	2E	4117-091814-1619-Offal	09/18/2014	15020546
American eel	2E	4117-092314-1208-Fillet	09/23/2014	15020397
American eel	2E	4117-092314-1208-Offal	09/23/2014	15020583
American eel	2F	4117-091614-1231-Fillet	09/16/2014	15020395
American eel	2F	4117-091614-1231-Offal	09/16/2014	15020542
American eel	2F	4117-091714-1057-Fillet	09/17/2014	15020396
American eel	2F	4117-091714-1059-Fillet	09/17/2014	15020396
American eel	2F	4117-091714-1057-Offal	09/17/2014	15020546
American eel	2F	4117-091714-1059-Offal	09/17/2014	15020546
American eel	2G	4117-091614-1230-Fillet	09/16/2014	15020395
American eel	2G	4117-091614-1230-Offal	09/16/2014	15020542
American eel	2G	4117-091714-1050-Fillet	09/17/2014	15020395
American eel	2G	4117-091714-1051-Fillet	09/17/2014	15020395
American eel	2G	4117-091714-1050-Offal	09/17/2014	15020542
American eel	2G	4117-091714-1051-Offal	09/17/2014	15020542
American eel	2H	4117-091614-1225-Fillet	09/16/2014	15020395
American eel	2H	4117-091614-1227-Fillet	09/16/2014	15020395
American eel	2H	4117-091614-1225-Offal	09/16/2014	15020542
American eel	2H	4117-091614-1227-Offal	09/16/2014	15020542
American eel	2H	4117-091714-1048-Fillet	09/17/2014	15020395
American eel	2H	4117-091714-1048-Offal	09/17/2014	15020542
American eel	3A	4117-091614-1036-Fillet	09/16/2014	15020395
American eel	3A	4117-091614-1036-Offal	09/16/2014	15020542
American eel	3A	4117-091714-0943-Fillet	09/17/2014	15020395
American eel	3A	4117-091714-0943-Offal	09/17/2014	15020542
American eel	3A	4117-092414-1249-Fillet	09/24/2014	15020397
American eel	3A	4117-092414-1249-Offal	09/24/2014	15020583
American eel	3B	4117-091814-1016-Fillet	09/18/2014	15020396
American eel	3B	4117-091814-1016-Offal	09/18/2014	15020546

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BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
American eel	3B	4117-091914-1003-Fillet	09/19/2014	15020396
American eel	3B	4117-091914-1003-Offal	09/19/2014	15020546
American eel	3B	4117-092314-1418-Fillet	09/23/2014	15020397
American eel	3B	4117-092314-1418-Offal	09/23/2014	15020583
American eel	3C	4117-091814-1020-Fillet	09/18/2014	15020396
American eel	3C	4117-091814-1022-Fillet	09/18/2014	15020396
American eel	3C	4117-091814-1029-Fillet	09/18/2014	15020396
American eel	3C	4117-091814-1020-Offal	09/18/2014	15020546
American eel	3C	4117-091814-1022-Offal	09/18/2014	15020546
American eel	3C	4117-091814-1029-Offal	09/18/2014	15020546
American eel	3D	4117-091614-1026-Fillet	09/16/2014	15020395
American eel	3D	4117-091614-1027-Fillet	09/16/2014	15020395
American eel	3D	4117-091614-1028-Fillet	09/16/2014	15020395
American eel	3D	4117-091614-1029-Fillet	09/16/2014	15020395
American eel	3D	4117-091614-1030-Fillet	09/16/2014	15020395
American eel	3D	4117-091614-1026-Offal	09/16/2014	15020542
American eel	3D	4117-091614-1027-Offal	09/16/2014	15020542
American eel	3D	4117-091614-1028-Offal	09/16/2014	15020542
American eel	3D	4117-091614-1029-Offal	09/16/2014	15020542
American eel	3D	4117-091614-1030-Offal	09/16/2014	15020542
Blue crab	1A	4117-091714-1610-Whole	09/17/2014	15020402
Blue crab	1A	4117-091814-1330-Whole	09/18/2014	15020402
Blue crab	1A	4117-091914-1210-Leg	09/19/2014	15020476
Blue crab	1A	4117-091914-1210-Hepatopancreas	09/19/2014	15030001
Blue crab	1B	4117-091814-1331-Leg	09/18/2014	15020402
Blue crab	1B	4117-091814-1332-Whole	09/18/2014	15020402
Blue crab	1B	4117-091814-1331-Hepatopancreas	09/18/2014	15030001
Blue crab	1B	4117-091914-1214-Leg	09/19/2014	15020476
Blue crab	1B	4117-091914-1214-Hepatopancreas	09/19/2014	15030001
Blue crab	1C	4117-091614-1612-Whole	09/16/2014	15020402
Blue crab	1C	4117-091714-1614-Whole	09/17/2014	15020402
Blue crab	1C	4117-091714-1615-Leg	09/17/2014	15020402
Blue crab	1C	4117-091714-1615-Hepatopancreas	09/17/2014	15030001
Blue crab	1C	4117-091814-1334-Leg	09/18/2014	15020402
Blue crab	1C	4117-091814-1334-Hepatopancreas	09/18/2014	15030001
Blue crab	1D	4117-091614-1610-Leg	09/16/2014	15020402
Blue crab	1D	4117-091614-1610-Hepatopancreas	09/16/2014	15030001
Blue crab	1D	4117-091814-1341-Whole	09/18/2014	15020402
Blue crab	1D	4117-092614-1028-Whole	09/26/2014	15020485
Blue crab	1E	4117-091714-1316-Leg	09/17/2014	15020402
Blue crab	1E	4117-091714-1316-Hepatopancreas	09/17/2014	15030001
Blue crab	1E	4117-091914-1219-Leg	09/19/2014	15020476
Blue crab	1E	4117-091914-1219-Hepatopancreas	09/19/2014	15030001

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BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
Blue crab	2A	4117-092314-1621-Leg	09/23/2014	15020476
Blue crab	2A	4117-092314-1622-Whole	09/23/2014	15020476
Blue crab	2A	4117-092314-1153-Leg	09/23/2014	15020485
Blue crab	2A	4117-092314-1153-Hepatopancreas	09/23/2014	15030001
Blue crab	2A	4117-092314-1621-Hepatopancreas	09/23/2014	15030001
Blue crab	2B	4117-092314-1158-Whole	09/23/2014	15020485
Blue crab	2C	4117-091814-1344-Whole	09/18/2014	15020402
Blue crab	2C	4117-092714-0822-Leg	09/27/2014	15020485
Blue crab	2C	4117-092714-0822-Hepatopancreas	09/27/2014	15030001
Blue crab	2D	4117-091714-1041-Leg	09/17/2014	15020402
Blue crab	2D	4117-091714-1041-Hepatopancreas	09/17/2014	15030001
Blue crab	2D	4117-092514-1111-Whole	09/25/2014	15020476
Blue crab	2E	4117-091814-1621-Whole	09/18/2014	15020476
Blue crab	2E	4117-092314-1205-Leg	09/23/2014	15020485
Blue crab	2E	4117-092314-1205-Hepatopancreas	09/23/2014	15030001
Blue crab	2F	4117-091814-1610-Whole	09/18/2014	15020476
Blue crab	2F	4117-091814-1611-Leg	09/18/2014	15020476
Blue crab	2F	4117-091814-1611-Hepatopancreas	09/18/2014	15030001
Blue crab	2G	4117-092714-0944-Leg	09/27/2014	15020485
Blue crab	2G	4117-092714-0944-Hepatopancreas	09/27/2014	15030001
Blue crab	2H	4117-091814-1614-Whole	09/18/2014	15020476
Blue crab	2H	4117-091814-1615-Leg	09/18/2014	15020476
Blue crab	2H	4117-091814-1615-Hepatopancreas	09/18/2014	15030001
Blue crab	3A	4117-091814-1014-Leg	09/18/2014	15020402
Blue crab	3A	4117-091814-1014-Hepatopancreas	09/18/2014	15030001
Blue crab	3A	4117-092314-1415-Whole	09/23/2014	15020485
Blue crab	3A	4117-092414-1244-Leg	09/24/2014	15020476
Blue crab	3A	4117-092414-1244-Hepatopancreas	09/24/2014	15030001
Blue crab	3B	4117-091814-1017-Whole	09/18/2014	15020402
Blue crab	3B	4117-091914-1001-Leg	09/19/2014	15020476
Blue crab	3B	4117-091914-1001-Hepatopancreas	09/19/2014	15030001
Blue crab	3B	4117-092314-1416-Leg	09/23/2014	15020485
Blue crab	3B	4117-092314-1417-Whole	09/23/2014	15020485
Blue crab	3B	4117-092314-1416-Hepatopancreas	09/23/2014	15030001
Blue crab	3C	4117-091614-1033-Whole	09/16/2014	15020402
Blue crab	3C	4117-091814-1018-Leg	09/18/2014	15020402
Blue crab	3C	4117-091814-1018-Hepatopancreas	09/18/2014	15030001
Blue crab	3C	4117-091914-1222-Whole	09/19/2014	15020476
Blue crab	3D	4117-091614-1031-Leg	09/16/2014	15020402
Blue crab	3D	4117-091614-1031-Hepatopancreas	09/16/2014	15030001
Blue crab	3D	4117-091814-1028-Leg	09/18/2014	15020402
Blue crab	3D	4117-091814-1028-Hepatopancreas	09/18/2014	15030001
Blue crab	3D	4117-091914-1006-Whole	09/19/2014	15020476

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BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
Blue crab	3D	4117-092614-1021-Leg	09/26/2014	15020485
Blue crab	3D	4117-092614-1022-Whole	09/26/2014	15020485
Blue crab	3D	4117-092614-1021-Hepatopancreas	09/26/2014	15030001
Hogchoker	1D	4117-092714-0915-Whole	09/26/2014	15020496
Hogchoker	1E	4117-092314-1614-Whole	09/23/2014	15020496
Hogchoker	1E	4117-092414-1240-Whole	09/24/2014	15020496
Hogchoker	1E	4117-092414-1241-Whole	09/24/2014	15020496
Hogchoker	1E	4117-092514-1417-Whole	09/25/2014	15020496
Hogchoker	1E	4117-092614-1440-Whole	09/26/2014	15020496
Hogchoker	2F	4117-091714-1105-Whole	09/17/2014	15020496
Hogchoker	2F	4117-091814-1607-Whole	09/18/2014	15020496
Hogchoker	2F	4117-091814-1609-Whole	09/18/2014	15020496
Hogchoker	2G	4117-091914-1009-Whole	09/19/2014	15020496
Hogchoker	2G	4117-092314-1214-Whole	09/23/2014	15020496
Hogchoker	2G	4117-092614-1030-Whole	09/26/2014	15020496
Hogchoker	2H	4117-091714-1045-Whole	09/17/2014	15020496
Hogchoker	2H	4117-091714-1046-Whole	09/17/2014	15020496
Hogchoker	2H	4117-091814-1613-Whole	09/18/2014	15020496
Hogchoker	3D	4117-091714-0945-Whole	09/17/2014	15020496
Hogchoker	3D	4117-091814-1027-Whole	09/18/2014	15020496
Hogchoker	3D	4117-092314-1423-Whole	09/23/2014	15020496
Hogchoker	3D	4117-092314-1424-Whole	09/23/2014	15020496
Hogchoker	3D	4117-092314-1425-Whole	09/23/2014	15020496
Oyster toadfish	1A	4117-092514-1415-Whole	09/25/2014	15020369
Oyster toadfish	1B	4117-092414-1647-Whole	09/24/2014	15020370
Oyster toadfish	1D	4117-092314-1616-Whole	09/23/2014	15020370
Oyster toadfish	1D	4117-092714-0824-Whole	09/26/2014	15020370
Oyster toadfish	1E	4117-091714-1313-Whole	09/17/2014	15020369
Oyster toadfish	1E	4117-091714-1314-Whole	09/17/2014	15020369
Oyster toadfish	1E	4117-092314-1611-Whole	09/23/2014	15020370
Oyster toadfish	2A	4117-091714-1309-Whole	09/17/2014	15020369
Oyster toadfish	2D	4117-092314-1204-Whole	09/23/2014	15020370
Oyster toadfish	2D	4117-092514-1118-Whole	09/25/2014	15020370
Oyster toadfish	2D	4117-092514-1119-Whole	09/25/2014	15020370
Oyster toadfish	2F	4117-091614-1232-Whole	09/16/2014	15020369
Oyster toadfish	2F	4117-092314-1215-Whole	09/23/2014	15020370
Oyster toadfish	2G	4117-091714-1054-Whole	09/17/2014	15020369
Oyster toadfish	2G	4117-092714-0946-Whole	09/26/2014	15020370
Oyster toadfish	2H	4117-091714-1047-Whole	09/17/2014	15020369
Oyster toadfish	3A	4117-092514-1121-Whole	09/25/2014	15020369
Oyster toadfish	3C	4117-091814-1024-Whole	09/18/2014	15020369
Oyster toadfish	3C	4117-091814-1025-Whole	09/18/2014	15020369
Oyster toadfish	3D	4117-091614-1032-Whole	09/16/2014	15020369

*Samples were submitted for PCB Congeners analysis.

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
Oyster toadfish	3D	4117-091914-1007-Whole	09/19/2014	15020369
Oyster toadfish	3D	4117-092314-1420-Whole	09/23/2014	15020370
Oyster toadfish	3D	4117-092314-1422-Whole	09/23/2014	15020370
Oyster toadfish	3D	4117-092614-1020-Whole	09/26/2014	15020370
White perch	1A	4117-091814-1325-Whole	09/18/2014	15020367
White perch	1A	4117-091814-1326-Whole	09/18/2014	15020367
White perch	1A	4117-091814-1327-Whole	09/18/2014	15020367
White perch	1A	4117-091814-1328-Whole	09/18/2014	15020367
White perch	1A	4117-091814-1329-Whole	09/18/2014	15020367*
White perch	1A	4117-092314-1618-Whole	09/23/2014	15020368
White perch	1A	4117-092314-1619-Whole	09/23/2014	15020368
White perch	1A	4117-092314-1620-Whole	09/23/2014	15020368
White perch	1B	4117-092514-1530-Whole	09/25/2014	15020367
White perch	1C	4117-092514-1416-Whole	09/25/2014	15020367*
White perch	2A	4117-092314-1150-Whole	09/23/2014	15020368
White perch	2A	4117-092314-1151-Whole	09/23/2014	15020368
White perch	2A	4117-092314-1152-Whole	09/23/2014	15020368
White perch	2A	4117-092314-1426-Whole	09/23/2014	15020368
White perch	2B	4117-092714-0947-Whole	09/27/2014	15030209*
White perch	2C	4117-091814-1617-Whole	09/18/2014	15020367*
White perch	2C	4117-092314-1624-Whole	09/23/2014	15020368
White perch	2C	4117-092314-1625-Whole	09/23/2014	15020368
White perch	2C	4117-092314-1626-Whole	09/23/2014	15020368
White perch	2C	4117-092314-1627-Fillet	09/23/2014	15030220
White perch	2C	4117-092314-1627-Offal	09/23/2014	15030222
White perch	2D	4117-092414-1641-Whole	09/24/2014	15020368
White perch	2D	4117-092414-1642-Whole	09/24/2014	15020368
White perch	2D	4117-092414-1644-Whole	09/24/2014	15020368
White perch	2D	4117-092414-1640-Fillet	09/24/2014	15030220
White perch	2D	4117-092414-1643-Fillet	09/24/2014	15030220
White perch	2D	4117-092414-1640-Offal	09/24/2014	15030222
White perch	2D	4117-092414-1643-Offal	09/24/2014	15030222
White perch	2E	4117-092314-1207-Whole	09/23/2014	15020368
White perch	2E	4117-092414-1648-Whole	09/24/2014	15020368
White perch	2E	4117-092514-1419-Whole	09/25/2014	15020367
White perch	2E	4117-092514-1418-Fillet	09/25/2014	15030220
White perch	2E	4117-092514-1420-Fillet	09/25/2014	15030220
White perch	2E	4117-092514-1418-Offal	09/25/2014	15030222
White perch	2E	4117-092514-1420-Offal	09/25/2014	15030222
White perch	3A	4117-092414-1645-Whole	09/24/2014	15020368
White perch	3A	4117-092414-1646-Whole	09/24/2014	15030209*
White perch	3A	4117-092414-1247-Fillet	09/24/2014	15030220
White perch	3A	4117-092414-1248-Fillet	09/24/2014	15030220

*Samples were submitted for PCB Congeners analysis.

TABLE - SUMMARY OF LAB REPORTS
BASELINE ANALYTICAL RESULTS - BIOTA 2014
OCTOBER 2015

SPECIES	LOCATION	SAMPLE ID	SAMPLE DATE	Total PCB and % Lipids
White perch	3A	4117-092414-1247-Offal	09/24/2014	15030222
White perch	3A	4117-092414-1248-Offal	09/24/2014	15030222
White perch	3A	4117-092514-1120-Fillet	09/25/2014	15030220
White perch	3A	4117-092514-1120-Offal	09/25/2014	15030222
White perch	3B	4117-091714-1618-Whole	09/17/2014	15020367
White perch	3B	4117-091714-1619-Whole	09/17/2014	15020367
White perch	3B	4117-091814-1622-Whole	09/18/2014	15020367
White perch	3B	4117-091814-1623-Whole	09/18/2014	15020367
White perch	3B	4117-091814-1624-Whole	09/18/2014	15020367
White perch	3C	4117-091914-1501-Whole	09/19/2014	15020367
White perch	3C	4117-091914-1502-Whole	09/19/2014	15020367
White perch	3C	4117-091914-1004-Whole	09/19/2014	15020367*
White perch	3C	4117-091914-1503-Fillet	09/19/2014	15030220
White perch	3C	4117-091914-1504-Fillet	09/19/2014	15030220
White perch	3C	4117-091914-1503-Offal	09/19/2014	15030222
White perch	3C	4117-091914-1504-Offal	09/19/2014	15030222

*Samples were submitted for PCB Congeners analysis.

LAB REPORTS (AVAILABLE ON DVD ONLY)

VOLUME 3

Human Health Risk Assessment (HHRA)

HALEY ALDRICH

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VOLUME 3
TOXIC SUBSTANCES CONTROL ACT (TSCA)
RISK-BASED DISPOSAL APPLICATION
HUMAN HEALTH RISK ASSESSMENT

FORMER ANACONDA WIRE & CABLE PLANT SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

by **Haley & Aldrich of New York**
Rochester, New York

for **Atlantic Richfield Company**
Naperville, Illinois

File No. 28612-359
November 2015

Executive Summary

This Human Health Risk Assessment (HHRA) is a component of the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application (RBDA) for polychlorinated biphenyls (PCBs) at the Former Anaconda Wire Project site located in Hastings-on-Hudson, New York. The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and will be submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA. The HHRA provides a quantitative estimate of the risk posed to humans through potential exposure to Site media where PCBs have been detected, under future land use conditions which consider remediation and re-development of the Site. The overall objective of the HHRA is to determine whether the remedial action requirements of the Records of Decision (RODs) will be protective of human health. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place under the conditions described in detail in Volume 2, will not pose unacceptable risks to human health.

The HHRA was completed following standard USEPA guidelines, and evaluated risks under future land use conditions which consider re-development of the Site as restricted residential or commercial use property *after* remediation has been completed. The HHRA evaluates risks under post-remedial conditions because the remedial actions stipulated in the RODs issued by NYSDEC will be performed independent of the results of the HHRA; i.e., even if the results of the risk assessment were to indicate that remedial actions are not required to maintain acceptable risks, remedial actions will still be performed. The exception to this concerns characterization of potential exposures and risks for fish ingestion associated with recreational angling. For that exposure pathway, fish tissue PCB concentrations representative of the current conditions are used to estimate risks. Risks based on current conditions provide a conservative assessment of possible future risks because they do not reflect the planned remediation of sediment, which will reduce PCB concentrations in the food chain.

Conceptually, the HHRA uses information concerning land uses at the Site and activities associated with those land uses, to define *who* may use or access the Site and for what purposes. That information, combined with the location of PCB-containing media, provides information on *where* and *how* potential exposures to PCBs could occur, as well as *how much* exposures to PCBs could occur. The *who*, *how*, and *where* of this analysis are collectively referred to as an exposure pathway. The quantification of *how much* exposure can occur is used with toxicity values for PCBs to estimate potential health risks. Exposure pathways are only complete if all elements are present: there must be PCBs present at a location where human contact can occur in order for an exposure pathway to be complete. When any one of these elements is not present, the exposure pathway is incomplete and therefore poses no unacceptable health risks. At this Site, the remediation that will be performed pursuant to the requirements of the RODs render several exposure pathways incomplete. Specifically:

- Direct contact (dermal contact and incidental ingestion) and inhalation of dust from soil will not be a complete exposure pathway under future conditions because residual PCBs in soil will be covered and excavation into soil containing residual PCBs will be subject to a Site Management Plan (SMP).

- Direct contact with groundwater will not occur because groundwater beneath the Site is not used as a source of potable water. Groundwater will not be used as a source of potable water in

the future because public drinking water is supplied to the Site and surrounding area, and institutional controls will prohibit the installation of potable wells.

- Inhalation of vapors from soil or groundwater will not be a complete exposure pathway because PCBs are not associated with enough volatility to pose a potential vapor concern and airborne distribution of soil particulates containing PBCs will be precluded due to the soil cover system.

- Direct contact with surface water will not be a complete exposure pathway under future conditions because PCBs were detected infrequently in surface water, and at a maximum concentration less than the federal drinking water standard of 0.0005 mg/L. Therefore, any potential exposure pathways to PCBs in surface water would be less than levels considered safe for drinking water. In addition, remediation of soil and construction of the migration barrier will ensure that soil, non-aqueous phase liquids (NAPL), and groundwater will not become sources to surface water in the future.

- Direct human contact with sediment is an incomplete or insignificant pathway; direct human contact for kayakers or those wading in shallow waters near the site is incomplete due the fact that surface sediments are generally at background conditions or access is restricted. Under future conditions, surface sediment that is beneath 15 feet or less of surface water (i.e., shallow water sediment) will be remediated such that PCBs will be near background, and sediment that is beneath more than 15 feet of water (i.e., deep water sediment) cannot be contacted due to the depth of the water. PCB concentrations associated with background (less than 1 mg/kg) are considered by USEPA to be associated with no unacceptable risks for direct contact under unrestricted use conditions.

Although no recreational or commercial fishing is known to occur at the Site, recreational angling occurs throughout the lower Hudson River. Exposures to PCBs can occur if people catch and eat fish which have accumulated PCBs in their edible tissues. The remediation that will be performed (as described in Volume 2) essentially renders all exposure pathways incomplete, except for fish ingestion. Therefore, the HHRA focused on quantifying potential exposures and risks associated with consumption of fish during recreational angling.

The primary mechanism for uptake of PCBs from environmental media into fish is ingestion of benthic invertebrates or aquatic vegetation that has accumulated PCBs via partitioning from sediment to porewater. Direct absorption of PCBs from surface water may also contribute to PCB body burdens in fish. However, the following lines of evidence suggest that these pathways may not be significant at OU-2:

- PCB concentrations in the bioactive zone (i.e., surficial sediment in the top six inches) across the majority of OU-2 are consistent with up-river ambient concentrations (approximately 1 mg/kg or less, as documented in Volume 2), indicating that there is no significant source of PCBs within the sediment horizon inhabited by benthic invertebrates. The exception to this is in the Deepwater Northwest Area, where a portion of surficial sediment contains PCBs at concentrations in excess of ambient background.

- PCB concentrations in pore water samples were non-detect in all but one sample, and that sample did not correlate with areas of the highest sediment PCB concentrations.

- There is no aquatic vegetation in the vicinity of OU-2.

- PCBs were generally not detected in surface water samples; sporadic detections in three of ten sampling events were at concentrations between 10 and 25 parts per trillion and were generally also detected in upriver samples. None of these events suggest an on-going site-specific contribution of PCBs to surface water. Note that the current feasible laboratory detection limit is much greater than the New York State Ambient Water Quality Standard of 0.001 ng/L or 0.001 parts per trillion.

- PCB concentrations in biota collected at OU-2 were generally similar to the reference location with some exceptions; OU-2 samples were statistically significantly greater than the reference location only for American eel (whole body and fillet), white perch (whole body only), and blue crab (Hepatopancreas only). However, no spatial correlation between tissue body burden and sediment concentration could be identified.

Potential human exposures to PCBs associated with recreational angling were quantified by calculating intakes for hypothetical recreational anglers and crabbers who consume fish (finfish and eels) and shellfish (blue crab) caught from OU-2. Potential fish ingestion intakes are influenced by:

- the types of fish that people catch and eat, in the vicinity of the Site;
- the amount of fish that people eat, that are caught in the vicinity of Site;
- fish trimming and cooking methods; and
- the PCB concentrations in fish near the Site

Surveys conducted by NYSDEC, which identified characteristics of recreational anglers, were used to identify the types of fish that recreational anglers harvest (i.e., catch and keep) from the lower Hudson River. That information, combined with the Baseline Sampling and Analysis Plan (BSAP) investigation results, indicated that white perch, American eel, and blue crab are the only species that:

- lower Hudson River anglers are known to harvest;
- occur at the Site at sufficient enough population to allow for angling with a reasonable level of effort; and
- potentially exhibit a Site-related uptake of PCBs due to their home range.

Other species such as striped bass and blue fish, which anglers on the lower Hudson River are known to target, are transient and any PCB body burdens carried by those species would not be indicative of potential uptake from OU-2, but rather a multitude of sources within the Hudson River. The absence of aquatic vegetation near OU-2 limits the species habitat. Therefore, other species that are harvested by lower Hudson River anglers and that could potentially exhibit a localized uptake of PCBs, such as catfish and blue gill, are infrequently present at OU-2. While not documented as a targeted species for anglers, Oyster Toadfish is potentially harvested for consumption. However, since fillet PCB concentrations in Oyster Toadfish were primarily non-detect, potential consumption of that species would not result in a health risk of concern.

Risks associated with ingestion of fish and crabs caught recreationally were calculated assuming that an adult who engages in these activities brings home fish or crabs to share with children and adolescents who live in the household. Fish and shellfish ingestion rates were derived from Site-specific information

which included the typical size of white perch, American eel, and blue crab harvested from the lower Hudson River, angling effort (number of fish harvested per fishing trip) as reported in the NYSDEC angling surveys, and a range of recreational angling trips per year. The calculated adult ingestion rates range from 1.6 g/day to 6.9 g/day of white perch and American eel, and 0.9 g/day to 1.8 g/day of blue crab. The fish ingestion rate estimates are generally consistent with the average recreational angling fish ingestion rate derived from a survey of New York State anglers of 4 g/day.

To provide a range of risk estimates for this HHRA, each of the exposure scenarios were evaluated for three different fish ingestion rates (a reasonable maximum exposure (RME) of 4 g/day, a central tendency exposure (CTE) of 1.6 g/day, and an upper-bound exposure of 31.9 g/day) and three different blue crab ingestion rates (an RME of 1 g/day, a CTE of 0.9 g/day, and an upper-bound of 1.8 g/day). These adult ingestion rates were scaled for application to young children and adolescents based on their smaller body weights.

The upper-bound fish ingestion rate was based on the 90^{th} percentile ingestion rate from the 1991 New York State anglers survey and is based on total consumption of all recreationally caught fish. This fish ingestion rate is applied in this HHRA solely for use as a bounding estimate, in that - for several reasons - it is not plausible that any angler would derive 100% of his or her fish diet from OU-2. First, given the limited species present at the Site, anglers would not exclusively fish at the Site. Therefore, it is most realistic to adjust the ingestion rate by the percentage of fish diet derived from OU-2. Second, the habitat at OU-2 does not sustain fish species that would be of a size or variety that reflect the number of recreationally-caught fish meals per year on which the upper-bound ingestion rate is based. Even at the RME ingestion rate, the fish population at OU-2 could not reasonably provide enough meals for the adult angler *plus* members of their family. Furthermore, there are no known Native American or ethnic populations in the vicinity of the Site that would use the area around OU-2 for subsistence fishing, and the demographics of Hastings-On-Hudson, combined with the availability of much better shoreline fishing spots within a few miles of the Site, suggest that fishing with the primary objective of providing food is very unlikely at OU-2. Use of the upper-bound ingestion rate is useful only as a bounding estimate and to provide a baseline from which the results of this HHRA could be compared to other HHRA's which used upper-bound estimates of fish consumption.

Consistent with USEPA guidance, PCB concentrations in fish tissue that could be consumed by recreational anglers (i.e., the PCB exposure point concentrations [EPCs]) were calculated using 95% upper confidence limit (UCL) concentrations of total PCBs measured in fish tissue during sampling completed during the BSAP. The fish tissue EPCs, therefore, reflect the current pre-remedial conditions at OU-2. Cooking and trimming loss during food preparation was also considered for PCBs. The EPCs were then used with the fish ingestion rates and toxicity values for PCBs published by USEPA to derive estimates of excess lifetime cancer risk (cancer risk) and hazard index (HI). The significance of cancer risk and HI values was evaluated using risk management criteria published in the National Contingency Plan (NCP), which indicate that cancer risks in excess of 10^{-4} or an HI value of 1 generally require a response action, while cancer risks less than 10^{-6} or an HI value of 1 do not require response actions, and risks within the range of 10^{-6} to 10^{-4} may require a response action on a case-by-case basis.

Incremental risk in excess of reference conditions is critical for risk management decision making because, in accordance with USEPA guidance, response actions are generally not required to address risks that are associated with ambient background conditions (i.e., cleanup of a site does not need to result in post-remedial conditions with constituent concentrations lower than ambient background

levels). This is particularly the case when total site risks are contributed by constituents which are not related to releases at the site. At OU-2, surficial sediment PCB concentrations across most of the area are presently similar to upriver sediment PCB concentrations, and PCB concentrations in edible fish tissue for all species other than American eel are essentially equal between those harvested adjacent to the Site and those harvested in the up-river reference area. This indicates that it is important to differentiate between risks that could be associated with OU-2 from those associated with background (up-river) conditions in the river.

The results of the HHRA indicate that cancer risks for all recreational fishing and crabbing scenarios, i.e. the three different fish ingestion rates, were within the range of 10^{-6} to 10^{-4}. HI values for the RME recreational fishing scenario were greater than unity (1) for fish harvested both adjacent to the Site and up-river, while the incremental HI value was 0.5 (i.e., calculated as the site HI minus the background HI). Similarly, HI values for the upper-bound exposure recreational fishing scenario were greater than unity for fish harvested both adjacent to the Site and up-river, while the incremental HI value was equal to unity. The HI values for the recreational fishing central tendency exposure scenario did not exceed unity, and the HI values for the recreational crabbing scenarios (all ingestion rates) were generally all less than unity. The difference in risks between OU-2 and the reference area is not indicative of unacceptable health risk, as cancer risks are within the range of 10^{-6} to 10^{-4} and HI values do not exceed unity.

Collectively, the results of the HHRA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are unacceptable when compared to ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Deepwater Northwest Areas that are in excess of background conditions. The use of measured fish tissue concentrations that reflect these existing conditions, to estimate long-term risks, is very conservative because the remediation described in Volume 2 will remove sources of PCBs in sediments and eliminate transport of PCBs from upland areas to river sediments. These actions will materially improve sediment quality from the pre-remediation conditions, ultimately resulting in surficial sediment concentrations that are; on average, consistent with up-river background conditions (i.e., averaging 1 mg/kg or less). As a result, post-remedy fish and crab tissue PCB concentrations will decline for any species that are local to the Site, and risks associated with consumption of such fish in the future will be lower than those estimated in this HHRA.

In conclusion, the results of the HHRA support the conclusions of the NYSDEC RODs, which indicate that implementation of the remedies described in Volume 2 will be protective of human health.

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1. Introduction

This Human Health Risk Assessment (HHRA) is a component of the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application (RBDA) for polychlorinated biphenyls (PCBs) at the Former Anaconda Wire Project site located in Hastings-on-Hudson, New York. The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and will be submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA. The HHRA provides a quantitative estimate of the risk posed to humans through potential exposure to Site media where PCBs have been detected, under future land use conditions which consider remediation and re-development of the Site. The overall objective of the HHRA is to determine whether the remedial action requirements of the Records of Decision (RODs) will be protective of human health. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place under the conditions described in detail in Volume 2, will not pose unacceptable risks to human health.

1.1 SITE DESCRIPTION

The Site is a 28-acre former industrial property located on the eastern bank of the Hudson River along the village of Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The Site is located at river mile 21, approximately five miles south (downstream) of the Tappan Zee Bridge. The site is bounded on the north and west by the Hudson River, including a former marina to the north, to the south by the Tappan Terminal site and to the east by a commuter railroad adjacent to the Village of Hastings-on-Hudson. At the location of the Site, the lower Hudson River is nearly a mile wide (approximately 4800 feet bank to bank). The deepest portion of the river cross-section is approximately 50 feet. The Hudson River is primarily used as a navigational/shipping lane with large vessels typically traveling near the middle of the river. The shoreline consists of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting. Figure 1-1 provides a site location and Figure 2-1 identifies key features of the site that are referenced throughout this document.

The site is zoned general industrial and has primarily been used as an industrial facility for well over a century with much of the site formerly covered with buildings; currently there are no active operations at the site. One permanent building remains at the site (Building 52) while most of the remaining portion of the site is covered by pavement or concrete building slabs. Currently, only three temporary trailers are in use for site security and to support remedial activities. Presently, there is no habitat for environmental receptors.

Surface Conditions: The site as shown below is predominantly covered by former building slabs. The site is gated and provides no habitat for environmental receptors.

River and Shoreline Conditions: Example photos below show the existing conditions of the shoreline with the IRM bulkhead wall in the bottom of the photo on the left and an example of the shoreline shown on the right.

During World War II, Anaconda Wire and Cable Company (AWC) was awarded contracts from the U.S. Navy (Navy) to manufacture electric cable for shipboard use. The Navy required the insulation of shipboard cable to be heat and flame resistant to avoid fire damage and to withstand heat generated from conducting high electric currents. PCB mixtures were used to make these products for the Navy. The material was used exclusively during the World War II-era and PCB use in the manufacturing of cable was suspended after AWC's contracts with the Navy were fulfilled at the end of the war, as there was no civilian market for these products. After World War II, AWC produced electrical and television cable until it ceased operations in 1975. Atlantic Richfield Company (ARC) purchased AWC in 1977, never operated the plant, and then sold the Site in 1978. Since 1978, several owners and tenants subsequently occupied the Site. In 1998, ARC's wholly owned subsidiary, ARCO Environmental Remediation LLC. (AERL), purchased the Site in order to facilitate environmental investigation and remediation efforts. Volume 2 of this application provides additional details on site description and history including site geology and hydrogeology, historic and current land use, and future land use.

As of 2013, Building 52 and the water tower are the only remaining structures on the Site. Building 52 is located in the northeastern corner of the Site. All other buildings have been demolished with only the slabs remaining. All tenants have vacated the Site.

Building 52: This building is the only remaining structure on the site. Currently, only three temporary trailers are in use for site security and to support remedial activities.

1.2 REGULATORY PROCESS

Since 1998, ARC has implemented remedial investigations, Interim Remedial Measures (IRM) and demolition activities as part of the remedial process. The Site was divided into two Operable Units (OUs), with OU-1 designated as the upland portion of the Site, and OU-2 designated as the river portion of the Site. NYSDEC issued a Record of Decision (ROD) for the OU-1 portion of the Site in March 2004 (NYSDEC, 2004). In March 2003 the Final Feasibility Study Report (FS) for OU-2 was prepared and submitted by Earth Tech of New York, Inc. (Earth Tech) (Earth Tech, 2003) based on the December 2000 Remedial Investigation Report (RI) for OU-2 (Earth Tech, 2000).

In October 2003, NYSDEC issued the Proposed Remedial Action Plan (PRAP) for OU-2 (NYSDEC, 2003). Subsequent investigations completed by Parsons lead to the necessity for updating the 2003 OU-2 FS. The Supplemental Feasibility Study Report for Operable Unit No. 2 (SFS) was completed and submitted to NYSDEC in April 2006 (Parsons, 2006). In 2009, a Modified Feasibility Study Report (MFS) was prepared and submitted to NYSDEC (Haley & Aldrich, 2009), which incorporated additional new data and analyses with the intent to fully integrate OU-2 and OU-1 remedial activities. In 2011, a Revised Feasibility Study (RFS) was submitted (Haley & Aldrich, 2011) to address proposed amendments to the OU-1 ROD and the integrated remedies for OU-1 and OU-2.

Based on the above regulatory process, on 30 March 2012 NYSDEC issued an amended ROD for OU-1 and a ROD for OU-2. The Amended Order on Consent was signed 6 November 2013.

1.3 REQUIREMENTS OF NYSDEC RODS

As described in Volume 2, the nature and extent of contamination at the Site has been fully characterized under the regulatory oversight of NYSDEC, which culminated in RODs for the Site in 2012. The specific requirements of the RODs are provided in Volume 1. In summary, the RODs require:

- Excavation of soil containing PCBs and covering the entire Site with a clean soil cover and/or buildings and hardscape (i.e., soil cover system), and implementation of a Site Management Plan (SMP) and institutional controls which will manage soil excavation activities and prohibit use of groundwater.

- Excavation of shallow water sediments with PCBs in excess of one mg/kg to a sediment depth of six feet, backfilling with clean substrate, and installing stone armor for erosion prevention along the shoreline. Shallow water sediments are defined as those beneath a depth of river water (less than 15 feet) where turbidity controls may be used during remediation.

- Excavation of deep water sediments with PCBs in excess of 50 mg/kg to a depth of six feet and backfilling with clean substrate. Deep water sediments are defined as those beneath a depth of river water (more than 15 feet) where turbidity controls cannot be effectively used during remediation.

- Installation of migration controls for groundwater and residual dense non-aqueous phase liquid (DNAPL)

OU-1

- Excavation of soil greater than 10 mg/kg PCB to a maximum depth of 9 or 12 feet.

- Excavation of surface soil (0-12 inches) greater than 1 mg/kg PCB. Note however, that PCBs in surface soil will be isolated by the application of a cover system over the entire site. Therefore, only excavation of soil greater than 10 mg/kg PCB is required as stated above.

- Building 52 outfalls will be addressed.

- Bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest Corner of the site and the Northwest Extension Area.

- Construction and operation of a post-remedy recovery system for PCB DNAPL.

- Installation of a site cover will be required to allow for restricted residential use of the site. Soil cover in areas not otherwise covered by the development at the site (e.g., buildings, pavement, etc.) will consist of two feet of clean soil over a demarcation layer. Note that the preliminary design currently plans to install a cover system over the entire site, including a shoreline protection system along the river.

- Implementation of institutional controls which will manage soil excavation activities and prohibit use of groundwater.

OU-2

- Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the Northwest Corner of the site and the Northwest Extension Area.

- Removal of sediment that contains PCB concentrations greater than 1 mg/kg to a maximum depth of 6 feet below the mud-line within areas of re-suspension controls (i.e., shallow water sediment in Nearshore Area, and Backwater Area).

- Nearshore dredge areas will be backfilled with clean material. Isolation capping will be provided where residual contamination remains above background concentrations. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer of which natural deposition may provide up to 12 inches where a reasonable time frame for deposition can be demonstrated.

- Subject to evaluation and further investigation, removal of sediment outside of re-suspension controls that contain PCB concentrations greater than 50 mg/kg, to a maximum depth of 6 feet below the mud-line. Note that these areas are discussed as the Deepwater Evaluation Area and Deepwater Northwest Area. Dredged areas will be backfilled based on final design requirements.

The RODs also require completion of several investigation activities to help support and gauge success of the remedial design. Those investigation activities have largely been completed, and the remedial design is in progress; remediation as required by the ROD has not yet been initiated.

1.4 POST-REMEDY SITE CONDITIONS

Volume 2 details post-remedy Site conditions. In summary, based on the requirements of the RODs, once remediation has been completed, Site conditions will be as follows:

- Surface Soil: PCBs in surface soil will be isolated by the application of a cover system over the entire site. This cover system will isolate residual PCBs in soil thereby preventing contact by human and environmental receptors and allowing for restricted residential use. The cover system will include an erosion protection layer along the shoreline which will prevent potential migration and subsequent exposure to residual PCBs. Institutional controls will ensure that soil cover system is maintained.

- Subsurface Soil: PCBs in subsurface soil will be isolated by the application of the cover system described above. Residual PCBs beneath the cover system will be reduced to 10 mg/kg or less by excavating and back-filling with clean soil as follows: In the Northwest Corner and along the Northern Shoreline, soils in excess of 10 mg/kg will be excavated to 9 ft bgs and backfilled with clean soil; Outside of these areas, soils in excess of 10 mg/kg will be excavated to a maximum depth of 12 ft bgs and backfilled with clean soil. Institutional controls will ensure that future excavation of soil containing residual PCBs is properly managed.

- Groundwater: Institutional controls will prohibit use of groundwater as a potable water source.

- Shallow water sediment: Sediments beneath 15 feet or less of surface water (i.e., sediments in the Nearshore and Backwater Areas) will contain PCBs at background conditions (i.e., approximately 1 mg/kg or less). This will be accomplished by excavating sediments in these areas with PCBs greater than approximately 1 mg/kg to a depth of 6 feet and backfilling with clean material that will isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.

- Deepwater sediment: The surficial deepwater sediments will consist of native sediment or clean backfill material with PCBs near background (approximately 1 mg/kg or less). Deepwater

sediments (i.e., those beneath more than 15 feet of surface water) that exceed 50 mg/kg and for which sufficient native cover is not present will be removed to a maximum depth of 6 feet and backfilled with clean material that will isolate remaining contamination. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.

- Migration controls: Migration of contaminated soil particles and DNAPL will be prevented through installation of migration controls. The shoreline will either be a steel bulkhead or a sloped shoreline with a cover system designed to prevent the migration of contaminated soil particles into the Hudson River and to resist erosion. The sheet pile wall in the vicinity of the PCB DNAPL will prevent mobilization of DNAPL and migration of PCBs in groundwater.

- Institutional controls: Institutional controls will include an environmental easement that will:

  - require the remedial party or site owner to complete and submit to NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
  - allow the use and development for restricted-residential use only (which allows for residential, commercial, and/or industrial use)
  - restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;
  - prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and
  - require compliance with a Department approved Site Management Plan.

NYSDEC concludes that the stipulated remedies are: a) protective of human health and the environment; b) comply with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable; and c) use permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, to satisfy the preference for remedies that reduce toxicity, mobility, or volume as a principal element. The New York State Department of Health (NYSDOH) concurs that the remedy for the Site is protective of human health.

1.5 RISK ASSESSMENT APPROACH

40 CFR 761.61 provides three options for cleanup of PCB remediation waste: 761.61(a) *Self-implementing*; 761.61(b) *Performance-based*; and 761.61(c) *Risk-based*. The Self-implementing option (761.61(a)) is not applicable to freshwater or marine sediments. Performance-based criteria (761.61(b)) are applicable to contaminated surfaces, not to soil and sediment. Although 761.61(a) or 761.61(c) may be used for soil, 761.61(c), Risk-based approval, is the only method that can be used for sediments. Risk-based approval is used for both soil and sediment at this Site. Based on Site conditions, a Risk-based approval approach was selected.

Risk-based approval is conducted by submitting to USEPA a written plan that describes the nature and extent of PCB contamination, the proposed remediation, and the basis for leaving PCBs in-place within

environmental media at the Site. Human health and ecological risk assessments, in turn, are used to support the proposed remediation, including documentation that leaving PCBs in-place (following remediation) does not pose unacceptable risks to human health and the environment.

Remedial activities will be completed at the Site to address PCBs in soil, shallow water sediment, and deep water sediment to comply with the NYSDEC RODs, as described above. In addition, remedial activities will be implemented to mitigate potential migration pathways for groundwater and NAPL. These remedial actions will be performed regardless of the results of this HHRA; i.e., if this HHRA indicates that the remedial actions stipulated in the RODs are not required to maintain acceptable risks, the remedial actions will still be performed. Consequently, this HHRA does not consider potential exposures and health risks associated with current conditions for soil and sediment. Rather, the HHRA considers post-remedial conditions for those media, to verify the remedial effectiveness at maintaining acceptable risks. The exception to this exclusive focus on post-remedy conditions concerns characterization of potential exposures and risks for fish ingestion associated with recreational angling. For that exposure pathway, fish tissue PCB concentrations representative of the current conditions are used to estimate risks. Risks based on current conditions provide a conservative assessment of possible future risks because they do not reflect the planned remediation of sediment, which will in turn reduce PCB concentrations in the food chain. In addition to ensuring the health-protectiveness of the HHRA, relying on current fish tissue concentrations reduces uncertainty by eliminating the need to model future fish tissue concentrations.

The RBDA for Former Anaconda Wire Site comprises the following four volumes:

- Volume 1, *Application*, which provides a summary of the project scope and objectives, investigation activities, human health and ecological risk assessments, and conclusions that are documented in detail in Volumes 2-4.

- Volume 2, *Basis for Remedial Approach and Design*, which documents investigation activities including nature and extent of PCB contamination, provides the proposed remedial design, and identification of anticipated post-remedial conditions (i.e., residual PCBs).

- Volume 3, *Human Health Risk Assessment (this volume)*, which provides the HHRA, including methodology, calculations, and results.

- Volume 4, *Ecological Risk Assessment*, which provides the ecological risk assessment, including methodology, calculations, and results.

The HHRA presented in this volume (Volume 3) was performed following standard United States Environmental Protection Agency (USEPA) guidelines, including the following documents:

- Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A (USEPA, 1989);
- Standard Default Exposure Factors (USEPA, 2014a)
- Exposure Factors Handbook (USEPA, 2011)
- Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites (USEPA, 2002a)

A complete list of references is presented in Section 7.

1.6 ORGANIZATION OF RISK ASSESSMENT REPORT

The HHRA consists of the following major components:

- Data Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Uncertainty Analysis

Section 2, Data Evaluation, reviews the analytical data collected at the Site and provides the rationale for the subset of analytical data and specific data sets that are used in the HHRA. This section also provides the methods used to statistically summarize and present analytical data.

Section 3, Exposure Assessment, provides information documenting the human populations that could access or use the Site under current and possible future land use conditions, discusses how those populations could potentially be exposed to the PCBs in Site media, and quantifies how much exposure could occur. Specific components of the Exposure Assessment include descriptions of current and future land uses, sources of contamination and exposure media, exposure pathways, and exposure scenarios, and documentation of exposure point concentration (EPC) and exposure intake calculations.

Section 4, Toxicity Assessment, discusses the chemical-specific toxicity criteria for PCBs that are used to quantify potential human risks. Section 5, Risk Characterization, provides the methods for calculating the non-carcinogenic and carcinogenic risks for each receptor and provides a summary of the results of the risk evaluations. Section 5 also includes an Uncertainty Analysis, which presents a discussion of both the inherent and Site-specific uncertainties associated with the HHRA. Section 6, Summary and Conclusions, presents a discussion of results of the HHRA.

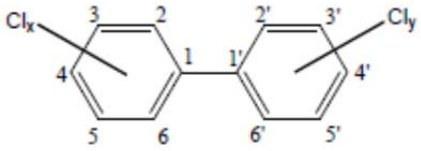
Appendices to this report provide supporting documentation for EPC and risk calculations.

2. Data Evaluation

The data evaluation portion of the HHRA identifies the available data for Site PCBs, documents the selection or exclusion of particular data for use in the risk assessment, provides the rationale for the way data will be grouped for evaluation in the risk assessment, and documents the methods used to summarize data using statistical descriptors.

2.1 SITE RELATED CHEMICALS OF CONCERN

Among TSCA-regulated compounds, this site contains only PCBs which therefore is the only substance evaluated in this HHRA. PCBs are a group of chemicals that comprise 209 individual chlorinated hydrocarbon compounds, known as congeners. PCBs have two to ten chlorine atoms known as homolog groups that are attached to the bi-phenyl molecule:



The physical and chemical properties of PCBs are determined by the number and location of the chlorine atoms. PCBs were manufactured for a variety of uses in the United States from 1929 to 1977. Most PCB mixtures are known by their commercial formulations, known as Aroclors. Aroclors are identified using a four-digit numerical code, where the first two numbers describe the mixture and the second two numbers typically describe the chlorine content by weight-percent. Arocolor-1260, for example, contains 60% chlorine.

PCBs have a strong binding capacity for organic carbon and very low solubility in water. Binding capacity and solubility are controlled by the degree of chlorination of PCBs (the log octanol-water partition coefficient (Log K_{ow}) ranges from 4.7 to 6.8 and the water solubility ranges from 0.0027 mg/L to 0.59 mg/L) (ATSDR, 2000).

As described in the following subsections, PCBs are evaluated in this HHRA as total PCBs, representing the sum of Aroclor concentrations within each environmental sample.

2.2 DATA SOURCES AND DATA QUALITY

Between 1990 and 2008, numerous remedial investigations of OU-1 and OU-2 were completed and summarized in the Conceptual Site Model (CSM) (Haley & Aldrich, 2008). Those investigations provided data for soil, groundwater, and sediment that was sufficient to identify the nature and extent of contamination and to support a determination that remedial actions were required at the Site. However those investigations were not sufficient to allow for a comprehensive remedial design. Therefore, during two extensive investigation programs were completed by Haley & Aldrich in 2014 and 2015: the baseline sampling and analysis program (BSAP), and the pre-design investigation (PDI).

The objective of the BSAP is to develop a baseline characterization of PCB concentrations in environmental media. After remediation has been completed, the types of sampling performed in the BSAP will be repeated, and the post-remedial analytical data will be compared to the BSAP analytical

data. The comparison will be used to help gage improvement in environmental quality. The characterization activities performed in support of the BSAP include:

- Bathymetry surveys
- Surface water sampling
- Biota sampling
- Habitat characterization
- Surface sediment sampling
- Pore water sampling
- Groundwater sampling

The objective of the PDI is to develop data that can be used to delineate the remedial boundaries in soil and sediment. Characterization activities performed in support of the PDI were limited to soil and sediment sampling based on data generated during the RI. Analytical data for other media from the RI (e.g., groundwater, surface water) are not considered representative of current conditions and were therefore not used in the HHRA; data for those media collected in support of the BSAP are used in the HHRA. Collectively, the RI and PDI data are sufficient to delineate PCBs in soil and sediment that require remediation.

The OU-2 Study Area is located downriver from the Upper Hudson River PCB Superfund Site, which extends from Hudson Falls to the Federal Dam in Troy, NY. Therefore, it is recognized that anthropogenic sources of PCBs that are unrelated to the OU-2 Study Area are present in Hudson River sediment and biota. To help evaluate if conditions within the OU-2 Study Area may differ from locations outside of the OU-2 Study Area, surface water, sediment, and biota were sampled from locations adjacent to the Site (adjacent area), one-mile up-river of the Site (North area), and one-half mile down-river of the Site (South area) during the BSAP, as shown in Figure 2-1. Data relating to bathymetry surveys and habitat characterization are used in this HHRA only to provide context for the exposure assessment.

The HHRA uses data collected in the BSAP and PDI, as opposed to the RI, to evaluate potential exposure pathways and to quantify potential health risks. The BSAP and PDI data were used because:

- Analytical data are current and therefore are more reflective of existing environmental conditions;
- Sampling targeted media such as surficial sediment (0 – 0.5 ft. bgs), pore water, and biota, that are more applicable to evaluation of potential exposure pathways.

Therefore, the data discussed in this Section were obtained from the PDI and BSAP programs and the RI data are not discussed.

2.2.1 Chemical Analyses

Laboratory methods to analyze environmental media for PCBs included:

- Soil/Sediment: EPA 3545A (pressurized fluid extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP)
- Biota: EPA 3540C (soxhlet extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP) NE331_01-rev.01 (tissue Preparation)

- Surface water, Pore water, & Groundwater: EPA 3535A (solid phase extraction), 8082a (analysis), S-NY-O-314-rev.00 (laboratory SOP)

2.2.2 Data Quality

Quality Assurance/Quality Control (QA/QC) samples were collected at a rate of 1 field duplicate per 10 samples and 1 MS/MSD per 20 samples for each media. All field and laboratory procedures were completed in accordance with the approved QAPP. Analytical data used for delineation was collected using Standard Operating Procedures and Quality Assurance Procedures that included the following:

- Holding Time and Sample Preservation Compliance
- GC/MS Instrument Performance Check (where applicable)
- Initial Calibration and Continuing Calibration Procedures
- Field/Method/Preparation Blank Sample Analysis
- System Monitoring Compound Recoveries (where applicable)
- Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicate Recoveries
- Internal Standard Recoveries (where applicable)
- Field Duplicate Sample Analysis
- ICP Interference Check Sample Performance (where applicable)
- ICP Serial Dilution Replicate Percent Difference (where applicable)

Data validation was subcontracted to a third party. Based on Data Usability Reports (DURs) provided to date, data validation has resulted in only minor changes in results or flags. The analytical data that supports the risk assessment and delineation was determined to be useable for those purposes.

Further description of the procedures used for data validation and evaluation is presented in Volume 2.

2.3 DATA SUMMARIZATION METHODS

The analytical data for each data set that was developed in support of the HHRA was summarized into descriptors which identify:

- Frequency of detection (number of positively detected results/total number of results)
- Range of detected concentrations
- Range of reporting limits
- Average of all samples, including detected results and ½ the reporting limit for those samples for which a constituent was non-detect.

The following procedures were applied when summarizing the analytical data for the HHRA:

- For samples in which both an original and a field duplicate result are available, both results are used.
- For samples in which analyte concentrations are detected outside the calibration range, and the samples are diluted and reanalyzed, data with the highest detected concentrations were used in the HHRA.

Total PCB concentrations were calculated using analytical data for Aroclors, as follows:

- Total PCB concentrations for each sample were calculated as the sum of all detected Aroclor concentrations in that sample.

- For samples in which no Aroclors were detected, the total PCB concentration used in the data set was the highest reporting limit among all Aroclors.

2.4 SELECTION OF DATA FOR USE IN HHRA

Data were selected for use in the HHRA using the criteria established by USEPA in "Guidance for Data Usability in Risk Assessment" (USEPA, 1992). The data are a product of sample collection and handling, laboratory analyses, and data QA/QC procedures performed in accordance with USEPA methods. The following data sets are compiled for use in the HHRA. Analytical data are provided in Volume 2.

2.4.1 Soil

Surface and subsurface soil samples were collected from the upland portion of the Site (OU-1) using sonic, minisonic, direct push, and drilled borings. Soil data were used to delineate areas requiring remediation. Volume 2 provides documentation of PCB concentrations in soil and shows anticipated residual PCB concentrations that may be present beneath the two-foot thick soil cover that will be placed on the Site. In summary, residual PCBs beneath the soil cover will be present at concentrations not exceeding 10 mg/kg to maximum depths of 9 to 12 ft. bgs. Based on the requirements of the ROD and anticipated post-remedy conditions, no complete exposure pathways to soil will exist. Therefore, soil data are not presented or evaluated in this HHRA.

2.4.2 Groundwater

Groundwater samples were collected from OU-1 using low-flow sampling techniques from six monitoring wells (Figure 2-1) in August 2014. Table 2-1 provides a summary of groundwater data. As shown in Table 2-1, Aroclor 1260 was the only PCB detected in groundwater, at a maximum concentration of less than one ug/L.

2.4.3 Pore Water

Pore water, representing the water that exists within the interstitial pore space of sediment, was collected from seven Nearshore, shallow water sediment sampling points within river during the BSAP in 2013 (Figure 2-2). Pore water was collected by extraction from sediment samples via centrifugation. As shown in Table 2-2, Aroclor 1248 and Aroclor 1254 were each detected in one pore water sample (PW-006, associated with location SS-009). The total PCB concentration in the pore water sample was 0.0296 ug/L.

2.4.4 Surface Water

Nine surface water sampling events have been performed with two in 2013 (October and December) and seven in 2014 (April – October). Monthly sampling events during the winter (January – March) were not performed as inclement weather presented health and safety concerns (e.g. extreme cold, river ice). Up to seven surface water samples were collected during each event with a Niskin grab sampler at locations in each of the three river sections (2 upstream, 3 adjacent, 2 downstream) (Figure 2-3). Samples were collected on a monthly basis, generally within a four hour interval prior to low tide. This

approach ensured that a) the river was moving uniformly downstream (toward the south) to minimize the potential for the Site to impact the upstream reference samples during the collection event and b) the samples reflected any potential contribution of the Site to the river at multiple points. Each sample was a composite of two grab samples collected 2 feet below the water surface and 2 feet above the sediment surface.

As indicated in Table 2-3, Aroclor 1242, Aroclor 1248, and Aroclor 1260 were each detected in 1 to 6 of the 69 surface water samples collected. The maximum total PCB concentration in surface water is 0.0245 ug/L.

2.4.5 Sediment

Sediment samples were collected during the PDI and BSAP in 2013 and 2014 to refine the extent of contamination, to support remedial design. Sediment samples were collected using a Petite Ponar dredge sampler, which was deployed and retrieved from a boat using a mechanical winch.

Table 2-4 provides a summary of PDI data for sediments beneath shallow water (less than 15 feet deep) from the 0 – 0.5 ft depth interval. As shown in Table 2-4, detected PCBs were almost exclusively Aroclor 1248 and Aroclor 1262, with a maximum total PCB concentration of 18.69 mg/kg. Figure 2-4 provides a summary of PDI and RI analytical data for PCBs. As shown in Figure 2-3, PCBs in excess of one mg/kg, within the top six inches of shallow water sediment, are confined to two general areas.

Table 2-5 provides a summary of PDI data for sediments beneath deep water (more than 15 feet deep) from the 0 – 0.5 ft depth interval. As shown in Table 2-5, detected PCBs were almost exclusively Aroclor 1248 and Aroclor 1262, with a maximum total PCB concentration of 277.7 mg/kg. As shown in Figure 2-4, PCBs in within the top six inches of deep water sediment across the majority of OU-2 were detected at less than one mg/kg. Areas of total PCBs in excess of one mg/kg, within the top six inches of deep water sediment, are confined to isolated detections in the scour area in the northwestern portion of OU-2.

2.4.6 Biota

Fish and shellfish were harvested from all three areas (Adjacent to Site, North (up-river) of Site, and South (down-river) of Site) using passive methods: gill nets, Fyke or Box traps, crab pots and eel traps in accordance with the NYSDEC-approved work plan. Fish were harvested under a scientific collection permit issued by NYSDEC. The size ranges and the total number of the targeted species were limited to ensure the inventory was within acceptable parameters but organisms were large enough to meet a minimum mass for analysis of PCBs (e.g. >10 grams). Biota were collected from shallow water stations (three North, five Adjacent, three South) and three deep water stations to sample biota that may be exposed to deeper sediments (e.g. American eel, hogchoker, blue crab) (Figure 2-2). The sampling targeted five specimens per station. Sampling was conducted for a period of two weeks each in September 2013 and September 2014. Biota samples were submitted for laboratory analysis of whole body, offal, or fillet. Analytical data for the biota samples, including weight and length of the specimens harvested, is provided in Appendix A.

Tables 2-6 through 2-8 provide summaries of fillet sample data for American eel, oyster toadfish, and white perch, and Table 2-9 provides summaries of leg and Hepatopancreas sample data for blue crab.

Within these tables, data are summarized by reach of the river where samples were biota were harvested (Adjacent to Site, North (up-river) of Site, and South (down-river) of Site).

- For American eel fillet samples, Aroclor 1254 and Aroclor 1262 were detected in the majority of samples from all three reaches, while Aroclor 1248 was detected in one-third to one-half of the samples (Table 2-6).

- Within oyster toadfish fillet samples, Aroclor 1262 was detected in samples from all three reaches, but detections were infrequent (Table 2-7).

- For white perch fillet samples, Aroclor 1248, Aroclor 1254 and Aroclor 1262 were detected in all samples from adjacent and south reaches (Table 2-8). Since fillet samples were not analyzed from fish harvested from the north reach, fillet concentrations for the north reach were calculated from whole body data using regression analysis, as presented in Appendix A.

- Within blue crab leg samples, Aroclor 1262 was detected in samples from all three reaches, but detections were infrequent (Table 2-9). Within Hepatopancreas samples, Aroclor 1262 was detected frequently in samples from all three reaches, whereas Aroclor 1248 and Aroclor 1254 were detected infrequently.

As described in Section 3, these species were targeted for collection due to their abundance, trophic level, and non-migratory status.

3. Exposure Assessment

The exposure assessment is conducted to evaluate the human populations that may potentially use or access the Site under the current and possible future land use conditions, the mechanisms or exposure pathways by which people may be potentially exposed to PCBs at the Site, and the magnitude of exposure that may occur through the potential exposure pathways. This process involves three steps:

- Characterization of the exposure setting in terms of physical characteristics, current and future uses of the Site, and the populations that may be potentially exposed to PCBs under the current and possible future land uses;
- Identification of potential exposure pathways and exposure points to which the populations may be exposed; and
- Quantification of exposure for each population from all exposure pathways. Exposures are quantified by developing receptor exposure scenarios, identifying EPCs, and then calculating chemical intakes.

These components are provided in the sections below.

3.1 CHARACTERIZATION OF THE EXPOSURE SETTING

The 28-acre Site is approximately 2500-feet long on the eastern bank of the Hudson River in the town of Hastings-On-Hudson, New York. The Site contains one permanent 100,000-square foot structure, a 130-foot tall, nonfunctional water tower, and three temporary trailers. Previous and future demolitions are required to prepare the Site for remediation. The proposed remedial action allows for restricted-residential use (which allows for residential, commercial, and/or industrial use but includes restrictions which prohibit single family housing and vegetable gardens) as described in NYSDEC 6 NYCRR Part 375-1.8(g). In addition, remedial action includes mitigation for construction required within the river which is expected to create habitat. Future development of the site has not been determined, but could include residential (e.g., condominiums or town houses), commercial (retail), or mixed residential/commercial uses.

The Site is located at river mile (RM) 21, approximately five miles south (downstream) of the Tappan Zee Bridge. At the location of the Site, the lower Hudson River is wide (approximately 1 mile bank to bank) and deep (approximately 50 feet in the shipping channel) and is primarily used as a navigational/shipping lane. The OU-2 Study Area extends approximately 400 feet from the shoreline, or about 1/12th of the way across the river. Within the OU-2 Study Area, the depth to the river bottom descends quickly with distance from the shore, reaching 50 feet in depth approximately 200 feet from the shoreline.

The lower Hudson River in the vicinity of the Site is tidal; the river water is a mix of fresh water flowing from the upper Hudson River and marine water carried upstream with incoming tides. As such, the lower Hudson River supports fish species that can tolerate fluctuations in salinity, such as striped bass, bluefish, catfish, white perch, and shad.

Recreational boats (e.g., kayaking, motorboats) have been observed in the vicinity of the Site. However, no direct river access is available at the Site. Some private facilities (e.g., yacht clubs) are located nearby, but the nearest public boat launches are MacEachron Park in Hastings-On-Hudson, Piermont Pier (4 miles upriver), and JFK Park (2 miles downriver). Future development plans for the Site may include construction of an elevated fairway along the river and a boat launch. These attributes could increase the accessibility to the river near the Site.

Hastings-On-Hudson is primarily a residential community of 7,975 people (US Census 2014 estimate). The community is considered to be 'affluent', with only 3.9% of the population below the poverty line (compared to 15.3% for New York State), and 'highly educated' with 68% of adults (25+) having a Bachelor's degree or higher (2009-2013 American Community Survey 5-Year Estimates). Water and Sanitary are provided to the town and the Site by United Water and Westchester County, respectively.

Based on the future land uses of the Site and surrounding area, the following populations could be present at and in the near vicinity of the Site:

- Commercial (retail) workers and patrons
- Service industry workers (landscape, maintenance, delivery)
- Construction workers
- Residents and visitors
- Recreational anglers
- Recreational boaters

3.2 IDENTIFICATION OF EXPOSURE PATHWAYS

An exposure pathway describes the course a chemical takes from the source to the exposed individual (receptor). Exposure pathway analysis links the sources, locations, and types of environmental releases with population locations and activity patterns to determine the significant pathways of human exposure. Exposure pathways generally consist of four elements (USEPA, 1989):

- a source and mechanism of chemical release,
- a retention or transport medium,
- a point of potential human contact with the contaminated medium (known as the exposure point), and
- an exposure route at the contact point (e.g., ingestion of soil).

In order for the exposure pathway to be considered potentially complete, all four elements must be present. Elimination of exposure pathways may occur based on Site-specific conditions, for example if the probability of exposure occurring is low or if the impact of the exposure pathway is expected to be minor in comparison to other exposure pathways (USEPA, 1989). Exposure pathways may also be made incomplete through use of institutional or engineering controls, for example by applying deed restrictions which prevent certain property uses from occurring, or requiring that a ground cover (such as a soil cap or concrete) remain in place.

The conceptual site model (CSM) is used to link sources to exposure media and therefore forms the basis for identifying potentially complete exposure pathways. The following subsections provide a description of the CSM for this Site, concluding with identification of potentially complete exposure pathways. Table 3-1 provides a summary of the CSM.

3.2.1 Sources

The source of PCBs at the Site is related to past manufacturing of electrical cables which used PCBs in the cable insulation. These activities occurred during and after World War II. Releases of PCBs were believed to primarily involve management of the insulation resin in its liquid phase in the vicinity of Building 52. Although the primary source of PCBs no longer exists, NAPL that contains PCBs remains in the Northwest Corner of the OU-1 portion of the Site. Through various mechanisms that may have included disposal of PCB-containing resin, erosion of PCB-contaminated soil and storm water runoff, PCBs migrated to and were sequestered in river sediments.

PCBs are recognized for their resistance to degradation under natural conditions, and therefore can be retained in environmental media decades after initial release. The residual sources of PCBs at the Site include NAPL, soil, and river sediment.

3.2.2 Migration Pathways

Conceptually, chemicals that are contained in NAPL or soil can partition to, and dissolve in, water that contacts those media, including precipitation that infiltrates through the vadose zone and groundwater. Once dissolved in groundwater, constituents can migrate with groundwater flow and discharge to surface water bodies through the sediment via pore water. From pore water, constituents can adsorb and desorb to sediment, or dilute into surface water. The top six inches of sediment was confirmed by the SPI analysis (performed as part of the BSAP) to be the biotic zone in deep water sediments. Benthic invertebrates living in the biotic zone of sediment are continuously exposed to pore water, and as such they can be exposed to, and bio-accumulate constituents in pore water. Similarly, aquatic vegetation can uptake constituents in sediment and sediment pore water. Fish that feed on benthic invertebrates or aquatic vegetation can, in turn, be exposed to bio-accumulating constituents in those food sources. Higher trophic level organisms, such as piscivorous birds and mammals and people who consume fish, can also be exposed to constituents that have bio-accumulated in the fish.

While the lipophilic nature of PCBs makes them amendable to bio-accumulating in the food chain, the high binding capacity of PCBs to organic carbon and low solubility of PCBs, suggest that partitioning of PCBs from NAPL or soil to water, and migration with groundwater flow, would be limited. A review of the analytical data for groundwater at the Site indicates that only Aroclor 1260 was detected in groundwater, at concentrations less than 0.1 ug/L. This suggests that groundwater is not a significant source medium for migration of PCBs.

PCBs were detected infrequently in pore water and river surface water, with maximum total PCB concentrations in each of these media less than 0.03 ug/L. Since neither surface water nor pore water samples were filtered, it is possible at the PCB detections in these samples are an artifact of suspended solids in the water samples. Regardless, the results indicate that PCBs are not readily partitioning from sediment to pore water or discharging to the river through groundwater migration. Furthermore, bulk sediment PCB area-weighted concentrations in the top six inches of river bottom sediment, as well as sediments in the 0.5 - 2 ft. bgs zone, are below one mg/kg (Figure 2-5). A finding of low bulk sediment PCB concentrations in the biotic zone helps support the lack of PCB detections in pore water, and since both of these findings are applicable to the zone of sediment where benthic organisms live, these findings collectively support a conclusion that benthic organisms are unlikely to have substantial PCB tissue burdens.

The areas with relatively low bulk sediment PCB concentrations are in a depositional environment, meaning that although sediment from upriver is constantly being deposited and removed from these areas, there is a net gain (deposition) of sediment. Over time, sediment deposition will continue, further covering and reducing PCB concentrations in the upper zone of sediment. Areas of elevated PCB concentrations in the top six inches of sediment are isolated to small areas in the shallow water sediments and an area of deep water sediments in the Deepwater Northwest Area (Figure 2-5). This area is recognized as a scour area, meaning that there is a net removal of sediment with river flow.

Hypothetically, sediment present in high energy reaches subject to scouring could be mobilized, transported downriver, and deposited in shallow areas where contact is possible. The existing conditions in the OU-2 study area suggest that this scenario is not occurring, as the deep water portion of OU-2 that is immediately downriver of the scour area is a depositional environment, and PCB concentrations in that area are in the 0.5 to 1 mg/kg range.

Analytical results for fish and crab indicate that PCBs were detected in whole body and fillet samples in all species sampled as part of the BSAP. However, the following lines of evidence suggest that uptake pathways may not be significant at OU-2. Specifically:

- PCB concentrations in the bioactive zone (i.e., surficial sediment in the top six inches) across the majority of OU-2 are consistent with up-river ambient concentrations (approximately 1 mg/kg or less, as documented in Volume 2), indicating that there is no significant source of PCBs within the sediment horizon inhabited by benthic invertebrates. The exception to this is in the Deepwater Northwest Area, where a portion of surficial sediment contains PCBs at concentrations in excess of ambient background;

- PCBs were detected very infrequently in pore water, which is the principal mechanism by which PCBs would be transferred from sediment to benthic organisms, suggesting that food sources for fish are not contaminated with PCBs;

- PCBs were detected very infrequently in surface water, thereby eliminating direct exposure to surface water as a mechanism for PCB uptake into fish;

- There is no aquatic vegetation at the OU-2 study area, thereby eliminating uptake of PCBs to biota via consumption of aquatic vegetation.

It is possible that PCBs could be present in pore water or surface water at concentrations that are less than the reporting limit of 0.01 ug/L; such concentrations could still be a bioaccumulation concern given that the aquatic life criteria protective for bioaccumulation (and subsequent human consumption) is 0.000064 ug/L. In such a case, it is possible that the migration pathway from sediment to pore water to organism could be complete, albeit likely not significant. This pathway is addressed here through consideration of fish and shellfish consumption under current biota concentrations.

It is also possible that areas of elevated PCB concentrations in the top six inches of sediment contribute to PCB loads in the food chain. However, spatial analysis of PCB concentrations in biota samples did not reveal any correlation between location of catch and location of elevated PCB concentrations in the top six inches of sediment. In addition, pore water samples were generally non-detect for PCBs.

To help place perspective on the PCB concentrations detected in biota, samples of each species were collected at locations downriver (North Area) and upriver (South Area) of the Site. Statistical evaluation of the analytical data among those three areas indicates that, for most species, there are no statistically significant differences between PCB concentrations in samples collected adjacent to the Site and PCB concentrations in fish collected in the North Area (upriver) of the Site, as summarized in the following table:

Summary of Statistical Evaluation of Biota Data

	American Eel		Oyster Toadfish		White Perch		Blue Crab	
	Fillet	Whole body	Fillet	Whole body	Fillet	Whole body	Hepato-pancreas	Leg
2013 Versus 2014	×	×	NA	✓	NA	✓	✓	×
Adjacent Versus North (upriver)	✓	✓	×	×	×	✓	✓	×

× - No Statistically Significant Difference ($p<0.05$)
✓ - Statistically Significant Difference ($p<0.05$)
NA – Not Applicable (no fillet samples collected in one of the two years)

Figures 3-1 through 3-4 present comparisons of these statistical evaluations, and the following bullets summarize the information:

- PCBs were detected infrequently and at low concentrations in crab legs and oyster toadfish fillets.

- There were no statistically significant differences between PCBs concentrations in biota caught adjacent to, upriver (North), or downriver of the Site for the following:
  - Crab legs
  - Oyster toadfish fillets
  - Oyster toadfish whole bodies
  - White perch fillets

- PCB concentrations in biota caught adjacent to the Site were statistically higher than in organisms caught upriver or downriver of the Site for the following:
  - White perch whole bodies
  - American eel fillets
  - American eel whole bodies
  - Crab Hepatopancreas

- Only Aroclor 1262 was detected in tissue samples from crabs and oyster toadfish, whereas Aroclor 1262, Aroclor 1254, and Aroclor 1248 were detected in white perch and American eels. PCBs in surficial sediment within the OU-2 study area are predominantly Aroclor 1248 and Aroclor 1262. Therefore, the presence of Aroclor 1254 in tissue samples does not appear to have any relationship to the OU-2 Study Area.

- No correlations were detected between tissue concentrations, location of organism capture, or bulk sediment concentration.

Overall, the tissue data suggest that PCB concentrations in biota collected at locations adjacent to the Site are not statistically significantly different from PCB concentrations in biota collected at locations in the North Area (up-river) or South Area (down-river) of the Site. These findings corroborate the sediment, pore water, and surface water analytical results, which suggest that there is not a significant sediment-to-biota migration pathway for PCBs at the OU-2 study area. Furthermore, the findings corroborate with the conclusions of the Baseline Data Summary Report (H&A, 2015), which showed that calculated sediment to fish PCB bioaccumulation factors were lower in the reach of the river adjacent to the Site than in the reach of the river south or north of the Site. The BSAP suggested that one reason for this may be due to the fact that total organic carbon levels were, on average, higher in sediments adjacent to the site than the average levels observed north and south of the site, but that in any event the findings are an indication that the site may not be a significant variable in terms of sediment contributing PCBs to the body burden of fish inhabiting the adjacent reach.

3.2.3 Potential Exposure Pathways

An analysis of exposure pathway completeness is presented below. This analysis is based on the preceding discussion concerning sources and migration pathways for PCBs at the Site, and in consideration of future uses of the Site and the remediation that will be performed pursuant to the requirements of the ROD.

- Direct Contact with Soil: Direct contact can occur through two exposure routes: dermal absorption and incidental ingestion. Dermal absorption can occur when skin contacts soil, the soil adheres to the skin, and substances in the soil are absorbed through the skin. Incidental ingestion can occur when soil that adheres to the skin is transferred to the mouth during hand-mouth contact. Direct contact with residual PCBs in soil will be an incomplete exposure pathway because the cover system will isolate PCBs and an SMP will be in place. These attributes will prevent direct contact with soil containing residual PCBs.

- Inhalation of Dust from Soil: Dust can be liberated from soil that is un-vegetated or not covered with hardscape, and during soil excavation activities. The soil cover system at the Site will prevent soil containing residual PCBs from becoming exposed, and unmanaged excavation activities into soil beneath the cover system will not be permitted (SMP will be in place). Therefore, inhalation of PCBs in soil-derived dust is not a complete pathway at the Site.

- Inhalation of Vapors from Soil: Vapors can be released from soil that contains volatile chemicals; vapors can migrate into ambient (outdoor) air during soil excavation activities, or to indoor air if buildings are constructed over the sources of volatile chemicals (this pathway is referred to as vapor intrusion). PCBs are generally considered to have negligible volatility. For example, the USEPA regional screening values for residential soil are developed by integrating cleanup levels for ingestion (0.35 mg/kg), dermal contact (0.88 mg/kg), and inhalation (4.1 mg/kg) to derive a cleanup level for all pathways of 0.23 mg/kg (USEPA 2015). This indicates the inhalation pathway is relatively insignificant. Furthermore, PCBs will be reduced to concentrations of 10 mg/kg or less in all soil at the Site within the top 9 to 12 feet and an SMP will be in place. Therefore, vapor intrusion from residual PCBs in soil is not a complete pathway at the Site.

- Direct Contact / Inhalation of Vapors from Groundwater: Exposure to groundwater can occur if groundwater is used as a source of drinking water, if excavation activities are advanced into the groundwater table (resulting in direct contact with groundwater), or through vapor intrusion of volatile substances in groundwater. Groundwater beneath the Site is not used as a source of potable water, and it will not be used as a source of potable water in the future because public drinking water is supplied to the Site and surrounding area and institutional controls will be in place. As described above, excavation activities beneath the soil cover system will not be permitted, and PCBs are not associated with enough volatility to pose a potential vapor intrusion concern. Therefore, there are no complete exposure pathways to groundwater.

- Direct Contact with Surface Water: Exposure to surface water can occur during recreational swimming and boating. PCBs were detected infrequently in surface water, and at maximum concentrations less than the federal drinking water standard of 0.0005 mg/L which is protective for drinking the water and bathing in the water therefore, any potential exposure pathways to PCBs in surface water would be less than levels considered safe for drinking water. In addition, remediation of soil and construction of the migration barrier will ensure that soil, non-aqueous phase liquids (NAPL), and groundwater will not become sources to surface water in the future.

- Direct Contact with Sediment: Direct contact with sediment can occur if people wade or swim in shallow water. Under such conditions, dermal absorption can occur to body parts such as feet that are immersed in sediment, and incidental ingestion can occur if hands that are covered with sediment contact the mouth, or if sediment becomes entrained in surface water and is then swallowed with incidental surface water ingestion. Direct contact exposure pathways to sediment are incomplete or insignificant for the following reasons:

  - Surface sediments are generally at background conditions or access is restricted.
  - Under future conditions, sediment that is beneath 15 feet or less of surface water (i.e., shallow water sediment) will be remediated such that no PCBs will exceed 1 mg/kg within surficial sediment. In addition, Nearshore Area sediments will be covered with stone armor. Collectively, these remedial activities will render exposure pathways to shallow water sediment incomplete or insignificant, as well as reduce the PCBs that are potentially available for uptake by biota to levels consistent with background.
  - Sediment that is beneath more than 15 feet of water (i.e., deep water sediment) cannot be contacted due to the depth of the water.

- Ingestion of Fish: Although no recreational or commercial fishing is known to occur at the Site, recreational angling occurs throughout the lower Hudson River. Exposures to PCBs can occur if people catch and eat fish which have accumulated PCBs in their edible tissues.

The remediation that will be performed (as described above) essentially renders all exposure pathways incomplete, except for fish ingestion. Therefore, the HHRA focused on quantifying potential exposures and risks associated with consumption of fish during recreational angling. This exposure pathway is the only exposure pathway associated with the Site that is potentially complete or potentially significant. Therefore, subsequent sections of this HHRA focus on quantifying potential exposures and risks associated with consumption of fish during recreational angling.

3.3 QUANTIFICATION OF EXPOSURE

Exposures to PCBs at the Site are quantified by calculating intakes for representative receptor populations that may engage in recreational angling and consume fish caught from the OU-2 study area. Fish ingestion intakes are influenced by:

- the types of fish that people catch and eat in the vicinity of the Site;
- the amount of fish that people eat that are caught in the vicinity of Site;
- fish trimming and cooking methods; and
- the PCB concentrations in fish that could be caught at the Site

These variables are collectively used to define exposure scenarios that relate recreational angling activity to numerical exposure parameters that can be used to quantify exposure. Those parameters are then used with exposure point concentrations (EPCs) of PCBs in fish to which recreational anglers may be exposed to derive intake. Fundamentally, intake is thus a function of EPC and exposure parameters:

Intake = (EPC) x (Exposure Parameters)

The following subsections describe the factors that were used to develop exposure scenarios and calculate EPCs.

3.3.1 Angling in the Lower Hudson River

Several surveys have been conducted to characterize angling in the lower Hudson River and other water bodies in the State (NYSDEC, 2005; 2007; 2009; USFWS, 2011). The studies are summarized below:

- The *2003 Assessment of Hudson River Recreational Fisheries* (2003 Creel Survey; NYSDEC, 2003) used aircraft counts of shoreline anglers and fishing boats, combined with angler interviews from selected fishing access locations to quantify the species of fish that anglers were catching, the percent of catch harvested, types of water bodies targeted, and the effort spent angling. The 2003 survey divided the span of the Hudson River in New York into three river sections, and provided statistics by river section. River section 1 covered the lower Hudson River. This survey also provided information on effort expended by type of angling (boat versus shoreline) and location.

- The NYSDEC (2007) *Assessment of Spring 2005 Hudson River Recreational Fisheries* (2005 Creel Survey; NYSDEC, 2007) used the same methods as the 2003 NYSDEC survey discussed above to quantify the species of fish anglers were catching, the percent of catch harvested, types of water bodies that anglers were targeting, and the effort spent angling. This survey also provided information on effort expended by type of angling (boat versus shoreline) and location.

- In the *2007 New York Statewide Angler Survey* (NYSDEC, 2009), NYSDEC conducted a statewide angler survey by mail to quantify the species of fish and types of water bodies that anglers were targeting and the preferences and attitudes of anglers. Responses were grouped by NYSDEC regions.

- The 2011 United States Fish & Wildlife Service (USFWS) survey (USFSW, 2011) is a national survey of fishing, hunting, and wildlife-related recreation and includes data on the number of participants in these activities, how often they participate, and their participation expenditures.

The survey was conducted by the U.S. Census Bureau by interviewing a sample of households to identify household anglers, hunters, and wildlife watchers. Follow up interviews were conducted with likely participants in fishing, hunting, and wildlife watching based on the survey responses.

3.3.1.1 Target Species, Species Harvested, and Species at the OU-2 Study Area

Table 3-2 provides a summary of species targeted by anglers in New York State, DEC Region 3 (Hastings-On-Hudson is located in the southern-most portion of DEC Region 3), and the lower Hudson River. As indicated in Table 3-2, while anglers in New York State and Region 3 target trout and small mouth bass primarily, and numerous other species to a lesser extent, most anglers who fish in the lower Hudson River target only striped bass, small mouth bass, and shad. Although anglers in the lower Hudson River target only a few species, creel surveys indicate that anglers actually catch and keep a range of species that include not only striped bass, but also white perch, carp, bluefish, shad, bullhead, eel, bluegill, yellow perch, and blue crab (Table 3-2).

Table 3-2 compares species harvested (i.e., fish that were kept either for consumption or for use as bait) by anglers in the lower Hudson River to species observed near the Site and those harvested as part of the BSAP. As indicated in Table 3-2, all of the species that are harvested by anglers in the lower Hudson River, except yellow perch, bluegill, and carp were observed near the Site. However, only white perch, American eel, and blue crab were harvested as part of the BSAP program. Specifically:

- Striped bass and bluefish are migratory. They travel from the ocean, up-river, to spawn. Therefore, their occurrence near the Site would be transient and any PCB body burdens carried by those species would be attributable to multiple sources within the Hudson River and along the East Coast.

- Species such as bullhead occurred infrequently near the Site, likely due to habitat preferences relative to availability. Anglers who target bullhead would not likely fish from the Site due to poor return on angling effort. The lack of aquatic vegetation in the vicinity of the Site limits the species that occur there.

- American eel, blue crab, white perch, and oyster toadfish were found in sufficient numbers in the vicinity of the Site to support their quantitative evaluation in the HHRA. These species tend to have limited home ranges and their feeding preferences (benthic invertebrates), suggest that if uptake of PCBs from sources at the Site could occur, these species would be more likely to exhibit such uptake. Consequently, these species were submitted for analysis of PCBs.

3.3.1.2 Angling Effort

Angling effort refers to the investment of time by anglers required to catch fish. Effort varies between the time required to catch a fish of any species, a fish of a target species, and a fish that is large enough to harvest for the purpose of consuming it (either target species or any species). It requires less time to simply catch a fish of any species, and more time to catch a fish of a specific target species that is large enough to be eaten.

The 2003 NYSDEC Creel Survey characterized the reasons that people fish in the lower Hudson River. The survey found that reasons varied slightly by type of target species, with the primary purpose across

target species being recreation (80%); only 20% of respondents reported fishing with the intention of harvesting the fish for consumption. The species primarily targeted for harvesting as food were blue crab, bluefish, common carp, catfish, striped bass, and 'other species', which includes white perch and American eel. Of these species, carp and striped bass were primarily harvested from boat fishing, while blue crab, blue fish, and 'other species,' including white perch and American eel, were primarily harvested from shoreline fishing. Oyster Toadfish is not among the 'other species' that the creel surveys identified as being targeted by anglers. It is recognized, however, that Oyster Toadfish can be consumed. Total PCB concentrations in Oyster Toadfish fillet were generally non-detect. Therefore, the risks characterized for consumption of other fish (e.g., white perch) are conservatively protective for potential consumption of Oyster Toadfish.

Collectively, this information indicates that the type of angling in the lower Hudson River is recreational, and not subsistence. Subsistence angling is particularly unlikely near the Site, as there are no known ethnic subpopulations living near the Site that would be more likely to engage in subsistence fishing[1], and the limited number of fish species in the vicinity of the Site would not readily support subsistence fishing.

3.3.1.3 Conclusions

Based on the angling survey data and BSAP investigation results, white perch, American eel, and blue crab are the only species that:

- lower Hudson River anglers are known to harvest;
- occur at the Site at sufficient enough population to allow for angling with a reasonable level of effort; and
- potentially exhibit a Site-related uptake of PCBs due to their home range.

Furthermore, the angling survey data indicate that these species would primarily be harvested by shoreline anglers, as opposed to boat anglers.

3.3.2 Recreational Angling Exposure Scenarios

Exposure scenarios are used to quantitatively describe the exposures to PCBs that could theoretically occur from ingestion of fish and shellfish caught at the Site. The exposure scenarios are used in conjunction with EPCs to derive quantitative estimates of intake. The ultimate goal of developing exposure scenarios, as defined in USEPA guidance, is to identify the combination of exposure parameters that results in the most intense level of exposure that may "reasonably" be expected to occur under the current and future Site conditions, referred to as the 'reasonable maximum exposure' (RME) (USEPA, 1989). As such, a single exposure scenario is often selected to provide a conservative evaluation for the range of possible receptors and populations that could be exposed at the Site under a given land use.

Based on the information presented in subsection 3.3.1, two types of recreational angling exposure scenarios are evaluated in this HHRA: recreational fishing, and recreational crabbing. The recreational

[1] 2010 US Census data indicate that for Hastings-On-Hudson, only 0.2% of the population is of Native Alaskan or American Indian decent compared to 0.6% for NY State average, and only 0.8% of the population is of southeast Asian decent compared to 1.25% for NY State average.

fishing scenario is intended to model potential exposures to PCBs that may result from consuming white perch and American eel caught at the OU-2 Study Area during recreational shore-line angling. The recreational crabbing scenario is intended to model potential exposures to PCBs that may result from consuming blue crab caught at the OU-2 Study Area, during recreational crabbing. Angling for fish and crabs is evaluated separately because crabbing requires a different fishing method; those who engage in crabbing would do so with a more deliberate intent and investment of effort than those who casually fish from shore. Although boat anglers who happen to pass through the Study Area may catch fish, those anglers would also catch fish from numerous other locations in the lower Hudson River, indicating that the percentage of fish in their diets that may have Study Area-related PCBs would be small. In contrast, a shore-line angler who is assumed to repeatedly fish at the Study Area would have a higher percentage of fish in their diets that may have Study Area-related PCBs.

The key elements of developing exposure scenarios involve defining the receptor population in terms of ages, body weights, and years of exposure, and defining the fish and shellfish ingestion rates. These elements are described below.

3.3.2.1 Receptor Population

Data from the *1998 Survey of Hudson River Anglers and an Estimate of Their Exposure to PCBs* (ATSDR, 1998) shows that more than 87% of the angling populations are adults (ages 24 and older). Therefore, the recreational angler is defined in this HHRA as an adult who lives at or near the Site (in the future) and engages in recreational crabbing or shoreline angling. However, ATSDR (1998) also shows that 35% of anglers brought fish home to serve to others in the household. Therefore, for purposes of defining the population that may be potentially exposed to PCBs through consumption of recreationally-caught fish, the HHRA assumes that children, adolescents, and adults consume fish caught from the OU-2 study area by an adult who brings the catch home to the family (although children and adolescents are also recognized as being part of the angling population, more experienced adult anglers are more likely to be successful in catching fish which could then be kept for consumption) .

Exposure duration is evaluated as a function of how long people live in a single residence. USEPA guidance indicates that 90th percentile tenure at a single place of residence is 26 years (USEPA, 2014a). Furthermore, USEPA guidance indicates that risk assessments should incorporate an assumption that the 26-years of residency at a single location occurs during from birth to age 26, and therefore incorporates stages of life that include young children (ages 1 to 6), older children/adolescents (ages 6 to 18), and adults (ages 18 to 26). Therefore, the recreational angler is defined as a composite receptor that includes:

- Young children (ages <6), weighing an average of 15 kg (USEPA, 2014a), who consume recreationally-caught fish over a six-year period;
- Older children/adolescents (ages 6 - <18), weighing an average of 50 kg (USEPA, 2011), who consume recreationally-caught fish over a twelve-year period;
- Adults (>18), weighing an average of 80 kg (USEPA, 2014a), who consume recreationally-caught fish over an eight-year period.

3.3.2.2 Fish Ingestion Rate

The fish ingestion rate represents the amount of fish and shellfish that is consumed by recreational anglers and crabbers, respectively. Numerous studies have been conducted using a variety of methods to attempt to quantify the amount of fish and shellfish that is consumed by various populations. Ingestion rates have been published for four general types of fish consumption (USEPA, 2011):

- Per capita fish ingestion
- Freshwater recreational angling fish ingestion
- Marine recreational angling fish ingestion
- Native American and subsistence fish ingestion

This HHRA focuses on potential exposures and risks associated with consumption of fish and shellfish caught at the OU-2 study area during recreational angling activities. Therefore, fish ingestion rates used in this HHRA should represent the amount of fish that recreational anglers would potentially eat from their catch at the OU-2 study area. Per capita fish ingestion rates consider the entire population, not just those who consume fish, as well as fish from all sources (e.g., grocery store and restaurants) and are therefore not applicable for consideration in this HHRA. Similarly, the receptor population evaluated in this HHRA is recreational anglers, so ingestion rates for Native American and subsistence populations are not applicable. Although the aquatic environment in the lower Hudson River is brackish, the recreational angling activities and methods used in the lower Hudson River are more closely aligned with freshwater angling. Therefore, ingestion rates applicable to freshwater recreational anglers who consume their catch are applicable to this HHRA.

Table 3-3 provides a summary of freshwater recreational angling fish ingestion rates from several state studies that were summarized by USEPA in the *Exposure Factors Handbook* (USEPA, 2011), as well as fish ingestion rates used in two other high profile fish ingestion HHRAs, the *Revised Upper Hudson River HHRA* (TAMS/Gradient, 2000) and the *Lower Passaic River HHRA* (Battelle, 2007). The values presented in Table 3-3 include average (generally, 50th percentile) and upper-bound (generally 90th or 95th percentile) ingestion rates derived from the various studies.

The values in Table 3-3 are presented in grams per day, but were ultimately derived from studies that considered number of recreationally-caught fish meals per year that were consumed. For use in the HHRA, those values were normalized to daily ingestion rates. The daily ingestion rates are therefore intended to be used with an exposure frequency of 365 days per year to derive total intake of recreationally-caught fish per year.

To help put the values in Table 3-3 into perspective, fish ingestion rate values from the *1991 New York State Angler Survey* (Connelly, 1992) are presented below. These values, derived from a study of New York recreational anglers, demonstrate how the number of recreationally-caught meals per year correlates to daily ingestion rates.

Summary of Fish Ingestion Rates Derived in 1991 NY Angler Survey

Percentile	Ingestion Rate	
	meals/year	g/day
10	1	0.62
20	2	1.2
30	3	1.9
40	5	3.1
50	6.4	4.0
60	10	6.2
70	15	9.3
80	28	17.4
90	51	31.9
95	102	63.4
98	292	182
99	393	244
Arithmetic Mean	28	17.3

As shown in this table, the 50th and 90th percentile ingestion rates shown in Table 3-3 are based on 6.4 and 51 recreationally-caught 8-ounce fish meals per year, respectively. The ingestion rates derived by Connelly are based on data collected from nine species (bass, walleye, bullhead, carp, eel, yellow perch, salmon, trout, and catfish) and an "other" category. Consequently, those ingestion rates reflect recreational angling for the full range of target species that anglers in New York State target, as shown in Table 3-2.

As discussed previously and as shown in Table 3-2, none of the species targeted by anglers in the lower Hudson River occur at the OU-2 Study Area or, if they do, would only be transiently present and therefore not representative of potential Site-related PCB uptake. The only species that potentially exhibit a Site-related PCB uptake and are known to be taken by recreational anglers are white perch, American eel, and blue crab. To put the 50th and 90th percentile ingestion rates from the Connelly study into perspective relative to the ingestion of the three species that could potentially occur at the OU-2 Study Area, ingestion rates were derived as shown in Table 3-4 using:

- information from the 2003 and 2005 NYSDEC creel surveys concerning catch and harvest effort (success rates), and shoreline fish trip duration;
- fillet weights based on samples collected in the BSAP;
- number of recreational fishing trips per year.

The information derived in Table 3-4 is summarized below and represents the total meals per year and ingestion rate for combined catch (number of fish caught using on-shore angling methods) and harvest (number of fish that were caught and then kept (i.e., not returned to the water)) of white perch and American eel. The ingestion rate of 1.6 g/day likely represents the most realistic representation of potential ingestion of fish caught at the OU-2 Study Area because:

- it accounts for the effort required to catch white perch and American eel that are of a size that people would keep for the purpose of eating,

- it uses Site-specific weights of these species that are consistent with the size of fish that people harvest at OU-2, and

- it is based on what is likely a reasonable number of recreational angling days (16 per year; USFWS, 2011) for the population of recreational anglers that would more likely to fish at the OU-2 Study Area (i.e., casual recreational anglers).

Fishing trips per year	**16**	**35**	**70**
Meals per year - catch	4.1	9.1	18
Meals per year - harvest	2.5	5.6	11
Ingestion rate – catch (g/day)	2.6	5.6	11.3
Ingestion rate – harvest (g/day)	1.6	3.5	6.9

To provide perspective, the average number of recreational fishing trips per year (16 trips per year [USFWS, 2011]) represents a fishing frequency of about one day every other weekend during the fishing season (35 weeks of the year). Even assuming up to 2 recreational fishing trips per week, (70 recreational fishing trips year), or about four-times the average recreational fishing trip frequency, the harvest of these species would yield only 11 meals per year. The apparent low number of meals per total number of fishing trips is due to the relatively small size of white perch (the average length of a harvested white perch is 6.9 inches [NYSDEC, 2007]) and the small number of eels that are harvested. It is also apparent from this information that recreational angling for white perch and American eel at the OU-2 Study Area could not provide enough food to also feed other household members as is assumed in the exposure scenarios described above.

Collectively, consideration of Site-specific information indicates that ingestion rates which are based on a recreational angling frequency that is two-times the average trip frequency (i.e., 35 trips per year) are representative of Reasonable Maximum Exposure (RME) estimates. This range of ingestion rates (3.5 g/day based on harvesting to 5.6 g/day based on total catch) correlates well with the published ingestion rate of 4.0 g/day in the 1991 New York State Angler Survey (Connelly, 1992). Therefore, the published value of 4.0 g/day is used to provide a conservative RME ingestion rate for the recreational fishing scenario. However, to help bound the range of exposures that could hypothetically be associated with recreational angling; two additional ingestion rates are evaluated:

- An 'upper-bound' ingestion rate of 31.9 g/day representative of the 90th to 95th percentile ingestion rates provided in Table 3-3, to maintain consistency with upper-bound values that have been used in other baseline HHRAs. It should be noted, however, that the upper-bound ingestion rates, including the value of 31.9 g/day, are based on total consumption of all recreationally-caught fish. To put the 90th percentile value shown above into perspective, the New York State Creel Surveys (NYSDEC, 2003; 2007) indicate that the total combined fishing effort for boat and shoreline anglers for all species fished yields approximately 1.7 fish harvested for each fishing trip. Conservatively assuming that each fish could provide an 8-ounce meal, it would require 30 fishing trips – nearly one trip per week the entire fishing season – to yield 51 meals per year (i.e., correlated with an ingestion rate of 31.9 g/day). That is, an angler would need to exclusively fish at this single location, would keep all fish caught, and would not

share any fish caught with family members or others, in order to support this upper-bound fish ingestion rate.

- A central tendency (CT) value of 1.6 g/day based on the white perch and American eel harvest for an average number of annual fishing trips (16 trips per year).

Table 3-4 also presents ingestion rates for crabbing using the same approach described above for white perch and American eel, but accommodating a shorter crabbing season (14.5 weeks). As shown in Table 3-4, ingestion rates associated with recreational crabbing are 0.92 g/day for recreational crabbing associated with 1 trip per week, 1 g/day for 16 trips/year and 1.8 g/day for 2 trips/per week. The crab ingestion rate associated with 16 trips/year was used for the RME scenario, the ingestion rate associated with 2 trips/week was used for the upper-bound scenario, and the ingestion rate associated with 1 trip/week was used for the CT scenario, consistent with how the fish ingestion rates were derived.

3.3.2.3 Fraction Ingested

The RME and CT ingestion rates incorporate the assumption that the entire recreational angling ingestion rate applies to white perch and American eel assumed to be caught at the OU-2 Study Area; i.e., the ingestion rates reflect reasonable assumptions about how much fish could potentially be harvested and consumed at the OU-2 Study Area. In contrast the upper-bound ingestion rate is based on the total annual dietary intake of recreationally-caught fish from all locations where an active angler may fish. Therefore, it is appropriate to account for the portion of recreationally-caught fish that are white perch and American eel when using the upper-bound ingestion rate. The fraction ingested term for the upper-bound scenario is therefore set at 39% (3% eel and 36% white perch, as shown in Table 3-2). This value still incorporates the assumption that *all* white perch and American eel that an angler would consume are harvested at OU-2. For the recreational crabbing scenario, it assumed that 100% of the crabs consumed would be caught at the OU-2 Study Area.

Tables 3-5 through 3-7 provide exposure parameters for the RME, upper-bound and CT recreational angling scenarios.

3.3.3 Exposure Point Concentration

The USEPA defines the EPC as the representative chemical concentration a receptor may contact in an exposure area over the exposure period (USEPA, 1989). EPCs are used with the receptor exposure parameters described in subsection 3.3.2 to calculate intakes. The key components of calculating EPCs for fish consumption include:

- Defining the concentration of PCBs in fish tissue
- Defining the tissue concentration loss of PCBs that occurs through trimming and cooking
- Accounting for dietary mix among various fish species

Each of these attributes is described below.

3.3.3.1 Fish Tissue Concentration

The typical concept of human exposure is that an individual contacts the contaminated medium on a periodic and random basis. Because of the repeated nature of such contact, the human exposure does

not really occur at a fixed point but rather at a variety of points with equal likelihood that any given point within the exposure area will be the contact location on any given day.

In the context of fish ingestion, these concepts apply to the fact that a person who catches and eats fish does not repeatedly eat the same fish, but rather eats a number of fish with varying PCB concentrations in their edible tissues, and possibly across a number of fishing locations, over multiple seasons and multiple years. Thus, exposure should be identified in consideration of the likelihood of a receptor eating any given fish (that is of an edible size) with equal probability, and the EPCs should be the arithmetic averages of the chemical concentrations within the exposure area. However, to account for uncertainty in estimating the arithmetic mean concentration, USEPA recommends that an upper confidence limit (UCL) on the mean be used to represent the EPC. In accordance with USEPA guidance (USEPA, 2002a), RME EPCs are based on the lesser of the 95 percent UCL on the arithmetic mean concentration (95% UCL value) or the maximum concentration in the data set. CT EPCs are based on the average concentrations.

As described previously, the tissue data sets used in the HHRA are for portions of the fish that are edible, including fillet, crab leg, and crab Hepatopancreas. The 95% UCL values for these tissue data sets are calculated using the ProUCL software (V. 5.0; USEPA, 2014b) and are presented in Tables 2-6 through 2-9. The ProUCL software performs a goodness-of-fit test that accounts for data sets without any non-detect observations, as well as data sets with non-detect observations. The software then determines the distribution of the data set for which the EPC is being derived (e.g., normal, lognormal, gamma, or non-discernable), and then calculates a conservative and stable 95 percent UCL value in accordance with the framework described in "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites" (USEPA, 2002a). The software includes numerous algorithms for calculating 95% UCL values, and provides a recommended UCL value based on the algorithm that is most applicable to the statistical nature of the data set. Documentation of the 95 UCL calculations is presented in Appendix B.

3.3.3.2 Cooking and Trimming Loss

Loss of PCBs due to trimming (e.g., scale removal, skin removal, and removal of visible fat) and cooking methods has been well documented in numerous studies, as shown in Table 3-8. The only cooking method that does not result in loss of PCBs is boiling. Since crab is typically boiled or steamed, no loss of PCBs is assumed from cooking or trimming in the recreational crabbing scenario. For the recreational angling scenario, the average cooking loss of 31% from the studies summarized in Table 3-8 is used.

3.3.3.3 Dietary Mix Considerations

Both the 2003 and 2005 NYSDEC Creel surveys demonstrate that eel is harvested far less than is white perch. Specifically, for every 8 ounces of eel harvested, 92 ounces of white perch are harvested. Therefore, it is appropriate to weight the EPC to account for the very different proportions of fish diet represented by these two species:

- Uncooked Fish EPC = [0.08 x eel fillet 95% UCL] + [0.92 x white perch fillet 95% UCL] and
- Cooked Fish EPC = Uncooked Fish EPC x [1-cooking and trimming loss]

While weighting by species is not necessary for the crabbing scenario (since it is assumed that only blue crabs are consumed), it is appropriate to weight the crab's EPC based on proportion of diet that is crab

leg and crab Hepatopancreas. Based on the average mass of the crab legs and the average mass of the crab Hepatopancreas samples collected in the BSAP program, 46% of the edible mass of the crab is legs, and 54% of the edible mass is Hepatopancreas Thus, the crab EPC is calculated as:

- Crab EPC = [0.54 x Hepatopancreas 95% UCL] + [0.46 x crab leg 95% UCL]

This approach to deriving EPCs for the crab incorporates the assumption that all people who eat crab also eat the Hepatopancreas. In reality, many people do not eat the Hepatopancreas.

3.3.4 Intake Equations

For the fish ingestion exposure routes, the general equation for calculating intake is as follows; specific algorithms and parameter values are provided in Appendix C:

$$Intake = \frac{EPC \times IR \times FI \times EF \times ED \times CF}{AT \times BW}$$

Where:

- Intake = Average daily intake of PCB during the period of exposure (mg/kg/day)
- EPC = Exposure Point Concentration (mg/kg)
- IR = Ingestion Rate of recreationally-caught fish or shellfish (g/day)
- FI = Fraction Ingested, representing dietary portion of fish or shellfish harvested from Site (unit less)
- EF = Exposure Frequency (days/year)
- ED = Exposure Duration (years)
- CF = Conversion Factor
- AT = Averaging Time (days) (equal to ED for non-cancer evaluation; equal to 70 years for cancer evaluation)
- BW = Body Weight (kg)

As described above, fish ingestion rates are normalized to daily values (g/day of fish or shellfish ingested) and are therefore intended to be used with an exposure frequency of 365 days per year. Consequently, the EF parameter for the exposure scenarios evaluated in this HHRA is automatically set to 365 days/yr. It is important to note that this exposure frequency does not reflect the number of days per year that angling occurs nor does it imply that people eat recreationally-caught fish each day.

Intake is calculated as an average daily intake or an average daily lifetime intake. The average daily intake represents the total intake that occurs over the period of exposure, divided by duration of exposure. This intake term is used to quantify intakes for evaluating non-carcinogenic effects. The average daily lifetime intake represents the total intake that occurs over the period of exposure, divided by the length of a lifetime (defined by USEPA as 70 years). This intake term is used to quantify intakes for evaluating carcinogenic effects.

The specific equations used to calculate intake and exposure are those presented in USEPA guidance (USEPA, 1989), and are provided in Appendix C.

4. Toxicity Assessment

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for particular constituents to cause adverse effects in exposed individuals; and to provide, where possible, an estimate of the relationship between the extent of exposure to a constituent and the increased likelihood of adverse effects (USEPA, 1989).

In accordance with USEPA guidance, hazard identification and dose-response evaluation are performed for non-carcinogenic health effects and carcinogenic health effects. Separate toxicity values are identified for each of these endpoints and risks are characterized separately for each of these endpoints.

4.1 NON-CANCER TOXICITY VALUES

Chronic reference dose (RfD) values are the non-carcinogenic toxicity values used in this HHRA for exposure periods lasting seven years or more. RfD values represent the dose that is associated with no observable adverse health effects for all populations (including sensitive subpopulations) and are derived from animal studies or human epidemiological studies. Chronic toxicity values were used for the recreational angling and crabbing scenarios because the total exposure is modeled over a 26-year exposure period.

4.2 CANCER TOXICITY VALUES

Cancer slope factor (CSF) values are the toxicity values used for compounds producing carcinogenic effects. Unlike RfD values, most CSF values are based on the assumption that there is no threshold dose for carcinogenicity; i.e., there is no dose at which there is no risk of developing cancer. CSF values are derived by USEPA using data obtained from animal studies or human epidemiological studies. The CSF value is considered to be a measure of the cancer-causing potential of a substance as a result of continuous exposure throughout a lifetime (assumed to be 70 years), and is defined as the 95 percent upper confidence limit of the slope of the dose-response curve extrapolated to low doses.

USEPA has developed carcinogen risk assessment guidelines (USEPA, 2005) that revise and replace the previous carcinogen risk assessment guidelines. However, the carcinogen risk assessments for many of the constituents listed in USEPA's IRIS database, including PCBs, still follow the classification system developed in the previous guidance (USEPA, 1999). The classification system in the previous guidance was developed according to the weight of evidence from epidemiologic and animal studies:

- Group A = Human Carcinogen (sufficient evidence of carcinogenicity in humans)
- Group B = Probable Human Carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 – sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)
- Group C = Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)
- Group D = Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)
- Group E = Evidence of Non-carcinogenicity for Humans (no evidence of carcinogenicity in adequate studies)

In the previous guidance, it was assumed that there is some finite level of risk associated with each non-zero dose. USEPA has developed computerized models that extrapolate dose-response relations observed at the relatively high doses used in animal studies to the low dose levels encountered by humans in environmental situations. The mathematical models developed by USEPA assume no threshold, and use both animal and human data (where available) to develop a potency estimate for a given constituent. The potency estimate for oral and dermal exposure, called a cancer slope factor (CSF) value is expressed in units of $(mg/kg\text{-}day)^{-1}$; the higher the CSF value, the greater the carcinogenic potential.

- Relative Absorption Factors: Relative absorption factors, which relate the amount of PCB absorbed from ingestion of fish at the Site to the amount of PCB that was absorbed during the toxicological studies that formed the basis of the toxicity values, were established at a value of one (reflecting an assumption that 100% of PCBs ingested will be absorbed through the gastro-intestinal tract), per USEPA guidance.

- Sources of Toxicity Values: USEPA-approved sources of toxicity values were reviewed to identify current toxicity values for the constituents, following USEPA's guidance regarding the hierarchy of sources of human health dose-response values in risk assessment (USEPA, 2003), as updated (USEPA, 2013). The sources include: 1) *IRIS* (USEPA, 2015), 2) *National Center for Environmental Assessment (NCEA) provisional peer reviewed toxicity values (PPRTVs)* (USEPA, 2014c)*, 3) California Environmental Protection Agency (CALEPA)* toxicity values (CALEPA, 2011 and 2014), and 4) *Agency for Toxic Substances and Disease Registry (ATSDR's) Minimal Risk Levels (MRLs)* (ATSDR, 2014).

USEPA publishes chronic RfD values for Aroclor 1016 and Aroclor 1254 in the IRIS data base; no chronic or subchronic RfD values are published for other Aroclors in the USEPA-approved sources listed above. The chronic RfD value for Aroclor 1254 is used as the RfD value for total PCBs in this HHRA. Although USEPA publishes a chronic RfD for Aroclor 1016, that value was not used in this HHRA because Aroclor 1016 was not detected, and the Aroclors that were detected have a higher chlorine content; it is expected that toxicological properties of PCBs with higher chlorine content would be more similar to Aroclor 1254 than to Aroclor 1016.

Although USEPA considers evidence of PCB-induced carcinogenicity in humans to be inadequate, USEPA identifies PCBs as a Group B2 probable human carcinogen, based on findings of statistically significant, dose-related increases in liver adenomas and carcinomas in laboratory rats exposed to Aroclor mixtures (USEPA, 2015). USEPA publishes cancer slope factor values for total PCBs. In accordance with guidance provided in the IRIS file for PCBs (USEPA, 2015); the upper-bound slope factor values for 'high risk and persistence' are used to quantify cancer risks for total PCBs in this HHRA because exposure routes include ingestion of food (i.e., fish and crabs). Toxicity values for PCBs are presented in Tables 4-1 and 4-2.

5. Risk Characterization

Risk characterization, including uncertainty analysis, is the final step in the risk assessment process. The risk characterization integrates the exposure and toxicity information generated in previous sections to qualitatively or quantitatively evaluate the potential health risks associated with exposure to PCBs at the Site. Risk estimates are then evaluated through a comparison to risk threshold criteria. Section 5.1 provides the methodology used to calculate risks. Section 5.2 provides the HHRA results. Section 5.3 provides an assessment of uncertainties in the HHRA.

5.1 RISK CHARACTERIZATION METHODS

Quantitative estimates of both carcinogenic and non-carcinogenic hazards are calculated for each exposure scenario selected for evaluation in the exposure assessment, in accordance with USEPA (1989) guidance. Cancer risks are calculated by multiplying the exposure route pathway-specific intake (e.g., ingestion of fish) by its exposure route-specific CSF value (e.g., oral CSF).

$$Intake\ (mg/kg/day) \times CSF\ (mg/kg/day)^{-1} = ELCR$$

The calculated value is an Excess Lifetime Cancer Risk (ELCR) and represents an upper bound of the probability of an individual developing cancer over a lifetime as the result of exposure to PCBs.

Non-cancer hazards associated with exposure to PCBs are calculated by dividing the exposure route pathway-specific intake (e.g., ingestion of fish) by its exposure route-specific RfD value.

$$Intake\ (mg/kg/day) / RfD\ (mg/kg/day) = HQ$$

The calculated value is a hazard quotient (HQ). Typically, chemical-specific HQs are summed across all exposure pathways to produce an HI value for the receptor scenario. However, since there is only one exposure pathway evaluated for each receptor scenario in this HHRA (i.e., ingestion of fish), the HQ derived for PCBs is also the HI value for the receptor. An HI value less than 1 indicates that non-carcinogenic toxic effects are unlikely to occur as a result of constituent exposure (in this case PCBs). HI values greater than one indicate a possible non-carcinogenic toxic effect. As the HI value increases, so does the likelihood that adverse effects might be associated with exposure. The text discussions in the Risk Characterization focus on HI values based on the child receptor because the HI values for the child receptor are equal to or higher than HI values for the adolescent and adult receptors.

5.2 RISK CHARACTERIZATION RESULTS

In the absence of specific risk management criteria specified in 761.61(c), the relative significance of the calculated risks is evaluated in terms of a comparison with acceptable risk levels established in the NCP (USEPA, 1990). In accordance with the NCP, cancer risk estimates for a site are compared to an ELCR range of 10^{-6} (one in a million) to 10^{-4} (one in ten-thousand). Non-cancer hazards are compared to an HI value of 1, which corresponds to levels of exposure that people (including sensitive individuals such as children) could experience without expected adverse effects. The results of the HHRA are used to make response action decisions.

USEPA (1991) guidance indicates that, "[w]here the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10(-4) and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted." USEPA (1991) also notes that, "[a] risk manager may also decide that a baseline risk level less than 10(-4) is unacceptable due to site specific reasons and that remedial action is warranted." In accordance with this guidance, the following criteria are typically used by USEPA to make response action decisions based on the results of the HHRA:

- A response action is not warranted when ELCR values are 10^{-6} or lower, and HI values are 1 or less;
- A response action is warranted when ELCR values are greater than 10^{-4} or HI values are greater than 1;
- The decision to require a response action when ELCR values are between 10^{-6} and 10^{-4} is to be made based on site-specific considerations.

A key consideration in determining whether risks require a response action, particularly when they are in a range of 10^{-6} to 10^{-4}, is the incremental risk that is in excess of the risk associated with reference conditions. Incremental risks represent the difference between risk for exposure to Site EPCs and risk for exposure to anthropogenic reference levels. An understanding of incremental risks is important for risk management decision making, because response actions generally are not required to address risks that are associated with ambient background conditions (i.e., cleanup of a site does not need to result in post-remedial conditions that are associated with lower constituent concentrations than ambient background levels) (USEPA, 2002b). This consideration is particularly relevant when total Site risks are contributed by constituents that are not solely attributable to Site releases. At the OU-2 Study Area, surficial sediment PCB concentrations across most of the area are currently similar to upriver sediment PCB concentrations, and fish tissue PCB concentrations for all species except American eel are similar between those harvested adjacent to the Site and those harvested upriver. This similarity in conditions adjacent to and upriver of the Site indicates that it is important to differentiate between risks that could be associated with the OU-2 Study Area and those associated with anthropogenic conditions in the river.

Therefore, this HHRA characterizes incremental risks by subtracting the risks associated with anthropogenic background conditions from risks associated with the Site media. In the context of the OU-2 Study Area 'anthropogenic background' is represented by the North area, which is upriver of OU-2. The risks for 'anthropogenic background' conditions are calculated using the biota EPCs for the North area (Tables 2-6 through 2-9) with the receptor exposure scenario parameters presented in Tables 3–5 through 3-7. Calculations are provided in Appendix D.

Based on this framework, the HHRA results are discussed in terms of cancer risks being less than or equal to an ELCR of 10^{-6}, within the range of 10^{-6} to 10^{-4}, or greater than 10^{-4}, and HI values are discussed in terms of being greater than or less than one. In addition, both cancer risks and noncancerous hazards for the Site are compared to those for the North area.

5.2.1 Central Tendency Exposure

- Recreational Angling: As shown in Table 5-1, estimated ELCR and HI values for the recreational fishing angler scenario are within USEPA's target risk range of 10^{-6} to 10^{-4} and at or less than the target HI value of 1 for both total Site risk (including background) and incremental risk.

- Recreational Crabbing: As shown in Table 5-1, estimated ELCR and HI values for the recreational crabbing angler scenario are at or less than USEPA's target risk range of 10^{-6} to 10^{-4} and less than the target HI value of 1 for both total Site risk (including background) and incremental risk..

5.2.2 Reasonable Maximum Exposure

- Recreational Angling: As shown in Table 5-2, the estimated ELCR for the recreational fishing angler scenario in terms of total Site risk (including background) as well as incremental risk is within the USEPA's target risk range of 10^{-6} to 10^{-4}. The HI value of 2 for total Site risk is greater than the target HI value of 1; however the incremental HI value of 0.5 is less than the target HI value of 1.

- Recreational Crabbing: As shown in Table 5-2, the estimated ELCR for the recreational crabbing angler scenario is within the target risk range of 10^{-6} to 10^{-4} for both total Site risk (including background) as well as incremental risk. The HI value is less than the target HI value of 1 for both total Site as well as incremental risk.

5.2.3 Upper-Bound Exposure

- Recreational Angling: As shown in Table 5-3, the theoretical upper bound ELCR for the recreational angler scenario in terms of total Site risk (including background) as well as incremental risk is within USEPA's target risk range of 10^{-6} to 10^{-4}. The theoretical upper bound HI value for total Site risk of 7.5 is greater than the target HI value of 1. However, the incremental HI value of 1 does not exceed the target HI value of 1.

- Recreational Crabbing: As shown in Table 5-3, the theoretical upper bound ELCR for the recreational crabbing angler scenario in terms of total Site risk (including background) as well as incremental risk is within USEPA's target risk range of 10^{-6} to 10^{-4}. The theoretical upper bound HI value for total Site risk of 1 is at the target of HI value of 1.

5.3 UNCERTAINTY ANALYSIS

This section identifies and discusses uncertainties in the HHRA. These uncertainties are identified in order to place the results of the HHRA in context or perspective and to understand the likelihood that risks may be either overestimated or underestimated. Unlike some other assessments, HHRAs rely not just on measured or certain facts, but also on assumptions and policy decisions, in the face of limited or nonexistent data. Risk assessments typically use highly conservative assumptions in the place of unavailable data, with the net result often being a substantial overestimation of potential risks. Consequently, the interpretation of risk assessment should be performed with the understanding that risk estimates are conservative values resulting from multiple layers of assumptions inherent in the risk assessment process, with the objective of erring on the side of overestimating risks, rather than underestimating risks, in the interest of protecting public health.

5.3.1 Inherent Sources of Uncertainty

Since the assumptions and other aspects of risk assessments are intended to be conservative, some degree of uncertainty is inherent to the process. Inherent sources of uncertainty typically relate to four areas:

- the Site characterization process;
- the exposure assessment;
- the toxicity assessment; and
- the risk characterization.

Inherent sources of uncertainty relating to the Site characterization process include:

- Field sampling location bias (sample locations were biased toward areas of highest contamination);
- Lack of consideration of source depletion, natural attenuation of constituents over time due to burial with cleaner sediments; and
- Limitations on the determination of background conditions.

Inherent sources of uncertainty relating to the exposure assessment include:

- Assumption that exposure scenarios and contact with affected media will occur;
- Selection of the 95% UCL of the mean, or the maximum concentration, for the exposure point concentration;
- Assumption of frequent, or routine exposure over prolonged durations;
- Use of default exposure values for physiological parameters such as body weight and lifetime expectancy.

Inherent sources of uncertainty relating to the toxicity analysis include:

- Use of published RfD and CSF values derived by standard USEPA methods;
- Assumption of 100% bioavailability of PCBs from tissue;
- Use of toxicity data based on Aroclor mixtures may over or underestimate risks for PCB congener mixtures in fish.

5.3.2 Site Specific Sources of Uncertainty

In addition to the uncertainties inherent in the risk assessment process, there are typically uncertainties associated with Site-specific information, constituents, or conditions. The following Site-specific sources of uncertainty apply to this HHRA:

Use of creel surveys to help select fish ingestion rates Creel surveys specific to the lower Hudson River, in combination with BSAP fish sampling data, were used in this HHRA to help identify fish ingestion rates that reflect the true nature of angling that may occur in the OU-2 Study Area. However, it should be recognized that anglers who catch and keep fish may under-report the number of fish that they keep, particularly if there are reasons that fish should not be kept, such as a fishing health advisory. Among the fish species evaluated in the BSAP, the following fishing regulations and health advisories apply for the portion of the Hudson River in the vicinity of the OU-2 Study Area:

- American eel: Daily limit of 25 fish, 9 – 14 inches in length, for use as bait only. Consumption of American eel is prohibited (NYSDEC, 2015). Given these regulations concerning American eel, it is possible that people may under-report the amount of eel that are harvested. However, the creel surveys did not differentiate among the specific reasons that eel would be harvested – e.g., for use as bait or for consumption. The HHRA used the percent harvest rate for eel and assumed that harvested eels would be eaten, rather than used for bait. Therefore, consumption of eel is likely overestimated in this HHRA.

- White perch: There is no limit on the number or size of fish that can be caught, as well as the length of the fishing season. However, there is a health advisory for consuming no more than 1 meal per month (NYSDOH, 2015). Given the advisory, it is possible that people would under-report the number of fish harvested (i.e., kept). Given a realistic fishing season in the lower Hudson of 35 weeks (8 months), the fishing advisory correlates to an ingestion rate of approximately 5 g/day, which is close to the RME ingestion rate used in the HHRA of 4 g/day. It is important to note that, based on the typical size of white perch in the lower Hudson River, catching eight 8-ounce fish meals per year would require fishing more than once per week over the 35 week fishing season. Even if it was assumed that all fish caught were kept by an angler who fishes twice per week all fishing season, the ingestion rate would be only 8 g/day. Consequently, although it is possible that harvesting of white perch was under-reported in the creel surveys, it appears unlikely that realistic ingestion rates would exceed a range of 4 g/day to 8 g/day. These ingestion rates are associated with acceptable risks.

- Blue crab: Limit of 50 crabs per day, with minimum size restrictions. However, there is a health advisory for consuming no more than 4 meals per month (24 crabs per month; NYSDOH, 2015). In addition, NYSDOH recommends not eating the tomalley (Hepatopancreas). Based on the mass of leg tissue obtained from blue crab sampled in the BSAP and a typical 4-month crab fishing season, the leg meat ingestion rate that would correlate to the fishing advisory is 3.8 g/day. This ingestion rate is about four-times greater than the RME and two-times greater than the upper bound ingestion rates used in the HHRA. However, the PCB EPC in crab leg tissue as only 0.025 mg/kg; ingesting crab leg tissue at the fishing advisory limit would yield acceptable health risks. The risks associated with crab were almost entirely due to the PCB concentration in the Hepatopancreas (EPC = 0.86 mg/kg). Although some people likely ignore the NYSDOH warning against consuming Hepatopancreas, the risk estimates for the crab assumed that 54% of crab tissue consumption was Hepatopancreas, an assumption that is not realistic.

- Combined consumption of fish and crabs: The HHRA evaluated recreational crabbing and recreational fishing as two separate exposure scenarios, based largely on the fact that the two types of fishing require different techniques and therefore likely target different individuals. It is unlikely that the same individual would engage in both recreational angling and recreational crabbing, at least not at the intensity assumed for the RME and upper bound scenarios. Review

of the risk summary tables indicates that CT risks for crabbing and fishing, if summed together, would not exceed EPA risk limits. Summing RME and upper bound risks for crabbing and fishing would incorporate an assumption that the same individual performs shoreline fishing and angling at the OU-2 Study Area up to 140 times per year (4 days per week). This intensity of angling is not commensurate with the concept of 'recreational' angling, nor is supported by the Study Area-specific demographics or physical setting.

- USEPA determined that three sections of the river between RM 154 and RM 189 require remediation to achieve acceptable health risks for use of the river and angling for fish. USEPA determined that portions of the river downstream of RM 154 do not require remediation. With the reach of river targeted for remediation, USEPA predicted post-remedial total PCB concentrations in fish to range from 0.51 mg/kg to 1.3 mg/kg as an average throughout the RM 154 to RM 189 reach, and up to 1.9 mg/kg for specific sections with that reach. For comparison, the average fish tissue concentrations evaluated in this HHRA for the OU-2 Study Area are 0.97 mg/kg for white perch and 1.99 mg/kg for American eel. Therefore, the existing PCB concentrations in fish collected within the OU-2 Study Area are already within the range of fish tissue PCB concentrations that USEPA targeted for post-remedial conditions at the Upper Hudson River Site.

6. Summary and Conclusions

This HHRA was completed as a component of the TSCA RBDA for PCBs at the Former Anaconda Wire Project Site located in Hastings-on-Hudson, New York. The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and was completed following standard USEPA guidelines for preparing risk assessments. The overall objective of the HHRA is to determine whether the remedial action requirements of the Records of Decision (RODs) will be protective of human health. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place under the conditions described in detail in Volume 2, will not pose unacceptable risks to human health.

The HHRA was completed following standard USEPA guidelines, and evaluated risks under future land use conditions which consider re-development of the Site as restricted residential or commercial use property *after* remediation has been completed. The HHRA evaluates risks under post-remedial conditions because the remedial actions stipulated in the RODs issued by NYSDEC will be performed independent of the results of the HHRA; i.e., even if the results of the risk assessment were to indicate that remedial actions are not required to maintain acceptable risks, remedial actions will still be performed. The exception to this concerns characterization of potential exposures and risks for fish ingestion associated with recreational angling. For that exposure pathway, fish tissue PCB concentrations representative of the *current* conditions are used to estimate risks. Risks based on current conditions provide a conservative assessment of possible future risks because they do not reflect the planned remediation of sediment, which will reduce PCB concentrations in the food chain.

At this Site, the remediation that will be performed pursuant to the requirements of the ROD render several exposure pathways incomplete. Specifically:

- Direct contact (dermal contact and incidental ingestion) and inhalation of dust from soil will not be a complete exposure pathway under future conditions because residual PCBs in soil will be covered and excavation into soil containing residual PCBs will be subject to a Site Management Plan (SMP).

- Direct contact with groundwater will not occur because groundwater beneath the Site is not used as a source of potable water. Groundwater will not be used as a source of potable water in the future because public drinking water is supplied to the Site and surrounding area, and institutional controls will prohibit the installation of potable wells.

- Inhalation of vapors from soil or groundwater will not be a complete exposure pathway because PCBs are not associated with enough volatility to pose a potential vapor concern and airborne distribution of soil particulates containing PBCs will be precluded due to the soil cover system.

  Direct contact with surface water will not be a complete exposure pathway under future conditions because PCBs were detected infrequently in surface water, and at a maximum concentration less than the federal drinking water standard of 0.0005 mg/L. Therefore, any potential exposure pathways to PCBs in surface water would be less than levels considered safe for drinking water. In addition, remediation of soil and construction of the migration barrier will ensure that soil, non-aqueous phase liquids (NAPL), and groundwater will not become sources to surface water in the future.

- Direct human contact with sediment is an incomplete or insignificant pathway; direct human contact for kayakers or those wading in shallow waters near the site is incomplete due the fact that surface sediments are generally at background conditions or access is restricted. Under future conditions, surface sediment that is beneath 15 feet or less of surface water (i.e., shallow water sediment) will be remediated such that PCBs will be near background, and sediment that is beneath more than 15 feet of water (i.e., deep water sediment) cannot be contacted due to the depth of the water. PCB concentrations associated with background (less than 1 mg/kg) are considered by USEPA to be associated with no unacceptable risks for direct contact under unrestricted use conditions.

Although no recreational or commercial fishing is known to occur at the Site, recreational angling occurs throughout the lower Hudson River. Exposures to PCBs can occur if people catch and eat fish which have accumulated PCBs in their edible tissues. The remediation that will be performed (as described in Volume 2) essentially renders all exposure pathways incomplete, except for fish ingestion. Therefore, the HHRA focused on quantifying potential exposures and risks associated with consumption of fish during recreational angling..

Risks associated with ingestion of fish during recreational angling were calculated for both recreational angling and recreational crabbing scenarios, assuming that an adult who engages in these activities brings home fish or crabs to share with children and adolescents who live in the household. Ingestion rates were derived based on the typical size of white perch, American eel, and blue crab harvested from the lower Hudson River, the angling effort (number of fish harvested per fishing trip) as reported in the NYSDEC angling surveys, as well as a range of recreational angling trips per year of the fishing season (e.g. one trip every other week [which is the New York State average], one trip every week, and two trips every week). Results are adult ingestion rates of 1.6 g/day to 6.9 g/day of white perch and American eel, and less than 0.9 g/day to 1.8 g/day of blue crab. These estimates are generally consistent with the average recreational angling fish ingestion rate derived from a survey of New York State anglers of 4 g/day.

To provide a range of risk estimates for this HHRA, each of the exposure scenarios were evaluated for three different fish ingestion rates (a reasonable maximum exposure (RME) of 4 g/day, a central tendency exposure (CTE) of 1.6 g/day, and an upper-bound exposure of 31.9 g/day) and three different blue crab ingestion rates (an RME of 1 g/day, a CTE of 0.9 g/day, and an upper-bound of 1.8 g/day). These adult ingestion rates were scaled for application to young children and adolescents based on their smaller body weights. The upper-bound ingestion rate was based on the 90th percentile ingestion rate from the 1991 New York State anglers survey and is based on total consumption of all recreationally caught fish.

The upper-bound ingestion rate is applied in this HHRA solely for use as a bounding estimate, in that it is not plausible that any angler would derive 100% of his or her fish diet from the OU-2 Study Area. It is not plausible for several reasons. First, given the limited access and species present at the Site, anglers would not exclusively fish at the Site. Therefore, it is most realistic to adjust the ingestion rate by the percentage of fish diet derived from the OU-2 Study Area. Second, the habitat at the OU-2 Study Area does not sustain fish species that would be of a size or variety that reflect the number of recreationally-caught fish meals per year on which the upper-bound ingestion rate is based. Even at the RME ingestion rate, the fish population at the OU-2 Study Area could not reasonably provide enough meals for the adult angler *plus* members of their family. Furthermore, there is no known Native American or ethnic populations in the vicinity of the Site that would use the area around OU-2 for subsistence fishing. The

demographics of Hastings-On-Hudson, combined with the availability of much better shoreline fishing spots within a few miles of the Site, suggest that fishing with the primary objective of providing food is very unlikely at the OU-2 Study Area. Use of the upper-bound ingestion rate is useful only as a bounding estimate and to provide a baseline from which the results of this HHRA could be compared to other HHRA's which used upper-bound estimates of fish consumption.

The results of the HHRA indicate that cancer risks for all recreational fishing and recreational angling scenarios, i.e. the three different fish ingestion rates, are within the range of 10^{-6} to 10^{-4}. HI values for the RME recreational fishing scenario are greater than one for fish harvested both adjacent to the Site and up-river, but the incremental HI value (i.e., the difference in risk between recreational angling at the OU-2 Study Area and recreational angling at the up-river reference area) is only 0.5. Similarly, HI values for the upper-bound exposure recreational fishing scenario are greater than one for fish harvested both adjacent to the Site and up-river, but the incremental HI value is one. The HI values for the recreational fishing central tendency exposure scenario do not exceed one, and the HI values for the recreational crabbing scenarios (all ingestion rates) are all less than one.

Collectively, the results of the HHRA indicate that current risks associated with consumption of fish and crabs from the OU-2 Study Area are not appreciably different than risks associated with consumption of fish and crabs harvested from the up-river reference area. These results are supported by the fish tissue data, which indicate that there are generally no statistically significant differences in PCB concentrations in fish collected at the OU-2 Study Area vs. fish collected from the North Area (up-river reference area). The difference in risks between the two areas is not indicative of unacceptable health risk, as cancer risks are within the range of 10^{-6} to 10^{-4} and HI values do not exceed one. Since the remedial actions required by the ROD will reduce PCB concentrations in sediment, and ensure that no migration pathways from residual sources at the Site to the river will be complete, PCB concentrations in fish are expected to decrease in the future, thereby reducing potential risks associated with recreational angling. In conclusion, the results of the HHRA support the conclusions of the NYSDEC ROD, which indicate that implementation of the remedies described in the ROD will be protective of human health and the environment.

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TABLES

TABLE 2-1
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	CAS No.	Number of Detects	Number of Samples	Minimum Detected Concentration	Maximum Detected Concentration	Range of Reporting Limits for Non-Detects		Location of Max Detect
PCBs (mg/L)								
Aroclor-1016 (PCB-1016)	12674-11-2	-	6	-	-	0.0001	0.00005	-
Aroclor-1221 (PCB-1221)	11104-28-2	-	6	-	-	0.0001	0.00005	-
Aroclor-1232 (PCB-1232)	11141-16-5	-	6	-	-	0.0001	0.00005	-
Aroclor-1242 (PCB-1242)	53469-21-9	-	6	-	-	0.0001	0.00005	-
Aroclor-1248 (PCB-1248)	12672-29-6	-	6	-	-	0.0001	0.00005	-
Aroclor-1254 (PCB-1254)	11097-69-1	-	6	-	-	0.0001	0.00005	-
Aroclor-1260 (PCB-1260)	11096-82-5	3	6	0.000241	0.000979	0.0001	0.00005	PDMW-19S
Aroclor-1262 (PCB-1262)	37324-23-5	-	6	-	-	0.0001	0.00005	-
Aroclor-1268 (PCB-1268)	11100-14-4	-	6	-	-	0.0001	0.00005	-
Total PCBs	TOTALPCB	3	6	0.000241	0.000979	0.0001	0.00005	PDMW-19S

Notes:
(1) Only normal samples shown in table (field duplicates excluded).
(2) Samples collected after 9/1/2013.

TABLE 2-2
SUMMARY OF PORE WATER ANALYTICAL RESULTS
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	CAS No.	Number of Detects	Number of Samples	Minimum Detected Concentration	Maximum Detected Concentration	Range of Reporting Limits for Non-Detects		Location of Max Detect
PCBs (mg/L)								
Aroclor-1016 (PCB-1016)	12674-11-2	-	7	-	-	0.00001	0.00000847	-
Aroclor-1221 (PCB-1221)	11104-28-2	-	7	-	-	0.00001	0.00000847	-
Aroclor-1232 (PCB-1232)	11141-16-5	-	7	-	-	0.00001	0.00000847	-
Aroclor-1242 (PCB-1242)	53469-21-9	-	7	-	-	0.00001	0.00000847	-
Aroclor-1248 (PCB-1248)	12672-29-6	1	7	0.0000139	0.0000139	0.00001	0.00000847	PW-006 (SS-009)
Aroclor-1254 (PCB-1254)	11097-69-1	1	7	0.0000157	0.0000157	0.00001	0.00000847	PW-006 (SS-009)
Aroclor-1260 (PCB-1260)	11096-82-5	-	7	-	-	0.00001	0.00000847	-
Aroclor-1262 (PCB-1262)	37324-23-5	-	7	-	-	0.00001	0.00000847	-
Aroclor-1268 (PCB-1268)	11100-14-4	-	7	-	-	0.00001	0.00000847	-
Total PCBs	TOTALPCB	1	7	0.0000296	0.0000296	0.00001	0.00000847	PW-006 (SS-009)

Notes:
(1) Only normal samples shown in table (field duplicates excluded).
(2) Samples collected after 9/1/2013.

TABLE 2-3
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	Number of Detects	Number of Samples	Minimum Detected Concentration	Maximum Detected Concentration	Range of Reporting Limits for Non-Detects		Location of Max Detect
PCBs (mg/L)							
Aroclor-1016 (PCB-1016)	-	69	-	-	0.00001	0.00005	-
Aroclor-1221 (PCB-1221)	-	69	-	-	0.00001	0.00005	-
Aroclor-1232 (PCB-1232)	-	69	-	-	0.00001	0.00005	-
Aroclor-1242 (PCB-1242)	6	69	0.0000132	0.0000245	0.00001	0.00005	SW-007
Aroclor-1248 (PCB-1248)	3	69	0.000019	0.0000211	0.00001	0.00005	SW-004
Aroclor-1254 (PCB-1254)	-	69	-	-	0.00001	0.00005	-
Aroclor-1260 (PCB-1260)	1	69	0.0000193	0.0000193	0.00001	0.00005	SW-004
Aroclor-1262 (PCB-1262)	-	69	-	-	0.00001	0.00005	-
Aroclor-1268 (PCB-1268)	-	69	-	-	0.00001	0.00005	-
Total PCBs	10	69	0.0000132	0.0000245	0.00001	0.00005	SW-007

Notes:
(1) Only normal samples shown in table (field duplicates excluded).
(2) Samples collected after 9/1/2013.
(3) Data includes May 2015 sampling event, which is preliminary and unvalidated.

TABLE 2-4
SUMMARY OF SEDIMENT ANALYTICAL RESULTS
NEARSHORE
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	Number of Detects	Number of Samples	Minimum Detected Concentration	Maximum Detected Concentration	Range of Reporting Limits for Non-Detects		Location of Max Detect
PCBs (mg/kg)							
Aroclor-1016 (PCB-1016)	-	22	-	-	0.0938	1.22	-
Aroclor-1221 (PCB-1221)	-	22	-	-	0.0938	1.22	-
Aroclor-1232 (PCB-1232)	-	22	-	-	0.0938	1.22	-
Aroclor-1242 (PCB-1242)	-	22	-	-	0.0938	1.22	-
Aroclor-1248 (PCB-1248)	20	22	0.107	0.587	0.0938	1.22	VC-404
Aroclor-1254 (PCB-1254)	2	22	0.371	3.19	0.0938	1.22	VC-419
Aroclor-1260 (PCB-1260)	-	22	-	-	0.0938	1.22	-
Aroclor-1262 (PCB-1262)	17	22	0.0832	15.5	0.0938	1.22	VC-419
Aroclor-1268 (PCB-1268)	1	22	0.501	0.501	0.0938	1.22	VC-404
Total PCBs	22	22	0.107	18.69	0.0938	1.22	VC-419

Notes:
(1) Samples are from 0 - 0.5 feet.
(2) Only normal samples shown in table (field duplicates excluded).
(3) Samples collected after 9/1/2013.

TABLE 2-5
SUMMARY OF SEDIMENT ANALYTICAL RESULTS
DEEPWATER
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	Number of Detects	Number of Samples	Minimum Detected Concentration	Maximum Detected Concentration	Range of Reporting Limits for Non-Detects		Location of Max Detect
PCBs (mg/kg)							
Aroclor-1016 (PCB-1016)	-	101	-	-	0.0816	10.5	-
Aroclor-1221 (PCB-1221)	-	101	-	-	0.0816	10.5	-
Aroclor-1232 (PCB-1232)	-	101	-	-	0.0816	10.5	-
Aroclor-1242 (PCB-1242)	1	101	0.336	0.336	0.0816	10.5	VC-364
Aroclor-1248 (PCB-1248)	99	101	0.119	37.7	0.0816	10.5	VC-337
Aroclor-1254 (PCB-1254)	3	101	0.108	1.21	0.0816	10.5	VC-325
Aroclor-1260 (PCB-1260)	-	101	-	-	0.0816	10.5	-
Aroclor-1262 (PCB-1262)	56	101	0.0629	240	0.0816	10.5	VC-337
Aroclor-1268 (PCB-1268)	5	101	0.513	2.31	0.0816	10.5	VC-301
Total PCBs	101	101	0.119	277.7	0.0816	10.5	VC-337

Notes:
(1) Samples are from 0 - 0.5 feet.
(2) Only normal samples shown in table (field duplicates excluded).
(3) Samples collected after 9/1/2013.

TABLE 2-6
SUMMARY OF ANALYTICAL DATA - AMERICAN EEL - FILLET
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	CAS No.	Number of Detects (1)	Number of Samples (1)	Detection Frequency (1)	Minimum Detected Concentration (mg/kg) (1)	Maximum Detected Concentration (mg/kg) (1)	Range of Reporting Limits for Non-Detects		Average Detected Concentration	95% Upper Confidence Limit (UCL) (mg/kg) (2)	(statistic) (2)
Fillet											
Adjacent											
Aroclor 1248	12672-29-6	21	51	41%	0.0755	0.832	0.05	0.15	0.334	0.218	[e]
Aroclor 1254	11097-69-1	48	51	94%	0.0346	1.95	0.05	0.1	0.543	0.614	[e]
Aroclor 1262	37324-23-5	51	51	100%	0.182	3.46	NA	NA	1.347	1.549	[b]
Total PCBs	NA	51	51	100%	0.289	5.582	NA	NA	1.995	2.28	[b]
North											
Aroclor 1248	12672-29-6	8	26	31%	0.0987	0.718	0.05	0.05	0.289	0.182	[e]
Aroclor 1254	11097-69-1	22	26	85%	0.0325	0.92	0.05	0.05	0.277	0.325	[a]
Aroclor 1262	37324-23-5	26	26	100%	0.114	1.12	NA	NA	0.462	0.551	[b]
Total PCBs	NA	26	26	100%	0.114	2.758	NA	NA	0.785	1	[b]
South											
Aroclor 1248	12672-29-6	8	26	31%	0.0699	0.517	0.05	0.05	0.274	0.17	[e]
Aroclor 1254	11097-69-1	20	26	77%	0.0493	0.674	0.05	0.05	0.289	0.297	[a]
Aroclor 1262	37324-23-5	25	26	96%	0.106	1.18	0.05	0.05	0.502	0.59	[a]
Total PCBs	NA	25	26	96%	0.106	2.317	0.05	0.05	0.82	1.336	[d]

Notes:
NA - Not Applicable.
(1) The samples included in the data set summarized in this table are provided in Appendix A
(2) Upper Confidence Limit (UCL95) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications version 5.0.00.
Documentation of the ProUCL output is provided in Appendix B.

Statistic key:

[a] 95% KM (t) UCL
[b] 95% Student's-t UCL
[c] 95% Adjusted Gamma UCL
[d] 95% Chebyshev (Mean, Sd) UCL
[e] 95% KM (Percentile Bootstrap) UCL

Distribution exhibited:

Data appear Approximate Normal at 5% Significance Level.
Data appear Normal at 5% Significance Level.
Data appear Gamma Distributed at 5% Significance Level.
Data do not follow a Discernable Distribution (0.05).

TABLE 2-7
SUMMARY OF ANALYTICAL DATA - OYSTER TOADFISH - FILLET
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	CAS No.	Number of Detects (1)	Number of Results (1)	Detection Frequency (1)	Minimum Detected Concentration (mg/kg) (1)	Maximum Detected Concentration (mg/kg) (1)	Range of Reporting Limits for Non-Detects		Average Detected Concentration	95% Upper Confidence Limit (UCL) (mg/kg) (2)	(statistic) (2)
Fillet											
Adjacent											
Aroclor 1262	37324-23-5	3	14	21%	0.025	0.11	0.05	0.05	0.063	0.0462	[a]
Total PCBs	NA	3	14	21%	0.025	0.11	0.05	0.05	0.063	0.0462	[a]
North											
Aroclor 1262	37324-23-5	1	10	10%	0.215	0.215	0.05	0.05	NA	NA	[3]
Total PCBs	NA	1	10	10%	0.215	0.215	0.05	0.05	NA	NA	[3]
South											
Aroclor 1262	37324-23-5	3	11	27%	0.0343	0.0845	0.05	0.05	0.0588	0.0512	[a]
Total PCBs	NA	3	11	27%	0.0343	0.0845	0.05	0.05	0.0588	0.0512	[a]

Notes:
NA - Not Applicable.
(1) The samples included in the data set summarized in this table are provided in Appendix A
(2) Upper Confidence Limit (UCL95) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications version 5.0.00.
Documentation of the ProUCL output is provided in Appendix B.

Statistic key:		Distribution exhibited:
[a]	95% KM (t) UCL	Data appear Approximate Normal at 5% Significance Level.
[b]	95% Student's-t UCL	Data appear Normal at 5% Significance Level.
[c]	95% Adjusted Gamma UCL	Data appear Gamma Distributed at 5% Significance Level.
[d]	95% Chebyshev (Mean, Sd) UCL	Data do not follow a Discernable Distribution (0.05).
[e]	95% Modified-t UCL	

(3) A UCL could not be calculated because there was only 1 detected value in the data set. The maximum concentration was used as the EPC.

TABLE 2-8
SUMMARY OF ANALYTICAL DATA - WHITE PERCH - FILLET
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	CAS No.	Number of Detects (1)	Number of Results (1)	Detection Frequency (1)	Minimum Detected Concentration (mg/kg) (1)	Maximum Detected Concentration (mg/kg) (1)	Range of Reporting Limits for Non-Detects		Average Detected Concentration	95% Upper Confidence Limit (UCL) (mg/kg) (2)	(statistic) (2)
Fillet											
Adjacent											
Aroclor 1248	12672-29-6	5	5	100%	0.146	0.453	NA	NA	0.345	0.463	[3]
Aroclor 1254	11097-69-1	5	5	100%	0.155	0.405	NA	NA	0.284	0.378	[b]
Aroclor 1262	37324-23-5	5	5	100%	0.164	0.575	NA	NA	0.343	0.496	[b]
Total PCBs	NA	5	5	100%	0.465	1.376	NA	NA	0.972	1.322	[b]
North											
Total PCBs [4]	NA	10	10	100%	0.298	1.582	NA	NA	0.955	1.146	[b]
South											
Aroclor 1248	12672-29-6	5	5	100%	0.243	0.583	NA	NA	0.412	0.56	[b]
Aroclor 1254	11097-69-1	5	5	100%	0.221	0.781	NA	NA	0.443	0.662	[b]
Aroclor 1262	37324-23-5	5	5	100%	0.164	0.486	NA	NA	0.336	0.483	[b]
Total PCBs	NA	5	5	100%	0.647	1.844	NA	NA	1.191	1.687	[b]

Notes:
NA - Not Applicable.
(1) The samples included in the data set summarized in this table are provided in Appendix A
(2) Upper Confidence Limit (UCL95) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications version 5.0.00.
Documentation of the ProUCL output is provided in Appendix B.

Statistic key:		Distribution exhibited:
[a]	95% KM (t) UCL	Data appear Approximate Normal at 5% Significance Level.
[b]	95% Student's-t UCL	Data appear Normal at 5% Significance Level.
[c]	95% Adjusted Gamma UCL	Data appear Gamma Distributed at 5% Significance Level.
[d]	95% Chebyshev (Mean, Sd) UCL	Data do not follow a Discernable Distribution (0.05).
[e]	95% Modified-t UCL	

(3) The UCL is greater than the maximum concentration. Therefore, the maximum concentration was used as the exposure point concentration (EPC).
(4) Total PCB concentration in fillet were calculated from whole body PCB concentrations (see Appendix A).

TABLE 2-9
SUMMARY OF ANALYTICAL DATA - BLUE CRAE
FORMER ANACONDA WIRE AND CABLE COMPANY

Parameter	CAS No.	Number of Detects (1)	Number of Results (1)	Detection Frequency (1)	Minimum Detected Concentration (mg/kg) (1)	Maximum Detected Concentration (mg/kg) (1)	Range of Reporting Limits for Non-Detects		Average Detected Concentration	95% Upper Confidence Limit (UCL) (mg/kg) (2)	(statistic) (2)
Leg											
Adjacent											
Aroclor 1262	37324-23-5	3	16	19%	0.0276	0.0927	0.05	0.334	0.0539	0.0554	[a]
Total PCBs	NA	3	16	19%	0.0276	0.0927	0.05	0.334	0.0539	0.0554	[a]
North											
Aroclor 1262	37324-23-5	2	15	13%	0.0395	0.0403	0.05	0.123	0.0399	0.0406	[3]
Total PCBs	NA	2	15	13%	0.0395	0.0403	0.05	0.123	0.0399	0.0406	[3]
South											
Aroclor 1262	37324-23-5	1	10	10%	0.0392	0.0392	0.05	0.151	NA	NA	[4]
Total PCBs	NA	1	7	14%	0.0392	0.0392	0.05	0.151	NA	NA	[4]
Hepatopancreas											
Adjacent											
Aroclor 1248	12672-29-6	2	16	13%	0.383	0.787	NA	NA	0.585	0.235	[a]
Aroclor 1254	11097-69-1	2	16	13%	0.202	0.577	NA	NA	0.39	0.175	[a]
Aroclor 1262	37324-23-5	14	16	88%	0.123	2.36	NA	NA	0.82	1.312	[c]
Total PCBs	NA	14	16	88%	0.123	3.724	NA	NA	0.959	1.599	[c]
North											
Aroclor 1248	12672-29-6	1	14	7%	0.134	0.134	NA	NA	NA	NA	[4]
Aroclor 1254	11097-69-1	1	14	7%	0.0734	0.0734	NA	NA	NA	NA	[4]
Aroclor 1262	37324-23-5	14	14	100%	0.0696	0.912	NA	NA	0.386	0.497	[b]
Total PCBs	NA	14	14	100%	0.0696	0.912	NA	NA	0.401	0.515	[b]
South											
Aroclor 1248	12672-29-6	1	10	10%	0.186	0.186	NA	NA	NA	NA	[4]
Aroclor 1254	11097-69-1	1	10	10%	0.0527	0.0527	NA	NA	NA	NA	[4]
Aroclor 1262	37324-23-5	10	10	100%	0.201	1.06	NA	NA	0.556	0.713	[b]
Total PCBs	NA	10	10	100%	0.201	1.06	NA	NA	0.58	0.742	[b]

Notes:
NA - Not Applicable.
(1) The samples included in the data set summarized in this table are provided in Appendix A
(2) Upper Confidence Limit (UCL95) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications version 5.0.00.
Documentation of the ProUCL output is provided in Appendix B.

Statistic key:		Distribution exhibited:
[a]	95% KM (t) UCL	Data appear Approximate Normal at 5% Significance Level.
[b]	95% Student's-t UCL	Data appear Normal at 5% Significance Level.
[c]	95% GROS Adjusted Gamma UCL	Data appear Gamma Distributed at 5% Significance Level.
[d]	95% Chebyshev (Mean, Sd) UCL	Data do not follow a Discernable Distribution (0.05).
[e]	95% Modified-t UCL	

(3) The UCL is greater than the maximum concentration. Therefore, the maximum concentration was used as the exposure point concentration (EPC).
(4) A UCL could not be calculated because there was only 1 detected value in the data set. The maximum concentration was used as the EPC.

TABLE 3-1
CONCEPTUAL SITE MODEL
FORMER ANACONDA WIRE AND CABLE COMPANY

Potential Source	Receiving Medium	Migration Pathway	Receiving Medium	Receptor Future/Post-Remedy	Pathway Complete	Rationale
Release of PCBs through manufacturing operations to soil, groundwater, and sediments at the Harbor at Hastings Site	Soil / NAPL			Commercial worker, resident, construction worker (direct contact)	No	Exposure is addressed by the remedy through soil removal, cover system and installation of sheet pile wall around deep residual PCB material.
			Groundwater	Commercial worker or resident (direct contact)	No	Not used for drinking water. Post-remedy migration pathway to river is incomplete. Additionally, no observed impact to river based on low detects in pore water and surface water.
			Surface water	Recreational boater (direct contact) / wader or swimmer (direct contact)	No	PCBs not detected in surface water at concentrations greater than drinking water standard indicate that direct contact with PCBs in surface water while boating or wading is an insignificant pathway. The river is not a source of potable water in the area.
			Pore water	None		PCBs were detected in pore water in only one sample (at a concentration less than 0.03 ug/L), indicating that pore water is not a source of PCBs to sediment or fish.
			Sediment	Recreational boater (direct contact) / wader or swimmer (direct contact)	No	Stone armor prevents exposure during recreational river activities (remaining PCBs will be remediated to <1 mg/kg). No exposure in deep water sediments due to depth of surface water (greater than 15 ft)
			Fish Tissue	Recreational angler (fish ingestion)	Yes	Constituent concentrations in biota tissue are similar upstream and downstream and the migration pathway for PCB uptake into fish at the Site is not significant as evidenced by lack of PCB detections in pore water and surface water, and low concentrations in surface sediment. Nevertheless, exposure to PCBs via ingestion of fish is considered a complete pathway.

TABLE 3-2
SUMMARY OF NYS ANGLING SURVEYS AND SPECIES TARGETED IN THE BASELINE SAMPLING AND ANALYSIS
FORMER ANACONDA WIRE AND CABLE COMPANY

	% Angling Days [a]			% Harvest [c]	Species Observed at Site	BSAP Target for PCB
Species	Entire State	Region 3	Lower Hudson [b]	Lower Hudson	2013 & 2014 BSAP	Analysis?
Trout	27%	34%				
Black Bass	22%	30%	12%			
Striped Bass	2%	9%	63%	28%	X	No - migratory
Bluegill	5%	5%		3%		
Yellow Perch	9%	4%		2%		
Pickerel	2%	4%				
Walleye	11%	3%				
Bullhead	3%	2%		4%	X	No - too few
White Perch	3%	2%		36%	X	Yes
Carp	1%	1%		11%		
Shad		1%	5%	5%	X	No - migratory
Northern Pike	4%					
Bluefish				8%	X	No - migratory
Salmon	5%					
Muskie	1%					
Eel				3%	X	Yes
Other	1%		10%	[d]	X (Blue Crab, Toadfish)	Yes
No Specific Species	5%	5%	10%	0%		
Total	100%	100%	100%	100%		

Notes:
BSAP - Baseline Sampling and Analysis.
[a] - NYSDEC, 2009. New York Statewide Angler Survey 2007. June 2009.
[b] - Species in which fewer than 5% of anglers targeted among all fishing seasons were reported under 'other'.
[c] - NYSDEC, 2007. Assessment of Spring 2005 Hudson River Recreational Fisheries. July 2007.
[d] - Survey noted that anglers harvested blue crab, but the study did not include counts in % harvest statistics

TABLE 3-3
FISH INGESTION RATES FROM SELECTED STUDIES AND RISK ASSESSMENTS
FORMER ANACONDA WIRE AND CABLE COMPANY

Area	Population	Source	Average Estimate [a] (g/day)	High End Estimate [b] (g/day)
Indiana	Consuming Anglers (reported for 'active sport fishing anglers')	[c]	20	61
Maine	Consuming Anglers	[c]	6.4	26
Michigan	Consuming Anglers	[c]	14	39
Minnesota	Consuming Anglers (males > 14 years)	[c]	4.5	40
New York	Consuming Anglers-Lake Ontario	[c]	5.8	NA
New York	Consuming Anglers-State Wide	[d]	4.0	31.9
North Dakota	Consuming Anglers (males > 14 years)	[c]	2.3	25
Wisconsin	Consuming Anglers	[c]	12	37
Upper Hudson River HHRA	Anglers	[e]	4.0	31.9
Lower Passaic River HHRA	Adult Anglers	[f]	8	25

Notes:
The shaded values were selected as the high end and site-specific fish ingestion rates.
[a] - Genearlly represents the 50th percentile value derived from the study.
[b] - The high end estimate is the 95th percentile for source [c] and the 90th percentile for all other sources.
[c] - EPA, 2011. Exposure Factors Handbook, Table 10-5. EPA/600/R-090/052F. September 2011.
[d] - Connelly, et al. 1992. Effects of the Health Advisory Changes on Fishing Habits and Fish Consumption in New York Sport Fisheries. Department of Natural Resources, New York State, College of Agriculture and Life Sciences. Report for the New York Sea Grant Institute Project No. R/FHD-2-PD, September.
[e] - Revised Human Health Risk Assessment, Hudson River PCBs Reassessment RI/FS (TAMS/Gradient, 2000) using values from the 1991 New York Angler survey of fish consumption by licensed anglers (Connelly et al., 1992).
[f] - Draft Focused Feasibility Study Risk Assessment, Lower Passaic Restoration Project (Battelle, 2007).

TABLE 3-4
RANGE OF SITE-SPECIFIC FISH INGESTION RATES
FORMER ANACONDA WIRE AND CABLE COMPANY

Fish Species	CPUE (fish/hr) [a]	HPUE (fish/hr) [a]	Catch/trip (No. of fish) [b]	Harvest/trip (No. of fish) [b]	Fishing season (weeks) [a]	Total fish caught 1 trip/wk [c]	Total fish caught 2 trip/wk [c]	Total fish caught 16 trip/yr [d]	Total fish harvested 1 trip/wk [e]	Total fish harvested 2 trip/wk [e]	Total fish harvested 16 trip/yr [f]
White Perch	0.1799	0.1292	0.79	0.57	35	27.7	55.4	12.7	19.9	39.8	9.10
Americal eel	0.0294	0.0095	0.13	0.04	35	4.5	9.1	2.1	1.5	2.9	0.67
				White Perch							
				Total mass of fish [g]		1517	3033	693	1089	2178	498
				No 8 oz fish meals/year		6.7	13	3.1	4.8	9.6	2.2
				Ing rate (g/day) [h]		4.2	8.3	1.9	3.0	6.0	1.4
				American eel							
				Total mass of fish [i]		539	1078	246	174	348	80
				No 8 oz fish meals/year		2.4	4.8	1.1	0.8	1.5	0.35
				Ing rate (g/day) [h]		1.5	3.0	0.7	0.5	1.0	0.22
				Perch and eel combined							
				No 8 oz fish meals/year		9.1	18	4.1	5.6	11	2.5
				Ing rate (g/day)		5.6	11.3	2.6	3.5	6.9	1.6

	CPUE (fish/hr) [a]	HPUE (fish/hr) [a]	Catch/trip (No. of fish) [b]	Harvest/trip (No. of fish) [b]	Fishing season (weeks) [j]	Total fish caught 1 trip/wk [c]	Total fish caught 2 trip/wk [c]	Total fish caught 16 trip/yr [d]	Total fish harvested 1 trip/wk [e]	Total fish harvested 2 trip/wk [e]	Total fish harvested 16 trip/yr [f]
Blue crab	0.224	0.166	0.99	0.73	14.5	14.3	28.6	15.8	10.6	21.1	11.7
				Blue crab							
				Total mass of fish [k]		455	910	502	336	672	371
				No 8 oz fish meals/year		2.01	4.0	2.2	1.48	3.0	1.64
				Ing rate (g/day) [h]		1.25	2.5	1.38	0.92	1.84	1.02

[a] - NYSDEC, 2003. Assessment of Spring 2001 Hudson River Recreational Fisheries. December, 2003. Table Appendix 4-12
[b] - Calculated as CPEU or HPEU multipled by average fishing trip length of 4.4 hours (NYSDEC, 2007)
[c] - Assumptions of 1 trip per week or 2 trips per week for entirety of fishing season; calculated as catch per trip multipled by number of trips per week and weeks per fishing season
[d] - Average number of recreational fishing trips per year (USF&W, 2011); calculated as catch per trip multipled by number of trips per week and weeks per fishing season
[e] - Assumptions of 1 trip per week or 2 trips per week for entirety of fishing season; calculated as harvest per trip multipled by number of trips per week and weeks per fishing season
[f] - Average number of recreational fishing trips per year (USF&W, 2011); calculated as harvest per trip multipled by number of trips per week and weeks per fishing season
[g] - Calculated as total number of fish multiplied by mass of fillet; fillet samples collected in BSAP program averaged 54.7 g for an average perch fish length of 7.3 inches, a value slightly larger than the average length of harvested white perch in the New York State Creel survey (6.9 inches; NYSDEC, 2007)
[h] - Calculated as total mass of fish (g) divided by 365 days
[i] - Calculated as total number of fish multiplied by mass of fillet; fillet samples collected in BSAP program averaged 119 g
[j] - Crabbing almost exclusively occurs during early summer (6 weeks) and late summer (8.5 weeks). CPEU and HPEU values are derived from the seasonal CPEU and HPEU values provided in NYSDEC, 2003, Table Appendix 4-13.
[k] - Calculated as total number of crabs multiplied by mass of legs plus the mass of hepatopancreas; leg samples collected in BSAP program averaged 14.74 g and hepatopancreas samples averaged 17.0

CPUE - catch per unit effort
HPUE - harvest per unit effort

TABLE 3-5
RECEPTOR EXPOSURE PARAMETERS - REASONABLE MAXIMUM EXPOSURE
FORMER ANACONDA WIRE AND CABLE COMPANY

			RECREATIONAL ANGLER				
RECEPTOR			**CHILD (AGE <6)**		**ADOLESCENT (AGE 6-<18)**		
Standard Parameters							
Body Weight	BW	kg	15	EPA, 2011 [a]	50	EPA, 2011 [a]	80
Exposure Frequency	EF	day/year	365	Fish ingestion rate is averaged over one year	365	Fish ingestion rate is averaged over one year	365
Exposure Duration	ED	year	6	EPA, 2014	12	EPA, 2014 [c]	8
Non–carcinogenic Averaging Time	AT	day	2190	Exposure duration expressed in days	4380	Exposure duration expressed in days	2920
Carcinogenic Averaging Time	$AT_{lifetime}$	day	25550	70 year lifetime	25550	70 year lifetime	25550
Ingestion							
Fish Tissue Ingestion Rate [e]	IR	g/day	0.8	[d]	2.5	[d]	4.0
Crab Leg/Hepatopancreas Ingestion Rate [e]	IR	g/day	0.19	[d]	0.63	[d]	1.0
Fraction from Source	FS	unitless	1	Assumes 100% of fish is from the Site	1	Assumes 100% of fish is from the Site	1

Notes:

EPA, 2011 - Exposure Factors Handbook. EPA/600/R-10/030. October, 2011.

EPA, 2014 - Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120. February 6, 2014.

[a] - Table 8-1 of EPA (2011).

[b] - See Table 3-3 and risk assessment text for the selection of tissue ingestion rates.

[c] - The exposure duration for the adolescent and adult were broken out to derive a total lifetime duration of 26 years for a child, adolescent and adult.

[d] - Adjusted value based on adult ingestion rate as follows:

Child Ingestion Rate (IR) = Adult IR x Child Body Weight (BW) / Adult BW

Adolescent IR = Adult IR x Adolescent BW / Adult BW

TABLE 3-5
RECEPTOR EXPOSURE PARAMETERS - REASONABLE MAXIMU
FORMER ANACONDA WIRE AND CABLE COMPANY

RECEPTOR		ADULT	
Standard Parameters			
Body Weight	BW	kg	EPA, 2011 [a]
Exposure Frequency	EF	day/year	Fish ingestion rate is averaged over one year
Exposure Duration	ED	year	EPA, 2014 [c]
Non–carcinogenic Averaging Time	AT	day	Exposure duration expressed in days
Carcinogenic Averaging Time	$AT_{lifetime}$	day	70 year lifetime
Ingestion			
Fish Tissue Ingestion Rate [e]	IR	g/day	[b]
Crab Leg/Hepatopancreas Ingestion Rate [e]	IR	g/day	[f]
Fraction from Source	FS	unitless	Assumes 100% of fish is from the Site

Notes:
EPA, 2011 - Exposure Factors Handbook. EPA/600/R-10/030.
EPA, 2014 - Human Health Evaluation Manual, Supplemental G
[a] - Table 8-1 of EPA (2011).
[b] - See Table 3-3 and risk assessment text for the selection of
[c] - The exposure duration for the adolescent and adult were
[d] - Adjusted value based on adult ingestion rate as follows:
Child Ingestion Rate (IR) = Adult IR x Child Body Weight (I
Adolescent IR = Adult IR x Adolescent BW / Adult BW

TABLE 3-6
RECEPTOR EXPOSURE PARAMETERS - UPPER-BOUND
FORMER ANACONDA WIRE AND CABLE COMPANY

			RECREATIONAL ANGLER				
RECEPTOR			**CHILD (AGE <6)**		**ADOLESCENT (AGE 6-<18)**		
Standard Parameters							
Body Weight	BW	kg	15	EPA, 2011 [a]	50	EPA, 2011 [a]	80
Exposure Frequency	EF	day/year	365	Fish ingestion rate is averaged over one year	365	Fish ingestion rate is averaged over one year	365
Exposure Duration	ED	year	6	EPA, 2014	12	EPA, 2014 [c]	8
Non–carcinogenic Averaging Time	AT	day	2190	Exposure duration expressed in days	4380	Exposure duration expressed in days	2920
Carcinogenic Averaging Time	$AT_{lifetime}$	day	25550	70 year lifetime	25550	70 year lifetime	25550
Ingestion							
Fish Tissue Ingestion Rate [e]	IR	g/day	6.0	[d]	19.9	[d]	31.9
Crab Leg/Hepatopancreas Ingestion Rate [e]	IR	g/day	0.35	[d]	1.2	[d]	1.8
Fraction from Source	FS	unitless	0.39	39% of fish is from the Site (combined eel and white perch); Table 3-2	0.39	39% of fish is from the Site (combined eel and white perch); Table 3-2	0.39

Notes:

EPA, 2011 - Exposure Factors Handbook. EPA/600/R-10/030. October, 2011.

EPA, 2014 - Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120. February 6, 2014.

[a] - Table 8-1 of EPA (2011).

[b] - See Table 3-3 and risk assessment text for the selection of tissue ingestion rates.

[c] - The exposure duration for the adolescent and adult were broken out to derive a total lifetime duration of 26 years for a child, adolescent and adult.

[d] - Adjusted value based on adult ingestion rate as follows:

Child Ingestion Rate (IR) = Adult IR x Child Body Weight (BW) / Adult BW

Adolescent IR = Adult IR x Adolescent BW / Adult BW

TABLE 3-6
RECEPTOR EXPOSURE PARAMETERS - UPPER-BOUND
FORMER ANACONDA WIRE AND CABLE COMPANY

RECEPTOR			
Standard Parameters			
Body Weight	BW	kg	EPA, 2011 [a]
Exposure Frequency	EF	day/year	Fish ingestion rate is averaged over one year
Exposure Duration	ED	year	EPA, 2014 [c]
Non–carcinogenic Averaging Time	AT	day	Exposure duration expressed in days
Carcinogenic Averaging Time	$AT_{lifetime}$	day	70 year lifetime
Ingestion			
Fish Tissue Ingestion Rate [e]	IR	g/day	[b]
Crab Leg/Hepatopancreas Ingestion Rate [e]	IR	g/day	[f]
Fraction from Source	FS	unitless	39% of fish is from the Site (combined eel and white perch); Table 3-2

Notes:
EPA, 2011 - Exposure Factors Handbook. EPA/600/R-10/030. C
EPA, 2014 - Human Health Evaluation Manual, Supplemental G
[a] - Table 8-1 of EPA (2011).
[b] - See Table 3-3 and risk assessment text for the selection of
[c] - The exposure duration for the adolescent and adult were b
[d] - Adjusted value based on adult ingestion rate as follows:
Child Ingestion Rate (IR) = Adult IR x Child Body Weight (B
Adolescent IR = Adult IR x Adolescent BW / Adult BW

TABLE 3-7
RECEPTOR EXPOSURE PARAMETERS - CENTRAL TENDENCY EXPOSURE
FORMER ANACONDA WIRE AND CABLE COMPANY

			RECREATIONAL ANGLER				
RECEPTOR			**CHILD (AGE <6)**		**ADOLESCENT (AGE 6-<18)**		
Standard Parameters							
Body Weight	BW	kg	15	EPA, 2011 [a]	50	EPA, 2011 [a]	80
Exposure Frequency	EF	day/year	365	Fish ingestion rate is averaged over one year	365	Fish ingestion rate is averaged over one year	365
Exposure Duration	ED	year	6	EPA, 2014	12	EPA, 2014 [c]	8
Non–carcinogenic Averaging Time	AT	day	2190	Exposure duration expressed in days	4380	Exposure duration expressed in days	2920
Carcinogenic Averaging Time	$AT_{lifetime}$	day	25550	70 year lifetime	25550	70 year lifetime	25550
Ingestion							
Fish tissue Ingestion Rate [e]	IR	g/day	0.30	[d]	1.0	[d]	1.6
Crab Leg/Hepatopancreas Ingestion Rate [e]	IR	g/day	0.17	[d]	0.56	[d]	0.90
Fraction from Source	FS	unitless	1	Assumes 100% of fish is from the Site	1	Assumes 100% of fish is from the Site	1

Notes:
EPA, 2011 - Exposure Factors Handbook. EPA/600/R-10/030. October, 2011.
EPA, 2014 - Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER 9200.1-120. February 6, 2014.
[a] - Table 8-1 of EPA (2011).
[b] - Based on average number of fish or crab potentially harvested (Table 3-4); see text.
[c] - The exposure duration for the adolescent and adult were broken out to derive a total lifetime duration of 26 years for a child, adolescent and adult.
[d] - Adjusted value based on adult ingestion rate as follows:
Child Ingestion Rate (IR) = Adult IR x Child Body Weight (BW) / Adult BW
Adolescent IR = Adult IR x Adolescent BW / Adult BW

TABLE 3-7
RECEPTOR EXPOSURE PARAMETERS - CENTRAL TENDENCY EX
FORMER ANACONDA WIRE AND CABLE COMPANY

RECEPTOR			**ADULT**
Standard Parameters			
Body Weight	BW	kg	EPA, 2011 [a]
Exposure Frequency	EF	day/year	Fish ingestion rate is averaged over one year
Exposure Duration	ED	year	EPA, 2014 [c]
Non–carcinogenic Averaging Time	AT	day	Exposure duration expressed in days
Carcinogenic Averaging Time	$AT_{lifetime}$	day	70 year lifetime
Ingestion			
Fish tissue Ingestion Rate [e]	IR	g/day	[b]
Crab Leg/Hepatopancreas Ingestion Rate [e]	IR	g/day	[b]
Fraction from Source	FS	unitless	Assumes 100% of fish is from the Site

Notes:
EPA, 2011 - Exposure Factors Handbook. EPA/600/R-10/030.
EPA, 2014 - Human Health Evaluation Manual, Supplemental C
[a] - Table 8-1 of EPA (2011).
[b] - Based on average number of fish or crab potentially harve
[c] - The exposure duration for the adolescent and adult were
[d] - Adjusted value based on adult ingestion rate as follows:
Child Ingestion Rate (IR) = Adult IR x Child Body Weight (I
Adolescent IR = Adult IR x Adolescent BW / Adult BW

TABLE 3-8
SUMMARY OF PCB COOKING LOSS FROM FISH
FORMER ANACONDA WIRE AND CABLE COMPANY

Study	Type of Fish	Location		Cooking Method	Percent PCB Loss from Fish (%)
Armbruster *et al* ., 1987	Striped Bass	Long Island Sound, NY	trimmed, skin-off	Baked 31-40 minutes	21
				Broiled 15-20 minutes	11
				Pan-fried, about 10 minutes	15
				Microwaved, 5-10 minutes	19
				Poached, 5-10 minutes	12
				Boiled, 10-20 minutes	(+4%)
Armbruster *et al* ., 1989	Bluefish	Long Island Sound	trimmed, skin-off	various	8
Moya *et al* ., 1998	Winter Flounder		filleted and sectioned	Deep fried - 1 minute	48
				Pan fried - 1 min/side	(+15%)
				Broiled - 2 minutes	(+17%)
Puffer and Gossett,	White Croaker	Orange County, CA	trimmed, skin-off	Pan Fried	28
		Santa Monica, CA	trimmed, skin-off		65
Salama *et al* ., 1998	Bluefish	Massachusetts	filleted	Smoked	65
				Microwaved	60
				Charbroiled (skin on)	47
				Charbroiled (skin off)	37
				Pan-fried	27
				Baked	39
Schecter *et al* ., 1998	Catfish	New York	filleted	Broiled - approx 30 minutes	47
Skea *et al* ., 1979	Smallmouth Bass	Lake Ontario	trimmed	Deep-fried for 3-4 minutes	74
			untrimmed	Baked	16
	Brown Trout		untrimmed	Smoked	27
			trimmed	Broiled for 15 minutes	0
Smith *et al* ., 1973	Chinook Salmon	Lake Michigan	cleaned steaks	Baked or Poached	2-8
			cleaned steaks	Baked-in-Bag	11-16
Zabik *et al* ., 1979	Lake trout		trimmed, skin-off	Broiled	53
			trimmed, skin-off	Baked	34
			trimmed, skin-off	Microwaved	26
			trimmed, skin-off	Baked	50
			trimmed, skin-off	Baked	40
Zabik *et al* ., 1995a	Chinook Salmon	Lakes Huron/Michigan	trimmed, skin-on	Baked	37
		Lakes Huron/Michigan	trimmed, skin- off	Baked	37
		Lakes Huron/Michigan	trimmed, skin-on	Charbroiled	45
		Lakes Huron/Michigan	trimmed, skin- off	Charbroiled	48
	Carp	Lakes Erie and Huron	trimmed, skin-on	Pan-fried	31
		Lakes Erie and Huron	trimmed, skin- off	Pan-fried	32
		Lakes Erie and Huron	trimmed, skin-on	Deep-fried	32
		Lakes Erie and Huron	trimmed, skin-off	Deep-fried	26
		Lake Erie	trimmed, skin-on or off	Deep fried or Pan fried	22
		Lake Huron	trimmed, skin-on or off	Deep fried or Pan fried	44
Zabik *et al* ., 1995b	Walleye	Lakes Erie, Huron and Michigan	filleted - skin on	Baked	19
			filleted - skin on	Charbroiled	25
		Lake Erie	filleted - skin on	Baked or Charbroiled	17
		Lake Huron	filleted - skin on	Baked or Charbroiled	24
		Lake Michigan	filleted - skin on	Baked or Charbroiled	25
	White Bass	Lake Erie	filleted - skin on	Pan fried	18
		Lake Huron	filleted - skin on	Pan fried	44
Zabik *et al* ., 1996	Lake Trout (lean)	Lakes Huron, Michigan and Ontario	filleted - skin off	Baked	13
			filleted - skin off	Charbroiled	11
		Lake Michigan	filleted - skin off	Baked	10
			filleted - skin off	Charbroiled	7
			filleted - skin off	Saltboiled	10
			filleted - skin on	Smoked	41
	Fat Trout (Siscowets)	Lake Superior	filleted - skin off	Baked	18
			filleted - skin off	Charbroiled	32
			filleted - skin off	Saltboiled	19
		Lake Huron	filleted - skin on	Smoked	37
				AVERAGE:	**31**

Notes:
Data as compiled in the Revised Human Health Risk Assessment, Hudson River PCBs Reassessment RI/FS (TAMS/Gradient, 2000) , Table 3-5.

TABLE 3-9
CALCULATED FISH EXPOSURE POINT CONCENTRATIONS - REASONABLE MAXIMUM EXPOSURE and UPPER-BOUND EXPOSURE
FORMER ANACONDA WIRE AND CABLE COMPANY

Species Consumed	Total PCB 95% UCL in Tissue (mg/kg) [a]	Consumption (%) [b]	Cooking & Trimming PCB loss (%) [c]	EPC (mg/kg) [d]
American Eel	2.28	8%	31%	0.12
White Perch	1.32	92%	31%	0.84
Total Fish PCB EPC				**0.96**
Blue Crab - Leg	0.06	46%	0%	0.025
Blue Crab - Hepatopancreas	1.60	54%	0%	0.86
Total Crab PCB EPC				**0.89**

Notes:
EPC - Exposure point concentration.
NA - Not applicable.
[a] - Upper Confidence Limit (95% UCL) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications, version 5.0.00, as shown in Tables 2-6, 2-8, and 2-9.
[b] - For perch and ell, the percent harvest values from NYSDEC, 2007 (Assessment of Spring 2005 Hudson River Recreational Fisheries. July 2007), Table 3-2, indicate that for every 8 ounces of eel are harvested, 92 ounces of white perch are harvested. For blue crab, the value is based on the average weights of the leg (14.7 g) and hepatopancreas (17 g) as a percentage weight. of the total leg + hepatopancreas
[c] - Cooking and trimming PCB loss is the mean value from Table 3-8. Since crab is typically boiled or steamed, a loss value of zero is used.
[d] - EPC = 95% UCL Tissue Concentration x species % consumption x (100% - % cooking loss).
This calculation is performed for each species, and the values are then summed together to derive total PCB EPCs for fish and for crab.

TABLE 3-10
CALCULATED FISH EXPOSURE POINT CONCENTRATIONS - CENTRAL TENDENCY
FORMER ANACONDA WIRE AND CABLE COMPANY

Species Consumed	Total PCB Average in Tissue (mg/kg) [a]	Consumption (%) [b]	Cooking & Trimming PCB loss (%) [c]	EPC (mg/kg) [d]
American Eel	1.99	8%	31%	0.11
White Perch	0.97	92%	31%	0.62
Total Fish PCB EPC				**0.72**
Blue Crab - Leg	0.05	46%	0%	0.025
Blue Crab - Hepatopancreas	0.96	54%	0%	0.52
Total Crab PCB EPC				**0.54**

Notes:
EPC - Exposure point concentration.
NA - Not applicable.
[a] - Average concentration (Tables 2-6, 2-8, and 2-9)
[b] - For perch and ell, the percent harvest values from NYSDEC, 2007 (Assessment of Spring 2005 Hudson River Recreational Fisheries. July 2007), Table 3-2, indicate that for every 8 ounces of eel are harvested, 92 ounces of white perch are harvested. For blue crab, the value is based on the average weights of the leg (14.7 g) and hepatopancreas (17 g) as a percentage weight. of the total leg + hepatopancreas
[c] - Cooking and trimming PCB loss is the mean value from Table 3-8. Since crab is typically boiled or steamed, a loss value of zero is used.
[d] - EPC = Average Tissue Concentration x species % consumption x (100% - % cooking loss).
This calculation is performed for each species, and the values are then summed together to derive total PCB EPCs for fish and for crab.

TABLE 4-1
CANCER TOXICITY DATA
FORMER ANACONDA WIRE AND CABLE COMPANY

Chemical of Potential Concern	Oral Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Source(s)	Date(s)
PESTICIDES/PCBs					
Polychlorinated Biphenyls (PCBs)	See Below ***		B2	IRIS	June-15
high risk and persistence-central estimate	1.0E+00	$(mg/kg/day)^{-1}$			
high risk and persistence-upper bound	2.0E+00	$(mg/kg/day)^{-1}$			
low risk and persistence-central estimate	3.0E-01	$(mg/kg/day)^{-1}$			
low risk and persistence-upper bound	4.0E-01	$(mg/kg/day)^{-1}$			
lowest risk and persistence-central estimate	4.0E-02	$(mg/kg/day)^{-1}$			
lowest risk and persistence-upper bound	7.0E-02	$(mg/kg/day)^{-1}$			

Notes:

In accordance with OSWER 9285.7-53, slope factors are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: June-15

Tier 2:

PPRTV = Preliminary Peer-Reviewed Reference Toxicity Jun-15 Obtained from Oak Ridge National Laboratory Regional Screening Levels for Chemical Contaminants at Superfund Sites

Tier 3:

HEAST97= Health Effects Assessment Summary Tables: FY 1997 From HEAST FY 1997 Update

HEAST= Health Effects Assessment Summary Tables: June-15 Obtained from Oak Ridge National Laboratory Regional Screening Levels for Chemical Contaminants at Superfund Sites

CALEPA - California Environmental Protection Agency July 2009

PCB slope factors are applicable to Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

mg = milligram
kg = kilogram
BW = body weight
ND = no data available

TABLE 4-2
NON-CANCER TOXICITY DATA
FORMER ANACONDA WIRE AND CABLE COMPANY

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units			Source(s)	Date(s)
PESTICIDES/PCBs							
Aroclor 1248	chronic	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate	
	subchronic	3.0E-05	mg/kg/day	CNS; decreased behavioral performance	300/1	Surrogate	
Aroclor-1254	chronic	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	IRIS	June-15
	subchronic	3.0E-05	mg/kg/day	CNS; decreased behavioral performance	300/1	MRL	April-15
Aroclor 1260	chronic	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate	
	subchronic	3.0E-05	mg/kg/day	CNS; decreased behavioral performance	300/1	Surrogate	
Aroclor 1262	chronic	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate	
	subchronic	3.0E-05	mg/kg/day	CNS; decreased behavioral performance	300/1	Surrogate	
Aroclor 1268	chronic	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate	
	subchronic	3.0E-05	mg/kg/day	CNS; decreased behavioral performance	300/1	Surrogate	
Polychlorinated Biphenyls (PCBs)	chronic	2.0E-05	mg/kg/day	Immune system; immunotoxicity	300/1	Surrogate	
	subchronic	3.0E-05	mg/kg/day	CNS; decreased behavioral performance	300/1	Surrogate	

Notes:
In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:
Tier 1:
IRIS = Integrated Risk Information System: June-15
Tier 2:
PPRTV = Preliminary Peer-Reviewed Toxicity Value: June-15 Obtained from Oak Ridge National Laboratory Regional Screening Levels for Chemical Contaminants
Tier 3: at Superfund Sites
HEAST= Health Effects Assessment Summary Tables: June-15 Obtained from Oak Ridge National Laboratory Regional Screening Levels for Chemical Contaminants
MRL = Minimum Risk Level (ATSDR: chronic MRLs): April-15 at Superfund Sites and the Risk Assessment Information System

Subchronic RfDs are identified from the following heirarchy of sources:
PPRTV = Preliminary Peer-Reviewed Toxicity Value:
MRL = Minimum Risk Level (ATSDR: intermittent MRLs):
HEAST= Health Effects Assessment Summary Tables:
Equal to chronic RfDs when values are not published in other sources

mg = milligram
kg = kilogram
surrogate - a value for a closely related chemical is used as the RfD
BW = body weight
chronic - the chronic value is used as the subchronic RfD
ND = no data available

RfD for Aroclor 1254 used as surrogate for other PCB congeners with no published RfDs

TABLE 5-1
TOTAL SITE RISK - CT
FORMER ANACONDA WIRE AND CABLE COMPANY

Exposure Point	Receptor Scenario	Exposure Medium	Exposure Route	Hazard Index	ELCR
Fish Tissue - Site (Adjacent)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	0.7	1.E-05
Fish Tissue - Background (North)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	0.7	1.E-05
Fish Tissue - Incremental (Site - Background)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	0.1	1.E-06
Crab Tissue - Site (Adjacent)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.3	5.E-06
Crab Tissue - Background (North)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.1	2.E-06
Crab Tissue - Incremental (Site - Background)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.2	3.E-06

Notes:
ELCR - Excess Lifetime Cancer Risk
Risk calculations are documented in Appendix C (Adjacent) and Appendix D (North)

TABLE 5-2
TOTAL SITE RISK - RME
FORMER ANACONDA WIRE AND CABLE COMPANY

Exposure Point	Receptor Scenario	Exposure Medium	Exposure Route	Hazard Index	ELCR
Fish Tissue - Site (Adjacent)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	2.4	4.E-05
Fish Tissue - Background (North)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	2.0	3.E-05
Fish Tissue - Incremental (Site - Background)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	0.5	7.E-06
Crab Tissue - Site (Adjacent)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.6	8.E-06
Crab Tissue - Background (North)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.2	3.E-06
Crab Tissue - Incremental (Site - Background)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.4	6.E-06

Notes:
ELCR - Excess Lifetime Cancer Risk
Risk calculations are documented in Appendix C (Adjacent) and Appendix D (North)

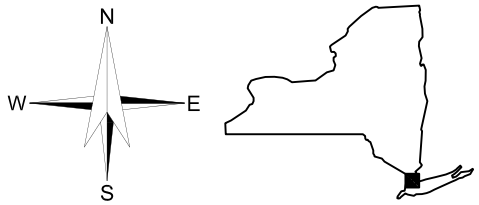
TABLE 5-3
TOTAL SITE RISK - UPPER-BOUND
FORMER ANACONDA WIRE AND CABLE COMPANY

Exposure Point	Receptor Scenario	Exposure Medium	Exposure Route	Hazard Index	ELCR
Fish Tissue - Site (Adjacent)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	7.5	1.E-04
Fish Tissue - Background (North)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	6.1	9.E-05
Fish Tissue - Incremental (Site - Background)	Recreational Angler - child, adolescent & adult	Fish Tissue	Incidental Ingestion	1	2.E-05
Crab Tissue - Site (Adjacent)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	1.0	2.E-05
Crab Tissue - Background (North)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.4	5.E-06
Crab Tissue - Incremental (Site - Background)	Recreational Angler - child, adolescent & adult	Crab Tissue	Incidental Ingestion	0.7	1.E-05

Notes:
ELCR - Excess Lifetime Cancer Risk
Risk calculations are documented in Appendix C (Adjacent) and Appendix D (North)

FIGURES

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

SCALE: 1:24000
MAY 2011

FIGURE 1-1

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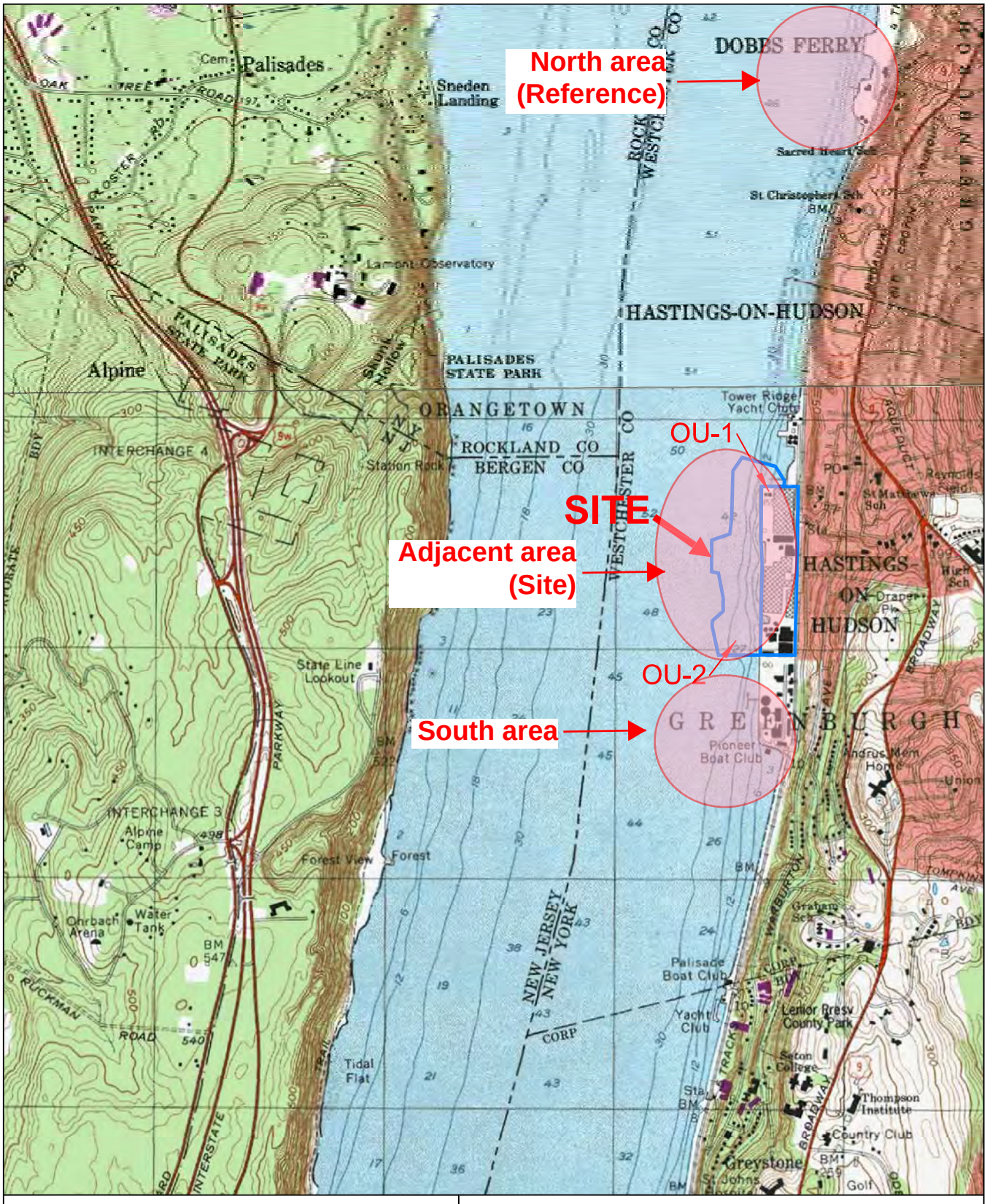
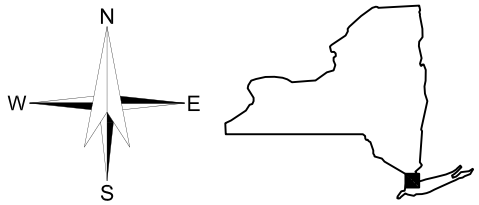


SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

STUDY AREA

SCALE: 1:24000
SEPTEMBER 2015

FIGURE 2-1

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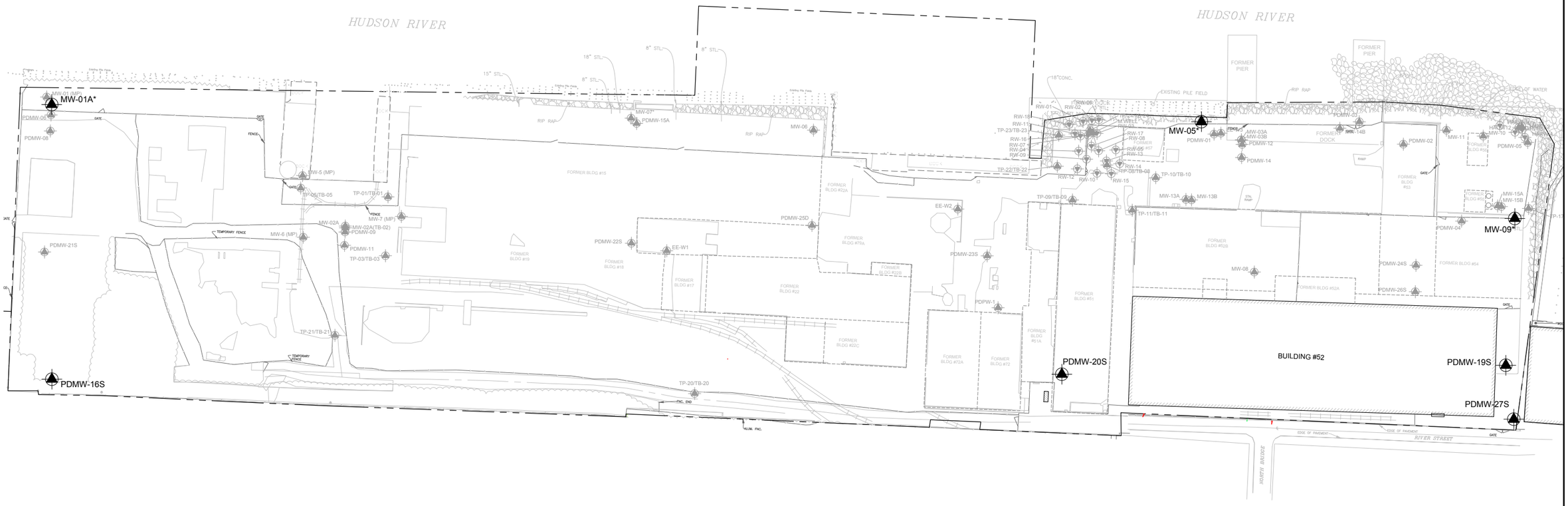


LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- RIP-RAP
- PDI SAMPLING WELL LOCATION
- EXISTING MONITORING WELL
- RECOVERY WELL

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

N

0 50 100 150 200

SCALE IN FEET

HALEY ALDRICH

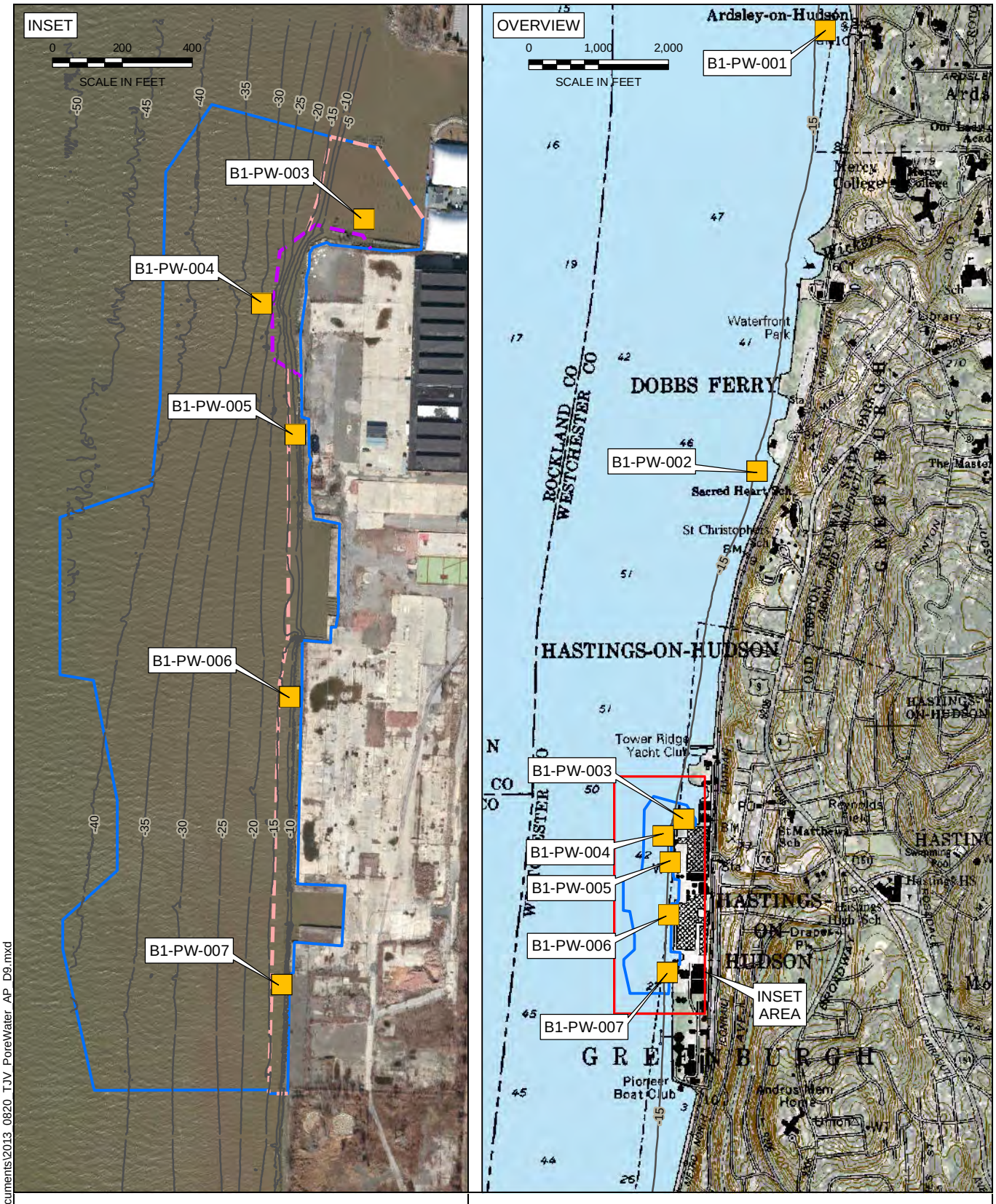
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YOR

GROUNDWATER SAMPLING LOCATION PLAN

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 2-2

POSTOLOWSKI, KEVIN Printed: 8/3/2015 3:15 PM Layout: FIG 3.2B
\\DTR\COMMON\28612_HASTINGS\293\CAD\28612-293-0010 2006 OU1 SAMPLING.DWG



POREWATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - POREWATER

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 2-3

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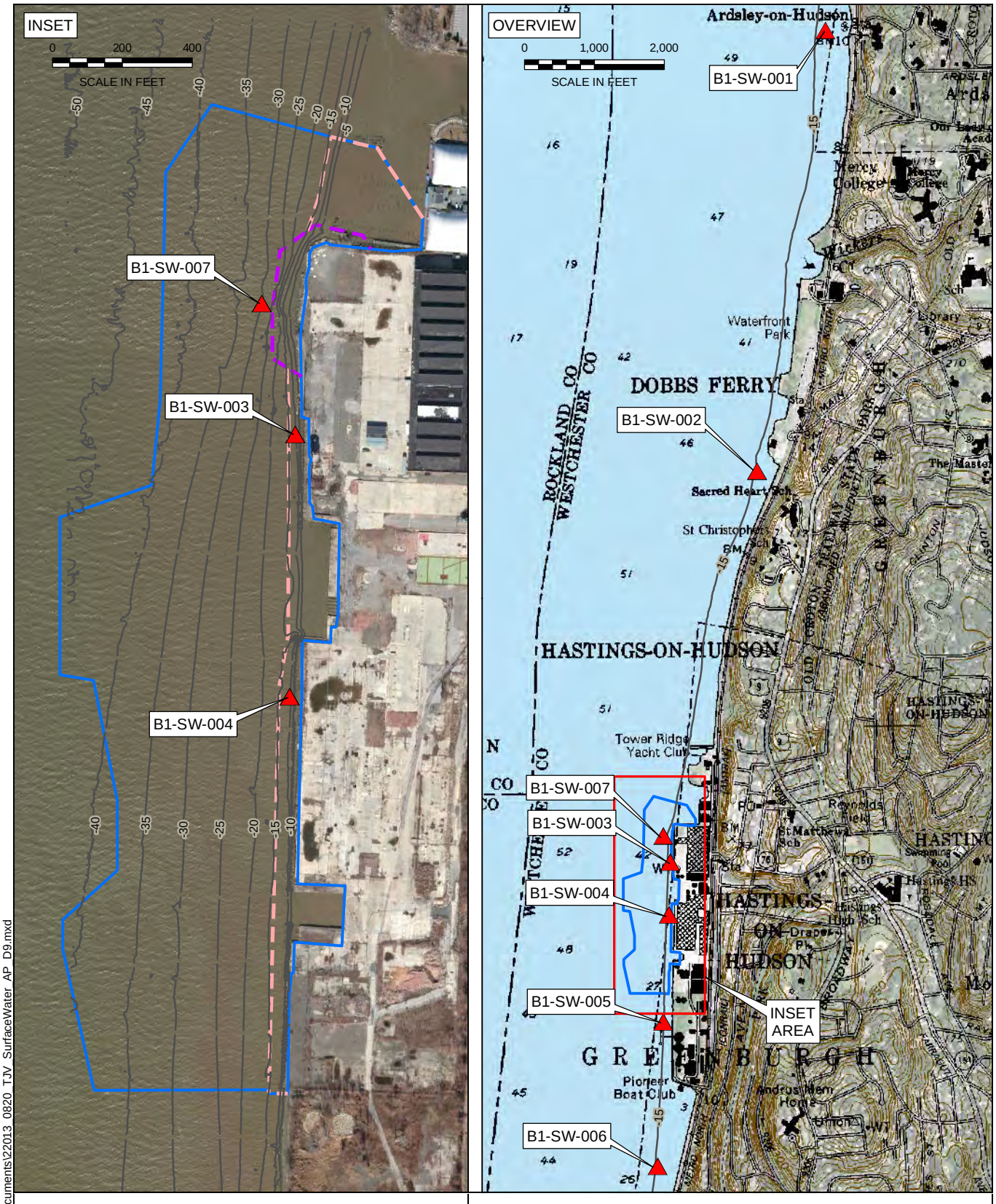

SURFACE WATER SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

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1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINE SAMPLING AND ANALYSIS PLAN - SURFACE WATER

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 2-4

G:\Projects\28612\Global\GIS\Map Documents\22013_0820_TJV_SurfaceWater_AP_D9.mxd

EB-06
EB-08
EB-09
EB-38
EB-07
VC-136
VC-141
VC-104
VC-128
VC-105
VC-109
VC-131
VC-114
VC-110
VC-138
VC-139
VC-120
GB-17
GB-14
VC-101
EB-10
VC-127
VC-108
VC-130
EB-13
CS-37
CS-47
CS-42
CS-45
EB-30
VC-113
VC-111
VC-137
VC-140
VC-132
VC-119
GB-16
CS-41
CS-36
EB-24
GB-13
VC-112
VC-106
VC-129
CS-29
EB-12
VC-107
CS-46
CS-44
EB-27
GB-12
CS-28
CS-48
CS-31
SHEET 1
SHEET 2
EB-28
VC-422
GB-15
RB-24
EB-03
VC-420
RB-26
VC-421
RB-25
VC-419
VC-418
SD03-CS
VC-417
CS-35
EB-25
VC-409
CS-32
CS-27
VC-416
EB-31
VC-415
VC-414
VC-413
VC-412
VC-411
BS-05
VC-408
VC-407
BS-07
CS-43
SD03-GB
CS-40
EB-26
CS-33
VC-410
RB-31
RB-32
SD-01
RB-33
CS-34
CS-30
VC-406
VC-405
VC-404
VC-403
SD-02
BS-06
CS-39
VC-605
CS-26
VC-604
VC-603
CS-38
SD-03

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200
SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 2-5
SHEET 1 OF 3

AUGUST 2015

GIS FILE PATH: G:\Projects\28612\Global\GIS\Map Documents\APP 6\2015_0716_TJV_Fig3-6I_PCBNS00-05Sediment_BL_D1.mxd — USER: mclancy — LAST SAVED: 8/6/2015 4:06:23 PM

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SHEET 1

SHEET 2

SHEET 2

SHEET 3

LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- DECISION UNIT
- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

NOTES

1. IMAGERY COURTESY OF THE NEW YORK STATE GIS CLEARINGHOUSE, 2013.

N

0 100 200

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER - PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 2-5
SHEET 2 OF 3

AUGUST 2015

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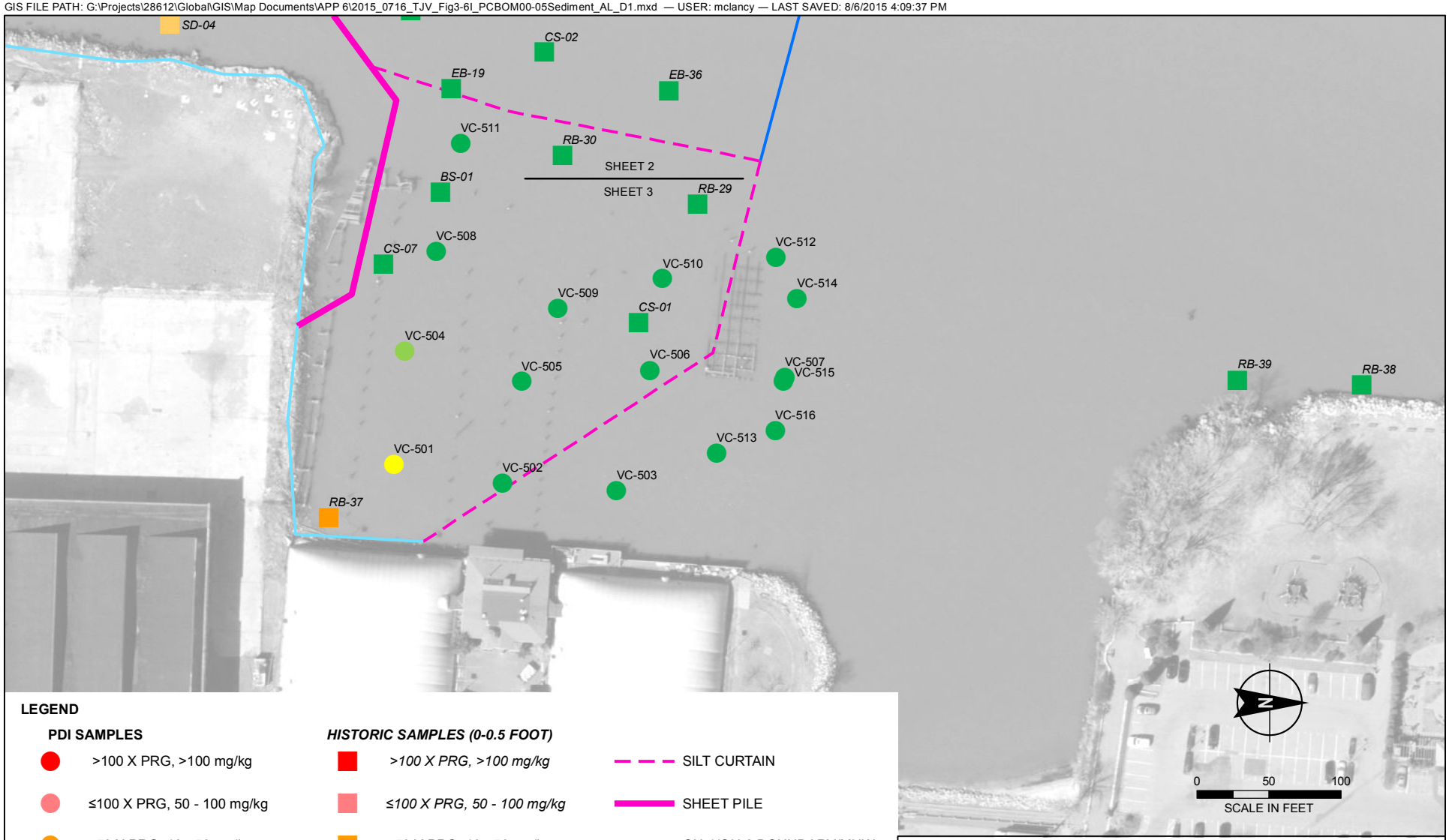


LEGEND

PDI SAMPLES

- >100 X PRG, >100 mg/kg
- ≤100 X PRG, 50 - 100 mg/kg
- ≤50 X PRG, 10 - 50 mg/kg
- ≤10 X PRG, 5 - 10 mg/kg
- ≤5 X PRG, 2 - 5 mg/kg
- ≤2 X PRG, 1 - 2 mg/kg
- BACKGROUND (PRG), 0-1 mg/kg

HISTORIC SAMPLES (0-0.5 FOOT)

- *>100 X PRG, >100 mg/kg*
- *≤100 X PRG, 50 - 100 mg/kg*
- *≤50 X PRG, 10 - 50 mg/kg*
- *≤10 X PRG, 5 - 10 mg/kg*
- *≤5 X PRG, 2 - 5 mg/kg*
- *≤2 X PRG, 1 - 2 mg/kg*
- *BACKGROUND (PRG), 0-1 mg/kg*

- SILT CURTAIN
- SHEET PILE
- OU-1/OU-2 BOUNDARY/MHW
- OU-2 LIMITS

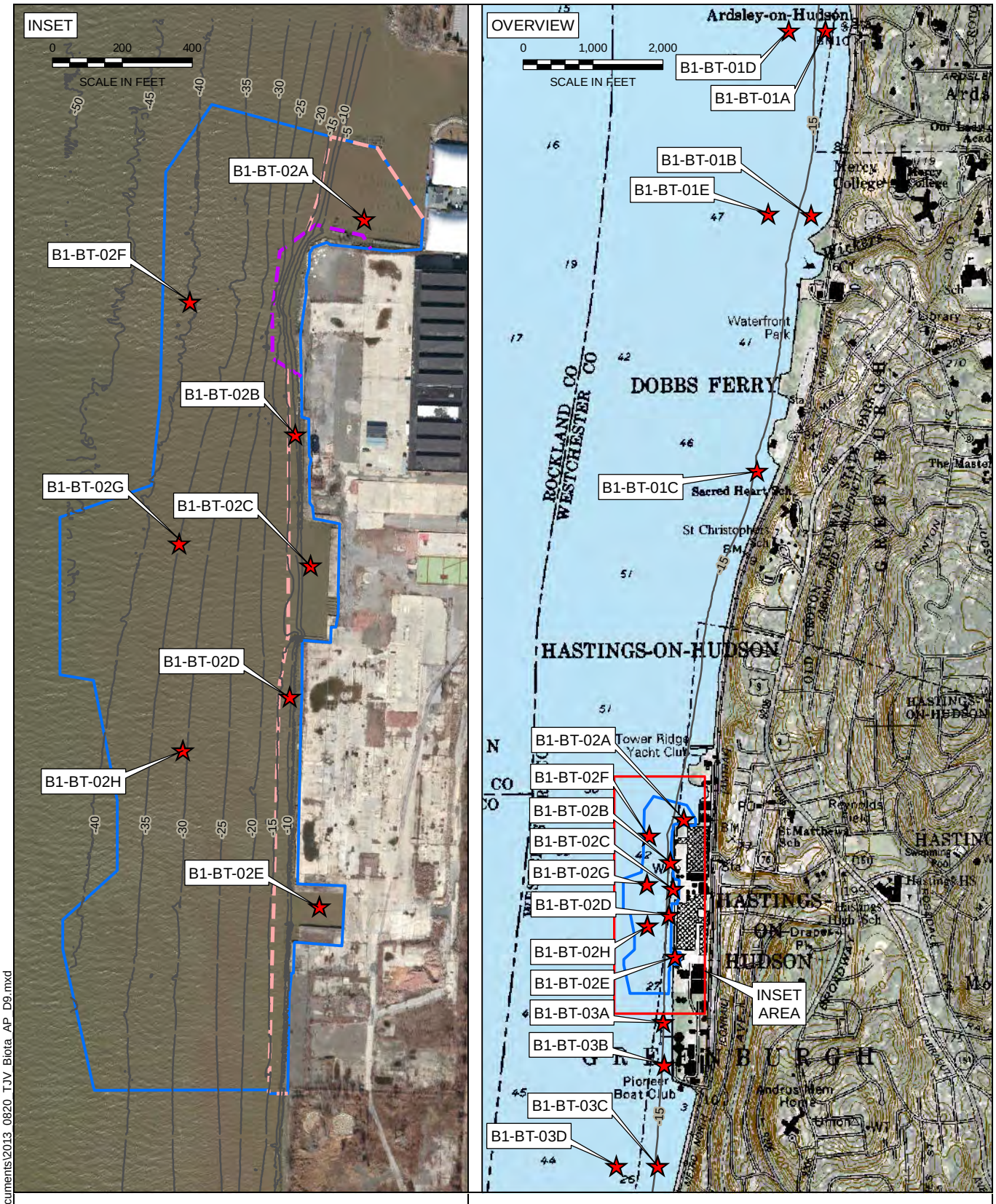
HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

NEARSHORE & BACKWATER- PDI PCB RESULTS - SURFACE TO 0.5 FOOT

FIGURE 2-5
SHEET 3 OF 3

AUGUST 2015



FISH AND SHELLFISH SAMPLE LOCATION

BATHYMETRIC CONTOUR

SILT CURTAIN

NORTHWEST EXTENSION

OU-2 BOUNDARY

NOTES:
1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

HALEY & ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

BASELINESAMPLING AND ANALYSIS PLAN - FISH AND SHELLFISH

SCALE: AS SHOWN
SEPTEMBER 2015

FIGURE 2-6

G:\Projects\28612\Global\GIS\Map Documents\2013_0820_TJV_Biota_AP_D9.mxd

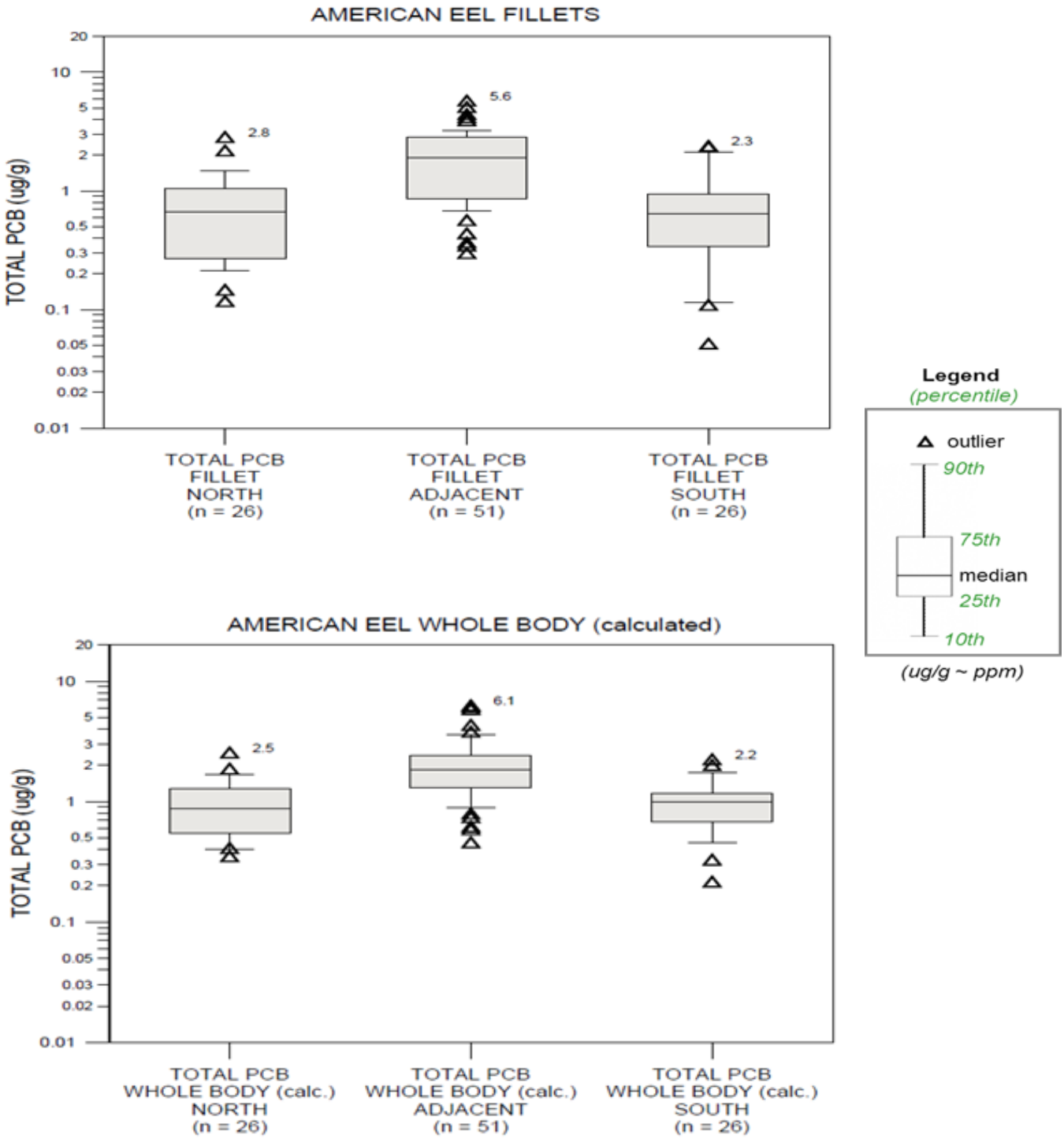


Figure 3-1
Statistical Summary of PCB Concentrations in American Eel

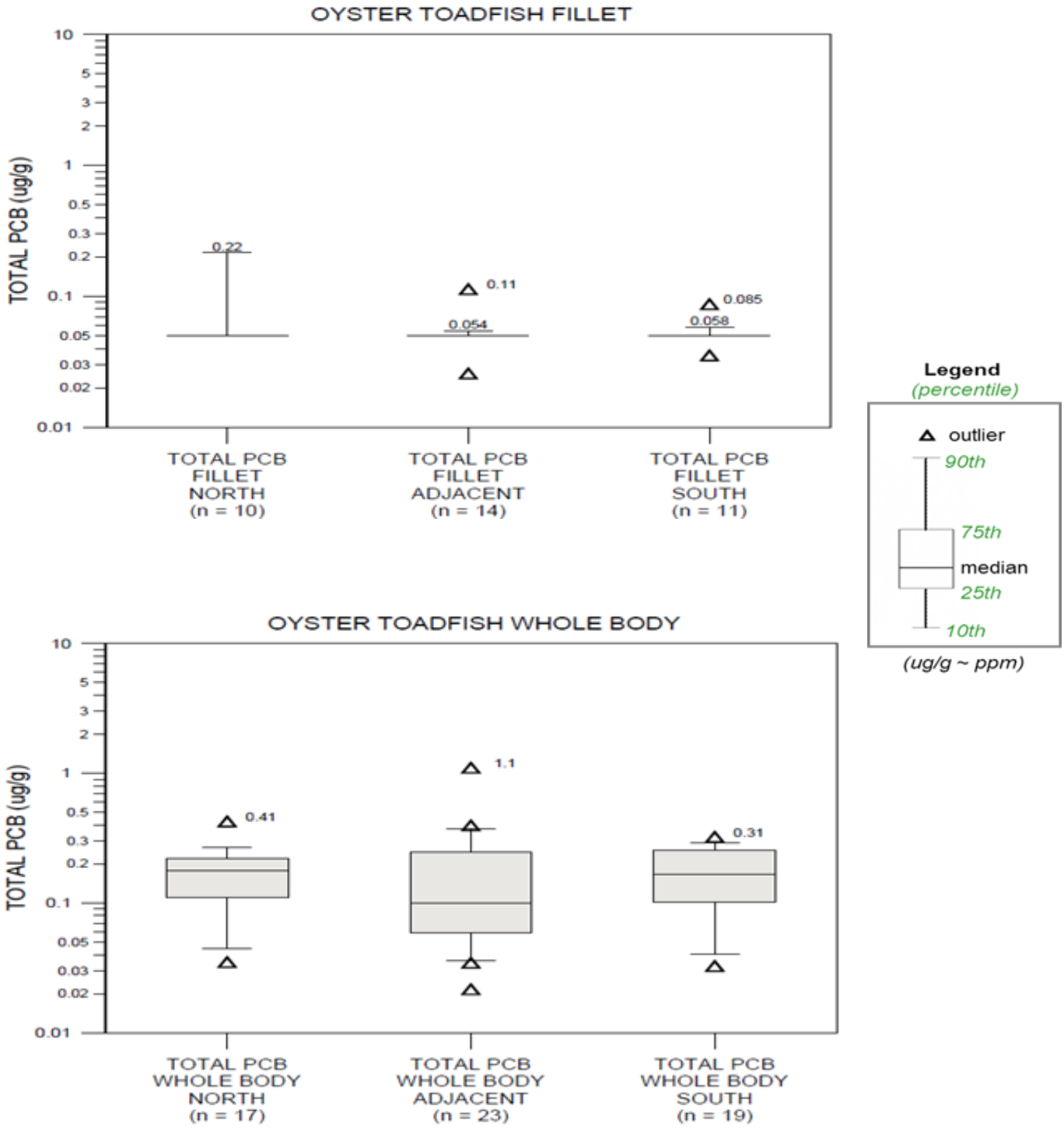


Figure 3-2
Statistical Summary of PCB Concentrations in Oyster Toadfish

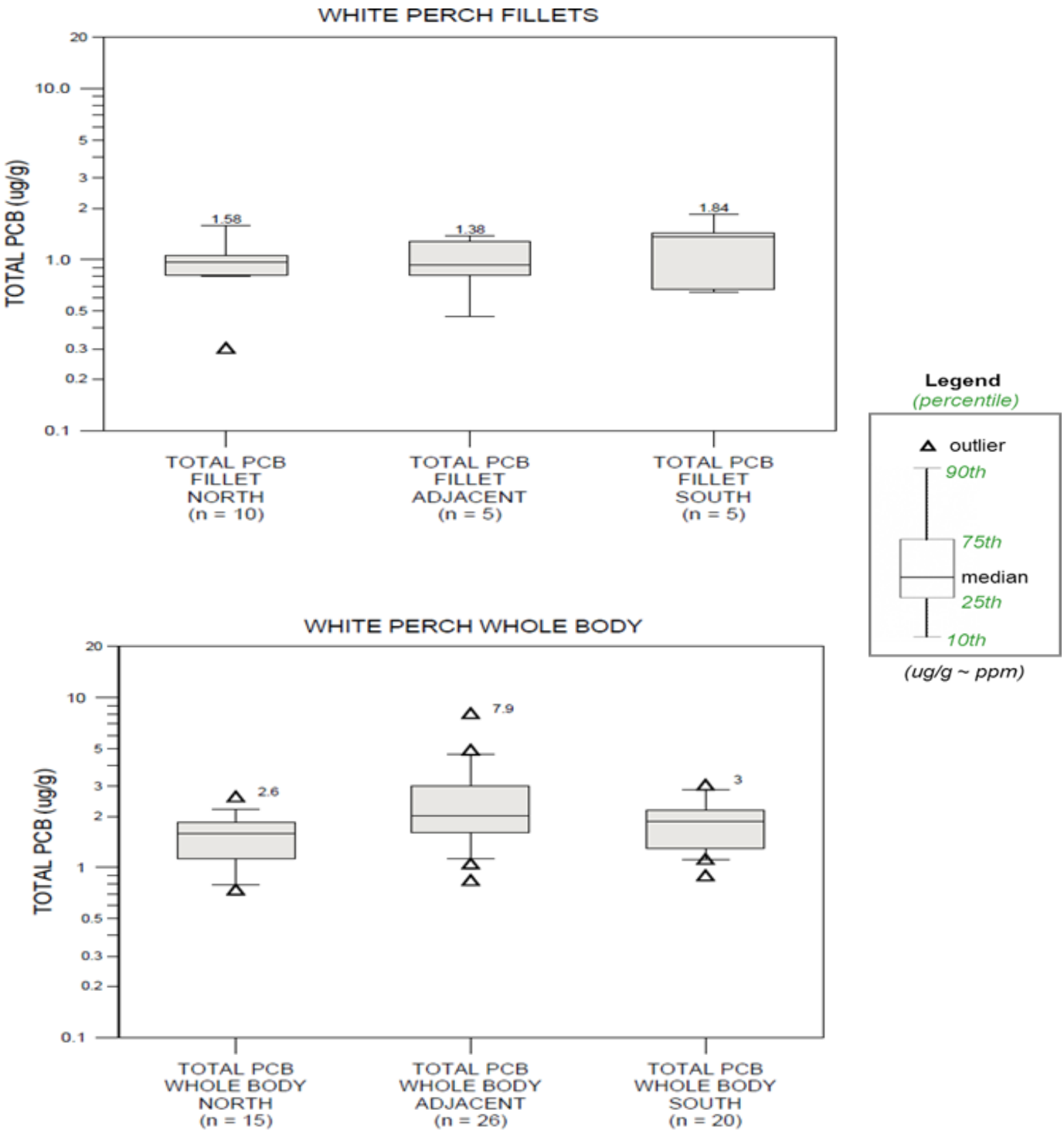


Figure 3-3
Statistical Summary of PCB Concentrations in White Perch

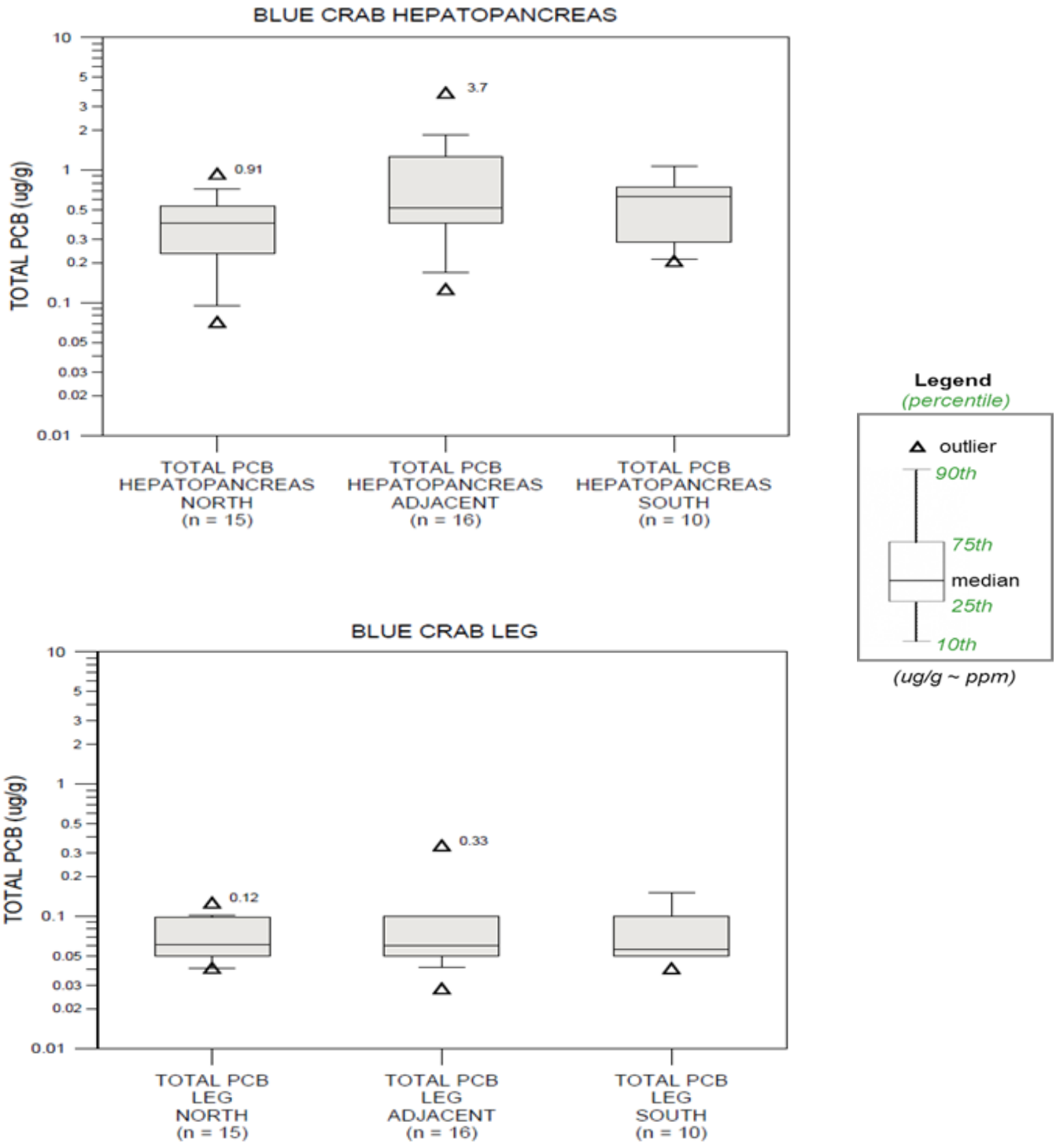


Figure 3-4
Statistical Summary of PCB Concentrations in Blue Crab

APPENDIX A

ANALYTICAL DATA USED IN RICK ASSESSMENTS

Client ID	Parent Sample ID	Location ID	Date Sampled	Species	Field Weight	Field Length	Lab Process	Comment	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL
NORTH - 2013																		
2242-092013-0845	AMEL-BT01A-002	1A	9/20/2013	American Eel	360	56.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.144	0.154	ND (0.05)	0.508	ND (0.05)	0.806
2242-092013-0846	AMEL-BT01A-003	1A	9/20/2013	American Eel	724	71.5	Fillet	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.718	0.92	ND (0.1)	1.12	ND (0.1)	2.758
2242-092013-0900	AMEL-BT01B-004	1B	9/20/2013	American Eel	215	50.3	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.142	ND (0.05)	0.142
2242-092313-1030	AMEL-BT01B-005	1B	9/23/2013	American Eel	225	50	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.266	0.457	ND (0.05)	0.622	ND (0.05)	1.345
2242-092313-1031	AMEL-BT01B-006	1B	9/23/2013	American Eel	256	53	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.114	ND (0.05)	0.114
2242-091913-1514	AMEL-BT01C-001	1C	9/19/2013	American Eel	219	48	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0987	0.0631	ND (0.05)	0.27	ND (0.05)	0.432
2242-092013-1109	AMEL-BT01D-004	1D	9/20/2013	American Eel	232	49.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0495	ND (0.05)	0.182	ND (0.05)	0.232
2242-092013-1350	AMEL-BT01D-005	1D	9/20/2013	American Eel	246	58	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.191	0.189	ND (0.05)	0.519	ND (0.05)	0.899
2242-092013-0915	AMEL-BT01E-002	1E	9/20/2013	American Eel	308	54.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.21	0.329	ND (0.05)	0.556	ND (0.05)	1.095
2242-092013-0916	AMEL-BT01E-001	1E	9/20/2013	American Eel	603.5	67.5	Fillet	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.567	0.532	ND (0.1)	1.02	ND (0.1)	2.119
2242-092013-0918	AMEL-BT01E-003	1E	9/20/2013	American Eel	395	58.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.114	0.127	ND (0.05)	0.373	ND (0.05)	0.614
NORTH - 2014																		
4117-091914-1212	AMEL-BT01A-001	1A	9/19/2014	American eel	167	48	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0474	ND (0.05)	0.594	ND (0.05)	0.6414
4117-092514-1114	AMEL-BT01A-002	1A	9/25/2014	American eel	415	60	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.378	ND (0.05)	0.49	ND (0.05)	0.868
4117-091714-1612	AMEL-BT01B-001	1B	9/17/2014	American eel	206	49	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.268	ND (0.05)	0.268
4117-092614-1023	AMEL-BT01B-002	1B	9/26/2014	American eel	156	46	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.099	ND (0.05)	0.315	ND (0.05)	0.414
4117-092614-1024	AMEL-BT01B-003	1B	9/26/2014	American eel	317	51	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.702	ND (0.05)	0.783	ND (0.05)	1.485
4117-091714-1616	AMEL-BT01C-001	1C	9/17/2014	American eel	327	56	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.211	ND (0.05)	0.211
4117-091814-1333	AMEL-BT01C-002	1C	9/18/2014	American eel	236	54	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.322	ND (0.05)	0.722	ND (0.05)	1.044
4117-092414-1650	AMEL-BT01C-003	1C	9/24/2014	American eel	287	56	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.264	ND (0.05)	0.657	ND (0.05)	0.921
4117-092414-1652	AMEL-BT01C-005	1C	9/24/2014	American eel	271	55	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0325	ND (0.05)	0.183	ND (0.05)	0.2155
4117-091814-1336	AMEL-BT01D-002	1D	9/18/2014	American eel	138	45	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0717	ND (0.05)	0.242	ND (0.05)	0.3137
4117-091814-1337	AMEL-BT01D-003	1D	9/18/2014	American eel	96	43	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0528	ND (0.05)	0.202	ND (0.05)	0.2548
4117-091814-1338	AMEL-BT01D-004	1D	9/18/2014	American eel	109	41	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.263	ND (0.05)	0.498	ND (0.05)	0.761
4117-091814-1339	AMEL-BT01D-005	1D	9/18/2014	American eel	163	47	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0542	ND (0.05)	0.243	ND (0.05)	0.2972
4117-091914-1218	AMEL-BT01E-001	1E	9/19/2014	American eel	213	52	Fillet	Head wound	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.747	ND (0.05)	0.712	ND (0.05)	1.459
4117-092314-1612	AMEL-BT01E-002	1E	9/23/2014	American eel	198	49	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.242	ND (0.05)	0.454	ND (0.05)	0.696
ADJACENT - 2013																		
2242-091813-1145	AMEL-BT02A-006	2A	9/18/2013	American Eel	534	66.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.69	0.879	ND (0.05)	1.3	ND (0.05)	2.869
2242-091813-1115	AMEL-BT02B-004	2B	9/18/2013	American Eel	52	29.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0521	ND (0.05)	0.237	ND (0.05)	0.289
2242-091813-1130	AMEL-BT02B-005	2B	9/18/2013	American Eel	656	66	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.129	0.081	ND (0.05)	0.585	ND (0.05)	0.795
2242-092413-1430	AMEL-BT02B-008	2B	9/24/2013	American Eel	217	49	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.86	ND (0.05)	1.860
2242-091813-1158	AMEL-BT02C-003	2C	9/18/2013	American Eel	563	60	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.237	0.232	ND (0.05)	1.85	ND (0.05)	2.319
2242-092513-1030	AMEL-BT02C-009	2C	9/25/2013	American Eel	82	36.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.133	0.173	ND (0.05)	0.37	ND (0.05)	0.676
2242-092513-1031	AMEL-BT02C-010	2C	9/25/2013	American Eel	155	47	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.311	0.472	ND (0.05)	1.83	ND (0.05)	2.613
2242-092313-1200	AMEL-BT02D-007	2D	9/23/2013	American Eel	96	40.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.114	0.124	ND (0.05)	0.66	ND (0.05)	0.898
2242-092513-1345	AMEL-BT02D-011	2D	9/25/2013	American Eel	260	49.6	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.417	0.766	ND (0.05)	1.7	ND (0.05)	2.883
2242-091813-1025	AMEL-BT02E-001	2E	9/18/2013	American Eel	418	61	Fillet	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.193	0.246	ND (0.1)	2.79	ND (0.1)	3.229
2242-091813-1026	AMEL-BT02E-002	2E	9/18/2013	American Eel	120	41	Fillet	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	1.95	ND (0.1)	2.98	ND (0.1)	4.930
2242-091913-1045	AMEL-BT02F-003	2F	9/19/2013	American Eel	217	51	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.158	ND (0.05)	0.267	ND (0.05)	0.425
2242-092513-0800	AMEL-BT02F-006	2F	9/25/2013	American Eel	115	44.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.43	0.651	ND (0.05)	0.881	ND (0.05)	1.962
2242-092513-0801	AMEL-BT02F-007	2F	9/25/2013	American Eel	114	40.8	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.167	0.233	ND (0.05)	0.456	ND (0.05)	0.856
2242-092513-0802	AMEL-BT02F-008	2F	9/25/2013	American Eel	98	39.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0819	0.163	ND (0.05)	0.304	ND (0.05)	0.549
2242-092513-0803	AMEL-BT02F-009	2F	9/25/2013	American Eel	150	44.6	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.308	0.487	ND (0.05)	0.763	ND (0.05)	1.558
2242-091913-1100	AMEL-BT02G-005	2G	9/19/2013	American Eel	104.5	39	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.475	ND (0.05)	0.807	ND (0.05)	1.282
2242-091913-1101	AMEL-BT02G-004	2G	9/19/2013	American Eel	178	45.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.751	ND (0.05)	1.37	ND (0.05)	2.121
2242-092513-0845	AMEL-BT02G-010	2G	9/25/2013	American Eel	125	42.3	Fillet	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.832	1.73	ND (0.15)	3.02	ND (0.15)	5.582
2242-092513-0846	AMEL-BT02G-011	2G	9/25/2013	American Eel	113	40.3	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0755	0.0775	ND (0.05)	0.182	ND (0.05)	0.335
2242-092513-0847	AMEL-BT02G-012	2G	9/25/2013	American Eel	99	40.2	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.117	0.19	ND (0.05)	0.511	ND (0.05)	0.818
2242-092513-0848	AMEL-BT02G-013	2G	9/25/2013	American Eel	94	41	Fillet	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.155	0.679	ND (0.15)	3.46	ND (0.15)	4.294
2242-091813-1535	AMEL-BT02H-002	2H	9/18/2013	American Eel	226	53	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.384	0.526	ND (0.05)	1.35	ND (0.05)	2.260
2242-091813-1536	AMEL-BT02H-001	2H	9/18/2013	American Eel	329	54	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.596	0.827	ND (0.05)	0.805	ND (0.05)	2.228
2242-092513-0900	AMEL-BT02H-014	2H	9/25/2013	American Eel	131	39.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.764	1.09	ND (0.05)	1.96	ND (0.05)	3.814
2242-092513-1330	AMEL-BT02H-015	2H	9/25/2013	American Eel	129	43.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.196	0.224	ND (0.05)	0.375	ND (0.05)	0.795
2242-092613-0931	AMEL-BT02H-016	2H	9/26/2013	American Eel	91	37.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.674	0.971	ND (0.05)	1.43	ND (0.05)	3.075

Client ID	Parent Sample ID	Location ID	Date Sampled	Species	Field Weight	Field Length	Lab Process	Comment	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL
ADJACENT - 2014																		
4117-092514-1115	AMEL-BT02A-001	2A	9/25/2014	American eel	157	43	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.76	ND (0.05)	0.906	ND (0.05)	1.666
4117-092514-1116	AMEL-BT02A-002	2A	9/25/2014	American eel	308	55	Fillet	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	0.841	ND (0.15)	3.2	ND (0.15)	4.041
4117-092614-1025	AMEL-BT02A-003	2A	9/26/2014	American eel	120	44	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.251	ND (0.05)	1.24	ND (0.05)	1.491
4117-092314-1154	AMEL-BT02B-001	2B	9/23/2014	American eel	108	39	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.549	ND (0.05)	1.23	ND (0.05)	1.779
4117-092314-1156	AMEL-BT02B-003	2B	9/23/2014	American eel	151	47	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0346	ND (0.05)	0.322	ND (0.05)	0.3566
4117-092314-1157	AMEL-BT02B-004	2B	9/23/2014	American eel	283	52	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.999	ND (0.05)	1.54	ND (0.05)	2.54
4117-091614-1233	AMEL-BT02C-001	2C	9/16/2014	American eel	360	58	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.366	ND (0.05)	1.6	ND (0.05)	1.966
4117-091614-1235	AMEL-BT02C-003	2C	9/16/2014	American eel	176	47	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.67	ND (0.05)	2.2	ND (0.05)	2.87
4117-091714-1311	AMEL-BT02C-004	2C	9/17/2014	American eel	176	49	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.684	ND (0.05)	0.684
4117-091614-1236	AMEL-BT02D-001	2D	9/16/2014	American eel	364	57	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.651	ND (0.05)	2.21	ND (0.05)	2.861
4117-092314-1202	AMEL-BT02D-002	2D	9/23/2014	American eel	136	43	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.352	ND (0.05)	1.21	ND (0.05)	1.562
4117-092414-1011	AMEL-BT02D-004	2D	9/24/2014	American eel	166	42	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.468	ND (0.05)	1.79	ND (0.05)	2.258
4117-091814-1618	AMEL-BT02E-002	2E	9/18/2014	American eel	310	56	Fillet	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.28	ND (0.1)	2.7	ND (0.1)	2.98
4117-091814-1619	AMEL-BT02E-003	2E	9/18/2014	American eel	293	46	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.209	ND (0.05)	1.38	ND (0.05)	1.589
4117-092314-1208	AMEL-BT02E-005	2E	9/23/2014	American eel	358	60	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.198	ND (0.05)	0.589	ND (0.05)	0.787
4117-091614-1231	AMEL-BT02F-001	2F	9/16/2014	American eel	169	45	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.27	ND (0.05)	1.95	ND (0.05)	3.22
4117-091714-1057	AMEL-BT02F-002	2F	9/17/2014	American eel	87	38	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.215	ND (0.05)	0.891	ND (0.05)	1.106
4117-091714-1059	AMEL-BT02F-004	2F	9/17/2014	American eel	216	48	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.436	ND (0.05)	1.12	ND (0.05)	1.556
4117-091614-1230	AMEL-BT02G-003	2G	9/16/2014	American eel	487	59	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.858	ND (0.05)	1.11	ND (0.05)	1.968
4117-091714-1050	AMEL-BT02G-004	2G	9/17/2014	American eel	209	48	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	1.16	ND (0.05)	1.18	ND (0.05)	2.34
4117-091714-1051	AMEL-BT02G-005	2G	9/17/2014	American eel	161	44	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.298	ND (0.05)	0.444	ND (0.05)	0.742
4117-091614-1225	AMEL-BT02H-003	2H	9/16/2014	American eel	539	68	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.51	ND (0.05)	1.41	ND (0.05)	1.92
4117-091614-1227	AMEL-BT02H-005	2H	9/16/2014	American eel	393	60	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.483	ND (0.05)	0.858	ND (0.05)	1.341
4117-091714-1048	AMEL-BT02H-006	2H	9/17/2014	American eel	372	59	Fillet	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	2.83	ND (0.1)	2.83
SOUTH - 2013																		
2242-091913-1000	AMEL-BT03A-003	3A	9/19/2013	American Eel	362	57.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.436	0.674	ND (0.05)	1.17	ND (0.05)	2.280
2242-091813-1600	AMEL-BT03B-001	3B	9/18/2013	American Eel	96	33	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.106	ND (0.05)	0.106
2242-091813-1602	AMEL-BT03B-002	3B	9/18/2013	American Eel	207	48	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.207	0.446	ND (0.05)	0.612	ND (0.05)	1.265
2242-091913-1015	AMEL-BT03B-004	3B	9/19/2013	American Eel	249.5	50.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.131	ND (0.05)	0.131
2242-091913-1031	AMEL-BT03B-005	3B	9/19/2013	American Eel	628	66.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.433	0.557	ND (0.05)	1.12	ND (0.05)	2.110
2242-092313-1220	AMEL-BT03B-006	3B	9/23/2013	American Eel	51	30.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.133	0.196	ND (0.05)	0.5	ND (0.05)	0.829
2242-092313-1230	AMEL-BT03C-007	3C	9/23/2013	American Eel	44	35.5	Fillet	Mouth/head wound	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.115	ND (0.05)	0.115
2242-091913-1210	AMEL-BT03D-001	3D	9/19/2013	American Eel	164	46.3	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.253	0.306	ND (0.05)	0.568	ND (0.05)	1.127
2242-091913-1211	AMEL-BT03D-003	3D	9/19/2013	American Eel	483	62.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.517	0.62	ND (0.05)	1.18	ND (0.05)	2.317
2242-091913-1218	AMEL-BT03D-002	3D	9/19/2013	American Eel	173	45	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.146	0.165	ND (0.05)	0.342	ND (0.05)	0.653
2242-092013-1255	AMEL-BT03D-004	3D	9/20/2013	American Eel	112	50.5	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092013-1256	AMEL-BT03D-005	3D	9/20/2013	American Eel	200	48.8	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0699	0.085	ND (0.05)	0.378	ND (0.05)	0.533
SOUTH - 2014																		
4117-091614-1036	AMEL-BT03A-002	3A	9/16/2014	American eel	799	70	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.503	ND (0.05)	0.727	ND (0.05)	1.23
4117-091714-0943	AMEL-BT03A-003	3A	9/17/2014	American eel	239	50	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.15	ND (0.05)	0.379	ND (0.05)	0.529
4117-092414-1249	AMEL-BT03A-005	3A	9/24/2014	American eel	264	52	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0493	ND (0.05)	0.294	ND (0.05)	0.3433
4117-091814-1016	AMEL-BT03B-003	3B	9/18/2014	American eel	179	46	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.157	ND (0.05)	0.431	ND (0.05)	0.588
4117-091914-1003	AMEL-BT03B-004	3B	9/19/2014	American eel	176	47	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.118	ND (0.05)	0.118
4117-092314-1418	AMEL-BT03B-005	3B	9/23/2014	American eel	137	45	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.238	ND (0.05)	0.238
4117-091814-1020	AMEL-BT03C-001	3C	9/18/2014	American eel	234	52	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.165	ND (0.05)	0.317	ND (0.05)	0.482
4117-091814-1022	AMEL-BT03C-003	3C	9/18/2014	American eel	139	44	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.322	ND (0.05)	0.612	ND (0.05)	0.934
4117-091814-1029	AMEL-BT03C-005	3C	9/18/2014	American eel	187	49	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.24	ND (0.05)	0.632	ND (0.05)	0.872
4117-091614-1026	AMEL-BT03D-001	3D	9/16/2014	American eel	153	45	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.255	ND (0.05)	0.535	ND (0.05)	0.79
4117-091614-1027	AMEL-BT03D-002	3D	9/16/2014	American eel	116	39	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.208	ND (0.05)	0.293	ND (0.05)	0.501
4117-091614-1028	AMEL-BT03D-003	3D	9/16/2014	American eel	147	44	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.169	ND (0.05)	0.456	ND (0.05)	0.625
4117-091614-1029	AMEL-BT03D-004	3D	9/16/2014	American eel	139	50	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.318	ND (0.05)	0.553	ND (0.05)	0.871
4117-091614-1030	AMEL-BT03D-005	3D	9/16/2014	American eel	173	47	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.187	ND (0.05)	0.733	ND (0.05)	0.92

CLIENTID	Parent Sample ID	Location ID	Date Sampled	Species	Field Weight	Field Length	Lab Process	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL
NORTH - 2013																	
2242-091913-1459	OYTD-BT01A-001	1A	9/19/2013	Oyster Toadfish	239	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1500	OYTD-BT01B-002	1B	9/19/2013	Oyster Toadfish	228	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1135	OYTD-BT01D-001	1D	9/19/2013	Oyster Toadfish	361	27	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1136	OYTD-BT01D-002	1D	9/19/2013	Oyster Toadfish	333	25	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1146	OYTD-BT01E-003	1E	9/19/2013	Oyster Toadfish	473	31	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.215	ND (0.05)	0.215
2242-092013-0843	OYTD-BT01A-004	1A	9/20/2013	Oyster Toadfish	389	27	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092013-0849	OYTD-BT01A-003	1A	9/20/2013	Oyster Toadfish	253	25	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092013-0909	OYTD-BT01B-005	1B	9/20/2013	Oyster Toadfish	200	21.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092013-0917	OYTD-BT01E-004	1E	9/20/2013	Oyster Toadfish	250	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092113-1040	OYTD-BT01E-005	1E	9/21/2013	Oyster Toadfish	262	23.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
ADJACENT - 2013																	
2242-091813-1139	OYTD-BT02B-001	2B	9/18/2013	Oyster Toadfish	125	18.3	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-0905	OYTD-BT02B-002	2B	9/19/2013	Oyster Toadfish	363	28	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.11	ND (0.05)	0.110
2242-092513-0815	OYTD-BT02B-003	2B	9/25/2013	Oyster Toadfish	397	27.3	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092513-1025	OYTD-BT02D-004	2D	9/25/2013	Oyster Toadfish	140	20	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092613-0835	OYTD-BT02E-005	2E	9/26/2013	Oyster Toadfish	240	23.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092513-0810	OYTD-BT02F-006	2F	9/25/2013	Oyster Toadfish	175	20.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092113-1130	OYTD-BT02G-001	2G	9/21/2013	Oyster Toadfish	275	24	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092113-1135	OYTD-BT02G-002	2G	9/21/2013	Oyster Toadfish	425	27.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092413-0900	OYTD-BT02G-004	2G	9/24/2013	Oyster Toadfish	170	21.6	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092513-0835	OYTD-BT02G-007	2G	9/25/2013	Oyster Toadfish	320	28	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.025	ND (0.05)	0.025
2242-092513-0836	OYTD-BT02G-008	2G	9/25/2013	Oyster Toadfish	224	23	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0541	ND (0.05)	0.054
2242-092313-1240	OYTC-BT02H-003	2H	9/23/2013	Oyster Toadfish	181	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092413-0910	OYTD-BT02H-005	2H	9/24/2013	Oyster Toadfish	267	24.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092513-1331	OYTD-BT02H-009	2H	9/25/2013	Oyster Toadfish	253	24	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
SOUTH - 2013																	
2242-091913-1009	OYTD-BT03A-001	3A	9/19/2013	Oyster Toadfish	74	15	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1016	OYTD-BT03B-002	3B	9/19/2013	Oyster Toadfish	265	23	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1400	OYTD-BT03C-003	3C	9/19/2013	Oyster Toadfish	205	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1408	OYTD-BT03C-004	3C	9/19/2013	Oyster Toadfish	222	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092013-1030	OYTD-BT03C-005	3C	9/20/2013	Oyster Toadfish	198	23	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092113-0912	OYTD-BT03C-006	3C	9/21/2013	Oyster Toadfish	253	23	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091813-1219	OYTD-BT03D-001	3D	9/18/2013	Oyster Toadfish	383	26	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0845	ND (0.05)	0.085
2242-092013-1258	OYTD-BT03D-002	3D	9/20/2013	Oyster Toadfish	309	25	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092013-1305	OYTD-BT03D-003	3D	9/20/2013	Oyster Toadfish	140	19.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092313-1501	OYTD-BT03D-004	3D	9/23/2013	Oyster Toadfish	470	28.5	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0576	ND (0.05)	0.058
2242-092313-1502	OYTD-BT03D-005	3D	9/23/2013	Oyster Toadfish	181	22.3	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.0343	ND (0.05)	0.034

Client ID	Parent Sample ID	Location ID	Date Sampled	Species	Field Weight	Field Length	Lab Process	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL
NORTH - 2014																	
4117-091814-1325	WP-BT01A-001	1A	9/18/2014	White perch	158	22	CALC_Fillet										0.298
4117-091814-1326	WP-BT01A-002	1A	9/18/2014	White perch	113	19	CALC_Fillet										1.013
4117-091814-1327	WP-BT01A-003	1A	9/18/2014	White perch	162	22	CALC_Fillet										0.823
4117-091814-1328	WP-BT01A-004	1A	9/18/2014	White perch	132	20	CALC_Fillet										0.803
4117-091814-1329	WP-BT01A-005	1A	9/18/2014	White perch	95	18	CALC_Fillet										1.582
4117-092314-1618	WP-BT01A-006	1A	9/23/2014	White perch	118	20	CALC_Fillet										1.059
4117-092314-1619	WP-BT01A-007	1A	9/23/2014	White perch	85	18	CALC_Fillet										0.968
4117-092314-1620	WP-BT01A-008	1A	9/23/2014	White perch	88	18	CALC_Fillet										0.816
4117-092514-1530	WP-BT01B-001	1B	9/25/2014	White perch	98	19	CALC_Fillet										0.964
4117-092514-1416	WP-BT01C-001	1C	9/25/2014	White perch	125	20	CALC_Fillet										1.228
ADJACENT - 2014																	
4117-092314-1627	WP-BT02C-005	2C	9/23/2014	White perch	78	18	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.453	0.348	ND (0.05)	0.575	ND (0.05)	1.376
4117-092414-1640	WP-BT02D-001	2D	9/24/2014	White perch	260	26	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.327	0.224	ND (0.05)	0.262	ND (0.05)	0.813
4117-092414-1643	WP-BT02D-004	2D	9/24/2014	White perch	79	18	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.358	0.286	ND (0.05)	0.285	ND (0.05)	0.929
4117-092514-1418	WP-BT02E-003	2E	9/25/2014	White perch	86	18	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.146	0.155	ND (0.05)	0.164	ND (0.05)	0.465
4117-092514-1420	WP-BT02E-005	2E	9/25/2014	White perch	159	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.443	0.405	ND (0.05)	0.428	ND (0.05)	1.276
SOUTH - 2014																	
4117-092414-1247	WP-BT03A-001	3A	9/24/2014	White perch	74	17	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.536	0.466	ND (0.05)	0.362	ND (0.05)	1.364
4117-092414-1248	WP-BT03A-002	3A	9/24/2014	White perch	92	18	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.437	0.509	ND (0.05)	0.486	ND (0.05)	1.432
4117-092514-1120	WP-BT03A-005	3A	9/25/2014	White perch	152	22	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.26	0.221	ND (0.05)	0.188	ND (0.05)	0.669
4117-091914-1503	WP-BT03C-004	3C	9/19/2014	White perch	160	21	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.583	0.781	ND (0.05)	0.48	ND (0.05)	1.844
4117-091914-1504	WP-BT03C-005	3C	9/19/2014	White perch	82	18	Fillet	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.243	0.24	ND (0.05)	0.164	ND (0.05)	0.647

CALC_FILLET: Total PCB concentration in fillet were calculated from whole body PCB concentrations using the following regression:
Fillet total PCB = 0.7269x-0.2808 (r^2 = 0.9154), where X is whole body total PCB concentration.
The regression was developed using the measured fillet and whole body total PCB concentrations in white perch collected from the Adjacent and South Areas (see Appendix A, Table 5).

CLIENTID	Parent Sample ID	Location ID	Date Sampled	Species	Field Weight	Field Length	Sex	Lab Process	Comment	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242
NORTH - 2013													
2242-091813-1440	BCRAB-BT01B-001	1B	9/18/2013	Blue Crab	164	13.4	M	Hepatopancreas	-	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
2242-091913-1138	BCRAB-BT01D-001	1D	9/19/2013	Blue Crab	223	18	-	Hepatopancreas	Only one claw - cull	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)
2242-091913-1450	BCRAB-BT01A-003	1A	9/19/2013	Blue Crab	130	14	-	Hepatopancreas	-	ND (0.094)	ND (0.094)	ND (0.094)	ND (0.094)
2242-091913-1458	BCRAB-BT01A-002	1A	9/19/2013	Blue Crab	205	15	M	Hepatopancreas	-	ND (0.132)	ND (0.132)	ND (0.132)	ND (0.132)
2242-091913-1516	BCRAB-BT01C-005	1C	9/19/2013	Blue Crab	75	11	-	Hepatopancreas	-	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)
2242-092113-1030	BCRAB-BT01D-002	1D	9/21/2013	Blue Crab	178	17	-	Hepatopancreas	-	ND (0.0696)	ND (0.0696)	ND (0.0696)	ND (0.0696)
2242-092313-1040	BCRAB-BT01E-004	1E	9/23/2013	Blue Crab	194	14.5	M	Hepatopancreas	-	ND (0.207)	ND (0.207)	ND (0.207)	ND (0.207)
2242-091813-1440	BCRAB-BT01B-001	1B	9/18/2013	Blue Crab	164	13.4	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1138	BCRAB-BT01D-001	1D	9/19/2013	Blue Crab	223	18	-	Leg	Only one claw - cull	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1450	BCRAB-BT01A-003	1A	9/19/2013	Blue Crab	130	14	-	Leg	-	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)
2242-091913-1458	BCRAB-BT01A-002	1A	9/19/2013	Blue Crab	205	15	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1516	BCRAB-BT01C-005	1C	9/19/2013	Blue Crab	75	11	-	Leg	-	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)
2242-092113-1030	BCRAB-BT01D-002	1D	9/21/2013	Blue Crab	178	17	-	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092313-1040	BCRAB-BT01E-004	1E	9/23/2013	Blue Crab	194	14.5	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
NORTH - 2014													
4117-091614-1610	BCRAB-BT01D-001	1D	9/16/2014	Blue crab	133	15	F	Hepatopancreas	-	ND (0.0541)	ND (0.0541)	ND (0.0541)	ND (0.0541)
4117-091714-1316	BCRAB-BT01E-002	1E	9/17/2014	Blue crab	142	14	M	Hepatopancreas	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091714-1615	BCRAB-BT01C-003	1C	9/17/2014	Blue crab	101	14	M	Hepatopancreas	-	ND (0.084)	ND (0.084)	ND (0.084)	ND (0.084)
4117-091814-1331	BCRAB-BT01B-002	1B	9/18/2014	Blue crab	188	14	M	Hepatopancreas	Missing 1 right leg	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)
4117-091814-1334	BCRAB-BT01C-004	1C	9/18/2014	Blue crab	139	14	M	Hepatopancreas	-	ND (0.0663)	ND (0.0663)	ND (0.0663)	ND (0.0663)
4117-091914-1210	BCRAB-BT01A-004	1A	9/19/2014	Blue crab	224	15	M	Hepatopancreas	Missing 1 right leg	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091914-1214	BCRAB-BT01B-005	1B	9/19/2014	Blue crab	113	14	M	Hepatopancreas	-	ND (0.0613)	ND (0.0613)	ND (0.0613)	ND (0.0613)
4117-091914-1219	BCRAB-BT01E-004	1E	9/19/2014	Blue crab	136	15	F	Hepatopancreas	Missing 2 right legs	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)
4117-091614-1610	BCRAB-BT01D-001	1D	9/16/2014	Blue crab	133	15	F	Leg	-	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)
4117-091714-1316	BCRAB-BT01E-002	1E	9/17/2014	Blue crab	142	14	M	Leg	-	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)
4117-091714-1615	BCRAB-BT01C-003	1C	9/17/2014	Blue crab	101	14	M	Leg	-	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)
4117-091814-1331	BCRAB-BT01B-002	1B	9/18/2014	Blue crab	188	14	M	Leg	Missing 1 right leg	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091814-1334	BCRAB-BT01C-004	1C	9/18/2014	Blue crab	139	14	M	Leg	-	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)
4117-091914-1210	BCRAB-BT01A-004	1A	9/19/2014	Blue crab	224	15	M	Leg	Missing 1 right leg	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091914-1214	BCRAB-BT01B-005	1B	9/19/2014	Blue crab	113	14	M	Leg	-	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)
4117-091914-1219	BCRAB-BT01E-004	1E	9/19/2014	Blue crab	136	15	F	Leg	Missing 2 right legs	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)
ADJACENT - 2013													
2242-091813-1118	BCRAB-BT02B-001	2B	9/18/2013	Blue Crab	215	16	M	Hepatopancreas	-	ND (0.103)	ND (0.103)	ND (0.103)	ND (0.103)
2242-091813-1150	BCRAB-BT02A-002	2A	9/18/2013	Blue Crab	211	15	0	Hepatopancreas	-	ND (0.205)	ND (0.205)	ND (0.205)	ND (0.205)
2242-091813-1350	BCRAB-BT02D-004	2B	9/18/2013	Blue Crab	178	14.2	M	Hepatopancreas	-	ND (0.247)	ND (0.247)	ND (0.247)	ND (0.247)
2242-091913-0930	BCRAB-BT02E-006	2E	9/19/2013	Blue Crab	180	15	-	Hepatopancreas	-	ND (0.163)	ND (0.163)	ND (0.163)	ND (0.163)
2242-092413-1435	BCRAB-BT02D-006	2D	9/24/2013	Blue Crab	53	10.5	F	Hepatopancreas	-	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)
2242-092513-0820	BCRAB-BT02B-008	2B	9/25/2013	Blue Crab	162	13.3	M	Hepatopancreas	-	ND (0.0975)	ND (0.0975)	ND (0.0975)	ND (0.0975)
2242-092513-1020	BCRAB-BT02E-009	2E	9/25/2013	Blue Crab	302	18.5	M	Hepatopancreas	-	ND (0.173)	ND (0.173)	ND (0.173)	ND (0.173)
2242-092613-1201	BCRAB-BT02E-010	2E	9/26/2013	Blue Crab	130	12.3	M	Hepatopancreas	-	ND (0.0914)	ND (0.0914)	ND (0.0914)	ND (0.0914)
2242-091813-1118	BCRAB-BT02B-001	2B	9/18/2013	Blue Crab	215	16	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091813-1150	BCRAB-BT02A-002	2A	9/18/2013	Blue Crab	211	15	0	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091813-1350	BCRAB-BT02D-004	2B	9/18/2013	Blue Crab	178	14.2	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-0930	BCRAB-BT02E-006	2E	9/19/2013	Blue Crab	180	15	-	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092413-1435	BCRAB-BT02D-006	2D	9/24/2013	Blue Crab	53	10.5	F	Leg	-	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)
2242-092513-0820	BCRAB-BT02B-008	2B	9/25/2013	Blue Crab	162	13.3	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092513-1020	BCRAB-BT02E-009	2E	9/25/2013	Blue Crab	302	18.5	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092613-1201	BCRAB-BT02E-010	2E	9/26/2013	Blue Crab	130	12.3	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

CLIENTID	Parent Sample ID	Location ID	Date Sampled	Species	Field Weight	Field Length	Sex	Lab Process	Comment	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242
ADJACENT - 2014													
4117-091714-1041	BCRAB-BT02D-001	2D	9/17/2014	Blue crab	162	14	M	Hepatopancreas	Missing 2 right legs	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091814-1611	BCRAB-BT02F-002	2F	9/18/2014	Blue crab	158	15	M	Hepatopancreas	-	ND (0.088)	ND (0.088)	ND (0.088)	ND (0.088)
4117-091814-1615	BCRAB-BT02H-002	2H	9/18/2014	Blue crab	138	14	M	Hepatopancreas	Missing right pincer, 1 left leg	ND (0.0793)	ND (0.0793)	ND (0.0793)	ND (0.0793)
4117-092314-1153	BCRAB-BT02A-001	2A	9/23/2014	Blue crab	125	15	F	Hepatopancreas	-	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)
4117-092314-1205	BCRAB-BT02E-005	2E	9/23/2014	Blue crab	199	15	M	Hepatopancreas	-	ND (0.0664)	ND (0.0664)	ND (0.0664)	ND (0.0664)
4117-092314-1621	BCRAB-BT02A-002	2A	9/23/2014	Blue crab	129	14	M	Hepatopancreas	Missing 2 right legs, 1 left leg	ND (0.107)	ND (0.107)	ND (0.107)	ND (0.107)
4117-092714-0822	BCRAB-BT02C-005	2C	9/27/2014	Blue crab	190	15	M	Hepatopancreas	-	ND (0.0755)	ND (0.0755)	ND (0.0755)	ND (0.0755)
4117-092714-0944	BCRAB-BT02G-003	2G	9/27/2014	Blue crab	184	15	M	Hepatopancreas	Missing right pincer, 2 right legs	ND (0.0667)	ND (0.0667)	ND (0.0667)	ND (0.0667)
4117-091714-1041	BCRAB-BT02D-001	2D	9/17/2014	Blue crab	162	14	M	Leg	Missing 2 right legs	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)
4117-091814-1611	BCRAB-BT02F-002	2F	9/18/2014	Blue crab	158	15	M	Leg	-	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
4117-091814-1615	BCRAB-BT02H-002	2H	9/18/2014	Blue crab	138	14	M	Leg	Missing right pincer, 1 left leg	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)
4117-092314-1153	BCRAB-BT02A-001	2A	9/23/2014	Blue crab	125	15	F	Leg	-	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)
4117-092314-1205	BCRAB-BT02E-005	2E	9/23/2014	Blue crab	199	15	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092314-1621	BCRAB-BT02A-002	2A	9/23/2014	Blue crab	129	14	M	Leg	Missing 2 right legs, 1 left leg	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)
4117-092714-0822	BCRAB-BT02C-005	2C	9/27/2014	Blue crab	190	15	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092714-0944	BCRAB-BT02G-003	2G	9/27/2014	Blue crab	184	15	M	Leg	Missing right pincer, 2 right legs	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)
SOUTH - 2013													
2242-091913-1409	BCRAB-BT03C-001	3C	9/19/2013	Blue Crab	136	13	M	Hepatopancreas	Missing one claw	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092313-1500	BCRAB-BT03D-001	3D	9/23/2013	Blue Crab	286	18.5	M	Hepatopancreas	-	ND (0.118)	ND (0.118)	ND (0.118)	ND (0.118)
2242-091913-1409	BCRAB-BT03C-001	3C	9/19/2013	Blue Crab	136	13	M	Leg	Missing one claw	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092313-1500	BCRAB-BT03D-001	3D	9/23/2013	Blue Crab	286	18.5	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
SOUTH - 2014													
4117-091614-1031	BCRAB-BT03D-001	3D	9/16/2014	Blue crab	162	14	M	Hepatopancreas	-	ND (0.083)	ND (0.083)	ND (0.083)	ND (0.083)
4117-091814-1014	BCRAB-BT03A-002	3A	9/18/2014	Blue crab	134	14	M	Hepatopancreas	Missing right pincer	ND (0.0694)	ND (0.0694)	ND (0.0694)	ND (0.0694)
4117-091814-1018	BCRAB-BT03C-003	3C	9/18/2014	Blue crab	95	14	F	Hepatopancreas	Soft shell, missing left pincer	ND (0.0848)	ND (0.0848)	ND (0.0848)	ND (0.0848)
4117-091814-1028	BCRAB-BT03D-002	3D	9/18/2014	Blue crab	181	14	M	Hepatopancreas	Missing right pincer, 1 right leg	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091914-1001	BCRAB-BT03B-002	3B	9/19/2014	Blue crab	140	14	M	Hepatopancreas	Missing 1 right leg	ND (0.0876)	ND (0.0876)	ND (0.0876)	ND (0.0876)
4117-092314-1416	BCRAB-BT03B-004	3B	9/23/2014	Blue crab	168	15	M	Hepatopancreas	Soft shell	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092414-1244	BCRAB-BT03A-005	3A	9/24/2014	Blue crab	122	12	M	Hepatopancreas	-	ND (0.0577)	ND (0.0577)	ND (0.0577)	ND (0.0577)
4117-092614-1021	BCRAB-BT03D-004	3D	9/26/2014	Blue crab	202	16	M	Hepatopancreas	-	ND (0.0679)	ND (0.0679)	ND (0.0679)	ND (0.0679)
4117-091614-1031	BCRAB-BT03D-001	3D	9/16/2014	Blue crab	162	14	M	Leg	-	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)
4117-091814-1014	BCRAB-BT03A-002	3A	9/18/2014	Blue crab	134	14	M	Leg	Missing right pincer	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)
4117-091814-1018	BCRAB-BT03C-003	3C	9/18/2014	Blue crab	95	14	F	Leg	Soft shell, missing left pincer	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)
4117-091814-1028	BCRAB-BT03D-002	3D	9/18/2014	Blue crab	181	14	M	Leg	Missing right pincer, 1 right leg	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091914-1001	BCRAB-BT03B-002	3B	9/19/2014	Blue crab	140	14	M	Leg	Missing 1 right leg	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)
4117-092314-1416	BCRAB-BT03B-004	3B	9/23/2014	Blue crab	168	15	M	Leg	Soft shell	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092414-1244	BCRAB-BT03A-005	3A	9/24/2014	Blue crab	122	12	M	Leg	-	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)
4117-092614-1021	BCRAB-BT03D-004	3D	9/26/2014	Blue crab	202	16	M	Leg	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

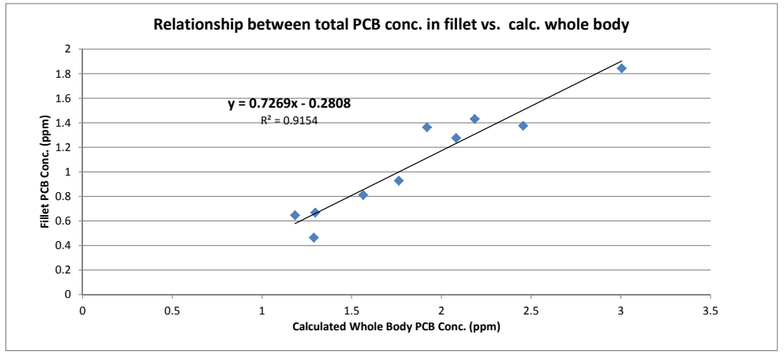
CLIENTID	Parent Sample ID	Location ID	Date Sampled	Species	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL
NORTH - 2013										
2242-091813-1440	BCRAB-BT01B-001	1B	9/18/2013	Blue Crab	ND (0.16)	ND (0.16)	ND (0.16)	0.912	ND (0.16)	0.912
2242-091913-1138	BCRAB-BT01D-001	1D	9/19/2013	Blue Crab	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)	ND (0.401)
2242-091913-1450	BCRAB-BT01A-003	1A	9/19/2013	Blue Crab	ND (0.094)	ND (0.094)	ND (0.094)	0.273	ND (0.094)	0.273
2242-091913-1458	BCRAB-BT01A-002	1A	9/19/2013	Blue Crab	ND (0.132)	ND (0.132)	ND (0.132)	0.459	ND (0.132)	0.459
2242-091913-1516	BCRAB-BT01C-005	1C	9/19/2013	Blue Crab	ND (0.103)	ND (0.103)	ND (0.103)	0.537	ND (0.103)	0.537
2242-092113-1030	BCRAB-BT01D-002	1D	9/21/2013	Blue Crab	0.134	0.0734	ND (0.0696)	0.413	ND (0.0696)	0.620
2242-092313-1040	BCRAB-BT01E-004	1E	9/23/2013	Blue Crab	ND (0.207)	ND (0.207)	ND (0.207)	0.723	ND (0.207)	0.723
2242-091813-1440	BCRAB-BT01B-001	1B	9/18/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1138	BCRAB-BT01D-001	1D	9/19/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1450	BCRAB-BT01A-003	1A	9/19/2013	Blue Crab	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)
2242-091913-1458	BCRAB-BT01A-002	1A	9/19/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-1516	BCRAB-BT01C-005	1C	9/19/2013	Blue Crab	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)	ND (0.0866)
2242-092113-1030	BCRAB-BT01D-002	1D	9/21/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092313-1040	BCRAB-BT01E-004	1E	9/23/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
NORTH - 2014										
4117-091614-1610	BCRAB-BT01D-001	1D	9/16/2014	Blue crab	ND (0.0541)	ND (0.0541)	ND (0.0541)	0.417	ND (0.0541)	0.417
4117-091714-1316	BCRAB-BT01E-002	1E	9/17/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.214	ND (0.05)	0.214
4117-091714-1615	BCRAB-BT01C-003	1C	9/17/2014	Blue crab	ND (0.084)	ND (0.084)	ND (0.084)	0.0951	ND (0.084)	0.0951
4117-091814-1331	BCRAB-BT01B-002	1B	9/18/2014	Blue crab	ND (0.0679)	ND (0.0679)	ND (0.0679)	0.233	ND (0.0679)	0.233
4117-091814-1334	BCRAB-BT01C-004	1C	9/18/2014	Blue crab	ND (0.0663)	ND (0.0663)	ND (0.0663)	0.507	ND (0.0663)	0.507
4117-091914-1210	BCRAB-BT01A-004	1A	9/19/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.269	ND (0.05)	0.269
4117-091914-1214	BCRAB-BT01B-005	1B	9/19/2014	Blue crab	ND (0.0613)	ND (0.0613)	ND (0.0613)	0.284	ND (0.0613)	0.284
4117-091914-1219	BCRAB-BT01E-004	1E	9/19/2014	Blue crab	ND (0.0605)	ND (0.0605)	ND (0.0605)	0.0696	ND (0.0605)	0.0696
4117-091614-1610	BCRAB-BT01D-001	1D	9/16/2014	Blue crab	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)	ND (0.0976)
4117-091714-1316	BCRAB-BT01E-002	1E	9/17/2014	Blue crab	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)	ND (0.0654)
4117-091714-1615	BCRAB-BT01C-003	1C	9/17/2014	Blue crab	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)	ND (0.123)
4117-091814-1331	BCRAB-BT01B-002	1B	9/18/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.0403	ND (0.05)	0.0403
4117-091814-1334	BCRAB-BT01C-004	1C	9/18/2014	Blue crab	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)	ND (0.0605)
4117-091914-1210	BCRAB-BT01A-004	1A	9/19/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.0395	ND (0.05)	0.0395
4117-091914-1214	BCRAB-BT01B-005	1B	9/19/2014	Blue crab	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)	ND (0.0993)
4117-091914-1219	BCRAB-BT01E-004	1E	9/19/2014	Blue crab	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)	ND (0.0969)
ADJACENT - 2013										
2242-091813-1118	BCRAB-BT02B-001	2B	9/18/2013	Blue Crab	ND (0.103)	ND (0.103)	ND (0.103)	1.85	ND (0.103)	1.850
2242-091813-1150	BCRAB-BT02A-002	2A	9/18/2013	Blue Crab	0.383	0.202	ND (0.205)	0.822	ND (0.205)	1.407
2242-091813-1350	BCRAB-BT02D-004	2B	9/18/2013	Blue Crab	ND (0.247)	ND (0.247)	ND (0.247)	0.663	ND (0.247)	0.663
2242-091913-0930	BCRAB-BT02E-006	2E	9/19/2013	Blue Crab	ND (0.163)	ND (0.163)	ND (0.163)	0.522	ND (0.163)	0.522
2242-092413-1435	BCRAB-BT02D-006	2D	9/24/2013	Blue Crab	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)	ND (0.237)
2242-092513-0820	BCRAB-BT02B-008	2B	9/25/2013	Blue Crab	0.787	0.577	ND (0.0975)	2.36	ND (0.0975)	3.724
2242-092513-1020	BCRAB-BT02E-009	2E	9/25/2013	Blue Crab	ND (0.173)	ND (0.173)	ND (0.173)	1.19	ND (0.173)	1.190
2242-092613-1201	BCRAB-BT02E-010	2E	9/26/2013	Blue Crab	ND (0.0914)	ND (0.0914)	ND (0.0914)	1.27	ND (0.0914)	1.270
2242-091813-1118	BCRAB-BT02B-001	2B	9/18/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	0.0276	ND (0.05)	0.028
2242-091813-1150	BCRAB-BT02A-002	2A	9/18/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091813-1350	BCRAB-BT02D-004	2B	9/18/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-091913-0930	BCRAB-BT02E-006	2E	9/19/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	0.0413	ND (0.05)	0.041
2242-092413-1435	BCRAB-BT02D-006	2D	9/24/2013	Blue Crab	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)	ND (0.334)
2242-092513-0820	BCRAB-BT02B-008	2B	9/25/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	0.0927	ND (0.05)	0.093
2242-092513-1020	BCRAB-BT02E-009	2E	9/25/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092613-1201	BCRAB-BT02E-010	2E	9/26/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

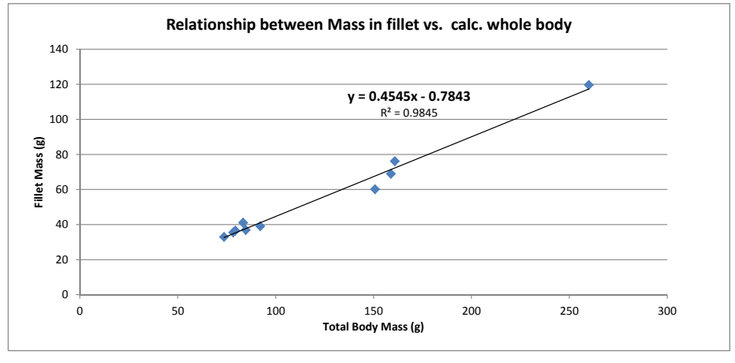
CLIENTID	Parent Sample ID	Location ID	Date Sampled	Species	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL
ADJACENT - 2014										
4117-091714-1041	BCRAB-BT02D-001	2D	9/17/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.424	ND (0.05)	0.424
4117-091814-1611	BCRAB-BT02F-002	2F	9/18/2014	Blue crab	ND (0.088)	ND (0.088)	ND (0.088)	0.123	ND (0.088)	0.123
4117-091814-1615	BCRAB-BT02H-002	2H	9/18/2014	Blue crab	ND (0.0793)	ND (0.0793)	ND (0.0793)	0.501	ND (0.0793)	0.501
4117-092314-1153	BCRAB-BT02A-001	2A	9/23/2014	Blue crab	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)	ND (0.169)
4117-092314-1205	BCRAB-BT02E-005	2E	9/23/2014	Blue crab	ND (0.0664)	ND (0.0664)	ND (0.0664)	0.521	ND (0.0664)	0.521
4117-092314-1621	BCRAB-BT02A-002	2A	9/23/2014	Blue crab	ND (0.107)	ND (0.107)	ND (0.107)	0.508	ND (0.107)	0.508
4117-092714-0822	BCRAB-BT02C-005	2C	9/27/2014	Blue crab	ND (0.0755)	ND (0.0755)	ND (0.0755)	0.396	ND (0.0755)	0.396
4117-092714-0944	BCRAB-BT02G-003	2G	9/27/2014	Blue crab	ND (0.0667)	ND (0.0667)	ND (0.0667)	0.331	ND (0.0667)	0.331
4117-091714-1041	BCRAB-BT02D-001	2D	9/17/2014	Blue crab	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)	ND (0.069)
4117-091814-1611	BCRAB-BT02F-002	2F	9/18/2014	Blue crab	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
4117-091814-1615	BCRAB-BT02H-002	2H	9/18/2014	Blue crab	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)	ND (0.0982)
4117-092314-1153	BCRAB-BT02A-001	2A	9/23/2014	Blue crab	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)	ND (0.0997)
4117-092314-1205	BCRAB-BT02E-005	2E	9/23/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092314-1621	BCRAB-BT02A-002	2A	9/23/2014	Blue crab	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)
4117-092714-0822	BCRAB-BT02C-005	2C	9/27/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092714-0944	BCRAB-BT02G-003	2G	9/27/2014	Blue crab	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)	ND (0.0946)
SOUTH - 2013										
2242-091913-1409	BCRAB-BT03C-001	3C	9/19/2013	Blue Crab	0.186	0.0527	ND (0.05)	0.537	ND (0.05)	0.776
2242-092313-1500	BCRAB-BT03D-001	3D	9/23/2013	Blue Crab	ND (0.118)	ND (0.118)	ND (0.118)	1.06	ND (0.118)	1.060
2242-091913-1409	BCRAB-BT03C-001	3C	9/19/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2242-092313-1500	BCRAB-BT03D-001	3D	9/23/2013	Blue Crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
SOUTH - 2014										
4117-091614-1031	BCRAB-BT03D-001	3D	9/16/2014	Blue crab	ND (0.083)	ND (0.083)	ND (0.083)	0.724	ND (0.083)	0.724
4117-091814-1014	BCRAB-BT03A-002	3A	9/18/2014	Blue crab	ND (0.0694)	ND (0.0694)	ND (0.0694)	0.709	ND (0.0694)	0.709
4117-091814-1018	BCRAB-BT03C-003	3C	9/18/2014	Blue crab	ND (0.0848)	ND (0.0848)	ND (0.0848)	0.213	ND (0.0848)	0.213
4117-091814-1028	BCRAB-BT03D-002	3D	9/18/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.201	ND (0.05)	0.201
4117-091914-1001	BCRAB-BT03B-002	3B	9/19/2014	Blue crab	ND (0.0876)	ND (0.0876)	ND (0.0876)	0.527	ND (0.0876)	0.527
4117-092314-1416	BCRAB-BT03B-004	3B	9/23/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.288	ND (0.05)	0.288
4117-092414-1244	BCRAB-BT03A-005	3A	9/24/2014	Blue crab	ND (0.0577)	ND (0.0577)	ND (0.0577)	0.557	ND (0.0577)	0.557
4117-092614-1021	BCRAB-BT03D-004	3D	9/26/2014	Blue crab	ND (0.0679)	ND (0.0679)	ND (0.0679)	0.746	ND (0.0679)	0.746
4117-091614-1031	BCRAB-BT03D-001	3D	9/16/2014	Blue crab	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)	ND (0.0614)
4117-091814-1014	BCRAB-BT03A-002	3A	9/18/2014	Blue crab	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)	ND (0.101)
4117-091814-1018	BCRAB-BT03C-003	3C	9/18/2014	Blue crab	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)	ND (0.151)
4117-091814-1028	BCRAB-BT03D-002	3D	9/18/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-091914-1001	BCRAB-BT03B-002	3B	9/19/2014	Blue crab	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)	ND (0.0987)
4117-092314-1416	BCRAB-BT03B-004	3B	9/23/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
4117-092414-1244	BCRAB-BT03A-005	3A	9/24/2014	Blue crab	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)	ND (0.0995)
4117-092614-1021	BCRAB-BT03D-004	3D	9/26/2014	Blue crab	ND (0.05)	ND (0.05)	ND (0.05)	0.0392	ND (0.05)	0.0392

TABLE A-5
REGRESSION ANALYSIS - WHITE PERCH FILLET VS. WHOLE BODY TOTAL PCB CONCENTRATIONS
FORMER ANACONDA WIRE AND CABLE COMPANY

Sample ID	Parent Sample ID	Location ID	Date Sampled	Time	Species	Field Weight	Field Length	Sex	Collected by	Lab Process	Comment	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB Amount > RL	Lipids	Total Mass (Pre Process)	Whole Body Mass	Fillet Mass	Offal Mass	Final Mass Available for Extraction	LRF
4117-092314-1627	WP-BT02C-005	2C	9/23/2014	0:00	White perch	78	18	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.453	0.348	ND (0.05)	0.575	ND (0.05)	**1.376**	2.85	78.3	-	35.6	-	36.7	15030220
4117-092414-1640	WP-BT02D-001	2D	9/24/2014	0:00	White perch	260	26	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.327	0.224	ND (0.05)	0.262	ND (0.05)	**0.813**	3.76	259.9	-	119.7	-	120.5	15030220
4117-092414-1643	WP-BT02D-004	2D	9/24/2014	0:00	White perch	79	18	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.358	0.286	ND (0.05)	0.285	ND (0.05)	**0.929**	3.16	79.4	-	36.6	-	35.3	15030220
4117-092514-1418	WP-BT02E-003	2E	9/25/2014	0:00	White perch	86	18	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.146	0.155	ND (0.05)	0.164	ND (0.05)	**0.465**	1.21	84.7	-	36.9	-	37.1	15030220
4117-092514-1420	WP-BT02E-005	2E	9/25/2014	0:00	White perch	159	22	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.443	0.405	ND (0.05)	0.428	ND (0.05)	**1.276**	4.43	158.8	-	69	-	69.5	15030220
4117-092414-1247	WP-BT03A-001	3A	9/24/2014	0:00	White perch	74	17	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.536	0.466	ND (0.05)	0.362	ND (0.05)	**1.364**	4.23	73.6	-	33	-	32.8	15030220
4117-092414-1248	WP-BT03A-002	3A	9/24/2014	0:00	White perch	92	18	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.437	0.509	ND (0.05)	0.486	ND (0.05)	**1.432**	4.59	92.1	-	39.1	-	41.7	15030220
4117-092514-1120	WP-BT03A-005	3A	9/25/2014	0:00	White perch	152	22	-	MJ/RR	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.26	0.221	ND (0.05)	0.188	ND (0.05)	**0.669**	2.72	150.7	-	60.2	-	62.4	15030220
4117-091914-1503	WP-BT03C-004	3C	9/19/2014	0:00	White perch	160	21	-	BC	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.583	0.781	ND (0.05)	0.48	ND (0.05)	**1.844**	4.96	160.8	-	76.2	-	76	15030220
4117-091914-1504	WP-BT03C-005	3C	9/19/2014	0:00	White perch	82	18	-	BC	Fillet	-	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.243	0.24	ND (0.05)	0.164	ND (0.05)	**0.647**	1.96	83.3	-	41.1	-	43.3	15030220

	Total PCB Concentration			LN PCB Concentration			Mass			Lipids
	Fillet	Offal	Calc. WB	Fillet	Offal	Calc. WB	Total Mass	Fillet	Offal	Fillet
4117-092314-1627	**1.376**	**4.07**	**2.455295019**	48.28	41.79	40.74	78.3	35.6	35.2	2.85
4117-092414-1640	**0.813**	**2.319**	**1.563827626**	21.62	20.52	20.48	259.9	119.7	133.3	3.76
4117-092414-1643	**0.929**	**2.73**	**1.762284635**	29.40	31.09	28.75	79.4	36.6	38.8	3.16
4117-092514-1418	**0.465**	**2.067**	**1.288547816**	38.43	40.61	38.08	84.7	36.9	44.5	1.21
4117-092514-1420	**1.276**	**2.94**	**2.081826196**	28.80	29.94	28.07	158.8	69	82.5	4.43
4117-092414-1247	**1.364**	**2.594**	**1.919149457**	32.25	32.26	30.72	73.6	33	37.1	4.23
4117-092414-1248	**1.432**	**3.172**	**2.18532899**	31.20	33.01	29.66	92.1	39.1	45.8	4.59
4117-092514-1120	**0.669**	**1.812**	**1.296489715**	24.60	25.06	24.06	150.7	60.2	85.6	2.72
4117-091914-1503	**1.844**	**4.37**	**3.004482587**	37.18	38.67	36.47	160.8	76.2	78.4	4.96
4117-091914-1504	**0.647**	**1.856**	**1.183727491**	33.01	32.50	31.43	83.3	41.1	38.8	1.96





APPENDIX B

UCL CALCULATIONS

American Eel ProUCL Output

	A	B	C	D	E	F	G	H	I	J	K	L
1	**UCL Statistics for Data Sets with Non-Detects**											
2												
3				User Selected Options								
4				Date/Time of Computation	5/5/2015 11:17:06 AM							
5				From File	Copy of Fish Master Data Table_a.xls							
6				Full Precision	OFF							
7				Confidence Coefficient	95%							
8				Number of Bootstrap Operations	2000							
9												
10	**Aroclor 1248 (adjacent)**											
11												
12	**General Statistics**											
13				Total Number of Observations	51			Number of Distinct Observations	24			
14				Number of Detects	21			Number of Non-Detects	30			
15				Number of Distinct Detects	21			Number of Distinct Non-Detects	3			
16				Minimum Detect	0.0755			Minimum Non-Detect	0.05			
17				Maximum Detect	0.832			Maximum Non-Detect	0.15			
18				Variance Detects	0.059			Percent Non-Detects	58.82%			
19				Mean Detects	0.334			SD Detects	0.243			
20				Median Detects	0.237			CV Detects	0.728			
21				Skewness Detects	0.852			Kurtosis Detects	-0.609			
22				Mean of Logged Detects	-1.362			SD of Logged Detects	0.759			
23												
24	**Normal GOF Test on Detects Only**											
25				Shapiro Wilk Test Statistic	0.869			**Shapiro Wilk GOF Test**				
26				5% Shapiro Wilk Critical Value	0.908			Detected Data Not Normal at 5% Significance Level				
27				Lilliefors Test Statistic	0.191			**Lilliefors GOF Test**				
28				5% Lilliefors Critical Value	0.193			Detected Data appear Normal at 5% Significance Level				
29	**Detected Data appear Approximate Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32				Mean	0.167			Standard Error of Mean	0.0296			
33				SD	0.206			95% KM (BCA) UCL	0.217			
34				95% KM (t) UCL	0.217			95% KM (Percentile Bootstrap) UCL	0.218			
35				95% KM (z) UCL	0.216			95% KM Bootstrap t UCL	0.233			
36				90% KM Chebyshev UCL	0.256			95% KM Chebyshev UCL	0.296			
37				97.5% KM Chebyshev UCL	0.352			99% KM Chebyshev UCL	0.462			
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40				A-D Test Statistic	0.521			**Anderson-Darling GOF Test**				
41				5% A-D Critical Value	0.754			Detected data appear Gamma Distributed at 5% Significance Level				
42				K-S Test Statistic	0.152			**Kolmogrov-Smirnoff GOF**				
43				5% K-S Critical Value	0.192			Detected data appear Gamma Distributed at 5% Significance Level				
44	**Detected data appear Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47				k hat (MLE)	2.047			k star (bias corrected MLE)	1.787			
48				Theta hat (MLE)	0.163			Theta star (bias corrected MLE)	0.187			
49				nu hat (MLE)	85.99			nu star (bias corrected)	75.04			
50				MLE Mean (bias corrected)	0.334			MLE Sd (bias corrected)	0.25			
51												
52	**Gamma Kaplan-Meier (KM) Statistics**											

53					k hat (KM)	0.656					nu hat (KM)	66.9
54					Approximate Chi Square Value (66.90, α)	49.08					Adjusted Chi Square Value (66.90, β)	48.63
55					95% Gamma Approximate KM-UCL (use when n>=50)	0.228					95% Gamma Adjusted KM-UCL (use when n<50)	0.23
56												
57					**Gamma ROS Statistics using Imputed Non-Detects**							
58					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
59					GROS may not be used when kstar of detected data is small such as < 0.1							
60					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
61					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
62					Minimum	0.01					Mean	0.144
63					Maximum	0.832					Median	0.01
64					SD	0.222					CV	1.548
65					k hat (MLE)	0.487					k star (bias corrected MLE)	0.472
66					Theta hat (MLE)	0.295					Theta star (bias corrected MLE)	0.304
67					nu hat (MLE)	49.69					nu star (bias corrected)	48.1
68					MLE Mean (bias corrected)	0.144					MLE Sd (bias corrected)	0.209
69											Adjusted Level of Significance (β)	0.0453
70					Approximate Chi Square Value (48.10, α)	33.18					Adjusted Chi Square Value (48.10, β)	32.82
71					95% Gamma Approximate UCL (use when n>=50)	0.208					95% Gamma Adjusted UCL (use when n<50)	0.21
72												
73					**Lognormal GOF Test on Detected Observations Only**							
74					Shapiro Wilk Test Statistic	0.948					**Shapiro Wilk GOF Test**	
75					5% Shapiro Wilk Critical Value	0.908					Detected Data appear Lognormal at 5% Significance Level	
76					Lilliefors Test Statistic	0.114					**Lilliefors GOF Test**	
77					5% Lilliefors Critical Value	0.193					Detected Data appear Lognormal at 5% Significance Level	
78					**Detected Data appear Lognormal at 5% Significance Level**							
79												
80					**Lognormal ROS Statistics Using Imputed Non-Detects**							
81					Mean in Original Scale	0.158					Mean in Log Scale	-2.668
82					SD in Original Scale	0.214					SD in Log Scale	1.351
83					95% t UCL (assumes normality of ROS data)	0.209					95% Percentile Bootstrap UCL	0.208
84					95% BCA Bootstrap UCL	0.216					95% Bootstrap t UCL	0.222
85					95% H-UCL (Log ROS)	0.289						
86												
87					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
88					KM Mean (logged)	-2.318					95% H-UCL (KM -Log)	0.204
89					KM SD (logged)	0.932					95% Critical H Value (KM-Log)	2.238
90					KM Standard Error of Mean (logged)	0.134						
91												
92					**DL/2 Statistics**							
93					**DL/2 Normal**						**DL/2 Log-Transformed**	
94					Mean in Original Scale	0.154					Mean in Log Scale	-2.668
95					SD in Original Scale	0.216					SD in Log Scale	1.223
96					95% t UCL (Assumes normality)	0.205					95% H-Stat UCL	0.228
97					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
98												
99					**Nonparametric Distribution Free UCL Statistics**							
100					**Detected Data appear Approximate Normal Distributed at 5% Significance Level**							
101												
102					**Suggested UCL to Use**							
103					95% KM (t) UCL	0.217					95% KM (Percentile Bootstrap) UCL	0.218
104												

105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
106	Recommendations are based upon data size, data distribution, and skewness.											
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
108	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
109												
110	**Aroclor 1248 (north)**											
111												
112	**General Statistics**											
113					Total Number of Observations	26			Number of Distinct Observations	9		
114					Number of Detects	8			Number of Non-Detects	18		
115					Number of Distinct Detects	8			Number of Distinct Non-Detects	1		
116					Minimum Detect	0.0987			Minimum Non-Detect	0.05		
117					Maximum Detect	0.718			Maximum Non-Detect	0.05		
118					Variance Detects	0.0522			Percent Non-Detects	69.23%		
119					Mean Detects	0.289			SD Detects	0.229		
120					Median Detects	0.201			CV Detects	0.792		
121					Skewness Detects	1.343			Kurtosis Detects	0.481		
122					Mean of Logged Detects	-1.483			SD of Logged Detects	0.717		
123												
124	**Normal GOF Test on Detects Only**											
125					Shapiro Wilk Test Statistic	0.799			**Shapiro Wilk GOF Test**			
126					5% Shapiro Wilk Critical Value	0.818			Detected Data Not Normal at 5% Significance Level			
127					Lilliefors Test Statistic	0.289			**Lilliefors GOF Test**			
128					5% Lilliefors Critical Value	0.313			Detected Data appear Normal at 5% Significance Level			
129	**Detected Data appear Approximate Normal at 5% Significance Level**											
130												
131	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
132					Mean	0.123			Standard Error of Mean	0.0339		
133					SD	0.162			95% KM (BCA) UCL	0.185		
134					95% KM (t) UCL	0.181			95% KM (Percentile Bootstrap) UCL	0.182		
135					95% KM (z) UCL	0.179			95% KM Bootstrap t UCL	0.242		
136					90% KM Chebyshev UCL	0.225			95% KM Chebyshev UCL	0.271		
137					97.5% KM Chebyshev UCL	0.335			99% KM Chebyshev UCL	0.461		
138												
139	**Gamma GOF Tests on Detected Observations Only**											
140					A-D Test Statistic	0.481			**Anderson-Darling GOF Test**			
141					5% A-D Critical Value	0.723			Detected data appear Gamma Distributed at 5% Significance Level			
142					K-S Test Statistic	0.212			**Kolmogrov-Smirnoff GOF**			
143					5% K-S Critical Value	0.297			Detected data appear Gamma Distributed at 5% Significance Level			
144	**Detected data appear Gamma Distributed at 5% Significance Level**											
145												
146	**Gamma Statistics on Detected Data Only**											
147					k hat (MLE)	2.233			k star (bias corrected MLE)	1.479		
148					Theta hat (MLE)	0.129			Theta star (bias corrected MLE)	0.195		
149					nu hat (MLE)	35.73			nu star (bias corrected)	23.67		
150					MLE Mean (bias corrected)	0.289			MLE Sd (bias corrected)	0.237		
151												
152	**Gamma Kaplan-Meier (KM) Statistics**											
153					k hat (KM)	0.582			nu hat (KM)	30.24		
154					Approximate Chi Square Value (30.24, α)	18.69			Adjusted Chi Square Value (30.24, β)	18.08		
155					95% Gamma Approximate KM-UCL (use when n>=50)	0.2			95% Gamma Adjusted KM-UCL (use when n<50)	0.206		
156												

	A	B	C	D	E	F	G	H	I	J	K	L
157	**Gamma ROS Statistics using Imputed Non-Detects**											
158	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
159	GROS may not be used when kstar of detected data is small such as < 0.1											
160	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
161	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
162					Minimum	0.01				Mean		0.0957
163					Maximum	0.718				Median		0.01
164					SD	0.178				CV		1.863
165					k hat (MLE)	0.491				k star (bias corrected MLE)		0.46
166					Theta hat (MLE)	0.195				Theta star (bias corrected MLE)		0.208
167					nu hat (MLE)	25.52				nu star (bias corrected)		23.91
168					MLE Mean (bias corrected)	0.0957				MLE Sd (bias corrected)		0.141
169										Adjusted Level of Significance (β)		0.0398
170					Approximate Chi Square Value (23.91, α)	13.78				Adjusted Chi Square Value (23.91, β)		13.27
171					95% Gamma Approximate UCL (use when n>=50)	0.166				95% Gamma Adjusted UCL (use when n<50)		0.172
172												
173	**Lognormal GOF Test on Detected Observations Only**											
174					Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**					
175					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level					
176					Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**					
177					5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level					
178	**Detected Data appear Lognormal at 5% Significance Level**											
179												
180	**Lognormal ROS Statistics Using Imputed Non-Detects**											
181					Mean in Original Scale	0.105				Mean in Log Scale		-3.345
182					SD in Original Scale	0.174				SD in Log Scale		1.59
183					95% t UCL (assumes normality of ROS data)	0.164				95% Percentile Bootstrap UCL		0.167
184					95% BCA Bootstrap UCL	0.181				95% Bootstrap t UCL		0.235
185					95% H-UCL (Log ROS)	0.363						
186												
187	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
188					KM Mean (logged)	-2.53				95% H-UCL (KM -Log)		0.156
189					KM SD (logged)	0.791				95% Critical H Value (KM-Log)		2.254
190					KM Standard Error of Mean (logged)	0.166						
191												
192	**DL/2 Statistics**											
193	**DL/2 Normal**						**DL/2 Log-Transformed**					
194					Mean in Original Scale	0.106				Mean in Log Scale		-3.01
195					SD in Original Scale	0.173				SD in Log Scale		1.105
196					95% t UCL (Assumes normality)	0.164				95% H-Stat UCL		0.163
197	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
198												
199	**Nonparametric Distribution Free UCL Statistics**											
200	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
201												
202	**Suggested UCL to Use**											
203					95% KM (t) UCL	0.181				95% KM (Percentile Bootstrap) UCL		0.182
204												
205	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
206	Recommendations are based upon data size, data distribution, and skewness.											
207	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
208	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
209												
210	**Aroclor 1248 (south)**											
211												
212	**General Statistics**											
213					Total Number of Observations	26			Number of Distinct Observations	9		
214					Number of Detects	8			Number of Non-Detects	18		
215					Number of Distinct Detects	8			Number of Distinct Non-Detects	1		
216					Minimum Detect	0.0699			Minimum Non-Detect	0.05		
217					Maximum Detect	0.517			Maximum Non-Detect	0.05		
218					Variance Detects	0.0276			Percent Non-Detects	69.23%		
219					Mean Detects	0.274			SD Detects	0.166		
220					Median Detects	0.23			CV Detects	0.606		
221					Skewness Detects	0.361			Kurtosis Detects	-1.657		
222					Mean of Logged Detects	-1.485			SD of Logged Detects	0.698		
223												
224	**Normal GOF Test on Detects Only**											
225					Shapiro Wilk Test Statistic	0.908			**Shapiro Wilk GOF Test**			
226					5% Shapiro Wilk Critical Value	0.818			Detected Data appear Normal at 5% Significance Level			
227					Lilliefors Test Statistic	0.205			**Lilliefors GOF Test**			
228					5% Lilliefors Critical Value	0.313			Detected Data appear Normal at 5% Significance Level			
229	**Detected Data appear Normal at 5% Significance Level**											
230												
231	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
232					Mean	0.119			Standard Error of Mean	0.0283		
233					SD	0.135			95% KM (BCA) UCL	0.166		
234					95% KM (t) UCL	0.167			95% KM (Percentile Bootstrap) UCL	0.17		
235					95% KM (z) UCL	0.166			95% KM Bootstrap t UCL	0.181		
236					90% KM Chebyshev UCL	0.204			95% KM Chebyshev UCL	0.242		
237					97.5% KM Chebyshev UCL	0.295			99% KM Chebyshev UCL	0.4		
238												
239	**Gamma GOF Tests on Detected Observations Only**											
240					A-D Test Statistic	0.31			**Anderson-Darling GOF Test**			
241					5% A-D Critical Value	0.722			Detected data appear Gamma Distributed at 5% Significance Level			
242					K-S Test Statistic	0.22			**Kolmogrov-Smirnoff GOF**			
243					5% K-S Critical Value	0.297			Detected data appear Gamma Distributed at 5% Significance Level			
244	**Detected data appear Gamma Distributed at 5% Significance Level**											
245												
246	**Gamma Statistics on Detected Data Only**											
247					k hat (MLE)	2.766			k star (bias corrected MLE)	1.812		
248					Theta hat (MLE)	0.0992			Theta star (bias corrected MLE)	0.151		
249					nu hat (MLE)	44.26			nu star (bias corrected)	29		
250					MLE Mean (bias corrected)	0.274			MLE Sd (bias corrected)	0.204		
251												
252	**Gamma Kaplan-Meier (KM) Statistics**											
253					k hat (KM)	0.78			nu hat (KM)	40.57		
254					Approximate Chi Square Value (40.57, α)	26.97			Adjusted Chi Square Value (40.57, β)	26.24		
255					95% Gamma Approximate KM-UCL (use when n>=50)	0.179			95% Gamma Adjusted KM-UCL (use when n<50)	0.184		
256												
257	**Gamma ROS Statistics using Imputed Non-Detects**											
258	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
259	GROS may not be used when kstar of detected data is small such as < 0.1											
260	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											

261	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
262					Minimum	0.01				Mean		0.0923
263					Maximum	0.517				Median		0.01
264					SD	0.152				CV		1.645
265					k hat (MLE)	0.52				k star (bias corrected MLE)		0.486
266					Theta hat (MLE)	0.178				Theta star (bias corrected MLE)		0.19
267					nu hat (MLE)	27.05				nu star (bias corrected)		25.26
268					MLE Mean (bias corrected)	0.0923				MLE Sd (bias corrected)		0.132
269										Adjusted Level of Significance (β)		0.0398
270					Approximate Chi Square Value (25.26, α)	14.81				Adjusted Chi Square Value (25.26, β)		14.28
271					95% Gamma Approximate UCL (use when n>=50)	0.157				95% Gamma Adjusted UCL (use when n<50)		0.163
272												
273	**Lognormal GOF Test on Detected Observations Only**											
274					Shapiro Wilk Test Statistic	0.937				**Shapiro Wilk GOF Test**		
275					5% Shapiro Wilk Critical Value	0.818				Detected Data appear Lognormal at 5% Significance Level		
276					Lilliefors Test Statistic	0.198				**Lilliefors GOF Test**		
277					5% Lilliefors Critical Value	0.313				Detected Data appear Lognormal at 5% Significance Level		
278	**Detected Data appear Lognormal at 5% Significance Level**											
279												
280	**Lognormal ROS Statistics Using Imputed Non-Detects**											
281					Mean in Original Scale	0.104				Mean in Log Scale		-3.198
282					SD in Original Scale	0.147				SD in Log Scale		1.468
283					95% t UCL (assumes normality of ROS data)	0.153				95% Percentile Bootstrap UCL		0.152
284					95% BCA Bootstrap UCL	0.16				95% Bootstrap t UCL		0.177
285					95% H-UCL (Log ROS)	0.304						
286												
287	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
288					KM Mean (logged)	-2.531				95% H-UCL (KM -Log)		0.154
289					KM SD (logged)	0.786				95% Critical H Value (KM-Log)		2.248
290					KM Standard Error of Mean (logged)	0.165						
291												
292	**DL/2 Statistics**											
293					**DL/2 Normal**					**DL/2 Log-Transformed**		
294					Mean in Original Scale	0.102				Mean in Log Scale		-3.011
295					SD in Original Scale	0.147				SD in Log Scale		1.101
296					95% t UCL (Assumes normality)	0.151				95% H-Stat UCL		0.162
297	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
298												
299	**Nonparametric Distribution Free UCL Statistics**											
300	**Detected Data appear Normal Distributed at 5% Significance Level**											
301												
302	**Suggested UCL to Use**											
303					95% KM (t) UCL	0.167				95% KM (Percentile Bootstrap) UCL		0.17
304												
305	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
306	Recommendations are based upon data size, data distribution, and skewness.											
307	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
308	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
309												
310	**Aroclor 1254 (adjacent)**											
311												
312	**General Statistics**											

313	Total Number of Observations				51	Number of Distinct Observations					49	
314	Number of Detects				48	Number of Non-Detects					3	
315	Number of Distinct Detects				47	Number of Distinct Non-Detects					2	
316	Minimum Detect				0.0346	Minimum Non-Detect					0.05	
317	Maximum Detect				1.95	Maximum Non-Detect					0.1	
318	Variance Detects				0.176	Percent Non-Detects					5.882%	
319	Mean Detects				0.543	SD Detects					0.419	
320	Median Detects				0.474	CV Detects					0.772	
321	Skewness Detects				1.365	Kurtosis Detects					2.237	
322	Mean of Logged Detects				-0.936	SD of Logged Detects					0.89	
323												
324	**Normal GOF Test on Detects Only**											
325	Shapiro Wilk Test Statistic				0.884	**Shapiro Wilk GOF Test**						
326	5% Shapiro Wilk Critical Value				0.947	Detected Data Not Normal at 5% Significance Level						
327	Lilliefors Test Statistic				0.12	**Lilliefors GOF Test**						
328	5% Lilliefors Critical Value				0.128	Detected Data appear Normal at 5% Significance Level						
329	**Detected Data appear Approximate Normal at 5% Significance Level**											
330												
331	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
332	Mean				0.513	Standard Error of Mean					0.0594	
333	SD				0.42	95% KM (BCA) UCL					0.612	
334	95% KM (t) UCL				0.613	95% KM (Percentile Bootstrap) UCL					0.614	
335	95% KM (z) UCL				0.611	95% KM Bootstrap t UCL					0.625	
336	90% KM Chebyshev UCL				0.692	95% KM Chebyshev UCL					0.772	
337	97.5% KM Chebyshev UCL				0.884	99% KM Chebyshev UCL					1.104	
338												
339	**Gamma GOF Tests on Detected Observations Only**											
340	A-D Test Statistic				0.238	**Anderson-Darling GOF Test**						
341	5% A-D Critical Value				0.765	Detected data appear Gamma Distributed at 5% Significance Level						
342	K-S Test Statistic				0.0852	**Kolmogrov-Smirnoff GOF**						
343	5% K-S Critical Value				0.13	Detected data appear Gamma Distributed at 5% Significance Level						
344	**Detected data appear Gamma Distributed at 5% Significance Level**											
345												
346	**Gamma Statistics on Detected Data Only**											
347	k hat (MLE)				1.685	k star (bias corrected MLE)					1.594	
348	Theta hat (MLE)				0.322	Theta star (bias corrected MLE)					0.341	
349	nu hat (MLE)				161.8	nu star (bias corrected)					153	
350	MLE Mean (bias corrected)				0.543	MLE Sd (bias corrected)					0.43	
351												
352	**Gamma Kaplan-Meier (KM) Statistics**											
353	k hat (KM)				1.498	nu hat (KM)					152.8	
354	Approximate Chi Square Value (152.76, α)				125.2	Adjusted Chi Square Value (152.76, β)					124.5	
355	95% Gamma Approximate KM-UCL (use when n>=50)				0.627	95% Gamma Adjusted KM-UCL (use when n<50)					0.63	
356												
357	**Gamma ROS Statistics using Imputed Non-Detects**											
358	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
359	GROS may not be used when kstar of detected data is small such as < 0.1											
360	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
361	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
362	Minimum				0.01	Mean					0.512	
363	Maximum				1.95	Median					0.468	
364	SD				0.425	CV					0.831	

365					k hat (MLE)	1.221				k star (bias corrected MLE)		1.162
366					Theta hat (MLE)	0.419				Theta star (bias corrected MLE)		0.441
367					nu hat (MLE)	124.5				nu star (bias corrected)		118.5
368					MLE Mean (bias corrected)	0.512				MLE Sd (bias corrected)		0.475
369										Adjusted Level of Significance (β)		0.0453
370					Approximate Chi Square Value (118.53, α)	94.39				Adjusted Chi Square Value (118.53, β)		93.76
371					95% Gamma Approximate UCL (use when n>=50)	0.643				95% Gamma Adjusted UCL (use when n<50)		0.647
372												
373					**Lognormal GOF Test on Detected Observations Only**							
374					Shapiro Wilk Test Statistic	0.962				**Shapiro Wilk GOF Test**		
375					5% Shapiro Wilk Critical Value	0.947				Detected Data appear Lognormal at 5% Significance Level		
376					Lilliefors Test Statistic	0.12				**Lilliefors GOF Test**		
377					5% Lilliefors Critical Value	0.128				Detected Data appear Lognormal at 5% Significance Level		
378					**Detected Data appear Lognormal at 5% Significance Level**							
379												
380					**Lognormal ROS Statistics Using Imputed Non-Detects**							
381					Mean in Original Scale	0.515				Mean in Log Scale		-1.043
382					SD in Original Scale	0.422				SD in Log Scale		0.967
383					95% t UCL (assumes normality of ROS data)	0.614				95% Percentile Bootstrap UCL		0.615
384					95% BCA Bootstrap UCL	0.619				95% Bootstrap t UCL		0.629
385					95% H-UCL (Log ROS)	0.768						
386												
387					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
388					KM Mean (logged)	-1.072				95% H-UCL (KM -Log)		0.8
389					KM SD (logged)	1.016				95% Critical H Value (KM-Log)		2.322
390					KM Standard Error of Mean (logged)	0.144						
391												
392					**DL/2 Statistics**							
393					**DL/2 Normal**					**DL/2 Log-Transformed**		
394					Mean in Original Scale	0.513				Mean in Log Scale		-1.084
395					SD in Original Scale	0.424				SD in Log Scale		1.054
396					95% t UCL (Assumes normality)	0.613				95% H-Stat UCL		0.838
397					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
398												
399					**Nonparametric Distribution Free UCL Statistics**							
400					**Detected Data appear Approximate Normal Distributed at 5% Significance Level**							
401												
402					**Suggested UCL to Use**							
403					95% KM (t) UCL	0.613				95% KM (Percentile Bootstrap) UCL		0.614
404												
405					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
406					Recommendations are based upon data size, data distribution, and skewness.							
407					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
408					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
409												
410	**Aroclor 1254 (north)**											
411												
412					**General Statistics**							
413					Total Number of Observations	26				Number of Distinct Observations		23
414					Number of Detects	22				Number of Non-Detects		4
415					Number of Distinct Detects	22				Number of Distinct Non-Detects		1
416					Minimum Detect	0.0325				Minimum Non-Detect		0.05

	A	B	C	D	E	F	G	H	I	J	K	L
417					Maximum Detect	0.92					Maximum Non-Detect	0.05
418					Variance Detects	0.0647					Percent Non-Detects	15.38%
419					Mean Detects	0.277					SD Detects	0.254
420					Median Detects	0.216					CV Detects	0.918
421					Skewness Detects	1.207					Kurtosis Detects	0.723
422					Mean of Logged Detects	-1.732					SD of Logged Detects	1.023
423												
424					**Normal GOF Test on Detects Only**							
425					Shapiro Wilk Test Statistic	0.854			**Shapiro Wilk GOF Test**			
426					5% Shapiro Wilk Critical Value	0.911			Detected Data Not Normal at 5% Significance Level			
427					Lilliefors Test Statistic	0.168			**Lilliefors GOF Test**			
428					5% Lilliefors Critical Value	0.189			Detected Data appear Normal at 5% Significance Level			
429					**Detected Data appear Approximate Normal at 5% Significance Level**							
430												
431					**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**							
432					Mean	0.241					Standard Error of Mean	0.0489
433					SD	0.244					95% KM (BCA) UCL	0.32
434					95% KM (t) UCL	0.325					95% KM (Percentile Bootstrap) UCL	0.317
435					95% KM (z) UCL	0.322					95% KM Bootstrap t UCL	0.341
436					90% KM Chebyshev UCL	0.388					95% KM Chebyshev UCL	0.454
437					97.5% KM Chebyshev UCL	0.547					99% KM Chebyshev UCL	0.728
438												
439					**Gamma GOF Tests on Detected Observations Only**							
440					A-D Test Statistic	0.423			**Anderson-Darling GOF Test**			
441					5% A-D Critical Value	0.765			Detected data appear Gamma Distributed at 5% Significance Level			
442					K-S Test Statistic	0.139			**Kolmogrov-Smirnoff GOF**			
443					5% K-S Critical Value	0.19			Detected data appear Gamma Distributed at 5% Significance Level			
444					**Detected data appear Gamma Distributed at 5% Significance Level**							
445												
446					**Gamma Statistics on Detected Data Only**							
447					k hat (MLE)	1.256					k star (bias corrected MLE)	1.115
448					Theta hat (MLE)	0.221					Theta star (bias corrected MLE)	0.249
449					nu hat (MLE)	55.26					nu star (bias corrected)	49.06
450					MLE Mean (bias corrected)	0.277					MLE Sd (bias corrected)	0.262
451												
452					**Gamma Kaplan-Meier (KM) Statistics**							
453					k hat (KM)	0.979					nu hat (KM)	50.92
454					Approximate Chi Square Value (50.92, α)	35.53					Adjusted Chi Square Value (50.92, β)	34.68
455					95% Gamma Approximate KM-UCL (use when n>=50)	0.346					95% Gamma Adjusted KM-UCL (use when n<50)	0.354
456												
457					**Gamma ROS Statistics using Imputed Non-Detects**							
458					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
459					GROS may not be used when kstar of detected data is small such as < 0.1							
460					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
461					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
462					Minimum	0.01					Mean	0.236
463					Maximum	0.92					Median	0.141
464					SD	0.253					CV	1.07
465					k hat (MLE)	0.828					k star (bias corrected MLE)	0.758
466					Theta hat (MLE)	0.285					Theta star (bias corrected MLE)	0.312
467					nu hat (MLE)	43.05					nu star (bias corrected)	39.42
468					MLE Mean (bias corrected)	0.236					MLE Sd (bias corrected)	0.271

469											Adjusted Level of Significance (β)	0.0398
470					Approximate Chi Square Value (39.42, α)	26.04					Adjusted Chi Square Value (39.42, β)	25.32
471					95% Gamma Approximate UCL (use when n>=50)	0.358					95% Gamma Adjusted UCL (use when n<50)	0.368
472												
473					**Lognormal GOF Test on Detected Observations Only**							
474					Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**					
475					5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level					
476					Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**					
477					5% Lilliefors Critical Value	0.189	Detected Data appear Lognormal at 5% Significance Level					
478					**Detected Data appear Lognormal at 5% Significance Level**							
479												
480					**Lognormal ROS Statistics Using Imputed Non-Detects**							
481					Mean in Original Scale	0.24	Mean in Log Scale	-1.986				
482					SD in Original Scale	0.249	SD in Log Scale	1.127				
483					95% t UCL (assumes normality of ROS data)	0.324	95% Percentile Bootstrap UCL	0.322				
484					95% BCA Bootstrap UCL	0.333	95% Bootstrap t UCL	0.342				
485					95% H-UCL (Log ROS)	0.474						
486												
487					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
488					KM Mean (logged)	-1.951	95% H-UCL (KM -Log)	0.428				
489					KM SD (logged)	1.057	95% Critical H Value (KM-Log)	2.582				
490					KM Standard Error of Mean (logged)	0.213						
491												
492					**DL/2 Statistics**							
493					**DL/2 Normal**		**DL/2 Log-Transformed**					
494					Mean in Original Scale	0.238	Mean in Log Scale	-2.033				
495					SD in Original Scale	0.251	SD in Log Scale	1.182				
496					95% t UCL (Assumes normality)	0.322	95% H-Stat UCL	0.505				
497					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
498												
499					**Nonparametric Distribution Free UCL Statistics**							
500					**Detected Data appear Approximate Normal Distributed at 5% Significance Level**							
501												
502					**Suggested UCL to Use**							
503					95% KM (t) UCL	0.325	95% KM (Percentile Bootstrap) UCL	0.317				
504												
505					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
506					Recommendations are based upon data size, data distribution, and skewness.							
507					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
508					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
509												
510	**Aroclor 1254 (south)**											
511												
512					**General Statistics**							
513					Total Number of Observations	26	Number of Distinct Observations	20				
514					Number of Detects	20	Number of Non-Detects	6				
515					Number of Distinct Detects	19	Number of Distinct Non-Detects	1				
516					Minimum Detect	0.0493	Minimum Non-Detect	0.05				
517					Maximum Detect	0.674	Maximum Non-Detect	0.05				
518					Variance Detects	0.0322	Percent Non-Detects	23.08%				
519					Mean Detects	0.289	SD Detects	0.18				
520					Median Detects	0.224	CV Detects	0.622				

521				Skewness Detects	0.927					Kurtosis Detects	-0.16	
522				Mean of Logged Detects	-1.435					SD of Logged Detects	0.663	
523												
524	**Normal GOF Test on Detects Only**											
525				Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**						
526				5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level						
527				Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**						
528				5% Lilliefors Critical Value	0.198	Detected Data appear Normal at 5% Significance Level						
529	**Detected Data appear Approximate Normal at 5% Significance Level**											
530												
531	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
532				Mean	0.233	Standard Error of Mean	0.0369					
533				SD	0.184	95% KM (BCA) UCL	0.295					
534				95% KM (t) UCL	0.297	95% KM (Percentile Bootstrap) UCL	0.294					
535				95% KM (z) UCL	0.294	95% KM Bootstrap t UCL	0.308					
536				90% KM Chebyshev UCL	0.344	95% KM Chebyshev UCL	0.394					
537				97.5% KM Chebyshev UCL	0.464	99% KM Chebyshev UCL	0.601					
538												
539	**Gamma GOF Tests on Detected Observations Only**											
540				A-D Test Statistic	0.396	**Anderson-Darling GOF Test**						
541				5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level						
542				K-S Test Statistic	0.121	**Kolmogrov-Smirnoff GOF**						
543				5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level						
544	**Detected data appear Gamma Distributed at 5% Significance Level**											
545												
546	**Gamma Statistics on Detected Data Only**											
547				k hat (MLE)	2.761	k star (bias corrected MLE)	2.38					
548				Theta hat (MLE)	0.105	Theta star (bias corrected MLE)	0.121					
549				nu hat (MLE)	110.5	nu star (bias corrected)	95.22					
550				MLE Mean (bias corrected)	0.289	MLE Sd (bias corrected)	0.187					
551												
552	**Gamma Kaplan-Meier (KM) Statistics**											
553				k hat (KM)	1.615	nu hat (KM)	84					
554				Approximate Chi Square Value (84.00, α)	63.87	Adjusted Chi Square Value (84.00, β)	62.71					
555				95% Gamma Approximate KM-UCL (use when n>=50)	0.307	95% Gamma Adjusted KM-UCL (use when n<50)	0.313					
556												
557	**Gamma ROS Statistics using Imputed Non-Detects**											
558	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
559	GROS may not be used when kstar of detected data is small such as < 0.1											
560	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
561	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
562				Minimum	0.01	Mean	0.228					
563				Maximum	0.674	Median	0.178					
564				SD	0.193	CV	0.846					
565				k hat (MLE)	1.084	k star (bias corrected MLE)	0.984					
566				Theta hat (MLE)	0.211	Theta star (bias corrected MLE)	0.232					
567				nu hat (MLE)	56.34	nu star (bias corrected)	51.18					
568				MLE Mean (bias corrected)	0.228	MLE Sd (bias corrected)	0.23					
569						Adjusted Level of Significance (β)	0.0398					
570				Approximate Chi Square Value (51.18, α)	35.75	Adjusted Chi Square Value (51.18, β)	34.89					
571				95% Gamma Approximate UCL (use when n>=50)	0.327	95% Gamma Adjusted UCL (use when n<50)	0.335					
572												

573	**Lognormal GOF Test on Detected Observations Only**											
574				Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**						
575				5% Shapiro Wilk Critical Value	0.905	Detected Data appear Lognormal at 5% Significance Level						
576				Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**						
577				5% Lilliefors Critical Value	0.198	Detected Data appear Lognormal at 5% Significance Level						
578	**Detected Data appear Lognormal at 5% Significance Level**											
579												
580	**Lognormal ROS Statistics Using Imputed Non-Detects**											
581				Mean in Original Scale	0.237	Mean in Log Scale	-1.75					
582				SD in Original Scale	0.184	SD in Log Scale	0.838					
583				95% t UCL (assumes normality of ROS data)	0.298	95% Percentile Bootstrap UCL	0.296					
584				95% BCA Bootstrap UCL	0.306	95% Bootstrap t UCL	0.309					
585				95% H-UCL (Log ROS)	0.364							
586												
587	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
588				KM Mean (logged)	-1.798	95% H-UCL (KM -Log)	0.365					
589				KM SD (logged)	0.873	95% Critical H Value (KM-Log)	2.35					
590				KM Standard Error of Mean (logged)	0.176							
591												
592	**DL/2 Statistics**											
593				**DL/2 Normal**		**DL/2 Log-Transformed**						
594				Mean in Original Scale	0.228	Mean in Log Scale	-1.955					
595				SD in Original Scale	0.193	SD in Log Scale	1.128					
596				95% t UCL (Assumes normality)	0.293	95% H-Stat UCL	0.489					
597	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
598												
599	**Nonparametric Distribution Free UCL Statistics**											
600	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
601												
602	**Suggested UCL to Use**											
603				95% KM (t) UCL	0.297	95% KM (Percentile Bootstrap) UCL	0.294					
604												
605	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
606	Recommendations are based upon data size, data distribution, and skewness.											
607	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
608	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
609												
610												
611	**Aroclor 1262 (adjacent)**											
612												
613	**General Statistics**											
614				Total Number of Observations	51	Number of Distinct Observations	51					
615						Number of Missing Observations	0					
616				Minimum	0.182	Mean	1.347					
617				Maximum	3.46	Median	1.23					
618				SD	0.86	Std. Error of Mean	0.12					
619				Coefficient of Variation	0.639	Skewness	0.754					
620												
621	**Normal GOF Test**											
622				Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**						
623				5% Shapiro Wilk P Value	0.0023	Data Not Normal at 5% Significance Level						
624				Lilliefors Test Statistic	0.109	**Lilliefors GOF Test**						

625				5% Lilliefors Critical Value		0.124		Data appear Normal at 5% Significance Level				
626	**Data appear Approximate Normal at 5% Significance Level**											
627												
628	**Assuming Normal Distribution**											
629	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
630				95% Student's-t UCL		1.549		95% Adjusted-CLT UCL (Chen-1995)				1.559
631								95% Modified-t UCL (Johnson-1978)				1.551
632												
633	**Gamma GOF Test**											
634				A-D Test Statistic		0.255	**Anderson-Darling Gamma GOF Test**					
635				5% A-D Critical Value		0.761	Detected data appear Gamma Distributed at 5% Significance Level					
636				K-S Test Statistic		0.0651	**Kolmogrov-Smirnoff Gamma GOF Test**					
637				5% K-S Critical Value		0.126	Detected data appear Gamma Distributed at 5% Significance Level					
638	**Detected data appear Gamma Distributed at 5% Significance Level**											
639												
640	**Gamma Statistics**											
641				k hat (MLE)		2.288		k star (bias corrected MLE)				2.166
642				Theta hat (MLE)		0.589		Theta star (bias corrected MLE)				0.622
643				nu hat (MLE)		233.3		nu star (bias corrected)				220.9
644				MLE Mean (bias corrected)		1.347		MLE Sd (bias corrected)				0.915
645								Approximate Chi Square Value (0.05)				187.5
646				Adjusted Level of Significance		0.0453		Adjusted Chi Square Value				186.6
647												
648	**Assuming Gamma Distribution**											
649	95% Approximate Gamma UCL (use when n>=50))					1.587		95% Adjusted Gamma UCL (use when n<50)				1.595
650												
651	**Lognormal GOF Test**											
652				Shapiro Wilk Test Statistic		0.953	**Shapiro Wilk Lognormal GOF Test**					
653				5% Shapiro Wilk P Value		0.0732	Data appear Lognormal at 5% Significance Level					
654				Lilliefors Test Statistic		0.11	**Lilliefors Lognormal GOF Test**					
655				5% Lilliefors Critical Value		0.124	Data appear Lognormal at 5% Significance Level					
656	**Data appear Lognormal at 5% Significance Level**											
657												
658	**Lognormal Statistics**											
659				Minimum of Logged Data		-1.704		Mean of logged Data				0.0637
660				Maximum of Logged Data		1.241		SD of logged Data				0.742
661												
662	**Assuming Lognormal Distribution**											
663				95% H-UCL		1.742		90% Chebyshev (MVUE) UCL				1.874
664				95% Chebyshev (MVUE) UCL		2.092		97.5% Chebyshev (MVUE) UCL				2.394
665				99% Chebyshev (MVUE) UCL		2.987						
666												
667	**Nonparametric Distribution Free UCL Statistics**											
668	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
669												
670	**Nonparametric Distribution Free UCLs**											
671				95% CLT UCL		1.545		95% Jackknife UCL				1.549
672				95% Standard Bootstrap UCL		1.546		95% Bootstrap-t UCL				1.558
673				95% Hall's Bootstrap UCL		1.553		95% Percentile Bootstrap UCL				1.543
674				95% BCA Bootstrap UCL		1.555						
675				90% Chebyshev(Mean, Sd) UCL		1.708		95% Chebyshev(Mean, Sd) UCL				1.872
676				97.5% Chebyshev(Mean, Sd) UCL		2.099		99% Chebyshev(Mean, Sd) UCL				2.546

677												
678	**Suggested UCL to Use**											
679				95% Student's-t UCL		1.549						
680												
681	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
682	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
683	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
684	For additional insight the user may want to consult a statistician.											
685												
686												
687	**Aroclor 1262 (north)**											
688												
689	**General Statistics**											
690				Total Number of Observations		26			Number of Distinct Observations			26
691									Number of Missing Observations			0
692				Minimum		0.114			Mean			0.462
693				Maximum		1.12			Median			0.472
694				SD		0.267			Std. Error of Mean			0.0524
695				Coefficient of Variation		0.579			Skewness			0.797
696												
697	**Normal GOF Test**											
698				Shapiro Wilk Test Statistic		0.925			**Shapiro Wilk GOF Test**			
699				5% Shapiro Wilk Critical Value		0.92			Data appear Normal at 5% Significance Level			
700				Lilliefors Test Statistic		0.148			**Lilliefors GOF Test**			
701				5% Lilliefors Critical Value		0.174			Data appear Normal at 5% Significance Level			
702	**Data appear Normal at 5% Significance Level**											
703												
704	**Assuming Normal Distribution**											
705	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
706				95% Student's-t UCL		0.551			95% Adjusted-CLT UCL (Chen-1995)			0.557
707									95% Modified-t UCL (Johnson-1978)			0.552
708												
709	**Gamma GOF Test**											
710				A-D Test Statistic		0.367			**Anderson-Darling Gamma GOF Test**			
711				5% A-D Critical Value		0.75			Detected data appear Gamma Distributed at 5% Significance Level			
712				K-S Test Statistic		0.13			**Kolmogrov-Smirnoff Gamma GOF Test**			
713				5% K-S Critical Value		0.172			Detected data appear Gamma Distributed at 5% Significance Level			
714	**Detected data appear Gamma Distributed at 5% Significance Level**											
715												
716	**Gamma Statistics**											
717				k hat (MLE)		3.051			k star (bias corrected MLE)			2.724
718				Theta hat (MLE)		0.151			Theta star (bias corrected MLE)			0.169
719				nu hat (MLE)		158.6			nu star (bias corrected)			141.7
720				MLE Mean (bias corrected)		0.462			MLE Sd (bias corrected)			0.28
721									Approximate Chi Square Value (0.05)			115.2
722				Adjusted Level of Significance		0.0398			Adjusted Chi Square Value			113.6
723												
724	**Assuming Gamma Distribution**											
725				95% Approximate Gamma UCL (use when n>=50))		0.568			95% Adjusted Gamma UCL (use when n<50)			0.576
726												
727	**Lognormal GOF Test**											
728				Shapiro Wilk Test Statistic		0.962			**Shapiro Wilk Lognormal GOF Test**			

729				5% Shapiro Wilk Critical Value		0.92		Data appear Lognormal at 5% Significance Level				
730				Lilliefors Test Statistic		0.146		**Lilliefors Lognormal GOF Test**				
731				5% Lilliefors Critical Value		0.174		Data appear Lognormal at 5% Significance Level				
732						**Data appear Lognormal at 5% Significance Level**							
733												
734						**Lognormal Statistics**							
735				Minimum of Logged Data		-2.172		Mean of logged Data				-0.946
736				Maximum of Logged Data		0.113		SD of logged Data				0.62
737												
738						**Assuming Lognormal Distribution**							
739				95% H-UCL		0.609		90% Chebyshev (MVUE) UCL				0.647
740				95% Chebyshev (MVUE) UCL		0.729		97.5% Chebyshev (MVUE) UCL				0.843
741				99% Chebyshev (MVUE) UCL		1.066						
742												
743						**Nonparametric Distribution Free UCL Statistics**							
744						**Data appear to follow a Discernible Distribution at 5% Significance Level**							
745												
746						**Nonparametric Distribution Free UCLs**							
747				95% CLT UCL		0.548		95% Jackknife UCL				0.551
748				95% Standard Bootstrap UCL		0.546		95% Bootstrap-t UCL				0.563
749				95% Hall's Bootstrap UCL		0.56		95% Percentile Bootstrap UCL				0.546
750				95% BCA Bootstrap UCL		0.556						
751				90% Chebyshev(Mean, Sd) UCL		0.619		95% Chebyshev(Mean, Sd) UCL				0.69
752				97.5% Chebyshev(Mean, Sd) UCL		0.789		99% Chebyshev(Mean, Sd) UCL				0.983
753												
754						**Suggested UCL to Use**							
755				95% Student's-t UCL		0.551						
756												
757	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
758	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
759	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
760	For additional insight the user may want to consult a statistician.											
761												
762	**Aroclor 1262 (south)**											
763												
764						**General Statistics**							
765				Total Number of Observations		26		Number of Distinct Observations				25
766				Number of Detects		25		Number of Non-Detects				1
767				Number of Distinct Detects		24		Number of Distinct Non-Detects				1
768				Minimum Detect		0.106		Minimum Non-Detect				0.05
769				Maximum Detect		1.18		Maximum Non-Detect				0.05
770				Variance Detects		0.0953		Percent Non-Detects				3.846%
771				Mean Detects		0.502		SD Detects				0.309
772				Median Detects		0.456		CV Detects				0.615
773				Skewness Detects		0.922		Kurtosis Detects				0.487
774				Mean of Logged Detects		-0.895		SD of Logged Detects				0.697
775												
776						**Normal GOF Test on Detects Only**							
777				Shapiro Wilk Test Statistic		0.901		**Shapiro Wilk GOF Test**				
778				5% Shapiro Wilk Critical Value		0.918		Detected Data Not Normal at 5% Significance Level				
779				Lilliefors Test Statistic		0.136		**Lilliefors GOF Test**				
780				5% Lilliefors Critical Value		0.177		Detected Data appear Normal at 5% Significance Level				

781	**Detected Data appear Approximate Normal at 5% Significance Level**											
782												
783	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
784					Mean	0.484				Standard Error of Mean	0.0619	
785					SD	0.309				95% KM (BCA) UCL	0.588	
786					95% KM (t) UCL	0.59				95% KM (Percentile Bootstrap) UCL	0.59	
787					95% KM (z) UCL	0.586				95% KM Bootstrap t UCL	0.6	
788					90% KM Chebyshev UCL	0.67				95% KM Chebyshev UCL	0.754	
789					97.5% KM Chebyshev UCL	0.871				99% KM Chebyshev UCL	1.1	
790												
791	**Gamma GOF Tests on Detected Observations Only**											
792					A-D Test Statistic	0.351	**Anderson-Darling GOF Test**					
793					5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level					
794					K-S Test Statistic	0.099	**Kolmogrov-Smirnoff GOF**					
795					5% K-S Critical Value	0.176	Detected data appear Gamma Distributed at 5% Significance Level					
796	**Detected data appear Gamma Distributed at 5% Significance Level**											
797												
798	**Gamma Statistics on Detected Data Only**											
799					k hat (MLE)	2.597				k star (bias corrected MLE)	2.312	
800					Theta hat (MLE)	0.193				Theta star (bias corrected MLE)	0.217	
801					nu hat (MLE)	129.8				nu star (bias corrected)	115.6	
802					MLE Mean (bias corrected)	0.502				MLE Sd (bias corrected)	0.33	
803												
804	**Gamma Kaplan-Meier (KM) Statistics**											
805					k hat (KM)	2.455				nu hat (KM)	127.7	
806					Approximate Chi Square Value (127.68, α)	102.6				Adjusted Chi Square Value (127.68, β)	101.1	
807					95% Gamma Approximate KM-UCL (use when n>=50)	0.603				95% Gamma Adjusted KM-UCL (use when n<50)	0.612	
808												
809	**Gamma ROS Statistics using Imputed Non-Detects**											
810	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
811	GROS may not be used when kstar of detected data is small such as < 0.1											
812	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
813	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
814					Minimum	0.0193				Mean	0.483	
815					Maximum	1.18				Median	0.444	
816					SD	0.317				CV	0.656	
817					k hat (MLE)	1.907				k star (bias corrected MLE)	1.713	
818					Theta hat (MLE)	0.253				Theta star (bias corrected MLE)	0.282	
819					nu hat (MLE)	99.17				nu star (bias corrected)	89.06	
820					MLE Mean (bias corrected)	0.483				MLE Sd (bias corrected)	0.369	
821										Adjusted Level of Significance (β)	0.0398	
822					Approximate Chi Square Value (89.06, α)	68.3				Adjusted Chi Square Value (89.06, β)	67.1	
823					95% Gamma Approximate UCL (use when n>=50)	0.63				95% Gamma Adjusted UCL (use when n<50)	0.641	
824												
825	**Lognormal GOF Test on Detected Observations Only**											
826					Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**					
827					5% Shapiro Wilk Critical Value	0.918	Detected Data appear Lognormal at 5% Significance Level					
828					Lilliefors Test Statistic	0.116	**Lilliefors GOF Test**					
829					5% Lilliefors Critical Value	0.177	Detected Data appear Lognormal at 5% Significance Level					
830	**Detected Data appear Lognormal at 5% Significance Level**											
831												
832	**Lognormal ROS Statistics Using Imputed Non-Detects**											

833	Mean in Original Scale				0.485	Mean in Log Scale					-0.96	
834	SD in Original Scale				0.314	SD in Log Scale					0.76	
835	95% t UCL (assumes normality of ROS data)				0.59	95% Percentile Bootstrap UCL					0.581	
836	95% BCA Bootstrap UCL				0.597	95% Bootstrap t UCL					0.613	
837	95% H-UCL (Log ROS)				0.716							
838												
839	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
840	KM Mean (logged)				-0.975	95% H-UCL (KM -Log)					0.727	
841	KM SD (logged)				0.782	95% Critical H Value (KM-Log)					2.244	
842	KM Standard Error of Mean (logged)				0.157							
843												
844	**DL/2 Statistics**											
845	**DL/2 Normal**					**DL/2 Log-Transformed**						
846	Mean in Original Scale				0.483	Mean in Log Scale					-1.002	
847	SD in Original Scale				0.317	SD in Log Scale					0.875	
848	95% t UCL (Assumes normality)				0.589	95% H-Stat UCL					0.813	
849	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
850												
851	**Nonparametric Distribution Free UCL Statistics**											
852	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
853												
854	**Suggested UCL to Use**											
855	95% KM (t) UCL				0.59	95% KM (Percentile Bootstrap) UCL					0.59	
856												
857	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
858	Recommendations are based upon data size, data distribution, and skewness.											
859	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
860	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
861												
862												
863	**Total PCB Amount > RL (adjacent)**											
864												
865	**General Statistics**											
866	Total Number of Observations				51	Number of Distinct Observations					50	
867						Number of Missing Observations					0	
868	Minimum				0.289	Mean					1.995	
869	Maximum				5.582	Median					1.92	
870	SD				1.211	Std. Error of Mean					0.17	
871	Coefficient of Variation				0.607	Skewness					0.808	
872												
873	**Normal GOF Test**											
874	Shapiro Wilk Test Statistic				0.939	**Shapiro Wilk GOF Test**						
875	5% Shapiro Wilk P Value				0.0162	Data Not Normal at 5% Significance Level						
876	Lilliefors Test Statistic				0.0921	**Lilliefors GOF Test**						
877	5% Lilliefors Critical Value				0.124	Data appear Normal at 5% Significance Level						
878	**Data appear Approximate Normal at 5% Significance Level**											
879												
880	**Assuming Normal Distribution**											
881	**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**						
882	95% Student's-t UCL				2.28	95% Adjusted-CLT UCL (Chen-1995)					2.295	
883						95% Modified-t UCL (Johnson-1978)					2.283	
884												

885	**Gamma GOF Test**											
886	A-D Test Statistic				0.428	**Anderson-Darling Gamma GOF Test**						
887	5% A-D Critical Value				0.76	Detected data appear Gamma Distributed at 5% Significance Level						
888	K-S Test Statistic				0.0864	**Kolmogrov-Smirnoff Gamma GOF Test**						
889	5% K-S Critical Value				0.125	Detected data appear Gamma Distributed at 5% Significance Level						
890	**Detected data appear Gamma Distributed at 5% Significance Level**											
891												
892	**Gamma Statistics**											
893	k hat (MLE)				2.477	k star (bias corrected MLE)						2.345
894	Theta hat (MLE)				0.806	Theta star (bias corrected MLE)						0.851
895	nu hat (MLE)				252.7	nu star (bias corrected)						239.2
896	MLE Mean (bias corrected)				1.995	MLE Sd (bias corrected)						1.303
897						Approximate Chi Square Value (0.05)						204.4
898	Adjusted Level of Significance				0.0453	Adjusted Chi Square Value						203.4
899												
900	**Assuming Gamma Distribution**											
901	95% Approximate Gamma UCL (use when n>=50))				2.335	95% Adjusted Gamma UCL (use when n<50)						2.346
902												
903	**Lognormal GOF Test**											
904	Shapiro Wilk Test Statistic				0.944	**Shapiro Wilk Lognormal GOF Test**						
905	5% Shapiro Wilk P Value				0.0272	Data Not Lognormal at 5% Significance Level						
906	Lilliefors Test Statistic				0.128	**Lilliefors Lognormal GOF Test**						
907	5% Lilliefors Critical Value				0.124	Data Not Lognormal at 5% Significance Level						
908	**Data Not Lognormal at 5% Significance Level**											
909												
910	**Lognormal Statistics**											
911	Minimum of Logged Data				-1.241	Mean of logged Data						0.476
912	Maximum of Logged Data				1.72	SD of logged Data						0.717
913												
914	**Assuming Lognormal Distribution**											
915	95% H-UCL				2.559	90% Chebyshev (MVUE) UCL						2.753
916	95% Chebyshev (MVUE) UCL				3.063	97.5% Chebyshev (MVUE) UCL						3.494
917	99% Chebyshev (MVUE) UCL				4.34							
918												
919	**Nonparametric Distribution Free UCL Statistics**											
920	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
921												
922	**Nonparametric Distribution Free UCLs**											
923	95% CLT UCL				2.274	95% Jackknife UCL						2.28
924	95% Standard Bootstrap UCL				2.273	95% Bootstrap-t UCL						2.305
925	95% Hall's Bootstrap UCL				2.305	95% Percentile Bootstrap UCL						2.263
926	95% BCA Bootstrap UCL				2.309							
927	90% Chebyshev(Mean, Sd) UCL				2.504	95% Chebyshev(Mean, Sd) UCL						2.735
928	97.5% Chebyshev(Mean, Sd) UCL				3.055	99% Chebyshev(Mean, Sd) UCL						3.683
929												
930	**Suggested UCL to Use**											
931	95% Student's-t UCL				2.28							
932												
933	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
934	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
935	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
936	For additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
937												
938												
939	**Total PCB Amount > RL (north)**											
940												
941	**General Statistics**											
942					Total Number of Observations	26			Number of Distinct Observations	26		
943									Number of Missing Observations	0		
944					Minimum	0.114			Mean	0.785		
945					Maximum	2.758			Median	0.669		
946					SD	0.641			Std. Error of Mean	0.126		
947					Coefficient of Variation	0.817			Skewness	1.513		
948												
949	**Normal GOF Test**											
950					Shapiro Wilk Test Statistic	0.856			**Shapiro Wilk GOF Test**			
951					5% Shapiro Wilk Critical Value	0.92			Data Not Normal at 5% Significance Level			
952					Lilliefors Test Statistic	0.148			**Lilliefors GOF Test**			
953					5% Lilliefors Critical Value	0.174			Data appear Normal at 5% Significance Level			
954	**Data appear Approximate Normal at 5% Significance Level**											
955												
956	**Assuming Normal Distribution**											
957					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
958					95% Student's-t UCL	1			95% Adjusted-CLT UCL (Chen-1995)	1.032		
959									95% Modified-t UCL (Johnson-1978)	1.006		
960												
961	**Gamma GOF Test**											
962					A-D Test Statistic	0.313			**Anderson-Darling Gamma GOF Test**			
963					5% A-D Critical Value	0.76			Detected data appear Gamma Distributed at 5% Significance Level			
964					K-S Test Statistic	0.126			**Kolmogrov-Smirnoff Gamma GOF Test**			
965					5% K-S Critical Value	0.174			Detected data appear Gamma Distributed at 5% Significance Level			
966	**Detected data appear Gamma Distributed at 5% Significance Level**											
967												
968	**Gamma Statistics**											
969					k hat (MLE)	1.714			k star (bias corrected MLE)	1.542		
970					Theta hat (MLE)	0.458			Theta star (bias corrected MLE)	0.509		
971					nu hat (MLE)	89.13			nu star (bias corrected)	80.18		
972					MLE Mean (bias corrected)	0.785			MLE Sd (bias corrected)	0.632		
973									Approximate Chi Square Value (0.05)	60.55		
974					Adjusted Level of Significance	0.0398			Adjusted Chi Square Value	59.42		
975												
976	**Assuming Gamma Distribution**											
977					95% Approximate Gamma UCL (use when n>=50))	1.039			95% Adjusted Gamma UCL (use when n<50)	1.059		
978												
979	**Lognormal GOF Test**											
980					Shapiro Wilk Test Statistic	0.971			**Shapiro Wilk Lognormal GOF Test**			
981					5% Shapiro Wilk Critical Value	0.92			Data appear Lognormal at 5% Significance Level			
982					Lilliefors Test Statistic	0.112			**Lilliefors Lognormal GOF Test**			
983					5% Lilliefors Critical Value	0.174			Data appear Lognormal at 5% Significance Level			
984	**Data appear Lognormal at 5% Significance Level**											
985												
986	**Lognormal Statistics**											
987					Minimum of Logged Data	-2.172			Mean of logged Data	-0.562		
988					Maximum of Logged Data	1.015			SD of logged Data	0.845		

989												
990	**Assuming Lognormal Distribution**											
991				95% H-UCL	1.206			90% Chebyshev (MVUE) UCL	1.241			
992				95% Chebyshev (MVUE) UCL	1.441			97.5% Chebyshev (MVUE) UCL	1.718			
993				99% Chebyshev (MVUE) UCL	2.262							
994												
995	**Nonparametric Distribution Free UCL Statistics**											
996	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
997												
998	**Nonparametric Distribution Free UCLs**											
999				95% CLT UCL	0.992			95% Jackknife UCL	1			
1000				95% Standard Bootstrap UCL	0.987			95% Bootstrap-t UCL	1.075			
1001				95% Hall's Bootstrap UCL	1.107			95% Percentile Bootstrap UCL	0.997			
1002				95% BCA Bootstrap UCL	1.054							
1003				90% Chebyshev(Mean, Sd) UCL	1.162			95% Chebyshev(Mean, Sd) UCL	1.333			
1004				97.5% Chebyshev(Mean, Sd) UCL	1.57			99% Chebyshev(Mean, Sd) UCL	2.036			
1005												
1006	**Suggested UCL to Use**											
1007				95% Student's-t UCL	1							
1008												
1009	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1010	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
1011	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
1012	For additional insight the user may want to consult a statistician.											
1013												
1014	**Total PCB Amount > RL (south)**											
1015												
1016	**General Statistics**											
1017				Total Number of Observations	26			Number of Distinct Observations	26			
1018				Number of Detects	25			Number of Non-Detects	1			
1019				Number of Distinct Detects	25			Number of Distinct Non-Detects	1			
1020				Minimum Detect	0.106			Minimum Non-Detect	0.05			
1021				Maximum Detect	2.317			Maximum Non-Detect	0.05			
1022				Variance Detects	0.399			Percent Non-Detects	3.846%			
1023				Mean Detects	0.82			SD Detects	0.631			
1024				Median Detects	0.653			CV Detects	0.77			
1025				Skewness Detects	1.251			Kurtosis Detects	1.159			
1026				Mean of Logged Detects	-0.523			SD of Logged Detects	0.901			
1027												
1028	**Normal GOF Test on Detects Only**											
1029				Shapiro Wilk Test Statistic	0.857			**Shapiro Wilk GOF Test**				
1030				5% Shapiro Wilk Critical Value	0.918			Detected Data Not Normal at 5% Significance Level				
1031				Lilliefors Test Statistic	0.189			**Lilliefors GOF Test**				
1032				5% Lilliefors Critical Value	0.177			Detected Data Not Normal at 5% Significance Level				
1033	**Detected Data Not Normal at 5% Significance Level**											
1034												
1035	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1036				Mean	0.791			Standard Error of Mean	0.125			
1037				SD	0.625			95% KM (BCA) UCL	1.001			
1038				95% KM (t) UCL	1.004			95% KM (Percentile Bootstrap) UCL	0.993			
1039				95% KM (z) UCL	0.996			95% KM Bootstrap t UCL	1.05			
1040				90% KM Chebyshev UCL	1.166			95% KM Chebyshev UCL	1.336			

	A	B	C	D	E	F	G	H	I	J	K	L
1041					97.5% KM Chebyshev UCL	1.571					99% KM Chebyshev UCL	2.034
1042												
1043					Gamma GOF Tests on Detected Observations Only							
1044					A-D Test Statistic	0.424	Anderson-Darling GOF Test					
1045					5% A-D Critical Value	0.76	Detected data appear Gamma Distributed at 5% Significance Level					
1046					K-S Test Statistic	0.117	Kolmogrov-Smirnoff GOF					
1047					5% K-S Critical Value	0.177	Detected data appear Gamma Distributed at 5% Significance Level					
1048					Detected data appear Gamma Distributed at 5% Significance Level							
1049												
1050					Gamma Statistics on Detected Data Only							
1051					k hat (MLE)	1.687	k star (bias corrected MLE)					1.511
1052					Theta hat (MLE)	0.486	Theta star (bias corrected MLE)					0.543
1053					nu hat (MLE)	84.34	nu star (bias corrected)					75.55
1054					MLE Mean (bias corrected)	0.82	MLE Sd (bias corrected)					0.667
1055												
1056					Gamma Kaplan-Meier (KM) Statistics							
1057					k hat (KM)	1.603	nu hat (KM)					83.35
1058					Approximate Chi Square Value (83.35, α)	63.31	Adjusted Chi Square Value (83.35, β)					62.16
1059					95% Gamma Approximate KM-UCL (use when n>=50)	1.041	95% Gamma Adjusted KM-UCL (use when n<50)					1.06
1060												
1061					Gamma ROS Statistics using Imputed Non-Detects							
1062					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs							
1063					GROS may not be used when kstar of detected data is small such as < 0.1							
1064					For such situations, GROS method tends to yield inflated values of UCLs and BTVs							
1065					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates							
1066					Minimum	0.01	Mean					0.789
1067					Maximum	2.317	Median					0.639
1068					SD	0.639	CV					0.809
1069					k hat (MLE)	1.269	k star (bias corrected MLE)					1.148
1070					Theta hat (MLE)	0.622	Theta star (bias corrected MLE)					0.687
1071					nu hat (MLE)	66	nu star (bias corrected)					59.72
1072					MLE Mean (bias corrected)	0.789	MLE Sd (bias corrected)					0.736
1073							Adjusted Level of Significance (β)					0.0398
1074					Approximate Chi Square Value (59.72, α)	42.95	Adjusted Chi Square Value (59.72, β)					42.01
1075					95% Gamma Approximate UCL (use when n>=50)	1.097	95% Gamma Adjusted UCL (use when n<50)					1.122
1076												
1077					Lognormal GOF Test on Detected Observations Only							
1078					Shapiro Wilk Test Statistic	0.919	Shapiro Wilk GOF Test					
1079					5% Shapiro Wilk Critical Value	0.918	Detected Data appear Lognormal at 5% Significance Level					
1080					Lilliefors Test Statistic	0.169	Lilliefors GOF Test					
1081					5% Lilliefors Critical Value	0.177	Detected Data appear Lognormal at 5% Significance Level					
1082					Detected Data appear Lognormal at 5% Significance Level							
1083												
1084					Lognormal ROS Statistics Using Imputed Non-Detects							
1085					Mean in Original Scale	0.791	Mean in Log Scale					-0.607
1086					SD in Original Scale	0.636	SD in Log Scale					0.981
1087					95% t UCL (assumes normality of ROS data)	1.004	95% Percentile Bootstrap UCL					0.996
1088					95% BCA Bootstrap UCL	1.019	95% Bootstrap t UCL					1.063
1089					95% H-UCL (Log ROS)	1.436						
1090												
1091					UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed							
1092					KM Mean (logged)	-0.618	95% H-UCL (KM -Log)					1.436

1093				KM SD (logged)	0.987				95% Critical H Value (KM-Log)			2.492
1094				KM Standard Error of Mean (logged)	0.198							
1095												
1096				**DL/2 Statistics**								
1097				**DL/2 Normal**					**DL/2 Log-Transformed**			
1098				Mean in Original Scale	0.79				Mean in Log Scale			-0.645
1099				SD in Original Scale	0.638				SD in Log Scale			1.079
1100				95% t UCL (Assumes normality)	1.003				95% H-Stat UCL			1.651
1101				**DL/2 is not a recommended method, provided for comparisons and historical reasons**								
1102												
1103				**Nonparametric Distribution Free UCL Statistics**								
1104				**Detected Data appear Gamma Distributed at 5% Significance Level**								
1105												
1106				**Suggested UCL to Use**								
1107				95% KM (Chebyshev) UCL	1.336				95% GROS Adjusted Gamma UCL			1.122
1108				95% Adjusted Gamma KM-UCL	1.06							
1109												
1110				Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.								
1111				Recommendations are based upon data size, data distribution, and skewness.								
1112				These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).								
1113				However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.								
1114												
1115												
1116	**Alt Total PCB Amount (adjacent)**											
1117												
1118				**General Statistics**								
1119				Total Number of Observations	51				Number of Distinct Observations			51
1120									Number of Missing Observations			0
1121				Minimum	0.26				Mean			1.858
1122				Maximum	4.93				Median			1.779
1123				SD	1.135				Std. Error of Mean			0.159
1124				Coefficient of Variation	0.611				Skewness			0.769
1125												
1126				**Normal GOF Test**								
1127				Shapiro Wilk Test Statistic	0.933				**Shapiro Wilk GOF Test**			
1128				5% Shapiro Wilk P Value	0.00887				Data Not Normal at 5% Significance Level			
1129				Lilliefors Test Statistic	0.102				**Lilliefors GOF Test**			
1130				5% Lilliefors Critical Value	0.124				Data appear Normal at 5% Significance Level			
1131				**Data appear Approximate Normal at 5% Significance Level**								
1132												
1133				**Assuming Normal Distribution**								
1134				**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**			
1135				95% Student's-t UCL	2.124				95% Adjusted-CLT UCL (Chen-1995)			2.138
1136									95% Modified-t UCL (Johnson-1978)			2.127
1137												
1138				**Gamma GOF Test**								
1139				A-D Test Statistic	0.531				**Anderson-Darling Gamma GOF Test**			
1140				5% A-D Critical Value	0.76				Detected data appear Gamma Distributed at 5% Significance Level			
1141				K-S Test Statistic	0.103				**Kolmogrov-Smirnoff Gamma GOF Test**			
1142				5% K-S Critical Value	0.126				Detected data appear Gamma Distributed at 5% Significance Level			
1143				**Detected data appear Gamma Distributed at 5% Significance Level**								
1144												

1145	**Gamma Statistics**											
1146					k hat (MLE)	2.409			k star (bias corrected MLE)			2.281
1147					Theta hat (MLE)	0.771			Theta star (bias corrected MLE)			0.815
1148					nu hat (MLE)	245.8			nu star (bias corrected)			232.6
1149					MLE Mean (bias corrected)	1.858			MLE Sd (bias corrected)			1.23
1150									Approximate Chi Square Value (0.05)			198.3
1151					Adjusted Level of Significance	0.0453			Adjusted Chi Square Value			197.4
1152												
1153	**Assuming Gamma Distribution**											
1154				95% Approximate Gamma UCL (use when n>=50))		2.18			95% Adjusted Gamma UCL (use when n<50)			2.19
1155												
1156	**Lognormal GOF Test**											
1157					Shapiro Wilk Test Statistic	0.937			**Shapiro Wilk Lognormal GOF Test**			
1158					5% Shapiro Wilk P Value	0.0131			Data Not Lognormal at 5% Significance Level			
1159					Lilliefors Test Statistic	0.148			**Lilliefors Lognormal GOF Test**			
1160					5% Lilliefors Critical Value	0.124			Data Not Lognormal at 5% Significance Level			
1161	**Data Not Lognormal at 5% Significance Level**											
1162												
1163	**Lognormal Statistics**											
1164					Minimum of Logged Data	-1.349			Mean of logged Data			0.398
1165					Maximum of Logged Data	1.595			SD of logged Data			0.731
1166												
1167	**Assuming Lognormal Distribution**											
1168					95% H-UCL	2.404			90% Chebyshev (MVUE) UCL			2.586
1169					95% Chebyshev (MVUE) UCL	2.882			97.5% Chebyshev (MVUE) UCL			3.293
1170					99% Chebyshev (MVUE) UCL	4.1						
1171												
1172	**Nonparametric Distribution Free UCL Statistics**											
1173	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1174												
1175	**Nonparametric Distribution Free UCLs**											
1176					95% CLT UCL	2.119			95% Jackknife UCL			2.124
1177					95% Standard Bootstrap UCL	2.119			95% Bootstrap-t UCL			2.145
1178					95% Hall's Bootstrap UCL	2.16			95% Percentile Bootstrap UCL			2.115
1179					95% BCA Bootstrap UCL	2.125						
1180					90% Chebyshev(Mean, Sd) UCL	2.335			95% Chebyshev(Mean, Sd) UCL			2.551
1181					97.5% Chebyshev(Mean, Sd) UCL	2.85			99% Chebyshev(Mean, Sd) UCL			3.439
1182												
1183	**Suggested UCL to Use**											
1184					95% Student's-t UCL	2.124						
1185												
1186	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1187	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
1188	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
1189	For additional insight the user may want to consult a statistician.											
1190												
1191												
1192	**Alt Total PCB Amount (north)**											
1193												
1194	**General Statistics**											
1195					Total Number of Observations	26			Number of Distinct Observations			26
1196									Number of Missing Observations			0

1197					Minimum	0.114					Mean	0.696
1198					Maximum	2.04					Median	0.652
1199					SD	0.506					Std. Error of Mean	0.0992
1200					Coefficient of Variation	0.727					Skewness	1.024
1201												
1202					**Normal GOF Test**							
1203					Shapiro Wilk Test Statistic	0.896		**Shapiro Wilk GOF Test**				
1204					5% Shapiro Wilk Critical Value	0.92		Data Not Normal at 5% Significance Level				
1205					Lilliefors Test Statistic	0.148		**Lilliefors GOF Test**				
1206					5% Lilliefors Critical Value	0.174		Data appear Normal at 5% Significance Level				
1207					**Data appear Approximate Normal at 5% Significance Level**							
1208												
1209					**Assuming Normal Distribution**							
1210					**95% Normal UCL**			**95% UCLs (Adjusted for Skewness)**				
1211					95% Student's-t UCL	0.865		95% Adjusted-CLT UCL (Chen-1995)				0.88
1212								95% Modified-t UCL (Johnson-1978)				0.869
1213												
1214					**Gamma GOF Test**							
1215					A-D Test Statistic	0.363		**Anderson-Darling Gamma GOF Test**				
1216					5% A-D Critical Value	0.758		Detected data appear Gamma Distributed at 5% Significance Level				
1217					K-S Test Statistic	0.134		**Kolmogrov-Smirnoff Gamma GOF Test**				
1218					5% K-S Critical Value	0.173		Detected data appear Gamma Distributed at 5% Significance Level				
1219					**Detected data appear Gamma Distributed at 5% Significance Level**							
1220												
1221					**Gamma Statistics**							
1222					k hat (MLE)	1.975		k star (bias corrected MLE)				1.773
1223					Theta hat (MLE)	0.352		Theta star (bias corrected MLE)				0.393
1224					nu hat (MLE)	102.7		nu star (bias corrected)				92.18
1225					MLE Mean (bias corrected)	0.696		MLE Sd (bias corrected)				0.523
1226								Approximate Chi Square Value (0.05)				71.04
1227					Adjusted Level of Significance	0.0398		Adjusted Chi Square Value				69.82
1228												
1229					**Assuming Gamma Distribution**							
1230					95% Approximate Gamma UCL (use when n>=50))	0.903		95% Adjusted Gamma UCL (use when n<50)				0.919
1231												
1232					**Lognormal GOF Test**							
1233					Shapiro Wilk Test Statistic	0.963		**Shapiro Wilk Lognormal GOF Test**				
1234					5% Shapiro Wilk Critical Value	0.92		Data appear Lognormal at 5% Significance Level				
1235					Lilliefors Test Statistic	0.135		**Lilliefors Lognormal GOF Test**				
1236					5% Lilliefors Critical Value	0.174		Data appear Lognormal at 5% Significance Level				
1237					**Data appear Lognormal at 5% Significance Level**							
1238												
1239					**Lognormal Statistics**							
1240					Minimum of Logged Data	-2.172		Mean of logged Data				-0.636
1241					Maximum of Logged Data	0.713		SD of logged Data				0.788
1242												
1243					**Assuming Lognormal Distribution**							
1244					95% H-UCL	1.03		90% Chebyshev (MVUE) UCL				1.072
1245					95% Chebyshev (MVUE) UCL	1.236		97.5% Chebyshev (MVUE) UCL				1.463
1246					99% Chebyshev (MVUE) UCL	1.909						
1247												
1248					**Nonparametric Distribution Free UCL Statistics**							

1249	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1250												
1251	**Nonparametric Distribution Free UCLs**											
1252				95% CLT UCL	0.859			95% Jackknife UCL	0.865			
1253				95% Standard Bootstrap UCL	0.855			95% Bootstrap-t UCL	0.891			
1254				95% Hall's Bootstrap UCL	0.886			95% Percentile Bootstrap UCL	0.864			
1255				95% BCA Bootstrap UCL	0.884							
1256				90% Chebyshev(Mean, Sd) UCL	0.994			95% Chebyshev(Mean, Sd) UCL	1.128			
1257				97.5% Chebyshev(Mean, Sd) UCL	1.315			99% Chebyshev(Mean, Sd) UCL	1.683			
1258												
1259	**Suggested UCL to Use**											
1260				95% Student's-t UCL	0.865							
1261												
1262	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1263	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
1264	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
1265	For additional insight the user may want to consult a statistician.											
1266												
1267	**Alt Total PCB Amount (south)**											
1268												
1269	**General Statistics**											
1270				Total Number of Observations	26			Number of Distinct Observations	26			
1271				Number of Detects	25			Number of Non-Detects	1			
1272				Number of Distinct Detects	25			Number of Distinct Non-Detects	1			
1273				Minimum Detect	0.106			Minimum Non-Detect	0.05			
1274				Maximum Detect	1.844			Maximum Non-Detect	0.05			
1275				Variance Detects	0.249			Percent Non-Detects	3.846%			
1276				Mean Detects	0.732			SD Detects	0.499			
1277				Median Detects	0.625			CV Detects	0.682			
1278				Skewness Detects	0.884			Kurtosis Detects	0.349			
1279				Mean of Logged Detects	-0.591			SD of Logged Detects	0.845			
1280												
1281	**Normal GOF Test on Detects Only**											
1282				Shapiro Wilk Test Statistic	0.906			**Shapiro Wilk GOF Test**				
1283				5% Shapiro Wilk Critical Value	0.918			Detected Data Not Normal at 5% Significance Level				
1284				Lilliefors Test Statistic	0.143			**Lilliefors GOF Test**				
1285				5% Lilliefors Critical Value	0.177			Detected Data appear Normal at 5% Significance Level				
1286	**Detected Data appear Approximate Normal at 5% Significance Level**											
1287												
1288	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1289				Mean	0.706			Standard Error of Mean	0.0995			
1290				SD	0.497			95% KM (BCA) UCL	0.873			
1291				95% KM (t) UCL	0.876			95% KM (Percentile Bootstrap) UCL	0.879			
1292				95% KM (z) UCL	0.87			95% KM Bootstrap t UCL	0.899			
1293				90% KM Chebyshev UCL	1.005			95% KM Chebyshev UCL	1.14			
1294				97.5% KM Chebyshev UCL	1.328			99% KM Chebyshev UCL	1.697			
1295												
1296	**Gamma GOF Tests on Detected Observations Only**											
1297				A-D Test Statistic	0.439			**Anderson-Darling GOF Test**				
1298				5% A-D Critical Value	0.757			Detected data appear Gamma Distributed at 5% Significance Level				
1299				K-S Test Statistic	0.125			**Kolmogrov-Smirnoff GOF**				
1300				5% K-S Critical Value	0.177			Detected data appear Gamma Distributed at 5% Significance Level				

1301	**Detected data appear Gamma Distributed at 5% Significance Level**											
1302												
1303	**Gamma Statistics on Detected Data Only**											
1304						k hat (MLE)	1.939			k star (bias corrected MLE)	1.733	
1305						Theta hat (MLE)	0.378			Theta star (bias corrected MLE)	0.423	
1306						nu hat (MLE)	96.97			nu star (bias corrected)	86.66	
1307						MLE Mean (bias corrected)	0.732			MLE Sd (bias corrected)	0.556	
1308												
1309	**Gamma Kaplan-Meier (KM) Statistics**											
1310						k hat (KM)	2.017			nu hat (KM)	104.9	
1311						Approximate Chi Square Value (104.87, α)	82.24			Adjusted Chi Square Value (104.87, β)	80.91	
1312						95% Gamma Approximate KM-UCL (use when n>=50)	0.901			95% Gamma Adjusted KM-UCL (use when n<50)	0.915	
1313												
1314	**Gamma ROS Statistics using Imputed Non-Detects**											
1315	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1316	GROS may not be used when kstar of detected data is small such as < 0.1											
1317	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
1318	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1319						Minimum	0.0124			Mean	0.705	
1320						Maximum	1.844			Median	0.607	
1321						SD	0.509			CV	0.722	
1322						k hat (MLE)	1.436			k star (bias corrected MLE)	1.296	
1323						Theta hat (MLE)	0.491			Theta star (bias corrected MLE)	0.544	
1324						nu hat (MLE)	74.68			nu star (bias corrected)	67.4	
1325						MLE Mean (bias corrected)	0.705			MLE Sd (bias corrected)	0.619	
1326										Adjusted Level of Significance (β)	0.0398	
1327						Approximate Chi Square Value (67.40, α)	49.5			Adjusted Chi Square Value (67.40, β)	48.49	
1328						95% Gamma Approximate UCL (use when n>=50)	0.96			95% Gamma Adjusted UCL (use when n<50)	0.98	
1329												
1330	**Lognormal GOF Test on Detected Observations Only**											
1331						Shapiro Wilk Test Statistic	0.908			**Shapiro Wilk GOF Test**		
1332						5% Shapiro Wilk Critical Value	0.918			Detected Data Not Lognormal at 5% Significance Level		
1333						Lilliefors Test Statistic	0.176			**Lilliefors GOF Test**		
1334						5% Lilliefors Critical Value	0.177			Detected Data appear Lognormal at 5% Significance Level		
1335	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
1336												
1337	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1338						Mean in Original Scale	0.707			Mean in Log Scale	-0.669	
1339						SD in Original Scale	0.506			SD in Log Scale	0.92	
1340						95% t UCL (assumes normality of ROS data)	0.877			95% Percentile Bootstrap UCL	0.879	
1341						95% BCA Bootstrap UCL	0.884			95% Bootstrap t UCL	0.904	
1342						95% H-UCL (Log ROS)	1.217					
1343												
1344	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
1345						KM Mean (logged)	-0.683			95% H-UCL (KM -Log)	1.23	
1346						KM SD (logged)	0.935			95% Critical H Value (KM-Log)	2.425	
1347						KM Standard Error of Mean (logged)	0.187					
1348												
1349	**DL/2 Statistics**											
1350	**DL/2 Normal**									**DL/2 Log-Transformed**		
1351						Mean in Original Scale	0.705			Mean in Log Scale	-0.71	
1352						SD in Original Scale	0.508			SD in Log Scale	1.027	

	A	B	C	D	E	F	G	H	I	J	K	L
1353				95% t UCL (Assumes normality)		0.876					95% H-Stat UCL	1.405
1354	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1355												
1356	**Nonparametric Distribution Free UCL Statistics**											
1357	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
1358												
1359	**Suggested UCL to Use**											
1360				95% KM (t) UCL		0.876					95% KM (Percentile Bootstrap) UCL	0.879
1361												
1362	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1363	Recommendations are based upon data size, data distribution, and skewness.											
1364	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1365	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1366												

Blue Crab Hepatopancreas ProUCL Output

HALEY ALDRICH

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/30/2015 10:53:58 AM
From File	ProUCL Input_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclor 1248 (adjacent)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	14
Minimum Detect	0.383	Minimum Non-Detect	0.05
Maximum Detect	0.787	Maximum Non-Detect	0.247
Variance Detects	0.0816	Percent Non-Detects	87.5%
Mean Detects	0.585	SD Detects	0.286
Median Detects	0.585	CV Detects	0.488
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.6	SD of Logged Detects	0.509

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.117	Standard Error of Mean	0.0675
SD	0.191	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.235	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.228	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.319	95% KM Chebyshev UCL	0.411
97.5% KM Chebyshev UCL	0.538	99% KM Chebyshev UCL	0.788

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.04	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0728	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	32.16	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.375	nu hat (KM)	12.01
		Adjusted Level of Significance (β)	0.0335
Approximate Chi Square Value (12.01, α)	5.231	Adjusted Chi Square Value (12.01, β)	4.731
95% Gamma Approximate KM-UCL (use when n>=50)	0.268	95% Gamma Adjusted KM-UCL (use when n<50)	0.297

53												
54	**Lognormal GOF Test on Detected Observations Only**											
55	**Not Enough Data to Perform GOF Test**											
56												
57	**Lognormal ROS Statistics Using Imputed Non-Detects**											
58						Mean in Original Scale	0.087				Mean in Log Scale	-3.699
59						SD in Original Scale	0.208				SD in Log Scale	1.217
60						95% t UCL (assumes normality of ROS data)	0.178				95% Percentile Bootstrap UCL	N/A
61						95% BCA Bootstrap UCL	N/A				95% Bootstrap t UCL	N/A
62						95% H-UCL (Log ROS)	0.135					
63												
64	**DL/2 Statistics**											
65	**DL/2 Normal**										**DL/2 Log-Transformed**	
66						Mean in Original Scale	0.127				Mean in Log Scale	-2.622
67						SD in Original Scale	0.196				SD in Log Scale	0.926
68						95% t UCL (Assumes normality)	0.213				95% H-Stat UCL	0.207
69	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
70												
71	**Nonparametric Distribution Free UCL Statistics**											
72	**Data do not follow a Discernible Distribution at 5% Significance Level**											
73												
74	**Suggested UCL to Use**											
75						95% KM (t) UCL	0.235				95% KM (% Bootstrap) UCL	N/A
76	**Warning: One or more Recommended UCL(s) not available!**											
77												
78	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
79	Recommendations are based upon data size, data distribution, and skewness.											
80	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
81	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
82												
83												
84	**Aroclor 1248 (north)**											
85												
86	**General Statistics**											
87						Total Number of Observations	1				Number of Distinct Observations	1
88											Number of Missing Observations	14
89						Minimum	0.134				Mean	0.134
90						Maximum	0.134				Median	0.134
91												
92	**Warning: This data set only has 1 observations!**											
93	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
94	**The data set for variable Aroclor 1248 (north) was not processed!**											
95												
96	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
97	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
98												
99												
100												
101	**Aroclor 1248 (south)**											
102												
103	**General Statistics**											
104						Total Number of Observations	1				Number of Distinct Observations	1

105											Number of Missing Observations	9
106					Minimum	0.186					Mean	0.186
107					Maximum	0.186					Median	0.186
108												
109	Warning: This data set only has 1 observations!											
110	Data set is too small to compute reliable and meaningful statistics and estimates!											
111	The data set for variable Aroclor 1248 (south) was not processed!											
112												
113	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
114	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
115												
116												
117	Aroclor 1254 (adjacent)											
118												
119	General Statistics											
120					Total Number of Observations	16					Number of Distinct Observations	16
121					Number of Detects	2					Number of Non-Detects	14
122					Number of Distinct Detects	2					Number of Distinct Non-Detects	14
123					Minimum Detect	0.202					Minimum Non-Detect	0.05
124					Maximum Detect	0.577					Maximum Non-Detect	0.247
125					Variance Detects	0.0703					Percent Non-Detects	87.5%
126					Mean Detects	0.39					SD Detects	0.265
127					Median Detects	0.39					CV Detects	0.681
128					Skewness Detects	N/A					Kurtosis Detects	N/A
129					Mean of Logged Detects	-1.075					SD of Logged Detects	0.742
130												
131	Warning: Data set has only 2 Detected Values.											
132	This is not enough to compute meaningful or reliable statistics and estimates.											
133												
134												
135	Normal GOF Test on Detects Only											
136	Not Enough Data to Perform GOF Test											
137												
138	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
139					Mean	0.0939					Standard Error of Mean	0.0465
140					SD	0.131					95% KM (BCA) UCL	N/A
141					95% KM (t) UCL	0.175					95% KM (Percentile Bootstrap) UCL	N/A
142					95% KM (z) UCL	0.17					95% KM Bootstrap t UCL	N/A
143					90% KM Chebyshev UCL	0.234					95% KM Chebyshev UCL	0.297
144					97.5% KM Chebyshev UCL	0.385					99% KM Chebyshev UCL	0.557
145												
146	Gamma GOF Tests on Detected Observations Only											
147	Not Enough Data to Perform GOF Test											
148												
149	Gamma Statistics on Detected Data Only											
150					k hat (MLE)	3.952					k star (bias corrected MLE)	N/A
151					Theta hat (MLE)	0.0985					Theta star (bias corrected MLE)	N/A
152					nu hat (MLE)	15.81					nu star (bias corrected)	N/A
153					MLE Mean (bias corrected)	N/A					MLE Sd (bias corrected)	N/A
154												
155	Gamma Kaplan-Meier (KM) Statistics											
156					k hat (KM)	0.516					nu hat (KM)	16.5

157											Adjusted Level of Significance (β)	0.0335
158					Approximate Chi Square Value (16.50, α)	8.318					Adjusted Chi Square Value (16.50, β)	7.663
159					95% Gamma Approximate KM-UCL (use when n>=50)	0.186					95% Gamma Adjusted KM-UCL (use when n<50)	0.202
160												
161					**Lognormal GOF Test on Detected Observations Only**							
162					**Not Enough Data to Perform GOF Test**							
163												
164					**Lognormal ROS Statistics Using Imputed Non-Detects**							
165					Mean in Original Scale	0.0612					Mean in Log Scale	-3.852
166					SD in Original Scale	0.145					SD in Log Scale	1.103
167					95% t UCL (assumes normality of ROS data)	0.125					95% Percentile Bootstrap UCL	N/A
168					95% BCA Bootstrap UCL	N/A					95% Bootstrap t UCL	N/A
169					95% H-UCL (Log ROS)	0.0881						
170												
171					**DL/2 Statistics**							
172					**DL/2 Normal**						**DL/2 Log-Transformed**	
173					Mean in Original Scale	0.102					Mean in Log Scale	-2.681
174					SD in Original Scale	0.135					SD in Log Scale	0.804
175					95% t UCL (Assumes normality)	0.161					95% H-Stat UCL	0.156
176					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
177												
178					**Nonparametric Distribution Free UCL Statistics**							
179					**Data do not follow a Discernible Distribution at 5% Significance Level**							
180												
181					**Suggested UCL to Use**							
182					95% KM (t) UCL	0.175					95% KM (% Bootstrap) UCL	N/A
183					**Warning: One or more Recommended UCL(s) not available!**							
184												
185					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
186					Recommendations are based upon data size, data distribution, and skewness.							
187					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
188					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
189												
190												
191	**Aroclor 1254 (north)**											
192												
193					**General Statistics**							
194					Total Number of Observations	1					Number of Distinct Observations	1
195											Number of Missing Observations	14
196					Minimum	0.0734					Mean	0.0734
197					Maximum	0.0734					Median	0.0734
198												
199					**Warning: This data set only has 1 observations!**							
200					**Data set is too small to compute reliable and meaningful statistics and estimates!**							
201					**The data set for variable Aroclor 1254 (north) was not processed!**							
202												
203					**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**							
204					**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**							
205												
206												
207												
208	**Aroclor 1254 (south)**											

209												
210	**General Statistics**											
211					Total Number of Observations	1			Number of Distinct Observations	1		
212									Number of Missing Observations	9		
213					Minimum	0.0527			Mean	0.0527		
214					Maximum	0.0527			Median	0.0527		
215												
216	**Warning: This data set only has 1 observations!**											
217	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
218	**The data set for variable Aroclor 1254 (south) was not processed!**											
219												
220	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
221	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
222												
223												
224	**Aroclor 1262 (adjacent)**											
225												
226	**General Statistics**											
227					Total Number of Observations	16			Number of Distinct Observations	16		
228					Number of Detects	14			Number of Non-Detects	2		
229					Number of Distinct Detects	14			Number of Distinct Non-Detects	2		
230					Minimum Detect	0.123			Minimum Non-Detect	0.169		
231					Maximum Detect	2.36			Maximum Non-Detect	0.237		
232					Variance Detects	0.403			Percent Non-Detects	12.5%		
233					Mean Detects	0.82			SD Detects	0.635		
234					Median Detects	0.522			CV Detects	0.774		
235					Skewness Detects	1.465			Kurtosis Detects	1.588		
236					Mean of Logged Detects	-0.455			SD of Logged Detects	0.759		
237												
238	**Normal GOF Test on Detects Only**											
239					Shapiro Wilk Test Statistic	0.829			**Shapiro Wilk GOF Test**			
240					5% Shapiro Wilk Critical Value	0.874			Detected Data Not Normal at 5% Significance Level			
241					Lilliefors Test Statistic	0.252			**Lilliefors GOF Test**			
242					5% Lilliefors Critical Value	0.237			Detected Data Not Normal at 5% Significance Level			
243	**Detected Data Not Normal at 5% Significance Level**											
244												
245	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
246					Mean	0.733			Standard Error of Mean	0.16		
247					SD	0.617			95% KM (BCA) UCL	1.008		
248					95% KM (t) UCL	1.013			95% KM (Percentile Bootstrap) UCL	1.002		
249					95% KM (z) UCL	0.996			95% KM Bootstrap t UCL	1.134		
250					90% KM Chebyshev UCL	1.213			95% KM Chebyshev UCL	1.43		
251					97.5% KM Chebyshev UCL	1.732			99% KM Chebyshev UCL	2.325		
252												
253	**Gamma GOF Tests on Detected Observations Only**											
254					A-D Test Statistic	0.483			**Anderson-Darling GOF Test**			
255					5% A-D Critical Value	0.746			Detected data appear Gamma Distributed at 5% Significance Level			
256					K-S Test Statistic	0.215			**Kolmogrov-Smirnoff GOF**			
257					5% K-S Critical Value	0.232			Detected data appear Gamma Distributed at 5% Significance Level			
258	**Detected data appear Gamma Distributed at 5% Significance Level**											
259												
260	**Gamma Statistics on Detected Data Only**											

261					k hat (MLE)	2.096					k star (bias corrected MLE)	1.695
262					Theta hat (MLE)	0.391					Theta star (bias corrected MLE)	0.484
263					nu hat (MLE)	58.7					nu star (bias corrected)	47.45
264					MLE Mean (bias corrected)	0.82					MLE Sd (bias corrected)	0.63
265												
266	**Gamma Kaplan-Meier (KM) Statistics**											
267					k hat (KM)	1.412					nu hat (KM)	45.2
268					Approximate Chi Square Value (45.20, α)	30.77					Adjusted Chi Square Value (45.20, β)	29.42
269					95% Gamma Approximate KM-UCL (use when n>=50)	1.076					95% Gamma Adjusted KM-UCL (use when n<50)	1.126
270												
271	**Gamma ROS Statistics using Imputed Non-Detects**											
272	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
273	GROS may not be used when kstar of detected data is small such as < 0.1											
274	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
275	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
276					Minimum	0.01					Mean	0.719
277					Maximum	2.36					Median	0.515
278					SD	0.652					CV	0.908
279					k hat (MLE)	0.907					k star (bias corrected MLE)	0.779
280					Theta hat (MLE)	0.793					Theta star (bias corrected MLE)	0.923
281					nu hat (MLE)	29.02					nu star (bias corrected)	24.91
282					MLE Mean (bias corrected)	0.719					MLE Sd (bias corrected)	0.815
283											Adjusted Level of Significance (β)	0.0335
284					Approximate Chi Square Value (24.91, α)	14.54					Adjusted Chi Square Value (24.91, β)	13.65
285					95% Gamma Approximate UCL (use when n>=50)	1.231					95% Gamma Adjusted UCL (use when n<50)	1.312
286												
287	**Lognormal GOF Test on Detected Observations Only**											
288					Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**					
289					5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level					
290					Lilliefors Test Statistic	0.173	**Lilliefors GOF Test**					
291					5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level					
292	**Detected Data appear Lognormal at 5% Significance Level**											
293												
294	**Lognormal ROS Statistics Using Imputed Non-Detects**											
295					Mean in Original Scale	0.737					Mean in Log Scale	-0.634
296					SD in Original Scale	0.633					SD in Log Scale	0.859
297					95% t UCL (assumes normality of ROS data)	1.014					95% Percentile Bootstrap UCL	1.017
298					95% BCA Bootstrap UCL	1.073					95% Bootstrap t UCL	1.183
299					95% H-UCL (Log ROS)	1.334						
300												
301	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
302					KM Mean (logged)	-0.66					95% H-UCL (KM -Log)	1.334
303					KM SD (logged)	0.873					95% Critical H Value (KM-Log)	2.515
304					KM Standard Error of Mean (logged)	0.227						
305												
306	**DL/2 Statistics**											
307	**DL/2 Normal**						**DL/2 Log-Transformed**					
308					Mean in Original Scale	0.73					Mean in Log Scale	-0.686
309					SD in Original Scale	0.64					SD in Log Scale	0.949
310					95% t UCL (Assumes normality)	1.011					95% H-Stat UCL	1.505
311	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
312												

313	**Nonparametric Distribution Free UCL Statistics**											
314	**Detected Data appear Gamma Distributed at 5% Significance Level**											
315												
316	**Suggested UCL to Use**											
317				95% KM (BCA) UCL	1.008			95% GROS Adjusted Gamma UCL	1.312			
318				95% Adjusted Gamma KM-UCL	1.126							
319												
320	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
321	Recommendations are based upon data size, data distribution, and skewness.											
322	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
323	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
324												
325												
326	**Aroclor 1262 (north)**											
327												
328	**General Statistics**											
329				Total Number of Observations	14			Number of Distinct Observations	14			
330								Number of Missing Observations	1			
331				Minimum	0.0696			Mean	0.386			
332				Maximum	0.912			Median	0.349			
333				SD	0.234			Std. Error of Mean	0.0624			
334				Coefficient of Variation	0.605			Skewness	0.846			
335												
336	**Normal GOF Test**											
337				Shapiro Wilk Test Statistic	0.94			**Shapiro Wilk GOF Test**				
338				5% Shapiro Wilk Critical Value	0.874			Data appear Normal at 5% Significance Level				
339				Lilliefors Test Statistic	0.169			**Lilliefors GOF Test**				
340				5% Lilliefors Critical Value	0.237			Data appear Normal at 5% Significance Level				
341	**Data appear Normal at 5% Significance Level**											
342												
343	**Assuming Normal Distribution**											
344				**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**				
345				95% Student's-t UCL	0.497			95% Adjusted-CLT UCL (Chen-1995)	0.504			
346								95% Modified-t UCL (Johnson-1978)	0.499			
347												
348	**Gamma GOF Test**											
349				A-D Test Statistic	0.232			**Anderson-Darling Gamma GOF Test**				
350				5% A-D Critical Value	0.744			Detected data appear Gamma Distributed at 5% Significance Level				
351				K-S Test Statistic	0.124			**Kolmogrov-Smirnoff Gamma GOF Test**				
352				5% K-S Critical Value	0.231			Detected data appear Gamma Distributed at 5% Significance Level				
353	**Detected data appear Gamma Distributed at 5% Significance Level**											
354												
355	**Gamma Statistics**											
356				k hat (MLE)	2.638			k star (bias corrected MLE)	2.12			
357				Theta hat (MLE)	0.146			Theta star (bias corrected MLE)	0.182			
358				nu hat (MLE)	73.86			nu star (bias corrected)	59.37			
359				MLE Mean (bias corrected)	0.386			MLE Sd (bias corrected)	0.265			
360								Approximate Chi Square Value (0.05)	42.65			
361				Adjusted Level of Significance	0.0312			Adjusted Chi Square Value	40.77			
362												
363	**Assuming Gamma Distribution**											
364				95% Approximate Gamma UCL (use when n>=50))	0.537			95% Adjusted Gamma UCL (use when n<50)	0.562			

365												
366	**Lognormal GOF Test**											
367					Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk Lognormal GOF Test**					
368					5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level					
369					Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**					
370					5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level					
371	**Data appear Lognormal at 5% Significance Level**											
372												
373	**Lognormal Statistics**											
374					Minimum of Logged Data	-2.665	Mean of logged Data	-1.153				
375					Maximum of Logged Data	-0.0921	SD of logged Data	0.714				
376												
377	**Assuming Lognormal Distribution**											
378					95% H-UCL	0.65	90% Chebyshev (MVUE) UCL	0.639				
379					95% Chebyshev (MVUE) UCL	0.748	97.5% Chebyshev (MVUE) UCL	0.899				
380					99% Chebyshev (MVUE) UCL	1.196						
381												
382	**Nonparametric Distribution Free UCL Statistics**											
383	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
384												
385	**Nonparametric Distribution Free UCLs**											
386					95% CLT UCL	0.489	95% Jackknife UCL	0.497				
387					95% Standard Bootstrap UCL	0.486	95% Bootstrap-t UCL	0.519				
388					95% Hall's Bootstrap UCL	0.548	95% Percentile Bootstrap UCL	0.486				
389					95% BCA Bootstrap UCL	0.503						
390					90% Chebyshev(Mean, Sd) UCL	0.573	95% Chebyshev(Mean, Sd) UCL	0.658				
391					97.5% Chebyshev(Mean, Sd) UCL	0.776	99% Chebyshev(Mean, Sd) UCL	1.007				
392												
393	**Suggested UCL to Use**											
394					95% Student's-t UCL	0.497						
395												
396	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
397	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
398	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
399	For additional insight the user may want to consult a statistician.											
400												
401												
402	**Aroclor 1262 (south)**											
403												
404	**General Statistics**											
405					Total Number of Observations	10	Number of Distinct Observations	10				
406							Number of Missing Observations	0				
407					Minimum	0.201	Mean	0.556				
408					Maximum	1.06	Median	0.547				
409					SD	0.27	Std. Error of Mean	0.0855				
410					Coefficient of Variation	0.486	Skewness	0.27				
411												
412	**Normal GOF Test**											
413					Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**					
414					5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level					
415					Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**					
416					5% Lilliefors Critical Value	0.28	Data appear Normal at 5% Significance Level					

417	**Data appear Normal at 5% Significance Level**											
418												
419	**Assuming Normal Distribution**											
420	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
421				95% Student's-t UCL		0.713				95% Adjusted-CLT UCL (Chen-1995)		0.705
422										95% Modified-t UCL (Johnson-1978)		0.714
423												
424	**Gamma GOF Test**											
425				A-D Test Statistic		0.455	**Anderson-Darling Gamma GOF Test**					
426				5% A-D Critical Value		0.729	Detected data appear Gamma Distributed at 5% Significance Level					
427				K-S Test Statistic		0.224	**Kolmogrov-Smirnoff Gamma GOF Test**					
428				5% K-S Critical Value		0.268	Detected data appear Gamma Distributed at 5% Significance Level					
429	**Detected data appear Gamma Distributed at 5% Significance Level**											
430												
431	**Gamma Statistics**											
432				k hat (MLE)		4.07				k star (bias corrected MLE)		2.916
433				Theta hat (MLE)		0.137				Theta star (bias corrected MLE)		0.191
434				nu hat (MLE)		81.4				nu star (bias corrected)		58.31
435				MLE Mean (bias corrected)		0.556				MLE Sd (bias corrected)		0.326
436										Approximate Chi Square Value (0.05)		41.76
437				Adjusted Level of Significance		0.0267				Adjusted Chi Square Value		39.33
438												
439	**Assuming Gamma Distribution**											
440				95% Approximate Gamma UCL (use when n>=50))		0.777				95% Adjusted Gamma UCL (use when n<50)		0.825
441												
442	**Lognormal GOF Test**											
443				Shapiro Wilk Test Statistic		0.897	**Shapiro Wilk Lognormal GOF Test**					
444				5% Shapiro Wilk Critical Value		0.842	Data appear Lognormal at 5% Significance Level					
445				Lilliefors Test Statistic		0.252	**Lilliefors Lognormal GOF Test**					
446				5% Lilliefors Critical Value		0.28	Data appear Lognormal at 5% Significance Level					
447	**Data appear Lognormal at 5% Significance Level**											
448												
449	**Lognormal Statistics**											
450				Minimum of Logged Data		-1.604				Mean of logged Data		-0.714
451				Maximum of Logged Data		0.0583				SD of logged Data		0.564
452												
453	**Assuming Lognormal Distribution**											
454				95% H-UCL		0.886				90% Chebyshev (MVUE) UCL		0.872
455				95% Chebyshev (MVUE) UCL		1.011				97.5% Chebyshev (MVUE) UCL		1.205
456				99% Chebyshev (MVUE) UCL		1.586						
457												
458	**Nonparametric Distribution Free UCL Statistics**											
459	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
460												
461	**Nonparametric Distribution Free UCLs**											
462				95% CLT UCL		0.697				95% Jackknife UCL		0.713
463				95% Standard Bootstrap UCL		0.69				95% Bootstrap-t UCL		0.721
464				95% Hall's Bootstrap UCL		0.721				95% Percentile Bootstrap UCL		0.689
465				95% BCA Bootstrap UCL		0.685						
466				90% Chebyshev(Mean, Sd) UCL		0.813				95% Chebyshev(Mean, Sd) UCL		0.929
467				97.5% Chebyshev(Mean, Sd) UCL		1.09				99% Chebyshev(Mean, Sd) UCL		1.407
468												

	A	B	C	D	E	F	G	H	I	J	K	L
469	**Suggested UCL to Use**											
470					95% Student's-t UCL	0.713						
471												
472	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
473	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
474	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
475	For additional insight the user may want to consult a statistician.											
476												
477	**Total PCB Amount > RL (adjacent)**											
478												
479	**General Statistics**											
480					Total Number of Observations	16			Number of Distinct Observations	16		
481					Number of Detects	14			Number of Non-Detects	2		
482					Number of Distinct Detects	14			Number of Distinct Non-Detects	2		
483					Minimum Detect	0.123			Minimum Non-Detect	0.169		
484					Maximum Detect	3.724			Maximum Non-Detect	0.237		
485					Variance Detects	0.875			Percent Non-Detects	12.5%		
486					Mean Detects	0.959			SD Detects	0.935		
487					Median Detects	0.522			CV Detects	0.975		
488					Skewness Detects	2.241			Kurtosis Detects	5.774		
489					Mean of Logged Detects	-0.384			SD of Logged Detects	0.85		
490												
491	**Normal GOF Test on Detects Only**											
492					Shapiro Wilk Test Statistic	0.736			**Shapiro Wilk GOF Test**			
493					5% Shapiro Wilk Critical Value	0.874			Detected Data Not Normal at 5% Significance Level			
494					Lilliefors Test Statistic	0.267			**Lilliefors GOF Test**			
495					5% Lilliefors Critical Value	0.237			Detected Data Not Normal at 5% Significance Level			
496	**Detected Data Not Normal at 5% Significance Level**											
497												
498	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
499					Mean	0.855			Standard Error of Mean	0.23		
500					SD	0.887			95% KM (BCA) UCL	1.267		
501					95% KM (t) UCL	1.258			95% KM (Percentile Bootstrap) UCL	1.236		
502					95% KM (z) UCL	1.233			95% KM Bootstrap t UCL	1.572		
503					90% KM Chebyshev UCL	1.545			95% KM Chebyshev UCL	1.858		
504					97.5% KM Chebyshev UCL	2.292			99% KM Chebyshev UCL	3.145		
505												
506	**Gamma GOF Tests on Detected Observations Only**											
507					A-D Test Statistic	0.597			**Anderson-Darling GOF Test**			
508					5% A-D Critical Value	0.75			Detected data appear Gamma Distributed at 5% Significance Level			
509					K-S Test Statistic	0.235			**Kolmogrov-Smirnoff GOF**			
510					5% K-S Critical Value	0.233			Detected Data Not Gamma Distributed at 5% Significance Level			
511	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
512												
513	**Gamma Statistics on Detected Data Only**											
514					k hat (MLE)	1.604			k star (bias corrected MLE)	1.308		
515					Theta hat (MLE)	0.598			Theta star (bias corrected MLE)	0.733		
516					nu hat (MLE)	44.93			nu star (bias corrected)	36.63		
517					MLE Mean (bias corrected)	0.959			MLE Sd (bias corrected)	0.839		
518												
519	**Gamma Kaplan-Meier (KM) Statistics**											
520					k hat (KM)	0.928			nu hat (KM)	29.7		

521	Approximate Chi Square Value (29.70, α)					18.26	Adjusted Chi Square Value (29.70, β)					17.24
522	95% Gamma Approximate KM-UCL (use when n>=50)					1.39	95% Gamma Adjusted KM-UCL (use when n<50)					1.472
523												
524	**Gamma ROS Statistics using Imputed Non-Detects**											
525	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
526	GROS may not be used when kstar of detected data is small such as < 0.1											
527	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
528	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
529	Minimum					0.01	Mean					0.841
530	Maximum					3.724	Median					0.515
531	SD					0.929	CV					1.105
532	k hat (MLE)					0.803	k star (bias corrected MLE)					0.694
533	Theta hat (MLE)					1.047	Theta star (bias corrected MLE)					1.211
534	nu hat (MLE)					25.7	nu star (bias corrected)					22.22
535	MLE Mean (bias corrected)					0.841	MLE Sd (bias corrected)					1.009
536							Adjusted Level of Significance (β)					0.0335
537	Approximate Chi Square Value (22.22, α)					12.5	Adjusted Chi Square Value (22.22, β)					11.68
538	95% Gamma Approximate UCL (use when n>=50)					1.494	95% Gamma Adjusted UCL (use when n<50)					1.599
539												
540	**Lognormal GOF Test on Detected Observations Only**											
541	Shapiro Wilk Test Statistic					0.956	**Shapiro Wilk GOF Test**					
542	5% Shapiro Wilk Critical Value					0.874	Detected Data appear Lognormal at 5% Significance Level					
543	Lilliefors Test Statistic					0.194	**Lilliefors GOF Test**					
544	5% Lilliefors Critical Value					0.237	Detected Data appear Lognormal at 5% Significance Level					
545	**Detected Data appear Lognormal at 5% Significance Level**											
546												
547	**Lognormal ROS Statistics Using Imputed Non-Detects**											
548	Mean in Original Scale					0.857	Mean in Log Scale					-0.584
549	SD in Original Scale					0.915	SD in Log Scale					0.961
550	95% t UCL (assumes normality of ROS data)					1.258	95% Percentile Bootstrap UCL					1.263
551	95% BCA Bootstrap UCL					1.388	95% Bootstrap t UCL					1.596
552	95% H-UCL (Log ROS)					1.705						
553												
554	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
555	KM Mean (logged)					-0.598	95% H-UCL (KM -Log)					1.654
556	KM SD (logged)					0.953	95% Critical H Value (KM-Log)					2.632
557	KM Standard Error of Mean (logged)					0.247						
558												
559	**DL/2 Statistics**											
560	**DL/2 Normal**						**DL/2 Log-Transformed**					
561	Mean in Original Scale					0.852	Mean in Log Scale					-0.624
562	SD in Original Scale					0.919	SD in Log Scale					1.029
563	95% t UCL (Assumes normality)					1.255	95% H-Stat UCL					1.89
564	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
565												
566	**Nonparametric Distribution Free UCL Statistics**											
567	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**											
568												
569	**Suggested UCL to Use**											
570	95% KM (BCA) UCL					1.267	95% GROS Adjusted Gamma UCL					1.599
571	95% Adjusted Gamma KM-UCL					1.472						
572												

	A	B	C	D	E	F	G	H	I	J	K	L
573	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
574	Recommendations are based upon data size, data distribution, and skewness.											
575	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
576	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
577												
578												
579	**Total PCB Amount > RL (north)**											
580												
581	**General Statistics**											
582						Total Number of Observations	14			Number of Distinct Observations	14	
583										Number of Missing Observations	1	
584						Minimum	0.0696			Mean	0.401	
585						Maximum	0.912			Median	0.351	
586						SD	0.242			Std. Error of Mean	0.0646	
587						Coefficient of Variation	0.603			Skewness	0.629	
588												
589	**Normal GOF Test**											
590						Shapiro Wilk Test Statistic	0.954			**Shapiro Wilk GOF Test**		
591						5% Shapiro Wilk Critical Value	0.874			Data appear Normal at 5% Significance Level		
592						Lilliefors Test Statistic	0.186			**Lilliefors GOF Test**		
593						5% Lilliefors Critical Value	0.237			Data appear Normal at 5% Significance Level		
594	**Data appear Normal at 5% Significance Level**											
595												
596	**Assuming Normal Distribution**											
597	**95% Normal UCL**									**95% UCLs (Adjusted for Skewness)**		
598						95% Student's-t UCL	0.515			95% Adjusted-CLT UCL (Chen-1995)	0.519	
599										95% Modified-t UCL (Johnson-1978)	0.517	
600												
601	**Gamma GOF Test**											
602						A-D Test Statistic	0.228			**Anderson-Darling Gamma GOF Test**		
603						5% A-D Critical Value	0.744			Detected data appear Gamma Distributed at 5% Significance Level		
604						K-S Test Statistic	0.119			**Kolmogrov-Smirnoff Gamma GOF Test**		
605						5% K-S Critical Value	0.231			Detected data appear Gamma Distributed at 5% Significance Level		
606	**Detected data appear Gamma Distributed at 5% Significance Level**											
607												
608	**Gamma Statistics**											
609						k hat (MLE)	2.536			k star (bias corrected MLE)	2.04	
610						Theta hat (MLE)	0.158			Theta star (bias corrected MLE)	0.197	
611						nu hat (MLE)	71			nu star (bias corrected)	57.12	
612						MLE Mean (bias corrected)	0.401			MLE Sd (bias corrected)	0.281	
613										Approximate Chi Square Value (0.05)	40.75	
614						Adjusted Level of Significance	0.0312			Adjusted Chi Square Value	38.92	
615												
616	**Assuming Gamma Distribution**											
617						95% Approximate Gamma UCL (use when n>=50))	0.562			95% Adjusted Gamma UCL (use when n<50)	0.588	
618												
619	**Lognormal GOF Test**											
620						Shapiro Wilk Test Statistic	0.937			**Shapiro Wilk Lognormal GOF Test**		
621						5% Shapiro Wilk Critical Value	0.874			Data appear Lognormal at 5% Significance Level		
622						Lilliefors Test Statistic	0.142			**Lilliefors Lognormal GOF Test**		
623						5% Lilliefors Critical Value	0.237			Data appear Lognormal at 5% Significance Level		
624	**Data appear Lognormal at 5% Significance Level**											

625												
626	**Lognormal Statistics**											
627					Minimum of Logged Data	-2.665				Mean of logged Data	-1.124	
628					Maximum of Logged Data	-0.0921				SD of logged Data	0.734	
629												
630	**Assuming Lognormal Distribution**											
631					95% H-UCL	0.691				90% Chebyshev (MVUE) UCL	0.674	
632					95% Chebyshev (MVUE) UCL	0.791				97.5% Chebyshev (MVUE) UCL	0.953	
633					99% Chebyshev (MVUE) UCL	1.272						
634												
635	**Nonparametric Distribution Free UCL Statistics**											
636	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
637												
638	**Nonparametric Distribution Free UCLs**											
639					95% CLT UCL	0.507				95% Jackknife UCL	0.515	
640					95% Standard Bootstrap UCL	0.502				95% Bootstrap-t UCL	0.536	
641					95% Hall's Bootstrap UCL	0.539				95% Percentile Bootstrap UCL	0.506	
642					95% BCA Bootstrap UCL	0.517						
643					90% Chebyshev(Mean, Sd) UCL	0.595				95% Chebyshev(Mean, Sd) UCL	0.683	
644					97.5% Chebyshev(Mean, Sd) UCL	0.805				99% Chebyshev(Mean, Sd) UCL	1.044	
645												
646	**Suggested UCL to Use**											
647					95% Student's-t UCL	0.515						
648												
649	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
650	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
651	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
652	For additional insight the user may want to consult a statistician.											
653												
654												
655	**Total PCB Amount > RL (south)**											
656												
657	**General Statistics**											
658					Total Number of Observations	10				Number of Distinct Observations	10	
659										Number of Missing Observations	0	
660					Minimum	0.201				Mean	0.58	
661					Maximum	1.06				Median	0.633	
662					SD	0.279				Std. Error of Mean	0.0882	
663					Coefficient of Variation	0.481				Skewness	-0.0082	
664												
665	**Normal GOF Test**											
666					Shapiro Wilk Test Statistic	0.928				**Shapiro Wilk GOF Test**		
667					5% Shapiro Wilk Critical Value	0.842				Data appear Normal at 5% Significance Level		
668					Lilliefors Test Statistic	0.178				**Lilliefors GOF Test**		
669					5% Lilliefors Critical Value	0.28				Data appear Normal at 5% Significance Level		
670	**Data appear Normal at 5% Significance Level**											
671												
672	**Assuming Normal Distribution**											
673	**95% Normal UCL**									**95% UCLs (Adjusted for Skewness)**		
674					95% Student's-t UCL	0.742				95% Adjusted-CLT UCL (Chen-1995)	0.725	
675										95% Modified-t UCL (Johnson-1978)	0.742	
676												

	A	B	C	D	E	F	G	H	I	J	K	L
677	**Gamma GOF Test**											
678	A-D Test Statistic					0.558	**Anderson-Darling Gamma GOF Test**					
679	5% A-D Critical Value					0.73	Detected data appear Gamma Distributed at 5% Significance Level					
680	K-S Test Statistic					0.218	**Kolmogrov-Smirnoff Gamma GOF Test**					
681	5% K-S Critical Value					0.268	Detected data appear Gamma Distributed at 5% Significance Level					
682	**Detected data appear Gamma Distributed at 5% Significance Level**											
683												
684	**Gamma Statistics**											
685	k hat (MLE)					3.915	k star (bias corrected MLE)					2.807
686	Theta hat (MLE)					0.148	Theta star (bias corrected MLE)					0.207
687	nu hat (MLE)					78.31	nu star (bias corrected)					56.15
688	MLE Mean (bias corrected)					0.58	MLE Sd (bias corrected)					0.346
689							Approximate Chi Square Value (0.05)					39.93
690	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					37.56
691												
692	**Assuming Gamma Distribution**											
693	95% Approximate Gamma UCL (use when n>=50))					0.816	95% Adjusted Gamma UCL (use when n<50)					0.867
694												
695	**Lognormal GOF Test**											
696	Shapiro Wilk Test Statistic					0.873	**Shapiro Wilk Lognormal GOF Test**					
697	5% Shapiro Wilk Critical Value					0.842	Data appear Lognormal at 5% Significance Level					
698	Lilliefors Test Statistic					0.225	**Lilliefors Lognormal GOF Test**					
699	5% Lilliefors Critical Value					0.28	Data appear Lognormal at 5% Significance Level					
700	**Data appear Lognormal at 5% Significance Level**											
701												
702	**Lognormal Statistics**											
703	Minimum of Logged Data					-1.604	Mean of logged Data					-0.678
704	Maximum of Logged Data					0.0583	SD of logged Data					0.582
705												
706	**Assuming Lognormal Distribution**											
707	95% H-UCL					0.948	90% Chebyshev (MVUE) UCL					0.924
708	95% Chebyshev (MVUE) UCL					1.075	97.5% Chebyshev (MVUE) UCL					1.285
709	99% Chebyshev (MVUE) UCL					1.697						
710												
711	**Nonparametric Distribution Free UCL Statistics**											
712	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
713												
714	**Nonparametric Distribution Free UCLs**											
715	95% CLT UCL					0.725	95% Jackknife UCL					0.742
716	95% Standard Bootstrap UCL					0.716	95% Bootstrap-t UCL					0.738
717	95% Hall's Bootstrap UCL					0.73	95% Percentile Bootstrap UCL					0.716
718	95% BCA Bootstrap UCL					0.716						
719	90% Chebyshev(Mean, Sd) UCL					0.845	95% Chebyshev(Mean, Sd) UCL					0.965
720	97.5% Chebyshev(Mean, Sd) UCL					1.131	99% Chebyshev(Mean, Sd) UCL					1.458
721												
722	**Suggested UCL to Use**											
723	95% Student's-t UCL					0.742						
724												
725	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
726	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
727	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
728	For additional insight the user may want to consult a statistician.											

	A	B	C	D	E	F	G	H	I	J	K	L
729												
730	Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be											
731	reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.											
732												

Blue Crab Leg ProUCL Output

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	5/5/2015 2:03:17 PM
From File	Copy of Fish Master Data Table_b.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclor 1262 (adjacent)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	11
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	8
Minimum Detect	0.0276	Minimum Non-Detect	0.05
Maximum Detect	0.0927	Maximum Non-Detect	0.334
Variance Detects	0.00118	Percent Non-Detects	81.25%
Mean Detects	0.0539	SD Detects	0.0343
Median Detects	0.0413	CV Detects	0.637
Skewness Detects	1.427	Kurtosis Detects	N/A
Mean of Logged Detects	-3.052	SD of Logged Detects	0.617

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0403	Standard Error of Mean	0.00862
SD	0.0186	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0554	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0545	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0661	95% KM Chebyshev UCL	0.0779
97.5% KM Chebyshev UCL	0.0941	99% KM Chebyshev UCL	0.126

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.991	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0135	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	23.94	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

53					k hat (KM)	4.666					nu hat (KM)	149.3
54											Adjusted Level of Significance (β)	0.0335
55					Approximate Chi Square Value (149.33, α)	122.1					Adjusted Chi Square Value (149.33, β)	119.3
56					95% Gamma Approximate KM-UCL (use when n>=50)	0.0493					95% Gamma Adjusted KM-UCL (use when n<50)	0.0504
57												
58					**Lognormal GOF Test on Detected Observations Only**							
59					Shapiro Wilk Test Statistic	0.964			**Shapiro Wilk GOF Test**			
60					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Lognormal at 5% Significance Level			
61					Lilliefors Test Statistic	0.253			**Lilliefors GOF Test**			
62					5% Lilliefors Critical Value	0.512			Detected Data appear Lognormal at 5% Significance Level			
63					**Detected Data appear Lognormal at 5% Significance Level**							
64												
65					**Lognormal ROS Statistics Using Imputed Non-Detects**							
66					Mean in Original Scale	0.0393					Mean in Log Scale	-3.298
67					SD in Original Scale	0.0164					SD in Log Scale	0.341
68					95% t UCL (assumes normality of ROS data)	0.0465					95% Percentile Bootstrap UCL	0.0466
69					95% BCA Bootstrap UCL	0.0484					95% Bootstrap t UCL	0.0528
70					95% H-UCL (Log ROS)	0.0463						
71												
72					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
73					KM Mean (logged)	-3.287					95% H-UCL (KM -Log)	0.0476
74					KM SD (logged)	0.358					95% Critical H Value (KM-Log)	1.918
75					KM Standard Error of Mean (logged)	0.196						
76												
77					**DL/2 Statistics**							
78					**DL/2 Normal**				**DL/2 Log-Transformed**			
79					Mean in Original Scale	0.0474					Mean in Log Scale	-3.219
80					SD in Original Scale	0.0365					SD in Log Scale	0.545
81					95% t UCL (Assumes normality)	0.0634					95% H-Stat UCL	0.0623
82					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
83												
84					**Nonparametric Distribution Free UCL Statistics**							
85					**Detected Data appear Normal Distributed at 5% Significance Level**							
86												
87					**Suggested UCL to Use**							
88					95% KM (t) UCL	0.0554					95% KM (Percentile Bootstrap) UCL	N/A
89					**Warning: One or more Recommended UCL(s) not available!**							
90												
91					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
92					Recommendations are based upon data size, data distribution, and skewness.							
93					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
94					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
95												
96	**Aroclor 1262 (north)**											
97												
98					**General Statistics**							
99					Total Number of Observations	15					Number of Distinct Observations	11
100					Number of Detects	2					Number of Non-Detects	13
101					Number of Distinct Detects	2					Number of Distinct Non-Detects	9
102					Minimum Detect	0.0395					Minimum Non-Detect	0.05
103					Maximum Detect	0.0403					Maximum Non-Detect	0.123
104					Variance Detects	3.2000E-7					Percent Non-Detects	86.67%

105				Mean Detects	0.0399					SD Detects	5.6569E-4
106				Median Detects	0.0399					CV Detects	0.0142
107				Skewness Detects	N/A					Kurtosis Detects	N/A
108				Mean of Logged Detects	-3.221					SD of Logged Detects	0.0142
109											
110	**Warning: Data set has only 2 Detected Values.**										
111	**This is not enough to compute meaningful or reliable statistics and estimates.**										
112											
113											
114	**Normal GOF Test on Detects Only**										
115	**Not Enough Data to Perform GOF Test**										
116											
117	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**										
118				Mean	0.0399					Standard Error of Mean	4.0000E-4
119				SD	4.0000E-4					95% KM (BCA) UCL	N/A
120				95% KM (t) UCL	0.0406					95% KM (Percentile Bootstrap) UCL	N/A
121				95% KM (z) UCL	0.0406					95% KM Bootstrap t UCL	N/A
122				90% KM Chebyshev UCL	0.0411					95% KM Chebyshev UCL	0.0416
123				97.5% KM Chebyshev UCL	0.0424					99% KM Chebyshev UCL	0.0439
124											
125	**Gamma GOF Tests on Detected Observations Only**										
126	**Not Enough Data to Perform GOF Test**										
127											
128	**Gamma Statistics on Detected Data Only**										
129				k hat (MLE)	9950					k star (bias corrected MLE)	N/A
130				Theta hat (MLE)	4.0102E-6					Theta star (bias corrected MLE)	N/A
131				nu hat (MLE)	39799					nu star (bias corrected)	N/A
132				MLE Mean (bias corrected)	N/A					MLE Sd (bias corrected)	N/A
133											
134	**Gamma Kaplan-Meier (KM) Statistics**										
135				k hat (KM)	9950					nu hat (KM)	298502
136										Adjusted Level of Significance (β)	0.0324
137				Approximate Chi Square Value (N/A, α)	297232					Adjusted Chi Square Value (N/A, β)	297076
138				95% Gamma Approximate KM-UCL (use when n>=50)	0.0401					95% Gamma Adjusted KM-UCL (use when n<50)	0.0401
139											
140	**Lognormal GOF Test on Detected Observations Only**										
141	**Not Enough Data to Perform GOF Test**										
142											
143	**Lognormal ROS Statistics Using Imputed Non-Detects**										
144				Mean in Original Scale	0.0399					Mean in Log Scale	-3.221
145				SD in Original Scale	4.0131E-4					SD in Log Scale	0.0101
146				95% t UCL (assumes normality of ROS data)	0.0401					95% Percentile Bootstrap UCL	0.0401
147				95% BCA Bootstrap UCL	0.0401					95% Bootstrap t UCL	0.0401
148				95% H-UCL (Log ROS)	N/A						
149											
150	**DL/2 Statistics**										
151	**DL/2 Normal**									**DL/2 Log-Transformed**	
152				Mean in Original Scale	0.038					Mean in Log Scale	-3.318
153				SD in Original Scale	0.0121					SD in Log Scale	0.321
154				95% t UCL (Assumes normality)	0.0435					95% H-Stat UCL	0.0449
155	**DL/2 is not a recommended method, provided for comparisons and historical reasons**										
156											

157	**Nonparametric Distribution Free UCL Statistics**											
158	**Data do not follow a Discernible Distribution at 5% Significance Level**											
159												
160	**Suggested UCL to Use**											
161					95% KM (t) UCL	0.0406			95% KM (% Bootstrap) UCL	N/A		
162	**Warning: One or more Recommended UCL(s) not available!**											
163	**Warning: Recommended UCL exceeds the maximum observation**											
164												
165	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
166	Recommendations are based upon data size, data distribution, and skewness.											
167	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
168	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
169												
170	**Aroclor 1262 (south)**											
171												
172	**General Statistics**											
173					Total Number of Observations	10			Number of Distinct Observations	7		
174					Number of Detects	1			Number of Non-Detects	9		
175					Number of Distinct Detects	1			Number of Distinct Non-Detects	6		
176												
177	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
178	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
179												
180	**The data set for variable Aroclor 1262 (south) was not processed!**											
181												
182												
183	**Total PCB Amount > RL (adjacent)**											
184												
185	**General Statistics**											
186					Total Number of Observations	16			Number of Distinct Observations	11		
187					Number of Detects	3			Number of Non-Detects	13		
188					Number of Distinct Detects	3			Number of Distinct Non-Detects	8		
189					Minimum Detect	0.0276			Minimum Non-Detect	0.05		
190					Maximum Detect	0.0927			Maximum Non-Detect	0.334		
191					Variance Detects	0.00118			Percent Non-Detects	81.25%		
192					Mean Detects	0.0539			SD Detects	0.0343		
193					Median Detects	0.0413			CV Detects	0.637		
194					Skewness Detects	1.427			Kurtosis Detects	N/A		
195					Mean of Logged Detects	-3.052			SD of Logged Detects	0.617		
196												
197	**Warning: Data set has only 3 Detected Values.**											
198	**This is not enough to compute meaningful or reliable statistics and estimates.**											
199												
200												
201	**Normal GOF Test on Detects Only**											
202					Shapiro Wilk Test Statistic	0.899			**Shapiro Wilk GOF Test**			
203					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Normal at 5% Significance Level			
204					Lilliefors Test Statistic	0.31			**Lilliefors GOF Test**			
205					5% Lilliefors Critical Value	0.512			Detected Data appear Normal at 5% Significance Level			
206	**Detected Data appear Normal at 5% Significance Level**											
207												
208	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											

209					Mean	0.0403				Standard Error of Mean		0.00862
210					SD	0.0186				95% KM (BCA) UCL		N/A
211					95% KM (t) UCL	0.0554				95% KM (Percentile Bootstrap) UCL		N/A
212					95% KM (z) UCL	0.0545				95% KM Bootstrap t UCL		N/A
213					90% KM Chebyshev UCL	0.0661				95% KM Chebyshev UCL		0.0779
214					97.5% KM Chebyshev UCL	0.0941				99% KM Chebyshev UCL		0.126
215												
216					**Gamma GOF Tests on Detected Observations Only**							
217					**Not Enough Data to Perform GOF Test**							
218												
219					**Gamma Statistics on Detected Data Only**							
220					k hat (MLE)	3.991				k star (bias corrected MLE)		N/A
221					Theta hat (MLE)	0.0135				Theta star (bias corrected MLE)		N/A
222					nu hat (MLE)	23.94				nu star (bias corrected)		N/A
223					MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A
224												
225					**Gamma Kaplan-Meier (KM) Statistics**							
226					k hat (KM)	4.666				nu hat (KM)		149.3
227										Adjusted Level of Significance (β)		0.0335
228					Approximate Chi Square Value (149.33, α)	122.1				Adjusted Chi Square Value (149.33, β)		119.3
229					95% Gamma Approximate KM-UCL (use when n>=50)	0.0493				95% Gamma Adjusted KM-UCL (use when n<50)		0.0504
230												
231					**Lognormal GOF Test on Detected Observations Only**							
232					Shapiro Wilk Test Statistic	0.964				**Shapiro Wilk GOF Test**		
233					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Lognormal at 5% Significance Level		
234					Lilliefors Test Statistic	0.253				**Lilliefors GOF Test**		
235					5% Lilliefors Critical Value	0.512				Detected Data appear Lognormal at 5% Significance Level		
236					**Detected Data appear Lognormal at 5% Significance Level**							
237												
238					**Lognormal ROS Statistics Using Imputed Non-Detects**							
239					Mean in Original Scale	0.0393				Mean in Log Scale		-3.298
240					SD in Original Scale	0.0164				SD in Log Scale		0.341
241					95% t UCL (assumes normality of ROS data)	0.0465				95% Percentile Bootstrap UCL		0.0462
242					95% BCA Bootstrap UCL	0.0492				95% Bootstrap t UCL		0.0534
243					95% H-UCL (Log ROS)	0.0463						
244												
245					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
246					KM Mean (logged)	-3.287				95% H-UCL (KM -Log)		0.0476
247					KM SD (logged)	0.358				95% Critical H Value (KM-Log)		1.918
248					KM Standard Error of Mean (logged)	0.196						
249												
250					**DL/2 Statistics**							
251					**DL/2 Normal**					**DL/2 Log-Transformed**		
252					Mean in Original Scale	0.0474				Mean in Log Scale		-3.219
253					SD in Original Scale	0.0365				SD in Log Scale		0.545
254					95% t UCL (Assumes normality)	0.0634				95% H-Stat UCL		0.0623
255					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
256												
257					**Nonparametric Distribution Free UCL Statistics**							
258					**Detected Data appear Normal Distributed at 5% Significance Level**							
259												
260					**Suggested UCL to Use**							

261				95% KM (t) UCL	0.0554				95% KM (Percentile Bootstrap) UCL		N/A	
262	**Warning: One or more Recommended UCL(s) not available!**											
263												
264	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
265	Recommendations are based upon data size, data distribution, and skewness.											
266	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
267	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
268												
269	**Total PCB Amount > RL (north)**											
270												
271	**General Statistics**											
272				Total Number of Observations	15				Number of Distinct Observations		11	
273				Number of Detects	2				Number of Non-Detects		13	
274				Number of Distinct Detects	2				Number of Distinct Non-Detects		9	
275				Minimum Detect	0.0395				Minimum Non-Detect		0.05	
276				Maximum Detect	0.0403				Maximum Non-Detect		0.123	
277				Variance Detects	3.2000E-7				Percent Non-Detects		86.67%	
278				Mean Detects	0.0399				SD Detects		5.6569E-4	
279				Median Detects	0.0399				CV Detects		0.0142	
280				Skewness Detects	N/A				Kurtosis Detects		N/A	
281				Mean of Logged Detects	-3.221				SD of Logged Detects		0.0142	
282												
283	**Warning: Data set has only 2 Detected Values.**											
284	**This is not enough to compute meaningful or reliable statistics and estimates.**											
285												
286												
287	**Normal GOF Test on Detects Only**											
288	**Not Enough Data to Perform GOF Test**											
289												
290	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
291				Mean	0.0399				Standard Error of Mean		4.0000E-4	
292				SD	4.0000E-4				95% KM (BCA) UCL		N/A	
293				95% KM (t) UCL	0.0406				95% KM (Percentile Bootstrap) UCL		N/A	
294				95% KM (z) UCL	0.0406				95% KM Bootstrap t UCL		N/A	
295				90% KM Chebyshev UCL	0.0411				95% KM Chebyshev UCL		0.0416	
296				97.5% KM Chebyshev UCL	0.0424				99% KM Chebyshev UCL		0.0439	
297												
298	**Gamma GOF Tests on Detected Observations Only**											
299	**Not Enough Data to Perform GOF Test**											
300												
301	**Gamma Statistics on Detected Data Only**											
302				k hat (MLE)	9950				k star (bias corrected MLE)		N/A	
303				Theta hat (MLE)	4.0102E-6				Theta star (bias corrected MLE)		N/A	
304				nu hat (MLE)	39799				nu star (bias corrected)		N/A	
305				MLE Mean (bias corrected)	N/A				MLE Sd (bias corrected)		N/A	
306												
307	**Gamma Kaplan-Meier (KM) Statistics**											
308				k hat (KM)	9950				nu hat (KM)		298502	
309									Adjusted Level of Significance (β)		0.0324	
310				Approximate Chi Square Value (N/A, α)	297232				Adjusted Chi Square Value (N/A, β)		297076	
311				95% Gamma Approximate KM-UCL (use when n>=50)	0.0401				95% Gamma Adjusted KM-UCL (use when n<50)		0.0401	
312												

313	**Lognormal GOF Test on Detected Observations Only**											
314	**Not Enough Data to Perform GOF Test**											
315												
316	**Lognormal ROS Statistics Using Imputed Non-Detects**											
317					Mean in Original Scale	0.0399				Mean in Log Scale		-3.221
318					SD in Original Scale	4.0131E-4				SD in Log Scale		0.0101
319				95% t UCL (assumes normality of ROS data)		0.0401				95% Percentile Bootstrap UCL		0.0401
320					95% BCA Bootstrap UCL	0.0401				95% Bootstrap t UCL		0.0401
321					95% H-UCL (Log ROS)	N/A						
322												
323	**DL/2 Statistics**											
324	**DL/2 Normal**						**DL/2 Log-Transformed**					
325					Mean in Original Scale	0.038				Mean in Log Scale		-3.318
326					SD in Original Scale	0.0121				SD in Log Scale		0.321
327					95% t UCL (Assumes normality)	0.0435				95% H-Stat UCL		0.0449
328	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
329												
330	**Nonparametric Distribution Free UCL Statistics**											
331	**Data do not follow a Discernible Distribution at 5% Significance Level**											
332												
333	**Suggested UCL to Use**											
334					95% KM (t) UCL	0.0406				95% KM (% Bootstrap) UCL		N/A
335	**Warning: One or more Recommended UCL(s) not available!**											
336	**Warning: Recommended UCL exceeds the maximum observation**											
337												
338	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
339	Recommendations are based upon data size, data distribution, and skewness.											
340	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
341	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
342												
343	**Total PCB Amount > RL (south)**											
344												
345	**General Statistics**											
346					Total Number of Observations	7				Number of Distinct Observations		7
347										Number of Missing Observations		3
348					Number of Detects	1				Number of Non-Detects		6
349					Number of Distinct Detects	1				Number of Distinct Non-Detects		6
350												
351	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
352	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
353												
354	**The data set for variable Total PCB Amount > RL (south) was not processed!**											
355												
356												

Oyster Toadfish ProUCL Output

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	5/5/2015 2:03:53 PM
From File	Copy of Fish Master Data Table_c.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclor 1262 (adjacent)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	11
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.025	Minimum Non-Detect	0.05
Maximum Detect	0.11	Maximum Non-Detect	0.05
Variance Detects	0.00187	Percent Non-Detects	78.57%
Mean Detects	0.063	SD Detects	0.0432
Median Detects	0.0541	CV Detects	0.685
Skewness Detects	0.891	Kurtosis Detects	N/A
Mean of Logged Detects	-2.938	SD of Logged Detects	0.741

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0332	Standard Error of Mean	0.00739
SD	0.0226	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0462	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0453	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0553	95% KM Chebyshev UCL	0.0654
97.5% KM Chebyshev UCL	0.0793	99% KM Chebyshev UCL	0.107

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.037	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0208	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	18.22	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

53					k hat (KM)	2.154					nu hat (KM)	60.32
54											Adjusted Level of Significance (β)	0.0312
55					Approximate Chi Square Value (60.32, α)	43.46					Adjusted Chi Square Value (60.32, β)	41.56
56					95% Gamma Approximate KM-UCL (use when n>=50)	0.046					95% Gamma Adjusted KM-UCL (use when n<50)	0.0481
57												
58					**Lognormal GOF Test on Detected Observations Only**							
59					Shapiro Wilk Test Statistic	0.999					**Shapiro Wilk GOF Test**	
60					5% Shapiro Wilk Critical Value	0.767					Detected Data appear Lognormal at 5% Significance Level	
61					Lilliefors Test Statistic	0.178					**Lilliefors GOF Test**	
62					5% Lilliefors Critical Value	0.512					Detected Data appear Lognormal at 5% Significance Level	
63					**Detected Data appear Lognormal at 5% Significance Level**							
64												
65					**Lognormal ROS Statistics Using Imputed Non-Detects**							
66					Mean in Original Scale	0.0336					Mean in Log Scale	-3.594
67					SD in Original Scale	0.0256					SD in Log Scale	0.638
68					95% t UCL (assumes normality of ROS data)	0.0457					95% Percentile Bootstrap UCL	0.0456
69					95% BCA Bootstrap UCL	0.0492					95% Bootstrap t UCL	0.0568
70					95% H-UCL (Log ROS)	0.0503						
71												
72					**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**							
73					KM Mean (logged)	-3.528					95% H-UCL (KM -Log)	0.0403
74					KM SD (logged)	0.416					95% Critical H Value (KM-Log)	1.992
75					KM Standard Error of Mean (logged)	0.136						
76												
77					**DL/2 Statistics**							
78					**DL/2 Normal**						**DL/2 Log-Transformed**	
79					Mean in Original Scale	0.0332					Mean in Log Scale	-3.528
80					SD in Original Scale	0.0234					SD in Log Scale	0.432
81					95% t UCL (Assumes normality)	0.0442					95% H-Stat UCL	0.041
82					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
83												
84					**Nonparametric Distribution Free UCL Statistics**							
85					**Detected Data appear Normal Distributed at 5% Significance Level**							
86												
87					**Suggested UCL to Use**							
88					95% KM (t) UCL	0.0462					95% KM (Percentile Bootstrap) UCL	N/A
89					**Warning: One or more Recommended UCL(s) not available!**							
90												
91					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
92					Recommendations are based upon data size, data distribution, and skewness.							
93					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
94					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
95												
96	**Aroclor 1262 (north)**											
97												
98					**General Statistics**							
99					Total Number of Observations	10					Number of Distinct Observations	2
100					Number of Detects	1					Number of Non-Detects	9
101					Number of Distinct Detects	1					Number of Distinct Non-Detects	1
102												
103					**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**							
104	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											

The data set for variable Aroclor 1262 (north) was not processed!

Aroclor 1262 (south)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	8
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.0343	Minimum Non-Detect	0.05
Maximum Detect	0.0845	Maximum Non-Detect	0.05
Variance Detects	6.3109E-4	Percent Non-Detects	72.73%
Mean Detects	0.0588	SD Detects	0.0251
Median Detects	0.0576	CV Detects	0.427
Skewness Detects	0.214	Kurtosis Detects	N/A
Mean of Logged Detects	-2.899	SD of Logged Detects	0.452

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.998	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.041	Standard Error of Mean	0.00565
SD	0.0153	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0512	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0503	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0579	95% KM Chebyshev UCL	0.0656
97.5% KM Chebyshev UCL	0.0762	99% KM Chebyshev UCL	0.0972

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	7.777	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00756	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	46.66	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	7.183	nu hat (KM)	158
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (158.04, α)	130	Adjusted Chi Square Value (158.04, β)	125.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0498	95% Gamma Adjusted KM-UCL (use when n<50)	0.0515

157	**Lognormal GOF Test on Detected Observations Only**											
158					Shapiro Wilk Test Statistic	0.993	**Shapiro Wilk GOF Test**					
159					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level					
160					Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**					
161					5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level					
162	**Detected Data appear Lognormal at 5% Significance Level**											
163												
164	**Lognormal ROS Statistics Using Imputed Non-Detects**											
165					Mean in Original Scale	0.0408	Mean in Log Scale	-3.279				
166					SD in Original Scale	0.0182	SD in Log Scale	0.408				
167					95% t UCL (assumes normality of ROS data)	0.0507	95% Percentile Bootstrap UCL	0.0496				
168					95% BCA Bootstrap UCL	0.0523	95% Bootstrap t UCL	0.0565				
169					95% H-UCL (Log ROS)	0.0534						
170												
171	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
172					KM Mean (logged)	-3.244	95% H-UCL (KM -Log)	0.0484				
173					KM SD (logged)	0.286	95% Critical H Value (KM-Log)	1.935				
174					KM Standard Error of Mean (logged)	0.106						
175												
176	**DL/2 Statistics**											
177				**DL/2 Normal**			**DL/2 Log-Transformed**					
178					Mean in Original Scale	0.0342	Mean in Log Scale	-3.474				
179					SD in Original Scale	0.0194	SD in Log Scale	0.421				
180					95% t UCL (Assumes normality)	0.0448	95% H-Stat UCL	0.0447				
181	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
182												
183	**Nonparametric Distribution Free UCL Statistics**											
184	**Detected Data appear Normal Distributed at 5% Significance Level**											
185												
186	**Suggested UCL to Use**											
187					95% KM (t) UCL	0.0512	95% KM (Percentile Bootstrap) UCL	N/A				
188	**Warning: One or more Recommended UCL(s) not available!**											
189												
190	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
191	Recommendations are based upon data size, data distribution, and skewness.											
192	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
193	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
194												
195	**Total PCB Amount > RL (adjacent)**											
196												
197	**General Statistics**											
198					Total Number of Observations	14	Number of Distinct Observations	4				
199					Number of Detects	3	Number of Non-Detects	11				
200					Number of Distinct Detects	3	Number of Distinct Non-Detects	1				
201					Minimum Detect	0.025	Minimum Non-Detect	0.05				
202					Maximum Detect	0.11	Maximum Non-Detect	0.05				
203					Variance Detects	0.00187	Percent Non-Detects	78.57%				
204					Mean Detects	0.063	SD Detects	0.0432				
205					Median Detects	0.0541	CV Detects	0.685				
206					Skewness Detects	0.891	Kurtosis Detects	N/A				
207					Mean of Logged Detects	-2.938	SD of Logged Detects	0.741				
208												

209	**Warning: Data set has only 3 Detected Values.**											
210	**This is not enough to compute meaningful or reliable statistics and estimates.**											
211												
212												
213	**Normal GOF Test on Detects Only**											
214					Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**					
215					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level					
216					Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**					
217					5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level					
218	**Detected Data appear Normal at 5% Significance Level**											
219												
220	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
221					Mean	0.0332	Standard Error of Mean	0.00739				
222					SD	0.0226	95% KM (BCA) UCL	N/A				
223					95% KM (t) UCL	0.0462	95% KM (Percentile Bootstrap) UCL	N/A				
224					95% KM (z) UCL	0.0453	95% KM Bootstrap t UCL	N/A				
225					90% KM Chebyshev UCL	0.0553	95% KM Chebyshev UCL	0.0654				
226					97.5% KM Chebyshev UCL	0.0793	99% KM Chebyshev UCL	0.107				
227												
228	**Gamma GOF Tests on Detected Observations Only**											
229	**Not Enough Data to Perform GOF Test**											
230												
231	**Gamma Statistics on Detected Data Only**											
232					k hat (MLE)	3.037	k star (bias corrected MLE)	N/A				
233					Theta hat (MLE)	0.0208	Theta star (bias corrected MLE)	N/A				
234					nu hat (MLE)	18.22	nu star (bias corrected)	N/A				
235					MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A				
236												
237	**Gamma Kaplan-Meier (KM) Statistics**											
238					k hat (KM)	2.154	nu hat (KM)	60.32				
239							Adjusted Level of Significance (β)	0.0312				
240					Approximate Chi Square Value (60.32, α)	43.46	Adjusted Chi Square Value (60.32, β)	41.56				
241					95% Gamma Approximate KM-UCL (use when n>=50)	0.046	95% Gamma Adjusted KM-UCL (use when n<50)	0.0481				
242												
243	**Lognormal GOF Test on Detected Observations Only**											
244					Shapiro Wilk Test Statistic	0.999	**Shapiro Wilk GOF Test**					
245					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level					
246					Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**					
247					5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level					
248	**Detected Data appear Lognormal at 5% Significance Level**											
249												
250	**Lognormal ROS Statistics Using Imputed Non-Detects**											
251					Mean in Original Scale	0.0336	Mean in Log Scale	-3.594				
252					SD in Original Scale	0.0256	SD in Log Scale	0.638				
253					95% t UCL (assumes normality of ROS data)	0.0457	95% Percentile Bootstrap UCL	0.0457				
254					95% BCA Bootstrap UCL	0.0508	95% Bootstrap t UCL	0.0563				
255					95% H-UCL (Log ROS)	0.0503						
256												
257	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
258					KM Mean (logged)	-3.528	95% H-UCL (KM -Log)	0.0403				
259					KM SD (logged)	0.416	95% Critical H Value (KM-Log)	1.992				
260					KM Standard Error of Mean (logged)	0.136						

261												
262	**DL/2 Statistics**											
263	**DL/2 Normal**						**DL/2 Log-Transformed**					
264					Mean in Original Scale	0.0332					Mean in Log Scale	-3.528
265					SD in Original Scale	0.0234					SD in Log Scale	0.432
266					95% t UCL (Assumes normality)	0.0442					95% H-Stat UCL	0.041
267	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
268												
269	**Nonparametric Distribution Free UCL Statistics**											
270	**Detected Data appear Normal Distributed at 5% Significance Level**											
271												
272	**Suggested UCL to Use**											
273					95% KM (t) UCL	0.0462					95% KM (Percentile Bootstrap) UCL	N/A
274	**Warning: One or more Recommended UCL(s) not available!**											
275												
276	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
277	Recommendations are based upon data size, data distribution, and skewness.											
278	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
279	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
280												
281	**Total PCB Amount > RL (north)**											
282												
283	**General Statistics**											
284					Total Number of Observations	10					Number of Distinct Observations	2
285					Number of Detects	1					Number of Non-Detects	9
286					Number of Distinct Detects	1					Number of Distinct Non-Detects	1
287												
288	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
289	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
290												
291	**The data set for variable Total PCB Amount > RL (north) was not processed!**											
292												
293												
294	**Total PCB Amount > RL (south)**											
295												
296	**General Statistics**											
297					Total Number of Observations	11					Number of Distinct Observations	4
298					Number of Detects	3					Number of Non-Detects	8
299					Number of Distinct Detects	3					Number of Distinct Non-Detects	1
300					Minimum Detect	0.0343					Minimum Non-Detect	0.05
301					Maximum Detect	0.0845					Maximum Non-Detect	0.05
302					Variance Detects	6.3109E-4					Percent Non-Detects	72.73%
303					Mean Detects	0.0588					SD Detects	0.0251
304					Median Detects	0.0576					CV Detects	0.427
305					Skewness Detects	0.214					Kurtosis Detects	N/A
306					Mean of Logged Detects	-2.899					SD of Logged Detects	0.452
307												
308	**Warning: Data set has only 3 Detected Values.**											
309	**This is not enough to compute meaningful or reliable statistics and estimates.**											
310												
311												
312	**Normal GOF Test on Detects Only**											

313	Shapiro Wilk Test Statistic				0.998	**Shapiro Wilk GOF Test**						
314	5% Shapiro Wilk Critical Value				0.767	Detected Data appear Normal at 5% Significance Level						
315	Lilliefors Test Statistic				0.186	**Lilliefors GOF Test**						
316	5% Lilliefors Critical Value				0.512	Detected Data appear Normal at 5% Significance Level						
317	**Detected Data appear Normal at 5% Significance Level**											
318												
319	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
320	Mean				0.041	Standard Error of Mean					0.00565	
321	SD				0.0153	95% KM (BCA) UCL					N/A	
322	95% KM (t) UCL				0.0512	95% KM (Percentile Bootstrap) UCL					N/A	
323	95% KM (z) UCL				0.0503	95% KM Bootstrap t UCL					N/A	
324	90% KM Chebyshev UCL				0.0579	95% KM Chebyshev UCL					0.0656	
325	97.5% KM Chebyshev UCL				0.0762	99% KM Chebyshev UCL					0.0972	
326												
327	**Gamma GOF Tests on Detected Observations Only**											
328	**Not Enough Data to Perform GOF Test**											
329												
330	**Gamma Statistics on Detected Data Only**											
331	k hat (MLE)				7.777	k star (bias corrected MLE)					N/A	
332	Theta hat (MLE)				0.00756	Theta star (bias corrected MLE)					N/A	
333	nu hat (MLE)				46.66	nu star (bias corrected)					N/A	
334	MLE Mean (bias corrected)				N/A	MLE Sd (bias corrected)					N/A	
335												
336	**Gamma Kaplan-Meier (KM) Statistics**											
337	k hat (KM)				7.183	nu hat (KM)					158	
338						Adjusted Level of Significance (β)					0.0278	
339	Approximate Chi Square Value (158.04, α)				130	Adjusted Chi Square Value (158.04, β)					125.8	
340	95% Gamma Approximate KM-UCL (use when n>=50)				0.0498	95% Gamma Adjusted KM-UCL (use when n<50)					0.0515	
341												
342	**Lognormal GOF Test on Detected Observations Only**											
343	Shapiro Wilk Test Statistic				0.993	**Shapiro Wilk GOF Test**						
344	5% Shapiro Wilk Critical Value				0.767	Detected Data appear Lognormal at 5% Significance Level						
345	Lilliefors Test Statistic				0.206	**Lilliefors GOF Test**						
346	5% Lilliefors Critical Value				0.512	Detected Data appear Lognormal at 5% Significance Level						
347	**Detected Data appear Lognormal at 5% Significance Level**											
348												
349	**Lognormal ROS Statistics Using Imputed Non-Detects**											
350	Mean in Original Scale				0.0408	Mean in Log Scale					-3.279	
351	SD in Original Scale				0.0182	SD in Log Scale					0.408	
352	95% t UCL (assumes normality of ROS data)				0.0507	95% Percentile Bootstrap UCL					0.0499	
353	95% BCA Bootstrap UCL				0.0525	95% Bootstrap t UCL					0.0564	
354	95% H-UCL (Log ROS)				0.0534							
355												
356	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
357	KM Mean (logged)				-3.244	95% H-UCL (KM -Log)					0.0484	
358	KM SD (logged)				0.286	95% Critical H Value (KM-Log)					1.935	
359	KM Standard Error of Mean (logged)				0.106							
360												
361	**DL/2 Statistics**											
362	**DL/2 Normal**					**DL/2 Log-Transformed**						
363	Mean in Original Scale				0.0342	Mean in Log Scale					-3.474	
364	SD in Original Scale				0.0194	SD in Log Scale					0.421	

	A	B	C	D	E	F	G	H	I	J	K	L
365					95% t UCL (Assumes normality)	0.0448					95% H-Stat UCL	0.0447
366	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
367												
368	**Nonparametric Distribution Free UCL Statistics**											
369	**Detected Data appear Normal Distributed at 5% Significance Level**											
370												
371	**Suggested UCL to Use**											
372					95% KM (t) UCL	0.0512					95% KM (Percentile Bootstrap) UCL	N/A
373	**Warning: One or more Recommended UCL(s) not available!**											
374												
375	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
376	Recommendations are based upon data size, data distribution, and skewness.											
377	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
378	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
379												

White Perch ProUCL Output

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	6/17/2015 11:13:37 AM
From File	Fish Master Data Table_e.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aroclor 1248 (adjacent)

General Statistics

Total Number of Observations	5	Number of Distinct Observations	5
		Number of Missing Observations	0
Minimum	0.146	Mean	0.345
Maximum	0.453	Median	0.358
SD	0.124	Std. Error of Mean	0.0554
Coefficient of Variation	0.359	Skewness	-1.263

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.463	95% Adjusted-CLT UCL (Chen-1995)	0.403
		95% Modified-t UCL (Johnson-1978)	0.458

Gamma GOF Test

A-D Test Statistic	0.527	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.293	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.108	k star (bias corrected MLE)	2.976
Theta hat (MLE)	0.0486	Theta star (bias corrected MLE)	0.116
nu hat (MLE)	71.08	nu star (bias corrected)	29.76
MLE Mean (bias corrected)	0.345	MLE Sd (bias corrected)	0.2
		Approximate Chi Square Value (0.05)	18.31
Adjusted Level of Significance	0.0086	Adjusted Chi Square Value	14.52

53	**Assuming Gamma Distribution**											
54	95% Approximate Gamma UCL (use when n>=50))				0.562	95% Adjusted Gamma UCL (use when n<50)					0.708	
55												
56	**Lognormal GOF Test**											
57	Shapiro Wilk Test Statistic				0.797	**Shapiro Wilk Lognormal GOF Test**						
58	5% Shapiro Wilk Critical Value				0.762	Data appear Lognormal at 5% Significance Level						
59	Lilliefors Test Statistic				0.315	**Lilliefors Lognormal GOF Test**						
60	5% Lilliefors Critical Value				0.396	Data appear Lognormal at 5% Significance Level						
61	**Data appear Lognormal at 5% Significance Level**											
62												
63	**Lognormal Statistics**											
64	Minimum of Logged Data				-1.924	Mean of logged Data					-1.135	
65	Maximum of Logged Data				-0.792	SD of logged Data					0.462	
66												
67	**Assuming Lognormal Distribution**											
68	95% H-UCL				0.688	90% Chebyshev (MVUE) UCL					0.565	
69	95% Chebyshev (MVUE) UCL				0.663	97.5% Chebyshev (MVUE) UCL					0.798	
70	99% Chebyshev (MVUE) UCL				1.064							
71												
72	**Nonparametric Distribution Free UCL Statistics**											
73	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
74												
75	**Nonparametric Distribution Free UCLs**											
76	95% CLT UCL				0.437	95% Jackknife UCL					0.463	
77	95% Standard Bootstrap UCL				0.426	95% Bootstrap-t UCL					0.433	
78	95% Hall's Bootstrap UCL				0.401	95% Percentile Bootstrap UCL					0.422	
79	95% BCA Bootstrap UCL				0.407							
80	90% Chebyshev(Mean, Sd) UCL				0.512	95% Chebyshev(Mean, Sd) UCL					0.587	
81	97.5% Chebyshev(Mean, Sd) UCL				0.691	99% Chebyshev(Mean, Sd) UCL					0.897	
82												
83	**Suggested UCL to Use**											
84	95% Student's-t UCL				0.463							
85												
86	**Recommended UCL exceeds the maximum observation**											
87												
88	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
89	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
90	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
91	For additional insight the user may want to consult a statistician.											
92												
93	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
94	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
95												
96												
97	**Aroclor 1248 (north)**											
98												
99	**General Statistics**											
100	Total Number of Observations				0	Number of Distinct Observations					0	
101						Number of Missing Observations					10	
102	Minimum				N/A	Mean					N/A	
103	Maximum				N/A	Median					N/A	
104												

	A	B	C	D	E	F	G	H	I	J	K	L
105	**Warning: This data set only has 0 observations!**											
106	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
107	**The data set for variable Aroclor 1248 (north) was not processed!**											
108												
109	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
110	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
111												
112												
113												
114	**Aroclor 1248 (south)**											
115												
116	**General Statistics**											
117					Total Number of Observations	5			Number of Distinct Observations	5		
118									Number of Missing Observations	0		
119					Minimum	0.243			Mean	0.412		
120					Maximum	0.583			Median	0.437		
121					SD	0.156			Std. Error of Mean	0.0696		
122					Coefficient of Variation	0.378			Skewness	-0.15		
123												
124	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
125	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
126	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
127	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
128												
129	**Normal GOF Test**											
130					Shapiro Wilk Test Statistic	0.883			**Shapiro Wilk GOF Test**			
131					5% Shapiro Wilk Critical Value	0.762			Data appear Normal at 5% Significance Level			
132					Lilliefors Test Statistic	0.235			**Lilliefors GOF Test**			
133					5% Lilliefors Critical Value	0.396			Data appear Normal at 5% Significance Level			
134	**Data appear Normal at 5% Significance Level**											
135												
136	**Assuming Normal Distribution**											
137	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
138					95% Student's-t UCL	0.56			95% Adjusted-CLT UCL (Chen-1995)	0.521		
139									95% Modified-t UCL (Johnson-1978)	0.559		
140												
141	**Gamma GOF Test**											
142					A-D Test Statistic	0.441			**Anderson-Darling Gamma GOF Test**			
143					5% A-D Critical Value	0.68			Detected data appear Gamma Distributed at 5% Significance Level			
144					K-S Test Statistic	0.262			**Kolmogrov-Smirnoff Gamma GOF Test**			
145					5% K-S Critical Value	0.358			Detected data appear Gamma Distributed at 5% Significance Level			
146	**Detected data appear Gamma Distributed at 5% Significance Level**											
147												
148	**Gamma Statistics**											
149					k hat (MLE)	8.057			k star (bias corrected MLE)	3.356		
150					Theta hat (MLE)	0.0511			Theta star (bias corrected MLE)	0.123		
151					nu hat (MLE)	80.57			nu star (bias corrected)	33.56		
152					MLE Mean (bias corrected)	0.412			MLE Sd (bias corrected)	0.225		
153									Approximate Chi Square Value (0.05)	21.31		
154					Adjusted Level of Significance	0.0086			Adjusted Chi Square Value	17.18		
155												
156	**Assuming Gamma Distribution**											

157	95% Approximate Gamma UCL (use when n>=50))					0.648	95% Adjusted Gamma UCL (use when n<50)					0.804
158												
159	**Lognormal GOF Test**											
160	Shapiro Wilk Test Statistic					0.862	**Shapiro Wilk Lognormal GOF Test**					
161	5% Shapiro Wilk Critical Value					0.762	Data appear Lognormal at 5% Significance Level					
162	Lilliefors Test Statistic					0.235	**Lilliefors Lognormal GOF Test**					
163	5% Lilliefors Critical Value					0.396	Data appear Lognormal at 5% Significance Level					
164	**Data appear Lognormal at 5% Significance Level**											
165												
166	**Lognormal Statistics**											
167	Minimum of Logged Data					-1.415	Mean of logged Data					-0.951
168	Maximum of Logged Data					-0.54	SD of logged Data					0.407
169												
170	**Assuming Lognormal Distribution**											
171	95% H-UCL					0.723	90% Chebyshev (MVUE) UCL					0.637
172	95% Chebyshev (MVUE) UCL					0.739	97.5% Chebyshev (MVUE) UCL					0.879
173	99% Chebyshev (MVUE) UCL					1.156						
174												
175	**Nonparametric Distribution Free UCL Statistics**											
176	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
177												
178	**Nonparametric Distribution Free UCLs**											
179	95% CLT UCL					0.526	95% Jackknife UCL					0.56
180	95% Standard Bootstrap UCL					0.513	95% Bootstrap-t UCL					0.543
181	95% Hall's Bootstrap UCL					0.474	95% Percentile Bootstrap UCL					0.506
182	95% BCA Bootstrap UCL					0.506						
183	90% Chebyshev(Mean, Sd) UCL					0.621	95% Chebyshev(Mean, Sd) UCL					0.715
184	97.5% Chebyshev(Mean, Sd) UCL					0.847	99% Chebyshev(Mean, Sd) UCL					1.104
185												
186	**Suggested UCL to Use**											
187	95% Student's-t UCL					0.56						
188												
189	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
190	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
191	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
192	For additional insight the user may want to consult a statistician.											
193												
194	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
195	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
196												
197												
198	**Aroclor 1254 (adjacent)**											
199												
200	**General Statistics**											
201	Total Number of Observations					5	Number of Distinct Observations					5
202							Number of Missing Observations					0
203	Minimum					0.155	Mean					0.284
204	Maximum					0.405	Median					0.286
205	SD					0.0987	Std. Error of Mean					0.0441
206	Coefficient of Variation					0.348	Skewness					-0.122
207												
208	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											

	A	B	C	D	E	F	G	H	I	J	K	L
209	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
210	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
211	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
212												
213	Normal GOF Test											
214					Shapiro Wilk Test Statistic	0.986	Shapiro Wilk GOF Test					
215					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
216					Lilliefors Test Statistic	0.143	Lilliefors GOF Test					
217					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
218	Data appear Normal at 5% Significance Level											
219												
220	Assuming Normal Distribution											
221	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
222					95% Student's-t UCL	0.378				95% Adjusted-CLT UCL (Chen-1995)	0.354	
223										95% Modified-t UCL (Johnson-1978)	0.377	
224												
225	Gamma GOF Test											
226					A-D Test Statistic	0.201	Anderson-Darling Gamma GOF Test					
227					5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level					
228					K-S Test Statistic	0.175	Kolmogrov-Smirnoff Gamma GOF Test					
229					5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level					
230	Detected data appear Gamma Distributed at 5% Significance Level											
231												
232	Gamma Statistics											
233					k hat (MLE)	9.4				k star (bias corrected MLE)	3.893	
234					Theta hat (MLE)	0.0302				Theta star (bias corrected MLE)	0.0728	
235					nu hat (MLE)	94				nu star (bias corrected)	38.93	
236					MLE Mean (bias corrected)	0.284				MLE Sd (bias corrected)	0.144	
237										Approximate Chi Square Value (0.05)	25.64	
238					Adjusted Level of Significance	0.0086				Adjusted Chi Square Value	21.05	
239												
240	Assuming Gamma Distribution											
241					95% Approximate Gamma UCL (use when n>=50))	0.431				95% Adjusted Gamma UCL (use when n<50)	0.525	
242												
243	Lognormal GOF Test											
244					Shapiro Wilk Test Statistic	0.964	Shapiro Wilk Lognormal GOF Test					
245					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
246					Lilliefors Test Statistic	0.166	Lilliefors Lognormal GOF Test					
247					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
248	Data appear Lognormal at 5% Significance Level											
249												
250	Lognormal Statistics											
251					Minimum of Logged Data	-1.864				Mean of logged Data	-1.314	
252					Maximum of Logged Data	-0.904				SD of logged Data	0.379	
253												
254	Assuming Lognormal Distribution											
255					95% H-UCL	0.472				90% Chebyshev (MVUE) UCL	0.428	
256					95% Chebyshev (MVUE) UCL	0.494				97.5% Chebyshev (MVUE) UCL	0.584	
257					99% Chebyshev (MVUE) UCL	0.762						
258												
259	Nonparametric Distribution Free UCL Statistics											
260	Data appear to follow a Discernible Distribution at 5% Significance Level											

261												
262	**Nonparametric Distribution Free UCLs**											
263					95% CLT UCL	0.356				95% Jackknife UCL	0.378	
264					95% Standard Bootstrap UCL	0.348				95% Bootstrap-t UCL	0.373	
265					95% Hall's Bootstrap UCL	0.365				95% Percentile Bootstrap UCL	0.346	
266					95% BCA Bootstrap UCL	0.345						
267					90% Chebyshev(Mean, Sd) UCL	0.416				95% Chebyshev(Mean, Sd) UCL	0.476	
268					97.5% Chebyshev(Mean, Sd) UCL	0.559				99% Chebyshev(Mean, Sd) UCL	0.723	
269												
270	**Suggested UCL to Use**											
271					95% Student's-t UCL	0.378						
272												
273	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
274	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
275	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
276	For additional insight the user may want to consult a statistician.											
277												
278	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
279	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
280												
281												
282	**Aroclor 1254 (north)**											
283												
284	**General Statistics**											
285					Total Number of Observations	0				Number of Distinct Observations	0	
286										Number of Missing Observations	10	
287					Minimum	N/A				Mean	N/A	
288					Maximum	N/A				Median	N/A	
289												
290	**Warning: This data set only has 0 observations!**											
291	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
292	**The data set for variable Aroclor 1254 (north) was not processed!**											
293												
294	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
295	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
296												
297												
298												
299	**Aroclor 1254 (south)**											
300												
301	**General Statistics**											
302					Total Number of Observations	5				Number of Distinct Observations	5	
303										Number of Missing Observations	0	
304					Minimum	0.221				Mean	0.443	
305					Maximum	0.781				Median	0.466	
306					SD	0.229				Std. Error of Mean	0.102	
307					Coefficient of Variation	0.516				Skewness	0.672	
308												
309	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
310	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
311	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
312	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											

313												
314	**Normal GOF Test**											
315					Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**					
316					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
317					Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**					
318					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
319	**Data appear Normal at 5% Significance Level**											
320												
321	**Assuming Normal Distribution**											
322	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
323					95% Student's-t UCL	0.662	95% Adjusted-CLT UCL (Chen-1995)	0.645				
324							95% Modified-t UCL (Johnson-1978)	0.667				
325												
326	**Gamma GOF Test**											
327					A-D Test Statistic	0.341	**Anderson-Darling Gamma GOF Test**					
328					5% A-D Critical Value	0.681	Detected data appear Gamma Distributed at 5% Significance Level					
329					K-S Test Statistic	0.251	**Kolmogrov-Smirnoff Gamma GOF Test**					
330					5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level					
331	**Detected data appear Gamma Distributed at 5% Significance Level**											
332												
333	**Gamma Statistics**											
334					k hat (MLE)	4.654	k star (bias corrected MLE)	1.995				
335					Theta hat (MLE)	0.0953	Theta star (bias corrected MLE)	0.222				
336					nu hat (MLE)	46.54	nu star (bias corrected)	19.95				
337					MLE Mean (bias corrected)	0.443	MLE Sd (bias corrected)	0.314				
338							Approximate Chi Square Value (0.05)	10.81				
339					Adjusted Level of Significance	0.0086	Adjusted Chi Square Value	8.038				
340												
341	**Assuming Gamma Distribution**											
342					95% Approximate Gamma UCL (use when n>=50))	0.818	95% Adjusted Gamma UCL (use when n<50)	1.1				
343												
344	**Lognormal GOF Test**											
345					Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk Lognormal GOF Test**					
346					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
347					Lilliefors Test Statistic	0.227	**Lilliefors Lognormal GOF Test**					
348					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
349	**Data appear Lognormal at 5% Significance Level**											
350												
351	**Lognormal Statistics**											
352					Minimum of Logged Data	-1.51	Mean of logged Data	-0.925				
353					Maximum of Logged Data	-0.247	SD of logged Data	0.534				
354												
355	**Assuming Lognormal Distribution**											
356					95% H-UCL	1.036	90% Chebyshev (MVUE) UCL	0.759				
357					95% Chebyshev (MVUE) UCL	0.901	97.5% Chebyshev (MVUE) UCL	1.099				
358					99% Chebyshev (MVUE) UCL	1.488						
359												
360	**Nonparametric Distribution Free UCL Statistics**											
361	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
362												
363	**Nonparametric Distribution Free UCLs**											
364					95% CLT UCL	0.612	95% Jackknife UCL	0.662				

365				95% Standard Bootstrap UCL	0.594					95% Bootstrap-t UCL	0.731	
366				95% Hall's Bootstrap UCL	0.624					95% Percentile Bootstrap UCL	0.609	
367				95% BCA Bootstrap UCL	0.61							
368				90% Chebyshev(Mean, Sd) UCL	0.751					95% Chebyshev(Mean, Sd) UCL	0.89	
369				97.5% Chebyshev(Mean, Sd) UCL	1.083					99% Chebyshev(Mean, Sd) UCL	1.462	
370												
371				**Suggested UCL to Use**								
372				95% Student's-t UCL	0.662							
373												
374	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
375	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
376	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
377	For additional insight the user may want to consult a statistician.											
378												
379												
380	**Aroclor 1262 (adjacent)**											
381												
382				**General Statistics**								
383				Total Number of Observations	5					Number of Distinct Observations	5	
384										Number of Missing Observations	0	
385				Minimum	0.164					Mean	0.343	
386				Maximum	0.575					Median	0.285	
387				SD	0.16					Std. Error of Mean	0.0718	
388				Coefficient of Variation	0.468					Skewness	0.676	
389												
390	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
391	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
392	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
393	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
394												
395				**Normal GOF Test**								
396				Shapiro Wilk Test Statistic	0.952					**Shapiro Wilk GOF Test**		
397				5% Shapiro Wilk Critical Value	0.762					Data appear Normal at 5% Significance Level		
398				Lilliefors Test Statistic	0.241					**Lilliefors GOF Test**		
399				5% Lilliefors Critical Value	0.396					Data appear Normal at 5% Significance Level		
400	**Data appear Normal at 5% Significance Level**											
401												
402				**Assuming Normal Distribution**								
403				**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**		
404				95% Student's-t UCL	0.496					95% Adjusted-CLT UCL (Chen-1995)	0.484	
405										95% Modified-t UCL (Johnson-1978)	0.499	
406												
407				**Gamma GOF Test**								
408				A-D Test Statistic	0.218					**Anderson-Darling Gamma GOF Test**		
409				5% A-D Critical Value	0.68					Detected data appear Gamma Distributed at 5% Significance Level		
410				K-S Test Statistic	0.212					**Kolmogrov-Smirnoff Gamma GOF Test**		
411				5% K-S Critical Value	0.358					Detected data appear Gamma Distributed at 5% Significance Level		
412	**Detected data appear Gamma Distributed at 5% Significance Level**											
413												
414				**Gamma Statistics**								
415				k hat (MLE)	5.698					k star (bias corrected MLE)	2.413	
416				Theta hat (MLE)	0.0602					Theta star (bias corrected MLE)	0.142	

417					nu hat (MLE)	56.98					nu star (bias corrected)	24.13
418					MLE Mean (bias corrected)	0.343					MLE Sd (bias corrected)	0.221
419											Approximate Chi Square Value (0.05)	13.94
420					Adjusted Level of Significance	0.0086					Adjusted Chi Square Value	10.72
421												
422					**Assuming Gamma Distribution**							
423				95% Approximate Gamma UCL (use when n>=50))		0.593					95% Adjusted Gamma UCL (use when n<50)	0.772
424												
425					**Lognormal GOF Test**							
426					Shapiro Wilk Test Statistic	0.979					**Shapiro Wilk Lognormal GOF Test**	
427					5% Shapiro Wilk Critical Value	0.762					Data appear Lognormal at 5% Significance Level	
428					Lilliefors Test Statistic	0.178					**Lilliefors Lognormal GOF Test**	
429					5% Lilliefors Critical Value	0.396					Data appear Lognormal at 5% Significance Level	
430					**Data appear Lognormal at 5% Significance Level**							
431												
432					**Lognormal Statistics**							
433					Minimum of Logged Data	-1.808					Mean of logged Data	-1.161
434					Maximum of Logged Data	-0.553					SD of logged Data	0.481
435												
436					**Assuming Lognormal Distribution**							
437					95% H-UCL	0.704					90% Chebyshev (MVUE) UCL	0.563
438					95% Chebyshev (MVUE) UCL	0.662					97.5% Chebyshev (MVUE) UCL	0.8
439					99% Chebyshev (MVUE) UCL	1.072						
440												
441					**Nonparametric Distribution Free UCL Statistics**							
442					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
443												
444					**Nonparametric Distribution Free UCLs**							
445					95% CLT UCL	0.461					95% Jackknife UCL	0.496
446					95% Standard Bootstrap UCL	0.448					95% Bootstrap-t UCL	0.659
447					95% Hall's Bootstrap UCL	1.661					95% Percentile Bootstrap UCL	0.454
448					95% BCA Bootstrap UCL	0.458						
449					90% Chebyshev(Mean, Sd) UCL	0.558					95% Chebyshev(Mean, Sd) UCL	0.656
450					97.5% Chebyshev(Mean, Sd) UCL	0.791					99% Chebyshev(Mean, Sd) UCL	1.057
451												
452					**Suggested UCL to Use**							
453					95% Student's-t UCL	0.496						
454												
455					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
456					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
457					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
458					For additional insight the user may want to consult a statistician.							
459												
460												
461	**Aroclor 1262 (north)**											
462												
463					**General Statistics**							
464					Total Number of Observations	0					Number of Distinct Observations	0
465											Number of Missing Observations	10
466					Minimum	N/A					Mean	N/A
467					Maximum	N/A					Median	N/A
468												

	A	B	C	D	E	F	G	H	I	J	K	L
469	**Warning: This data set only has 0 observations!**											
470	**Data set is too small to compute reliable and meaningful statistics and estimates!**											
471	**The data set for variable Aroclor 1262 (north) was not processed!**											
472												
473	**It is suggested to collect at least 8 to 10 observations before using these statistical methods!**											
474	**If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.**											
475												
476												
477												
478	**Aroclor 1262 (south)**											
479												
480	**General Statistics**											
481					Total Number of Observations	5			Number of Distinct Observations	5		
482									Number of Missing Observations	0		
483					Minimum	0.164			Mean	0.336		
484					Maximum	0.486			Median	0.362		
485					SD	0.154			Std. Error of Mean	0.0691		
486					Coefficient of Variation	0.46			Skewness	-0.221		
487												
488	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
489	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
490	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
491	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
492												
493	**Normal GOF Test**											
494					Shapiro Wilk Test Statistic	0.848			**Shapiro Wilk GOF Test**			
495					5% Shapiro Wilk Critical Value	0.762			Data appear Normal at 5% Significance Level			
496					Lilliefors Test Statistic	0.231			**Lilliefors GOF Test**			
497					5% Lilliefors Critical Value	0.396			Data appear Normal at 5% Significance Level			
498	**Data appear Normal at 5% Significance Level**											
499												
500	**Assuming Normal Distribution**											
501	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
502					95% Student's-t UCL	0.483			95% Adjusted-CLT UCL (Chen-1995)	0.442		
503									95% Modified-t UCL (Johnson-1978)	0.482		
504												
505	**Gamma GOF Test**											
506					A-D Test Statistic	0.497			**Anderson-Darling Gamma GOF Test**			
507					5% A-D Critical Value	0.681			Detected data appear Gamma Distributed at 5% Significance Level			
508					K-S Test Statistic	0.254			**Kolmogrov-Smirnoff Gamma GOF Test**			
509					5% K-S Critical Value	0.358			Detected data appear Gamma Distributed at 5% Significance Level			
510	**Detected data appear Gamma Distributed at 5% Significance Level**											
511												
512	**Gamma Statistics**											
513					k hat (MLE)	5.185			k star (bias corrected MLE)	2.207		
514					Theta hat (MLE)	0.0648			Theta star (bias corrected MLE)	0.152		
515					nu hat (MLE)	51.85			nu star (bias corrected)	22.07		
516					MLE Mean (bias corrected)	0.336			MLE Sd (bias corrected)	0.226		
517									Approximate Chi Square Value (0.05)	12.39		
518					Adjusted Level of Significance	0.0086			Adjusted Chi Square Value	9.382		
519												
520	**Assuming Gamma Distribution**											

521	95% Approximate Gamma UCL (use when n>=50))				0.598	95% Adjusted Gamma UCL (use when n<50)					0.79	
522												
523	**Lognormal GOF Test**											
524	Shapiro Wilk Test Statistic				0.839	**Shapiro Wilk Lognormal GOF Test**						
525	5% Shapiro Wilk Critical Value				0.762	Data appear Lognormal at 5% Significance Level						
526	Lilliefors Test Statistic				0.232	**Lilliefors Lognormal GOF Test**						
527	5% Lilliefors Critical Value				0.396	Data appear Lognormal at 5% Significance Level						
528	**Data appear Lognormal at 5% Significance Level**											
529												
530	**Lognormal Statistics**											
531	Minimum of Logged Data				-1.808	Mean of logged Data					-1.19	
532	Maximum of Logged Data				-0.722	SD of logged Data					0.517	
533												
534	**Assuming Lognormal Distribution**											
535	95% H-UCL				0.756	90% Chebyshev (MVUE) UCL					0.57	
536	95% Chebyshev (MVUE) UCL				0.676	97.5% Chebyshev (MVUE) UCL					0.822	
537	99% Chebyshev (MVUE) UCL				1.108							
538												
539	**Nonparametric Distribution Free UCL Statistics**											
540	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
541												
542	**Nonparametric Distribution Free UCLs**											
543	95% CLT UCL				0.45	95% Jackknife UCL					0.483	
544	95% Standard Bootstrap UCL				0.437	95% Bootstrap-t UCL					0.464	
545	95% Hall's Bootstrap UCL				0.413	95% Percentile Bootstrap UCL					0.435	
546	95% BCA Bootstrap UCL				0.424							
547	90% Chebyshev(Mean, Sd) UCL				0.543	95% Chebyshev(Mean, Sd) UCL					0.637	
548	97.5% Chebyshev(Mean, Sd) UCL				0.767	99% Chebyshev(Mean, Sd) UCL					1.023	
549												
550	**Suggested UCL to Use**											
551	95% Student's-t UCL				0.483							
552												
553	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
554	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
555	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
556	For additional insight the user may want to consult a statistician.											
557												
558	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
559	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
560												
561												
562	**Total PCB Amount > RL (adjacent)**											
563												
564	**General Statistics**											
565	Total Number of Observations				5	Number of Distinct Observations					5	
566						Number of Missing Observations					0	
567	Minimum				0.465	Mean					0.972	
568	Maximum				1.376	Median					0.929	
569	SD				0.367	Std. Error of Mean					0.164	
570	Coefficient of Variation				0.378	Skewness					-0.337	
571												
572	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											

	A	B	C	D	E	F	G	H	I	J	K	L
573	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
574	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
575	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0											
576												
577	Normal GOF Test											
578					Shapiro Wilk Test Statistic	0.953	Shapiro Wilk GOF Test					
579					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
580					Lilliefors Test Statistic	0.196	Lilliefors GOF Test					
581					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
582	Data appear Normal at 5% Significance Level											
583												
584	Assuming Normal Distribution											
585	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
586					95% Student's-t UCL	1.322	95% Adjusted-CLT UCL (Chen-1995)					1.216
587							95% Modified-t UCL (Johnson-1978)					1.318
588												
589	Gamma GOF Test											
590					A-D Test Statistic	0.282	Anderson-Darling Gamma GOF Test					
591					5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level					
592					K-S Test Statistic	0.216	Kolmogrov-Smirnoff Gamma GOF Test					
593					5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level					
594	Detected data appear Gamma Distributed at 5% Significance Level											
595												
596	Gamma Statistics											
597					k hat (MLE)	7.506	k star (bias corrected MLE)					3.136
598					Theta hat (MLE)	0.129	Theta star (bias corrected MLE)					0.31
599					nu hat (MLE)	75.06	nu star (bias corrected)					31.36
600					MLE Mean (bias corrected)	0.972	MLE Sd (bias corrected)					0.549
601							Approximate Chi Square Value (0.05)					19.56
602					Adjusted Level of Significance	0.0086	Adjusted Chi Square Value					15.63
603												
604	Assuming Gamma Distribution											
605					95% Approximate Gamma UCL (use when n>=50))	1.558	95% Adjusted Gamma UCL (use when n<50)					1.95
606												
607	Lognormal GOF Test											
608					Shapiro Wilk Test Statistic	0.919	Shapiro Wilk Lognormal GOF Test					
609					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
610					Lilliefors Test Statistic	0.199	Lilliefors Lognormal GOF Test					
611					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
612	Data appear Lognormal at 5% Significance Level											
613												
614	Lognormal Statistics											
615					Minimum of Logged Data	-0.766	Mean of logged Data					-0.0967
616					Maximum of Logged Data	0.319	SD of logged Data					0.433
617												
618	Assuming Lognormal Distribution											
619					95% H-UCL	1.805	90% Chebyshev (MVUE) UCL					1.541
620					95% Chebyshev (MVUE) UCL	1.797	97.5% Chebyshev (MVUE) UCL					2.151
621					99% Chebyshev (MVUE) UCL	2.848						
622												
623	Nonparametric Distribution Free UCL Statistics											
624	Data appear to follow a Discernible Distribution at 5% Significance Level											

625												
626	**Nonparametric Distribution Free UCLs**											
627				95% CLT UCL	1.242				95% Jackknife UCL	1.322		
628				95% Standard Bootstrap UCL	1.21				95% Bootstrap-t UCL	1.361		
629				95% Hall's Bootstrap UCL	1.358				95% Percentile Bootstrap UCL	1.223		
630				95% BCA Bootstrap UCL	1.177							
631				90% Chebyshev(Mean, Sd) UCL	1.465				95% Chebyshev(Mean, Sd) UCL	1.688		
632				97.5% Chebyshev(Mean, Sd) UCL	1.998				99% Chebyshev(Mean, Sd) UCL	2.606		
633												
634	**Suggested UCL to Use**											
635				95% Student's-t UCL	1.322							
636												
637	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
638	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
639	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
640	For additional insight the user may want to consult a statistician.											
641												
642	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
643	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
644												
645												
646	**Total PCB Amount > RL (north)**											
647												
648	**General Statistics**											
649				Total Number of Observations	10				Number of Distinct Observations	10		
650									Number of Missing Observations	0		
651				Minimum	0.298				Mean	0.955		
652				Maximum	1.582				Median	0.966		
653				SD	0.329				Std. Error of Mean	0.104		
654				Coefficient of Variation	0.344				Skewness	-0.1		
655												
656	**Normal GOF Test**											
657				Shapiro Wilk Test Statistic	0.931				**Shapiro Wilk GOF Test**			
658				5% Shapiro Wilk Critical Value	0.842				Data appear Normal at 5% Significance Level			
659				Lilliefors Test Statistic	0.222				**Lilliefors GOF Test**			
660				5% Lilliefors Critical Value	0.28				Data appear Normal at 5% Significance Level			
661	**Data appear Normal at 5% Significance Level**											
662												
663	**Assuming Normal Distribution**											
664	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
665				95% Student's-t UCL	1.146				95% Adjusted-CLT UCL (Chen-1995)	1.123		
666									95% Modified-t UCL (Johnson-1978)	1.145		
667												
668	**Gamma GOF Test**											
669				A-D Test Statistic	0.647				**Anderson-Darling Gamma GOF Test**			
670				5% A-D Critical Value	0.727				Detected data appear Gamma Distributed at 5% Significance Level			
671				K-S Test Statistic	0.271				**Kolmogrov-Smirnoff Gamma GOF Test**			
672				5% K-S Critical Value	0.267				Data Not Gamma Distributed at 5% Significance Level			
673	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
674												
675	**Gamma Statistics**											
676				k hat (MLE)	7.236				k star (bias corrected MLE)	5.132		

677					Theta hat (MLE)	0.132					Theta star (bias corrected MLE)	0.186
678					nu hat (MLE)	144.7					nu star (bias corrected)	102.6
679					MLE Mean (bias corrected)	0.955					MLE Sd (bias corrected)	0.422
680											Approximate Chi Square Value (0.05)	80.26
681					Adjusted Level of Significance	0.0267					Adjusted Chi Square Value	76.83
682												
683					**Assuming Gamma Distribution**							
684				95% Approximate Gamma UCL (use when n>=50))		1.222					95% Adjusted Gamma UCL (use when n<50)	1.276
685												
686					**Lognormal GOF Test**							
687					Shapiro Wilk Test Statistic	0.81					**Shapiro Wilk Lognormal GOF Test**	
688					5% Shapiro Wilk Critical Value	0.842					Data Not Lognormal at 5% Significance Level	
689					Lilliefors Test Statistic	0.307					**Lilliefors Lognormal GOF Test**	
690					5% Lilliefors Critical Value	0.28					Data Not Lognormal at 5% Significance Level	
691					**Data Not Lognormal at 5% Significance Level**							
692												
693					**Lognormal Statistics**							
694					Minimum of Logged Data	-1.211					Mean of logged Data	-0.116
695					Maximum of Logged Data	0.458					SD of logged Data	0.437
696												
697					**Assuming Lognormal Distribution**							
698					95% H-UCL	1.336					90% Chebyshev (MVUE) UCL	1.377
699					95% Chebyshev (MVUE) UCL	1.561					97.5% Chebyshev (MVUE) UCL	1.817
700					99% Chebyshev (MVUE) UCL	2.32						
701												
702					**Nonparametric Distribution Free UCL Statistics**							
703					**Data appear to follow a Discernible Distribution at 5% Significance Level**							
704												
705					**Nonparametric Distribution Free UCLs**							
706					95% CLT UCL	1.126					95% Jackknife UCL	1.146
707					95% Standard Bootstrap UCL	1.117					95% Bootstrap-t UCL	1.144
708					95% Hall's Bootstrap UCL	1.181					95% Percentile Bootstrap UCL	1.119
709					95% BCA Bootstrap UCL	1.109						
710					90% Chebyshev(Mean, Sd) UCL	1.267					95% Chebyshev(Mean, Sd) UCL	1.408
711					97.5% Chebyshev(Mean, Sd) UCL	1.605					99% Chebyshev(Mean, Sd) UCL	1.99
712												
713					**Suggested UCL to Use**							
714					95% Student's-t UCL	1.146						
715												
716					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
717					These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)							
718					and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.							
719					For additional insight the user may want to consult a statistician.							
720												
721					**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**							
722					**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**							
723												
724												
725	**Total PCB Amount > RL (south)**											
726												
727					**General Statistics**							
728					Total Number of Observations	5					Number of Distinct Observations	5

729											Number of Missing Observations	0
730					Minimum	0.647					Mean	1.191
731					Maximum	1.844					Median	1.364
732					SD	0.52					Std. Error of Mean	0.233
733					Coefficient of Variation	0.437					Skewness	-0.0185
734												
735	**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use**											
736	**guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.**											
737	**For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).**											
738	**Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**											
739												
740	**Normal GOF Test**											
741					Shapiro Wilk Test Statistic	0.886	**Shapiro Wilk GOF Test**					
742					5% Shapiro Wilk Critical Value	0.762	Data appear Normal at 5% Significance Level					
743					Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**					
744					5% Lilliefors Critical Value	0.396	Data appear Normal at 5% Significance Level					
745	**Data appear Normal at 5% Significance Level**											
746												
747	**Assuming Normal Distribution**											
748	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
749					95% Student's-t UCL	1.687					95% Adjusted-CLT UCL (Chen-1995)	1.572
750											95% Modified-t UCL (Johnson-1978)	1.687
751												
752	**Gamma GOF Test**											
753					A-D Test Statistic	0.486	**Anderson-Darling Gamma GOF Test**					
754					5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level					
755					K-S Test Statistic	0.282	**Kolmogrov-Smirnoff Gamma GOF Test**					
756					5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level					
757	**Detected data appear Gamma Distributed at 5% Significance Level**											
758												
759	**Gamma Statistics**											
760					k hat (MLE)	5.965					k star (bias corrected MLE)	2.52
761					Theta hat (MLE)	0.2					Theta star (bias corrected MLE)	0.473
762					nu hat (MLE)	59.65					nu star (bias corrected)	25.2
763					MLE Mean (bias corrected)	1.191					MLE Sd (bias corrected)	0.75
764											Approximate Chi Square Value (0.05)	14.76
765					Adjusted Level of Significance	0.0086					Adjusted Chi Square Value	11.42
766												
767	**Assuming Gamma Distribution**											
768					95% Approximate Gamma UCL (use when n>=50))	2.033					95% Adjusted Gamma UCL (use when n<50)	2.627
769												
770	**Lognormal GOF Test**											
771					Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk Lognormal GOF Test**					
772					5% Shapiro Wilk Critical Value	0.762	Data appear Lognormal at 5% Significance Level					
773					Lilliefors Test Statistic	0.279	**Lilliefors Lognormal GOF Test**					
774					5% Lilliefors Critical Value	0.396	Data appear Lognormal at 5% Significance Level					
775	**Data appear Lognormal at 5% Significance Level**											
776												
777	**Lognormal Statistics**											
778					Minimum of Logged Data	-0.435					Mean of logged Data	0.0888
779					Maximum of Logged Data	0.612					SD of logged Data	0.477
780												

	A	B	C	D	E	F	G	H	I	J	K	L
781	**Assuming Lognormal Distribution**											
782					95% H-UCL	2.433				90% Chebyshev (MVUE) UCL		1.955
783					95% Chebyshev (MVUE) UCL	2.299				97.5% Chebyshev (MVUE) UCL		2.776
784					99% Chebyshev (MVUE) UCL	3.714						
785												
786	**Nonparametric Distribution Free UCL Statistics**											
787	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
788												
789	**Nonparametric Distribution Free UCLs**											
790					95% CLT UCL	1.574				95% Jackknife UCL		1.687
791					95% Standard Bootstrap UCL	1.532				95% Bootstrap-t UCL		1.757
792					95% Hall's Bootstrap UCL	1.449				95% Percentile Bootstrap UCL		1.527
793					95% BCA Bootstrap UCL	1.514						
794					90% Chebyshev(Mean, Sd) UCL	1.889				95% Chebyshev(Mean, Sd) UCL		2.205
795					97.5% Chebyshev(Mean, Sd) UCL	2.644				99% Chebyshev(Mean, Sd) UCL		3.506
796												
797	**Suggested UCL to Use**											
798					95% Student's-t UCL	1.687						
799												
800	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
801	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
802	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
803	For additional insight the user may want to consult a statistician.											
804												
805	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
806	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
807												

APPENDIX C

INTAKE AND RISK CALCULATIONS – SITE (ADJACENT)

Appendix C, Table 1
Intake and Risk Equations - Composite Receptor/Age-Adjusted
Adjacent - Fish - CT
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	1E-05
		1E-05

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.72	5.3E-06	1	2.0E+00	1.1E-05	1.1E-05

Appendix C, Table 2
Non-Cancer Risk Calculations
Adjacent - Fish - CT
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	7E-01
		0.7

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.72	1.4E-05	1	2.0E-05	7.2E-01	7.2E-01

Appendix C, Table 3
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	0.52	--	g-yr/kg-day
IR	NA	0.3	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

Appendix C, Table 4
Intake and Risk Equations - Composite Receptor/Age-Adjusted
Adjacent - Fish - RME
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	4E-05
		4E-05

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.96	1.8E-05	1	2.0E+00	3.6E-05	3.6E-05

Appendix C, Table 5
Non-Cancer Risk Calculations
Adjacent - Fish - RME
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	2.4E+00
		2.4

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.96	4.8E-05	1	2.0E-05	2.4E+00	2.4E+00

Appendix C, Table 6
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * FI * ABS_{ing} * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	1.3	--	g-yr/kg-day
IR	NA	0.75	g/day
C1	0.001	0.001	kg/g
FI	1	1	unitless

Appendix C, Table 7
Intake and Risk Equations - Composite Receptor/Age-Adjusted
Adjacent - Fish - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	1E-04
		1E-04

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.96	5.5E-05	1	2.0E+00	1.1E-04	1.1E-04

Appendix C, Table 8
Non-Cancer Risk Calculations
Adjacent - Fish - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	7.5E+00
		7.5

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.96	1.5E-04	1	2.0E-05	7.5E+00	7.5E+00

Appendix C, Table 9
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * FI * ABS_{ing} * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	10	--	g-yr/kg-day
IR	NA	6.0	g/day
C1	0.001	0.001	kg/g
FI	0.39	0.39	unitless

Appendix C, Table 10
Intake and Risk Equations - Composite Receptor/Age-Adjusted
Adjacent - Blue Crab - CT
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	5E-06
		5E-06

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.54	2.3E-06	1	2.0E+00	4.5E-06	4.5E-06

Appendix C, Table 11
Non-Cancer Risk Calculations
Adjacent - Blue Crab - CT
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	3E-01
		0.31

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.54	6.1E-06	1	2.0E-05	3.1E-01	3.1E-01

Appendix C, Table 12
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * FI * ABS_{ing} * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	0	--	g-yr/kg-day
IR	NA	0.17	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

Appendix C, Table 13
Intake and Risk Equations - Composite Receptor/Age-Adjusted
Adjacent - Blue Crab - RME
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	8E-06
		8E-06

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.89	4.2E-06	1	2.0E+00	8.3E-06	8.3E-06

Appendix C, Table 14
Non-Cancer Risk Calculations
Adjacent - Blue Crab - RME
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	6E-01
		0.6

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.89	1.1E-05	1	2.0E-05	5.6E-01	5.6E-01

Appendix C, Table 15
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	0	--	g-yr/kg-day
IR	NA	0.19	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

Appendix C, Table 16
Intake and Risk Equations - Composite Receptor/Age-Adjusted
Adjacent - Blue Crab - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	2E-05
		2E-05

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.89	7.6E-06	1	2.0E+00	1.5E-05	1.5E-05

Appendix C, Table 17
Non-Cancer Risk Calculations
Adjacent - Blue Crab - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	1.0E+00
		1.0

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations	Absorption Factors	Non-Cancer Toxicity Values		
			$Intake_{ingestion}$ (mg/kg/day)	ABS_{ing} (unitless)	RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.89	2.1E-05	1	2.0E-05	1.0E+00	1.0E+00

Appendix C, Table 18
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	1	--	g-yr/kg-day
IR	NA	0.35	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

APPENDIX D

INTAKE AND RISK CALCULATIONS – REFERENCE (NORTH)

TABLE D-1
CALCULATED FISH EXPOSURE POINT CONCENTRATIONS - REASONABLE MAXIMUM EXPOSURE and UPPER-BOUND EXPOSURE - NORTH
FORMER ANACONDA WIRE AND CABLE COMPANY

Species Consumed	Total PCB 95% UCL in Tissue (mg/kg) [a]	Consumption (%) [b]	Cooking & Trimming PCB loss (%) [c]	EPC (mg/kg) [d]
American Eel	1.00	8%	31%	0.05
White Perch	1.15	92%	31%	0.73
Total Fish PCB EPC				**0.78**
Blue Crab - Leg	0.04	46%	0%	0.019
Blue Crab - Hepatopancreas	0.52	54%	0%	0.28
Total Crab PCB EPC				**0.30**

Notes:
EPC - Exposure point concentration.
NA - Not applicable.
[a] - Upper Confidence Limit (95% UCL) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications, version 5.0.00, as shown in Tables 2-6, 2-8, and 2-9.
[b] - For perch and ell, the percent harvest values from NYSDEC, 2007 (Assessment of Spring 2005 Hudson River Recreational Fisheries. July 2007), Table 3-2, indicate that for every 8 ounces of eel are harvested, 92 ounces of white perch are harvested. For blue crab, the value is based on the average weights of the leg (14.7 g) and hepatopancreas (17 g) as a percentage weight. of the total leg + hepatopancreas
[c] - Cooking and trimming PCB loss is the mean value from Table 3-8. Since crab is typically boiled or steamed, a loss value

TABLE D-2
CALCULATED FISH EXPOSURE POINT CONCENTRATIONS - CENTRAL TENDENCY - NORTH
FORMER ANACONDA WIRE AND CABLE COMPANY

Species Consumed	Total PCB Average in Tissue (mg/kg) [a]	Consumption (%) [b]	Cooking & Trimming PCB loss (%) [c]	EPC (mg/kg) [d]
American Eel	0.79	8%	31%	0.04
White Perch	0.96	92%	31%	0.61
Total Fish PCB EPC				**0.65**
Blue Crab - Leg	0.04	46%	0%	0.018
Blue Crab - Hepatopancreas	0.40	54%	0%	0.22
Total Crab PCB EPC				**0.23**

Notes:
EPC - Exposure point concentration.
NA - Not applicable.
[a] - Average concentration (Tables 2-6, 2-8, and 2-9)
[b] - For perch and ell, the percent harvest values from NYSDEC, 2007 (Assessment of Spring 2005 Hudson River Recreational Fisheries. July 2007), Table 3-2, indicate that for every 8 ounces of eel are harvested, 92 ounces of white perch are harvested. For blue crab, the value is based on the average weights of the leg (14.7 g) and hepatopancreas (17 g) as a percentage weight. of the total leg + hepatopancreas
[c] - Cooking and trimming PCB loss is the mean value from Table 3-8. Since crab is typically boiled or steamed, a loss value of zero is used.
[d] - EPC = Average Tissue Concentration x species % consumption x (100% - % cooking loss).
This calculation is performed for each species, and the values are then summed together to derive total PCB EPCs for fish and for crab.

Appendix D, Table 3
Intake and Risk Equations - Composite Receptor/Age-Adjusted
North - Fish - CT
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	1E-05
		1E-05

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.65	4.8E-06	1	2.0E+00	9.7E-06	9.7E-06

Appendix D, Table 4
Non-Cancer Risk Calculations
North - Fish - CT
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	7E-01
		0.7

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.65	1.3E-05	1	2.0E-05	6.5E-01	6.5E-01

Appendix D, Table 5
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	1	--	g-yr/kg-day
IR	NA	0.3	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

Appendix D, Table 6
Intake and Risk Equations - Composite Receptor/Age-Adjusted
North - Fish - RME
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	3E-05
		3E-05

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.78	1.4E-05	1	2.0E+00	2.9E-05	2.9E-05

Appendix D, Table 7
Non-Cancer Risk Calculations
North - Fish - RME
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	2E+00
		2.0

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.78	3.9E-05	1	2.0E-05	2.0E+00	2.0E+00

Appendix D, Table 8
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	1	--	g-yr/kg-day
IR	NA	0.75	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

Appendix D, Table 9
Intake and Risk Equations - Composite Receptor/Age-Adjusted
North - Fish - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	9E-05
		9E-05

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Cancer Toxicity Values: CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.78	4.5E-05	1	2.0E+00	9.0E-05	9.0E-05

Appendix D, Table 10
Non-Cancer Risk Calculations
North - Fish - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	6.1E+00
		6.1

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.78	1.2E-04	1	2.0E-05	6.1E+00	6.1E+00

Appendix D, Table 11
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * FI * ABS_{ing} * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	10	--	g-yr/kg-day
IR	NA	6.0	g/day
C1	0.001	0.001	kg/g
FI	0.39	0.39	unitless

Appendix D, Table 12
Intake and Risk Equations - Composite Receptor/Age-Adjusted
North - Blue Crab - CT
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	2E-06
		2E-06

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.23	9.6E-07	1	2.0E+00	1.9E-06	1.9E-06

Appendix D, Table 13
Non-Cancer Risk Calculations
North - Blue Crab - CT
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	1E-01
		0.13

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.23	2.6E-06	1	2.0E-05	1.3E-01	1.3E-01

Appendix D, Table 14
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	0	--	g-yr/kg-day
IR	NA	0.17	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

Appendix D, Table 15
Intake and Risk Equations - Composite Receptor/Age-Adjusted
North - Blue Crab - RME
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	3E-06
		3E-06

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.3	1.4E-06	1	2.0E+00	2.8E-06	2.8E-06

Appendix D, Table 16
Non-Cancer Risk Calculations
North - Blue Crab - RME
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	2E-01
		0.2

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.3	3.8E-06	1	2.0E-05	1.9E-01	1.9E-01

Appendix D, Table 17
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	0	--	g-yr/kg-day
IR	NA	0.19	g/day
C1	0.001	0.001	kg/g

Appendix D, Table 18
Intake and Risk Equations - Composite Receptor/Age-Adjusted
North - Blue Crab - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD, ADOLESCENT, and ADULT (AGES 6 - 36)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		ELCR (Total)
Ingestion	Yes	5E-06
		5E-06

COPC - chemical of potential concern
EPC - exposure point concentration
NC - not carcinogenic by this exposure route
ABS - absorption factor
CSF - cancer slope factor
NTV - no toxicity value available
ELCR - excess lifetime cancer risk

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors ABS_{ing} (unitless)	Cancer Toxicity Values CSF_{oral} $(mg/kg/day)^{-1}$	$ELCR_{ingestion}$	$ELCR_{total}$
Polychlorinated Biphenyls	1336-36-3	0.3	2.6E-06	1	2.0E+00	5.1E-06	5.1E-06

Appendix D, Table 19
Non-Cancer Risk Calculations
North - Blue Crab - Upper-Bound
RECREATIONAL ANGLER (3 AGES) - CHILD (AGE<6)

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Exposure Routes Evaluated		HI (Total)
Ingestion	Yes	4E-01
		0.4

COPC - chemical of potential concern
EPC - exposure point concentration
ABS - absorption factor
RfD - reference dose
NTV - no toxicity value available
HQ - hazard quotient
HI - hazard index

COPC	ENTER CASRN HERE	Biota EPC (mg/kg)	Intake Calculations: $Intake_{ingestion}$ (mg/kg/day)	Absorption Factors: ABS_{ing} (unitless)	Non-Cancer Toxicity Values: RfD_{oral} (mg/kg/day)	$HQ_{ingestion}$	HQ_{total}
Polychlorinated Biphenyls	1336-36-3	0.3	7.0E-06	1	2.0E-05	3.5E-01	3.5E-01

Appendix D, Table 20
Intake and Risk Equations - Composite Receptor/Age-Adjusted

HHRA in Support of TSCA 761.61(c)
Former Anaconda Wire and Cable Company
Hastings-On-Hudson, NY

Cancer Risk from Ingestion

$$ELCR = Intake_{ing} * CSF$$

$$Intake_{ing\ (age\ group\ x)} = \frac{[EPC]_{biota} * IFS_{adj} * FI * ABS_{ing} * EF * C1}{AT_{lifetime}}$$

Noncancer Risk from Ingestion

$$HQ = \frac{Intake_{ing}}{RfD}$$

$$Intake_{ing} = \frac{[EPC]_{biota} * IR * ABS_{ing} * FI * EF * ED * C1}{BW * AT}$$

Parameter	Value - Cancer	Value - Non-Cancer	Units
CSF	Chemical specific	--	$(mg/kg\text{-}day)^{-1}$
Intake	Age/chemical specific	--	mg/kg-day
ELCR	Age/chemical specific	--	unitless
RfD	--	Chemical specific	mg/kg-day
HQ	--	Age/chemical specific	unitless
$[EPC]_{biota}$	Chemical specific	Chemical specific	mg/kg
ABS_{ing}	Chemical specific	Chemical specific	unitless
BW	NA	15	kg
EF	365	365	day/year
ED	26	6	year
AT	--	2190	day
ATlifetime	25550	--	day
IFSadj	1	--	g-yr/kg-day
IR	NA	0.35	g/day
C1	0.001	0.001	kg/g
FI	1.00E+00	1.00E+00	unitless

VOLUME 4

Baseline Ecological Risk Assessment (BERA)

HALEY ALDRICH

HALEY ALDRICH

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VOLUME 4
TOXIC SUBSTANCES CONTROL ACT (TSCA) ECOLGICAL RISK ASSESSMENT

FORMER ANACONDA WIRE & CABLE PLANT SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK
NYSDEC SITE #3-60-022

By **Haley & Aldrich of New York**
Rochester, New York

For **Atlantic Richfield Company**
Naperville, Illinois

File No. 28612-359
November 2015

Executive Summary

This Baseline Ecological Risk Assessment (BERA) is a component of the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application (RBDA) for polychlorinated biphenyls (PCBs) at the Former Anaconda Wire Project site located in Hastings-on-Hudson, New York. The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and will be submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA. The overall objective of the BERA is to determine whether the remedial action requirements of the ROD will be protective of the environment. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place at the remediation levels specified in the ROD will not pose unacceptable risks to the environment.

The BERA was completed following standard USEPA guidelines, and evaluated risks under existing land use conditions which *do not* consider remediation of sediments in OU-2 as stipulated in the ROD. Although the BERA considered all data obtained from all media sampled in OU-2 during the BSAP conducted in 2013 and 2014, the assessment principally relied on analysis of PCBs in fish targeted for that baseline study.

There is no terrestrial habitat at the Site and the post-remedial conditions will include installation of a clean cover system over the entire Site, thereby preventing any direct exposure to or migration of residual PCBs in soil. Consequently, are no complete exposure pathways to PCBs in the upland environment under current and post-remedial conditions. Therefore, the BERA focused on the aquatic habitat within OU-2. The BERA evaluated the following populations of environmental receptors:

- Benthic invertebrates which could be exposed to PCBs in sediment via interstitial porewater;
- Fish, which could be exposed to PCBs via uptake from surface water and prey (e.g., benthic invertebrates or aquatic vegetation);
- Mammals, which could be exposed to PCBs via consumption of fish that have accumulated them via surface water and prey;
- Birds, which could be exposed to PCBs via consumption of fish that have accumulated them via surface water and prey.

Benthic invertebrates were evaluated using a two-pronged approach to assess habitat and the benthic community by conducting a comprehensive Sediment Profile Imagery (SPI) study (~220 locations imaged) that was augmented by traditional benthic grabs which obtained taxonomic information that is not possible to obtain using the SPI alone. These studies concluded that there is no real difference between the Site and reference stations in benthic community structure, thereby indicating that OU-2 does not pose an ecological risk of significance to benthic invertebrates. These conclusions are conceptually supported by the general lack of PCB detections in porewater, and surficial sediment PCB concentrations across most of OU-2 that are similar to upriver sediment PCB concentrations.

Risks to fish (based on PCB concentrations in fish tissue) were evaluated and determined to have hazard quotients of less than unity (1). The lack of aquatic vegetation adjacent to the Site places constraints on the habitat; herbivorous birds and mammals and species that require habitats with aquatic vegetation are not present at OU-2 and if habitat were to change in the future, the remedy would have addressed any PCB exposures. Therefore, the BERA focused on characterizing potential risks to fish-eating wildlife

(piscivorous birds and mammals); these species would not be expected to inhabit OU-2, but rather use the aquatic environment at OU-2 as a foraging area.

Mammal and bird evaluation focused on representative species. The BERA evaluated three piscivorous birds (Great blue heron, bald eagle, and double-crested cormorant) and one piscivorous mammal (river otter). Risks were quantified by using the 95% UCL concentrations of total PCBs in whole body fish tissue with parameters that describe the ingestion rates and body weights of the indicator species to derive total PCB intakes. The intakes were then used with toxicity values that describe the PCB dose that would preclude lack of survivability, decrease in growth or impairment of reproduction. Overall, the parameters used to model exposures and the toxicity values were consistent with those used in the Revised Upper Hudson River BERA.

The results of the BERA indicate that hazard quotients for the river otter, Great Blue heron, double-crested cormorant and bald eagle are well less than unity for realistic exposure assumptions modelled in the BERA. These results indicate that ecological risks meet the USEPA acceptable risk benchmarks under the existing (pre-remedial) Site conditions.

Collectively, the results of the BERA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are appreciably different than ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Deepwater Northwest Areas that are in excess of background conditions. The use of benthic invertebrate metrics and measured fish tissue concentrations that reflect these existing conditions, to estimate future risks, is very conservative because the remediation described in Volume 2 will remove sources of PCBs in sediments and eliminate any transport of PCBs from upland areas to river sediments. These actions will materially improve sediment quality from the pre-remediation conditions, ultimately resulting in surficial sediment concentrations that are, on average, consistent with up-river background conditions (i.e., averaging 1 mg/kg or less). Moreover, habitat substrate that will be created in the Nearshore Area will be constructed over sediments that have been remediated and backfilled with clean substrate, indicating that exposure pathways to PCBs in Nearshore Area sediments will be incomplete. As a result, post-remedy PCB concentrations in biota will decline for any species that are local to the Site, and risks associated with food chain exposures in the future will be lower than those estimated in the BERA.

In conclusion, the results of the BERA support the conclusions of the NYSDEC ROD, which indicate that implementation of the remedies described in Section 4 will be protective of the environment.

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1. Introduction

This baseline ecological risk assessment (BERA) is a component of the Toxic Substances Control Act (TSCA) Risk-Based Disposal Application (RBDA) for the Former Anaconda Wire Project Site located in Hastings-on-Hudson, New York (Site). The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and will be submitted to the United States Environmental Protection Agency (USEPA) Region 2, TSCA. The HHRA provides a quantitative estimate of the risk posed to aquatic receptors through potential exposure to Site media where PCBs have been detected, under future land use conditions which consider remediation and re-development of the Site. The overall objective of the BERA is to determine whether the remedial action requirements of the Records of Decision (RODs) will be protective of the environment. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place under the conditions described in detail in Volume 2, will not pose unacceptable risks to the environment.

1.1 SITE DESCRIPTION

The Site is a 28-acre former industrial property located on the eastern bank of the Hudson River along the village of Hastings-on-Hudson waterfront, separated from the village commercial district by railroad tracks. The Site is located at river mile 21, approximately five miles south (downstream) of the Tappan Zee Bridge. The site is bounded on the north and west by the Hudson River, including a former marina to the north, to the south by the Tappan Terminal site and to the east by a commuter railroad adjacent to the Village of Hastings-on-Hudson. At the location of the Site, the lower Hudson River is nearly a mile wide (approximately 4800 feet bank to bank). The deepest portion of the river cross-section is approximately 50 feet. The Hudson River is primarily used as a navigational/shipping lane with large vessels typically traveling near the middle of the river. The shoreline consists of loosely-placed rip rap and concrete rubble in the north and decaying wooden bulkheads, docks and piers in the central area. Two former boat slips are present along the waterfront, both of which have filled in to a shallow depth with naturally-deposited sediment. The shoreline south of the South Boat Slip consists of modern steel sheeting. Figure 1 provides a site location and Figure 2 identifies key features of the site that are referenced throughout this document.

The site is zoned general industrial and has primarily been used as an industrial facility for well over a century with much of the site formerly covered with buildings; currently there are no active operations at the site. One permanent building remains at the site (Building 52) while most of the remaining portion of the site is covered by pavement or concrete building slabs. Currently, only three temporary trailers are in use for site security and to support remedial activities. Presently, there is no habitat for environmental receptors.

Surface Conditions: The site as shown below is predominantly covered by former building slabs. The site is gated and provides no habitat for environmental receptors.

River and Shoreline Conditions: Example photos below show the existing conditions of the shoreline with the IRM bulkhead wall in the bottom of the photo on the left and an example of the shoreline shown on the right.

During World War II, Anaconda Wire and Cable Company (AWC) was awarded contracts from the U.S. Navy (Navy) to manufacture electric cable for shipboard use. The Navy required the insulation of shipboard cable to be heat and flame resistant to avoid fire damage and to withstand heat generated from conducting high electric currents. PCB mixtures were used to make these products for the Navy. The material was used exclusively during the World War II-era and PCB use in the manufacturing of cable was suspended after AWC's contracts with the Navy were fulfilled at the end of the war, as there was no civilian market for these products. After World War II, AWC produced electrical and television cable until it ceased operations in 1975. Atlantic Richfield Company (ARC) purchased AWC in 1977, never operated the plant, and then sold the Site in 1978. Since 1978, several owners and tenants subsequently occupied the Site. In 1998, ARC's wholly owned subsidiary, ARCO Environmental Remediation Limited (AERL), purchased the Site in order to facilitate environmental investigation and remediation efforts. Volume 2 of this application provides additional details on site description and history including site geology and hydrogeology, historic and current land use, and future land use.

As of 2013, Building 52 and the water tower are the only remaining structures on the Site. Building 52 is located in the northeastern corner of the Site. All other buildings have been demolished with only the slabs remaining. All tenants have vacated the Site.

Building 52: This building is the only remaining structure on the site. Currently, only three temporary trailers are in use for site security and to support remedial activities.

1.2 REGULATORY PROCESS

Since 1998, ARC has implemented remedial investigations, Interim Remedial Measures (IRM) and demolition activities as part of the remedial process. The Site was divided into two Operable Units (OUs), with OU-1 designated as the upland portion of the Site, and OU-2 designated as the river portion of the Site. NYSDEC issued a Record of Decision (ROD) for the OU-1 portion of the Site in March 2004 (NYSDEC, 2004). In March 2003 the Final Feasibility Study Report (FS) for OU-2 was prepared and submitted by Earth Tech of New York, Inc. (Earth Tech) (Earth Tech, 2003) based on the December 2000 Remedial Investigation Report (RI) for OU-2 (Earth Tech, 2000).

In October 2003, NYSDEC issued the Proposed Remedial Action Plan (PRAP) for OU-2 (NYSDEC, 2003). Subsequent investigations completed by Parsons lead to the necessity for updating the 2003 OU-2 FS. The Supplemental Feasibility Study Report for Operable Unit No. 2 (SFS) was completed and submitted to NYSDEC in April 2006 (Parsons, 2006). In 2009, a Modified Feasibility Study Report (MFS) was prepared and submitted to NYSDEC (Haley & Aldrich, 2009), which incorporated additional new data and analyses with the intent to fully integrate OU-2 and OU-1 remedial activities. In 2011, a Revised Feasibility Study (RFS) was submitted (Haley & Aldrich, 2011) to address proposed amendments to the OU-1 ROD and the integrated remedies for OU-1 and OU-2.

Based on the above regulatory process, on 30 March 2012 NYSDEC issued an amended ROD for OU-1 and a ROD for OU-2. The Amended Order on Consent was signed 6 November 2013.

1.3 REQUIREMENTS OF NYSDEC RODS

As described in Volume 2, the nature and extent of contamination at the Site has been fully characterized under the regulatory oversight of NYSDEC, which culminated in RODs for the Site in 2012. The specific requirements of the RODs are provided in Volume 1. In summary, the RODs require:

- Excavation of soil containing PCBs and covering the entire Site with a clean soil cover and/or buildings and hardscape (i.e., soil cover system), and implementation of a Site Management Plan (SMP) and institutional controls which will manage soil excavation activities and prohibit use of groundwater.

- Excavation of shallow water sediments with PCBs in excess of one mg/kg to a sediment depth of six feet, backfilling with clean substrate, and installing stone armor for erosion prevention along the shoreline. Shallow water sediments are defined as those beneath a depth of river water (less than 15 feet) where turbidity controls may be used during remediation.

- Excavation of deep water sediments with PCBs in excess of 50 mg/kg to a depth of six feet and backfilling with clean substrate. Deep water sediments are defined as those beneath a depth of river water (more than 15 feet) where turbidity controls cannot be effectively used during remediation.

- Installation of migration controls for groundwater and residual dense non-aqueous phase liquid (DNAPL)

<u>OU-1</u>

- Excavation of soil greater than 10 mg/kg PCB to a maximum depth of 9 or 12 feet.

- Excavation of surface soil (0-12 inches) greater than 1 mg/kg PCB. Note however, that PCBs in surface soil will be isolated by the application of a cover system over the entire site. Therefore, only excavation of soil greater than 10 mg/kg PCB is required as stated above.

- Building 52 outfalls will be addressed.

- Bulkhead installation in the Northwest Corner of the site to provide containment and allow for the delineation and recovery of PCB DNAPL beneath the Northwest Corner of the site and the Northwest Extension Area.

- Construction and operation of a post-remedy recovery system for PCB DNAPL.

- Installation of a site cover will be required to allow for restricted residential use of the site. Soil cover in areas not otherwise covered by the development at the site (e.g., buildings, pavement, etc.) will consist of two feet of clean soil over a demarcation layer. Note that the preliminary design currently plans to install a cover system over the entire site, including a shoreline protection system along the river.

- Implementation of institutional controls which will manage soil excavation activities and prohibit use of groundwater.

OU-2

- Development and implementation of a plan for further delineation and recovery of PCB DNAPL from beneath the Northwest Corner of the site and the Northwest Extension Area.

- Removal of sediment that contains PCB concentrations greater than 1 mg/kg to a maximum depth of 6 feet below the mud-line within areas of re-suspension controls (i.e., shallow water sediment in Nearshore Area, and Backwater Area).

- Nearshore dredge areas will be backfilled with clean material. Isolation capping will be provided where residual contamination remains above background concentrations. The isolation cap will consist of a sand isolation layer; armoring layer; and a minimum of a 24 inch habitat layer of which natural deposition may provide up to 12 inches where a reasonable time frame for deposition can be demonstrated.

- Subject to evaluation and further investigation, removal of sediment outside of re-suspension controls that contain PCB concentrations greater than 50 mg/kg, to a maximum depth of 6 feet below the mud-line. Note that these areas are discussed as the Deepwater Evaluation Area and Deepwater Northwest Area. Dredged areas will be backfilled based on final design requirements.

The RODs also require completion of several investigation activities to help support and gauge success of the remedial design. Those investigation activities have largely been completed, and the remedial design is in progress; remediation as required by the ROD has not yet been initiated.

1.4 POST-REMEDY SITE CONDITIONS

Volume 2 details post-remedy Site conditions. In summary, based on the requirements of the RODs, once remediation has been completed, Site conditions will be as follows:

- Surface Soil: PCBs in surface soil will be isolated by the application of a cover system over the entire site. This cover system will isolate residual PCBs in soil thereby preventing contact by human and environmental receptors and allowing for restricted residential use. The cover system will include an erosion protection layer along the shoreline which will prevent potential migration and subsequent exposure to residual PCBs. Institutional controls will ensure that soil cover system is maintained.

- Subsurface Soil: PCBs in subsurface soil will be isolated by the application of the cover system described above. Residual PCBs beneath the cover system will be reduced to 10 mg/kg or less by excavating and back-filling with clean soil as follows: In the Northwest Corner and along the Northern Shoreline, soils in excess of 10 mg/kg will be excavated to 9 ft bgs and backfilled with clean soil; Outside of these areas, soils in excess of 10 mg/kg will be excavated to a maximum depth of 12 ft bgs and backfilled with clean soil. Institutional controls will ensure that future excavation of soil containing residual PCBs is properly managed.

- Groundwater: Institutional controls will prohibit use of groundwater as a potable water source.

- Shallow water sediment: Sediments beneath 15 feet or less of surface water (i.e., sediments in the Nearshore and Backwater Areas) will contain PCBs at background conditions (i.e.,

approximately 1 mg/kg or less). This will be accomplished by excavating sediments in these areas with PCBs greater than approximately 1 mg/kg to a depth of 6 feet and backfilling with clean material that will isolate remaining contamination, prevent erosion of cap materials, restore bathymetry, and provide a habitat layer. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.

- Deepwater sediment: The surficial deepwater sediments will consist of native sediment or clean backfill material with PCBs near background (approximately 1 mg/kg or less). Deepwater sediments (i.e., those beneath more than 15 feet of surface water) that exceed 50 mg/kg and for which sufficient native cover is not present will be removed to a maximum depth of 6 feet and backfilled with clean material that will isolate remaining contamination. The resulting conditions will ensure that human and environmental receptors are not exposed to PCBs at concentrations in excess of up-river background concentrations.

- Migration controls: Migration of contaminated soil particles and DNAPL will be prevented through installation of migration controls. The shoreline will either be a steel bulkhead or a sloped shoreline with a cover system designed to prevent the migration of contaminated soil particles into the Hudson River and to resist erosion. The sheet pile wall in the vicinity of the PCB DNAPL will prevent mobilization of DNAPL and migration of PCBs in groundwater.

- Institutional controls: Institutional controls will include an environmental easement that will:

  - require the remedial party or site owner to complete and submit to NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
  - allow the use and development for restricted-residential use only (which allows for residential, commercial, and/or industrial use)
  - restrict the use of groundwater and/or surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or Westchester County DOH;
  - prohibit agriculture or vegetable gardens on the controlled property with the exception of community gardens with the approval of the Department; and
  - require compliance with a Department approved Site Management Plan.

NYSDEC concludes that the stipulated remedies are: a) protective of human health and the environment; b) comply with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable; and c) use permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, to satisfy the preference for remedies that reduce toxicity, mobility, or volume as a principal element. The New York State Department of Health (NYSDOH) concurs that the remedy for the Site is protective of human health.

1.5 RISK ASSESSMENT APPROACH

40 CFR 761.61 provides three options for cleanup of PCB remediation waste: 761.61(a) *Self-implementing*; 761.61(b) *Performance-based*; and 761.61(c) *Risk-based*. The Self-implementing option (761.61(a)) is not applicable to freshwater or marine sediments. Performance-based criteria (761.61(b)) are applicable to contaminated surfaces, not to soil and sediment. Although 761.61(a) or 761.61(c) may be used for soil, 761.61(c), Risk-based approval, is the only method that can be used for sediments. Risk-based approval is used for both soil and sediment at this Site. Based on Site conditions, a Risk-based approval approach was selected.

Risk-based approval is conducted by submitting to USEPA a written plan that describes the nature and extent of PCB contamination, the proposed remediation, and the basis for leaving PCBs in-place within environmental media at the Site. Human health and ecological risk assessments, in turn, are used to support the proposed remediation, including documentation that leaving PCBs in-place (following remediation) does not pose unacceptable risks to human health and the environment.
Remedial activities will be completed at the Site to address PCBs in soil, shallow water sediment, and deep water sediment to comply with the NYSDEC RODs, as described above. In addition, remedial activities will be implemented to mitigate potential migration pathways for groundwater and NAPL. These remedial actions will be performed regardless of the results of this BERA; i.e., if this BERA indicates that the remedial actions stipulated in the RODs are not required to maintain acceptable risks, the remedial actions will still be performed. However, the BERA uses the existing (pre-remedial) Site conditions to evaluate potential risks. Risks based on current conditions provide a conservative assessment of possible future risks because they do not reflect the planned remediation of sediment, which will in turn reduce PCB concentrations in the food chain. In addition to ensuring the protectiveness of the BERA, relying on current PCB concentrations reduces uncertainty by eliminating the need to model future concentrations.

The RBDA for Former Anaconda Wire Site comprises the following four volumes:

- Volume 1, *Application*, which provides a summary of the project scope and objectives, investigation activities, human health and ecological risk assessments, and conclusions that are documented in detail in Volumes 2-4.

- Volume 2, *Basis for Remedial Approach and Design*, which documents investigation activities including nature and extent of PCB contamination, provides the proposed remedial design, and identification of anticipated post-remedial conditions (i.e., residual PCBs).

- Volume 3, *Human Health Risk Assessment*, which provides the human health risk assessment, including methodology, calculations, and results.

- Volume 4, *Ecological Risk Assessment (this volume)*, which provides the ecological risk assessment, including methodology, calculations, and results.

The BERA quantitatively evaluates risks to the aquatic receptors in OU-2 by the presence of PCBs at the site in its current condition (i.e. pre-remedial actions). An assessment of ecological risks for OU-1 is not necessary as there is no habitat available to support terrestrial wildlife (the site is mainly covered by buildings and pavement with no vegetation present for nesting, cover or foraging). Under future re-developed conditions, the covers system at OU-1 will prevent potential exposures to residual PCBs in

soil. The basis for the evaluation of this OU-2 BERA is current U.S. Environmental Protection Agency (USEPA) policy and generally conforms to practices set forth in *USEPA's Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997)*. Additional documents used to conduct the BERA include:

- Risk Assessment Guidance for Superfund (RAGS), Volume II: Environmental Evaluation Manual (USEPA, 1989);
- Framework for Ecological Risk Assessment (USEPA, 1992);
- Guidelines for Ecological Risk Assessment (USEPA, 1998);
- Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment (USEPA, 2001a);
- The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments, ECO Update (USEPA, 2001b); and
- Eco Update Toxicity Series (USEPA, 1991 - 2008).

A complete list of references is presented in Section 9.

2. Description of OU-2

The study area is a portion of the Hudson River that is situated immediately west of the Site (Figure 2). This reach ranges from 400 to 800 feet wide and the river bottom consists of generally uniform sediments, although some discrete areas contain historical construction debris (Parsons, 2006). The eastern edge of the Site is the river shoreline which consists of bulkheads (including small inlets known as the North and South Boat Slip) and old wooden pilings that are remnants of structures that have been razed. The southern edge of the Site generally coincides with the northern border of the former Tappan Terminal. The western boundary of OU-2 is generally parallel to the shoreline and extends into the main navigation channel of the Hudson River. The northern edge of the site extends approximately 300 feet north of the property and includes the area referred to as the "Old Marina." OU-2 comprises the following area, to which reference will be made in this report. These areas are graphically depicted in Figure 3.

- Nearshore – this portion of OU-2 consists of areas defined by the expected silt curtain alignment on the west and the OU-1/OU-2 Boundary on the east.

- Backwater – this portion of OU-2 consists of areas within the nearshore portion at the area of slower river velocities and increased deposition primarily consisting of the Old Marina, North Boat Slip, and South Boat Slip.

- Deepwater Area – this portion of OU-2 consists of areas west of Nearshore Area to the western boundary of the OU-2.

3. Site Background

The RI provided data for soil, groundwater, and sediment that was sufficient to identify the nature and extent of contamination and to support a determination that remedial actions were required at the Site. However, the RI data were not sufficient to allow for a comprehensive remedial design. Therefore, two extensive investigation programs were completed by Haley & Aldrich between 2013 and 2015: the pre-design investigation (PDI), and the baseline sampling and analysis program (BSAP).

The objective of the PDI is to develop data that can be used to delineate the remedial boundaries in soil and sediment. Characterization activities performed in support of the PDI were limited to soil and sediment sampling based on data generated during the RI.

The objective of the BSAP is to develop a baseline characterization of PCB concentrations in environmental media. After remediation has been completed, the types of sampling performed in the BSAP will be repeated, and the post-remedial analytical data will be compared to the BSAP analytical data. The comparison will be used to help gage improvement in environmental quality.

OU-2 is located downriver from the Upper Hudson River PCB Superfund Site, which extends from Hudson Falls to the Federal Dam in Troy, NY. Therefore, it is recognized that anthropogenic sources of PCBs that are unrelated to the OU-2 Study Area are present in Hudson River sediment and biota. To help evaluate if conditions within the OU-2 Study Area may differ from locations outside of OU-2, surface water, sediment, and biota were sampled from locations adjacent to the Site (adjacent area), one-mile up-river of the Site (North area), and one-half mile down-river of the Site (South area) during the BSAP.

The BERA uses data collected in the BSAP and PDI, as opposed to the RI, to evaluate potential exposure pathways and to quantify potential health risks. The BSAP and PDI data were used because:

- Analytical data are current and therefore are more reflective of existing environmental conditions;
- Sampling targeted media such as surficial sediment (0 – 0.5 ft bgs), pore water, and biota that are more applicable to evaluation of potential exposure pathways.

Baseline monitoring of the site and reference locations have been performed in both 2013 and 2014. This work included a comprehensive field program that included development of a bathymetric map, evaluation of benthic habitat (using sediment profile imaging) and sampling and analysis of surface water, sediment, pore water and biota (benthic macroinvertebrates, fish and blue crab). All work plans, permits and data monitoring reports were approved by NYSDEC.

With the exception of the 2015 fall fish sampling event, the tasks developed for the BSAP have been completed and existing data is sufficient to complete the OU-2 BERA:

- Bathymetry: indicates armoring of the shoreline (stone, pilings, and bulkhead) and a riverbed that is composed of “generally featureless” soft muds.

- Habitat and Benthic Community: bathymetric observations were confirmed by extensive sediment profile imagery (SPI) which showed, through both photographs and traditional benthic community metrics, that any adverse effects in the benthic habitat could not be attributed to sources at the former Anaconda Wire and Cable Company site. The active biotic zone was also shown to be between 0.5 – 7 inches. Additional information that addresses any potential impacts to the benthic community is presented in Section 5.5.1.

- Surface Water: ten sampling events (Appendix A, Figure A-1) showed water quality parameters (D.O., pH, temperature, salinity, turbidity) were similar to values measured in past studies (Earth Tech, 2000) and are within optimal ranges to support aquatic life. Site-related PCBs were undetected (MDL ≈10 - 18 pg/L) in almost every composite grab sample (Table A-1). Surface water therefore is not a medium of concern as the frequency of detection was very low. The levels of PCBs that were detected were generally lower than historically measured values.

- Sediment: concentrations of PCBs within most samples (0 – 6 inches) were less than 1 mg/kg (Appendix A, Figure A-2) which is consistent with historical data (only one elevated sample near the North Boat Slip); Site-related Aroclors (1260) were detected in OU-2 samples but at relatively low concentrations.

- Porewater: with the exception of one sample between the boat slips (SS-007), porewater samples did not contain detectable concentrations of PCBs (Appendix A, Table A-2).

- Fish: target species were American eel, white perch, hogchoker and oyster toadfish. Although blue crabs were the targeted shellfish, they are not typically consumed by piscivorous birds and therefore were not considered as a dietary component in this BERA. An oyster bed was identified near the North Boat Slip, but these organisms generally are not consumed by birds or mammals native to the area. Prey fish that occupy lower trophic levels were not abundant (e.g. mummichog, grass shrimp). Average whole body tissue concentrations of PCBs were less than 1 mg/kg for hogchoker and oyster toadfish, and between 2 – 2.5 mg/kg for American eel and white perch (Appendix A, Figure A-3). PCB concentrations in fish fillets and blue crab legs were generally less than concentrations observed in offal and hepatopancreas, respectively. For the combined 2013 and 2014 data set, average whole body PCB concentrations in American eel and white perch were statistically higher adjacent to the Site when compared to fish caught north or south of OU-2.

Samples collected from media described above were analyzed for Aroclors using USEPA Method 8082A. Extraction was performed using USEPA Method 3545, which is a pressurized fluid extraction method that achieves a recovery equal to that of Soxhlet extraction.

Quality Assurance/Quality Control (QA/QC) samples were collected at a rate of 1 field duplicate per 10 samples and 1 MS/MSD per 20 samples for each media. All field and laboratory procedures were completed in accordance with the approved QAPP. Data validation was subcontracted to a third party. Based on Data Usability Reports (DURs) provided to date, data validation has resulted in only minor changes in results or flags. The analytical data that supports the risk assessment and delineation was determined to be useable for those purposes.

Further description of the procedures used for data validation and evaluation is presented in Volume 2.

Additional detailed historical information for OU-2 is contained in the 2000 RI (Earth Tech, 2000), the Supplemental Feasibility Study (Parsons, 2006), and the Revised Feasibility Study for OU-2 (Haley & Aldrich, 2011) including others.

4. Problem Formulation

Problem Formulation is an iterative planning step in the BERA. The objectives of Problem Formulation are to identify the focus and scope of the BERA and to develop a problem statement to be addressed in the Analysis Plan. Typically, the Problem Formulation develops a Conceptual Site Model (CSM), characterizes habitat, and selects receptors of interest, constituents of potential ecological concern (COPEC), and assessment and measurement endpoints.

For OU-2, the Problem Formulation has been in development since the completion of the 2000 RI and FS (Earth Tech, 2000; 2003). Major aspects of the CSM also have been developed within the CSM document (Haley & Aldrich, 2009) and further refined through the development of the Predesign Investigation and the BSAP.

4.1 HABITAT CHARACTERIZATION

OU-2 is primarily underwater, although tidal fluctuations result in the regular exposure of a narrow intertidal zone that includes soft substrates, stone rip-rap, sheet piling and remnants of old buildings and wharves (decayed wooden pilings). With the exception of anthropogenic debris, the majority of the bottom substrate area of OU-2 is classified as "depositional" and therefore consists of a substantial accretion of silts and clays. Several comprehensive benthic mapping studies have been conducted in the past throughout all of the major reaches of the Hudson River. For the benthic community, the productivity of subsurface habitats varies based on a wide array of physicochemical factors but appears to be best explained by the type of substrate (Strayer *et al*., 2005).

The river bottom of OU-2 transitions from the shore to a depth of 50 feet in the center of the navigational channel. The existing rip-rap and other constructed substrates that exist in OU-2 do not reflect shoreline characteristics that would support a vegetated riparian zone; however, the existing river substrate supports surface-dwelling invertebrates. Using biota and chemistry as endpoints, Llansó and Southerland, (2006) determined the quality of the sediment in the Lower Hudson River and classified sediments as degraded. Sites near Yonkers that were initially evaluated for the purpose of selecting a reference location also were later categorized as "degraded."

Estuaries, including the Lower Hudson estuary (southern tip of Manhattan to the northern end of Haverstraw Bay), typically are used by many types of fish as nursery areas, in that they provide ideal habitats for supporting early critical life stages. The natural attributes of a productive estuarine habitat, such as submerged aquatic vegetation, an undisturbed intertidal zone, a naturally occurring shoreline and euryhaline (wide range of salinities) conditions are not, however, present within the confines of the OU-2.

The lower Hudson River estuary south of OU-2 is one of the most productive ecosystems among the northern Atlantic coast for fisheries and contains over 200 different species of fish. Marine finfish that use this area include American eel (*Anguilla rostrata*), white perch (*Morone americana*), and menhaden (*Brevoortia tyrannus*). Estuarine fish that spawn in this stretch of the Hudson include winter flounder (*Pleuronectes americanus*), bay anchovy (*Anchoa mitchilli*), hogchoker (*Trinectes maculatus*), Atlantic silversides (*Menidia menidia*), and mummichog (*Fundulus heteroclitus*). Passive traps used during both the 2000 RI and the BSAP confirmed most of these species were present. Oyster toadfish (*Opsanus tau*),

a ground fish which has not been sampled or analyzed in any previous monitoring studies, was efficiently trapped in eel and crab pots.

The benthic habitat was thoroughly characterized during the BSAP via a bathymetric survey, sediment profile imaging (220 locations) and a benthic invertebrate community survey. With the exception of the shoreline habitat, there is very little variability between the reaches defined by areas north, adjacent to and south of the site. The selection of receptors of interest, therefore, is fairly independent of habitat. For this BERA, it is assumed that the prey of receptors of interest are invertebrates and/or fish that are endemic to the locale north, adjacent to and south of OU-2. This BERA therefore takes a conservative approach that segregates the data for fish sampled north (upstream), adjacent to, and south (downstream) of the site. The foraging area of any of the receptor animals are, however, adjusted for the purposes of deriving risk estimates, as their home ranges are larger than OU-2.

Finally, it is important to note that a large portion of OU-2 is a "depositional environment" so that, once dredge and fill construction has been completed, any risks posed by residuals contributed by the site should rapidly decrease due to natural attenuation mechanisms (e.g. burial).

4.2 COPEC SELECTION

Based on the existing data PCBs are the primary class of COPEC and, although Aroclor 1260 or 1262 is considered to be an indicator of site-related contamination, this BERA will only evaluate hazard from total PCBs as most toxicity benchmarks use the latter as an endpoint. Metals (copper, lead, zinc) do not bio-accumulate into higher trophic levels and concentrations of lead in fish tissue were so low that NYSDEC waived its analysis after the first year. Thus, metals are not designated as COPECs.

4.3 CONCEPTUAL SITE MODEL

CSMs typically describe the source(s) of contamination, nature and extent of contamination, whether COPECs can transform or migrate within or from a source, and receptor of interest that are potentially exposed to COPECs. Historically, the original source of PCBs to OU-2 is assumed to be OU-1. Within OU-2, concentrations of PCBs are generally near background (~1 mg/kg) and fairly uniform in the upper foot of sediment; preliminary data from the Pre-Design Investigation revealed that concentrations are higher and more variable with increasing sediment depth. PCBs do not easily degrade in the environment and they sorb strongly to organic matter and lipids. Due to their lipophilicity, PCBs tend to bio-accumulate (i.e., concentrations in a given receptor increase over time) and bio-magnify (i.e., concentrations increase with increasing trophic level). Consequently, exposures tend to be highest among older, larger, higher trophic level receptors, such as piscivorous birds and mammals.

It is important to note that, with the exception of a different spatial scale, a similar CSM was previously developed for the entire Hudson River as part of the *Revised Baseline Ecological Risk Assessment* (USEPA, 2000). Information from this comprehensive document was used as a general guideline to inform the OU-2 BERA CSM. More detail is presented below in Section 4.4.1.

4.4 ASSESSMENT AND MEASUREMENT ENDPOINTS

According to USEPA (1997), assessment endpoints are explicit statements of the characteristics of the ecological system that are to be protected. Assessment endpoints can be measured directly or are evaluated through indirect measures. Measurement endpoints represent quantifiable ecological

characteristics that can be measured, interpreted, and related to the valued ecological component(s) chosen as the assessment endpoints (Roberts et al., 1999). Assessment endpoints, and the associated measurement endpoints, provide information to support or refute the mechanisms and/or suppositions generated in the Conceptual Site Model. As discussed below, the selection of assessment and measurement endpoints used in this BERA is partly informed by historical decisions made by USEPA in the Revised Hudson River BERA (USEPA, 2000), which was conducted for a much larger reach of the Hudson River in response to historical releases from facilities located within the Upper Hudson River.

4.4.1 Revised Hudson River Baseline Ecological Risk Assessment

PCBs (principally as Aroclor 1242) were released decades ago from facilities located in the Upper Hudson River. The USEPA designated the entire Hudson River a Federal Superfund Site and issued a BERA for both the Upper Hudson River the Lower Hudson River in August 1999 (USEPA, 1999a). An ERA for "future risks" in the Lower Hudson was issued in December 1999 (USEPA, 1999b). In 2000, USEPA convened a panel of independent scientific experts to peer review the BERA for the Hudson River PCBs Site and issued a Revised BERA later that year (USEPA, 2000).

USEPA (2000) defined the Upper Hudson as a 40-mile river segment from Hudson Falls to the Federal Dam at Troy (River Mile 189 – 154). The BERA designated the Lower Hudson River as the reach that runs from below the Federal Dam (River Mile 143.5) to a few miles south of the Tappan Zee Bridge (River Mile 25.8). Because OU-2 falls within the "Lower Hudson," the conclusions of the Revised Hudson River BERA provide valuable insight for the OU-2 BERA.

For purposes of the OU-2 BERA, the USEPA Revised Hudson River Risk Assessment (USEPA, 2000) was reviewed to a) inform the types of receptors of interest that may be chosen for evaluation b) ensure consistency in exposure routes and pathways and c) evaluate how the assessment and measurement endpoints used in that risk assessment could be aligned with the assessment and measurement endpoints applicable to this BERA. Additionally, the exposure point concentrations and hazard quotients reported by USEPA (2000) for the Lower Hudson were evaluated relative to those generated in this OU-2 BERA. The evaluation of the Revised Hudson River BERA (USEPA, 2000), in relation to this BERA, is discussed in the Uncertainty Analysis (Section 7).

The assessment endpoints used by USEPA (2000) focused on the sustainability (i.e., survival, growth, and reproduction) of local wildlife (fish, mammals and birds), while the measurement endpoints addressed benthic invertebrate metrics and a comparison of fish tissue concentrations (or exposure doses/concentrations estimated using a food chain model) to toxicity reference values (TRVs). The receptors of concern evaluated by USEPA (2000) included benthic invertebrates, fish, piscivorous (fish-eating) birds and mammals. For all receptors, USEPA (2000) used 95% Upper Confidence Limits (95% UCL) as the exposure point concentrations for every receptor and risk scenario.

In the Revised Hudson River BERA (USEPA, 2000) for the Lower Hudson, two lines of evidence were used to suggest effects of PCBs on benthic invertebrate populations (serving as a food source to local fish). Risks to local fish populations were evaluated using seven lines of evidence. Collectively, for the Lower Hudson River, they indicated that risks from "current" (based on 1993 data) exposures showed a "limited exceedance" of toxicity benchmarks to prevent reproduction or recruitment (i.e. inward migration from tributaries) of common fish species.

For aerial insectivorous birds (e.g. swallows), the Revised Hudson River BERA concluded that measured concentrations of PCBs in surface waters of the Lower Hudson River exceeded criteria developed for the protection of wildlife at most locations. Risks to waterfowl (e.g. mallards) were evaluated using six lines of evidence and PCBs were deemed not of a sufficient magnitude to prevent reproduction in the Lower Hudson River. Toxicity quotients for the bald eagle were less than 1 for all locations in the Lower Hudson River.

Piscivorous mammals were evaluated using four lines of evidence, which indicated that current and future concentrations of PCBs are not of a sufficient magnitude to prevent reproduction.

4.4.2 Selection of Assessment and Measurement Endpoints

The OU-2 BERA generally maintains consistency with USEPA (2000) relative to assessment endpoints, measurement endpoints, receptors of interest and their life history and algometric parameters.

The following assessment and measurement endpoints are used to interpret data concerning ecological risks within the study area.

- Assessment Endpoint - sustainability (i.e. survival, growth and reproduction) of resident biota (e.g., piscivorous bird and mammal populations) resulting from exposures to PCBs (typically in the diet).

- Measurement Endpoint - Comparison of the estimated exposure (as average daily doses (ADD) of PCBs (typically from dietary ingestion) to conservative values considered “safe” (typically identified from controlled laboratory exposures of aquatic organisms or following administration to fish, birds or mammals).

For vertebrates, the ADD represents the “dose” for each receptor of interest in milligrams per kilogram of body weight per day. This dose is compared to an estimated “safe” dose known as the Toxicity Reference Value (TRV). The TRV is typically derived from a controlled laboratory toxicity study on a domesticated bird or mammal. Since these forms do not typically exist under environmental conditions, TRVs are conservative and will thus tend to overestimate risk.

4.5 SELECTION OF ECOLOGICAL RECEPTORS OF INTEREST

As discussed above, it is important to note that the Revised BERA for the Hudson River Superfund Site conducted a comprehensive ecological assessment for all trophic levels (benthic invertebrates, fish, and wetland-dependent birds and mammals). The Revised Hudson River BERA provides a foundation for this TSCA BERA as it is important to select similar species on which exposure to PCBs and the subsequent effects have already been characterized, in detail, for all species known to inhabit the Hudson River. The use of some of the same receptors and their life history parameters saves a considerable amount of time and effort as well as adding consistency to the risk assessment process (some toxicity endpoints will have changed based on updated of more current benchmarks). For the OU-2 BERA, it is logically assumed that the overall level of contamination in the Lower Hudson is *lower* today as compared to when exposure was assessed 15 years ago. This is based on the fact that active sources of PCBs no longer exist and that depuration of PCBs is occurring in fish as a result of natural processes affecting fate and transport (e.g. mass transport, dilution, burial, microbial degradation). Additionally, the Revised Hudson River BERA found no significant risks, for the Lower Hudson reach, to either the benthic

community or to fish. The lack of hazard in terms of exposure to higher levels of PCBs in the past led to a decision to exclude these two classes of receptors in this BERA, as described below.

4.5.1 Benthic Invertebrates

The 2000 RI found no differences in the functional taxonomic metrics developed from grab samples obtained in both the reference area and within OU-2, nor did the concentrations of PCBs in invertebrates exceed the effect-based NOEC values for representative benthic organisms indicating an acceptable level of risk. Additionally, although PCB levels in sediment were greater in 2000, sediment toxicity tests found "that the site sediments are no more toxic than the reference site".

It is difficult to assign a "cause-and-effect" between concentrations of PCBs in sediment to measures of benthic community structure. This is partly due to the clustered (spatial) distribution of benthic macroinvertebrates i.e. there is an inherent variability that is seen in muds that are generally "featureless". The BSAP used two lines of evidence to assess habitat and the benthic community: 1) a comprehensive SPI survey (~220 locations imaged) and 2) sediment grab samples analyzed for taxonomic endpoints (i.e. abundance and types of benthic invertebrates). Toxicity tests were suggested as a possible line-of-evidence but the NYSDEC recommended that bioassays not be performed as they were not convinced the results would be meaningful.

As detailed in the Germano report (Appendix B), SPI uses an optical device that works like an upside-down periscope that records cross-sectional images of the upper 20 cm of the sediment bed. A camera is mounted in the center of a frame equipped with a mirror set at a 45 degree angle. The mirror acts as a wedge to penetrate the sediment bed. The camera photographs the upper portion of the sediments typically inhabited by benthic invertebrates.

Sediment Profile Imaging (SPI) provided direct visual information about sediment grain size, the demarcation between oxic and anoxic sediments (e.g. the apparent 'redox potential discontinuity'), some of the types of organisms present, the presence of debris, and occurrence of methane gas bubbles. Following sediment remediation, SPI also can provide data on presence of dredge residuals or cap material, as well as and natural recovery processes. The sediment and macroinvertebrate grab sampling assist in the validation of observations made during the SPI drops.

The Germano report (Appendix B) used advanced statistical ordination tools (nonmetric multidimensional scaling) which allowed a visual assessment of the relationship (or a difference) between both SPI and taxonomic measurements made at stations upstream, adjacent to or downstream of the Site. The report also presents traditional histograms for comparing functional taxonomy metrics for the north, adjacent and south reaches of the study area.

Using visual SPI metrics, the Germano report concludes that there is a decrease in the depth of shallow reduced sediments as one moves offshore and that this "disturbance appears to be caused by erosion and transport of the surface oxidized layer most likely due to ship prop wash". Their interpretation of the benthic invertebrate taxonomy data from the sediment grabs was that, "while the species composition has changed slightly in the time that has passed since the initial [2000 RI] investigation, the overall conclusion has not; by traditional benthic metrics alone, there is no real difference between the site or reference stations."

4.5.2 Fish

The Revised Hudson River BERA (USEPA, 2000) compared PCB concentrations in various species of fish (pumpkinseed, spottail shiner, brown bullhead, white perch, yellow perch, striped bass) to tissue residue benchmarks that are suspected to be protective of each of these individual species of fish (often called "toxicity reference values" or TRVs). If the ratio of the measured fish concentrations to the TRVs (i.e., the Hazard Quotient or HQ) was less than 1.0, then it was assumed that the body burden of PCBs in the various species would not pose a hazard to fish growth or reproduction.

In the Revised Hudson River BERA, all of the HQs for all of the fish species in the Lower Hudson River (generally River Mile 50 and lower) were well below 1.0. The whole body TRV for fish used in the Revised Hudson River BERA was 9.3 mg/kg, which is much greater than all of the tissue concentrations observed in fish collected adjacent to OU-2. Furthermore, given that average concentrations of PCBs in present day fish are generally lower than concentrations observed 15 years ago, and are expected to continue to decrease after the OU-2 remedy is implemented, it can be deduced that no significant hazard from exposure to PCBs exists for Lower Hudson River fish under current or future conditions.

4.5.3 Mammals

Mammalian receptors found within the Hudson River valley represent various trophic levels and habitats. The Revised Hudson River BERA (USEPA, 2000) selected four mammals (little brown bat, raccoon, mink and river otter) to serve as representative receptors. The little brown bat and the raccoon had HQs significantly less than 1.0 for the section of the Lower Hudson River below River Mile 25.8 (Appendix C, Table C-2). As stated above, if HQs were less than 1.0 in 2000, they are likely lower under current conditions since concentrations of PCBs in all media have declined over the last 15 years. The upland (OU-1) habitat is also not currently conducive to the recruitment of either the little brown bat or the raccoon, nor will future development provide significant habitat for these species. Given that HQs for bats and raccoons were less than 1.0 in the Revised Hudson River BERA (USEPA, 2000) and that habitat at the Site is not suitable for either species, neither is selected as receptor of interest for the OU-2 BERA.

USEPA (2000) also evaluated mink and river otter and both receptors had HQs greater than 1.0 for the Lower Hudson River (Appendix C, Table C-2). For the OU-2 BERA, the river otter was selected over the mink because neither current nor future habitat is suitable to mink, while river otter can easily swim to the Site from nearby locations. Given their taxonomic similarity and to ensure the conservatism of the OU-2 BERA, however, TRVs applied to the river otter were selected from mink studies. The river otter's life history is summarized in Appendix D.

4.5.4 Birds

USEPA (2000) evaluated the following five avian receptors: tree swallow (*Tachycineta bicolor)*, mallard (*Anas platyrhychos*), belted kingfisher (*Ceryle alcyon*), Great blue heron (*Ardea herodias*) and bald eagle (*Haliaeetus leucocephalus)*. Ratios of modeled exposure levels to TRVs yielded HQs significantly less than 1.0 for the swallow, mallard and belted kingfisher for the Lower Hudson River near River Mile 25.8 (Appendix C, Table C-2). As discussed above, levels of PCBs in the Hudson River have since declined so that current risks also are lower than estimated by USEPA (2000). Neither the tree swallow nor the mallard eats fish, while the belted kingfisher prefers woodland shorelines and eats fish that are smaller and lower on the food chain than the fish consumed by great blue heron and bald eagle. For these

reasons, tree swallow, mallard and belted kingfisher are not selected as receptors of interest for the OU-2 BERA.

To be consistent with the Revised Hudson River BERA (USEPA, 2000), this assessment considered piscivorous birds expected to be most highly exposed to PCBs. Two receptors evaluated by USEPA (2000) were selected as receptors of interest--great blue heron and bald eagle—and a third piscivorous bird species was added, the double-crested cormorant. The life histories of the three avian receptors of interest are summarized in Appendix D.

5. Analysis

This section describes the process used to evaluate the potential exposures of the ecological receptors of interest and COPEC (PCBs) identified in the previous section. The analysis phase of an ecological risk assessment consists of the technical evaluation of data addressing existing and potential exposures to COPECs and ecological effects thereof. The analysis is primarily based on empirical data collected to support the BSAP but also includes additional assumptions to assist in the interpretation of the data. The analysis of exposure and effects is performed interactively, with the analysis of one informing the analysis of the other.

5.1 ESTIMATION OF EXPOSURE

The estimation of exposure point concentrations was performed according to USEPA ecological risk assessment guidance (USEPA, 1989; 1993; 1997; 1998) using ProUCL software (Version 5.0.00). Exposure point concentrations for total PCBs are presented in Table 1. Total PCB concentrations were calculated using analytical data for Aroclors, as follows:

- Total PCB concentrations for each sample were calculated as the sum of all detected Aroclor concentrations in that sample.
- For samples in which no Aroclors were detected, the total PCB concentration used in the data set was the highest reporting limit among all Aroclors.

Each receptor of interest was assumed to consume most of the species of fish sampled, albeit in varying proportions according to dietary preferences. Although concentrations for each fish species (American eel, white perch, oyster toadfish and hogchoker) are presented for the North, Adjacent and South segments of the Study Area as well as all locations combined, the OU-2 BERA mainly focused on comparing risks from consumption of fish caught north of (upstream) and adjacent to the site. Although no spatial differences were seen in tissue concentrations of PCBs for blue crab, oyster toadfish and hogchoker, the whole body PCB concentrations for the American eel and white perch were, relative to the upstream fish, slightly higher adjacent to the site.

Exposures of avian and mammalian receptor of interest at the site area were calculated using site- and species-specific exposure models for two separate pathways: 1) indirect exposure to COPECs in food (e.g., consumption of fish, vegetation or invertebrates that have accumulated PCBs) and 2) direct exposure to COPECs in sediment (incidental ingestion). In the case of mammals and birds, the dose of COPECs is considered negligible from water consumption, dermal absorption and inhalation. The total average daily dose is entirely based on consumption of contaminated food and, either directly or indirectly, sediment. Parameters used to describe ingestion rates, body weights, dietary composition, home ranges and area/seasonal use factors used to calculate ADD values are provided in Table 2.

The average daily dose (ADD) for each ROI is the sum of the ingestion of plant matter, intentional or inadvertent ingestion of sediment, and the ingestion of animal matter:

The general ADD equation is:

Exposure = Total Average Daily Dose = $[ADD_P + ADD_A + ADD_S] \times AUF \times SUF$
where:

ADD_P = average daily dose by ingestion of plant matter
ADD_A = average daily dose by ingestion of animal matter (prey)
ADD_S = average daily dose by ingestion of sediment
AUF = area use factor (area of site habitat/area of receptor home range)
SUF = seasonal use factor (months inhabiting site/12 months per year)

For this BERA, the only media of significance ingested in the diet of a piscivorous (fish-eating) receptor of interest would be the ADD from ingestion of animal matter (fish: ADD_A). The exposure equation for dietary intake is estimated as follows:

$$ADD_A = EPC \times NIR_A$$

where:

EPC = exposure point concentration in prey (mg COPEC/kg prey)
NIR_A = normalized ingestion rate of animal material (kg/kg body weight/day)

and:

NIR_A = $NIRf \times A_F$
NIR_F = normalized ingestion rate of food (kg/kg body weight/day)
AF = fraction of diet that is prey (unitless)

Each set of equations provides an estimate of the ADD for each receptor. Typically, all of the ADDs for all exposure pathways (plants, invertebrates, prey and sediments) are summed to calculate a total ADD for each receptor for each chemical. For this BERA, the ADD contributed by the ingestion of fish is the only relevant pathway; inadvertent ingestion of plants and sediment is not a factor for all four piscivorous species.

Once the ADDs were calculated using conservative dietary ingestion parameters (above and Table 2), exposure was adjusted by taking into account the Area Use Factor as area of the site (~40 acres) is very small compared to the much larger range of areas within the Hudson River watershed that piscivorous receptors typically forage across. (i.e., the acreage of OU-2 divided by the area of the receptor of interest home range). For all four receptors of interest, the area of OU-2 is a smaller fraction of their home range and Area Use Factors are all 5% or lower. With regard to time, although the double-crested cormorant and the great blue heron may not be present for a certain portion of the year (e.g. migration typically is November through March), the BERA was conservative and did not adjust for seasonal behavior. The exposure concentrations were also not adjusted for bioaccessibility, which is the percentage of the COPEC that is known to become bioavailable once the prey is ingested. Thus this factor is assumed to be 100% for PCBs in fish.

5.1.1 Average Daily Dose for Mammals

The results of the exposure assessment (expressed in terms of ADDs in mg/kg/day) for the river otter, are presented in Table 3. The composition the diet is based on best professional judgement which assumes that this mammal will primarily consume perch and eel with hogchoker and oyster toadfish as a minor component of the diet. The inadvertent consumption of sediment was conservatively estimated

as 1% of the total mass of the food ingested. Most of the PCB body burden is contributed by the consumption of white perch, and the total ADD adjacent to the site (0.004 mg/kg/day) is double the ADD in the North section of the river (0.002 mg/kg/day).

5.1.2 Average Daily Dose for Birds

The results of the exposure assessment (expressed in terms of the ADD in mg/kg/day) for the double-crested cormorant are presented in Table 4. The composition the diet is based on best professional judgement which assumes that this bird will primarily consume perch and eel with hogchoker and oyster toadfish as a minor component of the diet. Most of the PCB body burden is contributed by the consumption of white perch and American eel, and the total ADD adjacent to the site (0.02 mg/kg/day) is about twice the dose for the North section of the river (0.01 mg/kg/day).

The results of the exposure assessment for the great blue heron (expressed in terms of the ADD in mg/kg/day) are presented in Table 5. Although most sources cite that the incidental ingestion of sediment is considered negligible for the great blue heron, a conservative assumption of 2 percent is being used in the BERA. Most of the PCB body burden is contributed by the consumption of American eel and white perch , and the total ADD adjacent to the site (0.02 mg/kg/day) is approximately double the ADD in the North section of the river (0.01 mg/kg/day).

The results of the exposure assessment for the bald eagle (expressed in terms of the ADD in mg/kg/day) are presented in Table 6. The composition the diet is based on best professional judgement which assumes that this bird will primarily consume perch and eel with hogchoker and oyster toadfish as a minor component of the diet. The inadvertent consumption of sediment was not considered for the bald eagle based on feeding behavior (i.e. it is strictly based on consumption of fish in the water column). Most of the PCB body burden is contributed by the consumption of white perch and American eel, and the total ADD adjacent to the site (0.002 mg/kg/day) is about double the ADD in the North section of the river (0.001 mg/kg/day).

5.2 ANALYSIS OF EFFECTS

According to USEPA (1997), the purpose of the effects assessment component of an ERA is to describe the relationship between the chemical dose and the magnitudes of effects elicited in exposed individuals, populations and/or communities.

Toxicity Reference Values for the ecological receptor of interests are presented in Table 7. The TRVs represent the “safe” doses anticipated for mammals and birds following chronic exposure to COPECs. These values represent the “bounded” no observed adverse effect levels (NOAELs) and lowest observed adverse effects levels (LOAELs) associated with continuous chronic exposures of mammals and birds to PCBs. The TRVs for the double-crested cormorant, great blue heron and bald eagle were obtained from the Revised BERA for the Hudson River PCBs Reassessment (USEPA, 2000). The TRV used for the river otter is derived from a study by conducted by Bursian *et al*., (2006) who fed PCB contaminated fish to mink and developed a dose-response relationship based on the adverse effects on survival of mink kits (young offspring; mink are highly sensitive to PCBs). Although Bursian published another paper on mink fed fish from the Hudson River, those endpoints were not used as the effect in the LOAEL dose group was severe (all kits died at 31 weeks post parturition). Additionally, 5 weeks after the study began, the diet had to be adjusted with a flavor enhancer as many of the animals were not eating enough of the fish meal to maintain proper health.

The TRVs presented in Table 7 are conservative benchmarks because they represent some of the most sensitive effects published in the literature, culled from hundreds of peer-reviewed articles and intended for use as effects criteria. Although the values are "bounded" and therefore have some degree of certainty from the perspective of dose/response, many TRVs a) do not use a weight-of-evidence approach; and b) are based on species that have little resemblance to the "surrogate" species of interest.

6. Risk Characterization

Risk characterization involves two components: 1) risk estimation and 2) risk description. The purpose of the risk characterization is to estimate the chemical hazards associated with potential exposures and their significance. During risk estimation, the exposure assessment and effects assessment are integrated to evaluate the likelihood of adverse effects to the receptors of interest (birds and mammals).

Risk estimation is a calculated by dividing the dose estimate (ADD, from the Estimation of Exposure) by the applicable TRV (from the Estimation of Effects) to obtain a HQ.

$$HQ = \frac{ADD}{TRV}$$

As mentioned above, these TRVs for birds were obtained from the Revised BERA for the Hudson River PCBs Reassessment (USEPA, 2000) while the TRVs for the river otter was obtained from Bursian *et al*., (2006). To be conservative, the ADDs used to calculate HQs were based on the 95% UCL of the mean, which is a conservative estimate of the average (Table 1). Per USEPA risk assessment guidance (1997), if a HQ is less than or equal to 1, it is reasonable to conclude that there is No Significant Risk. Alternatively, if a HQ is greater than 1, it does not necessarily mean that a significant ecological risk from exposure to COPECs exists and often further evaluation is warranted.

6.1.1 Benthic Invertebrates

The Germano report observed that the taxonomic data from the benthic grabs showed no apparent effect on traditional population metrics and that and the interpretation of the observations noted in all of the SPI photographs were unremarkable. Consequently, it is apparent that OU-2 has had no adverse effects on the structure of the benthic community and that benthic macroinvertebrates do not appear to be at risk from site-related constituents. It is also apparent from the analysis of samples taken of both pore water and sediment that PCBs are present, for the vast majority of the site, at levels similar to stations sampled both North (upstream) and South (downstream) of the site. These findings are consistent with previous studies (EarthTech, 2000) which showed no apparent effects on taxonomic metrics between reference and site-related areas nor were there any effects seen following the performance of sediment toxicity tests (*op cit*.). Finally, it is known that benthic macroinvertebrates lack the Ah receptor so they would not be sensitive to any “dioxin-like” toxicity. Given this information, it is apparent that the benthic community is not at risk to site-related PCBs.

6.1.2 Fish

In the Revised Hudson River BERA, all of the HQs for all of the fish species in the Lower Hudson River (generally River Mile 50 and lower) were well below 1.0. The average concentrations of PCBs in present day fish are also lower than concentrations observed 15 years ago, and are expected to continue to decrease after the OU-2 remedy is implemented. Additionally, a comprehensive review of journal articles examining the effects of PCBs on fish showed that these organisms are generally resistant to the effects of PCBs (Henry, 2015). Given this information, it can be deduced that no significant hazard from exposure to PCBs exists for Lower Hudson River fish under current conditions.

6.1.3 Mammals

Table 8 presents the relative risks, estimated as HQs, when the exposure concentration is adjusted for the foraging area for the river otter. It can be clearly seen that when the body burden is adjusted based on the areal proportion that the animal would spend in OU-2 relative to its home range, the risks are negligible for both OU-2 and the North (upstream) segment of the study area. Even though the estimation of HQs using the NOAEL-based TRVs are about ten times higher than the LOAEL-based TRVs, the HQs are still well below one.

Table 9 presents the risks assuming that the river otter gets all of its food from OU-2. Using the LOAEL-based TRVs, the estimated HQs are lower than one for both OU-2 and the upstream (North) segment of the river. Even using the NOAEL-based TRVs, the HQs are very close to unity for both OU-2 and the North (upstream) segment of the Hudson River.

Based on these risk estimations, it can be concluded that PCBs do not pose a risk to river otters that may feed, either partly or wholly, within OU-2.

6.1.4 Birds

Table 8 presents the relative risks, estimated as HQs, when the exposure concentration is adjusted for the foraging area for the double crested cormorant, the great blue heron and the bald eagle. Although the NOAEL-based HQs are ten times greater than the LOAEL-based HQs, it is clear that, when the body burden is adjusted based on the areal proportion that the animal would spend in OU-2 (relative to its home range), the risks are negligible for both OU-2 and the North (upstream) segment of the study area.

Table 9 presents the risks assuming that these three types of birds get all of their food from OU-2. Using either the LOAEL-based or the NOAEL-based TRVs, the estimated HQs are lower than one for both OU-2 and the upstream (North) segment of the river.

Based on these risk estimations, it can be concluded that PCBs do not pose a risk to the double crested cormorant, the great blue heron and the bald eagle that may feed, either partly or wholly, within OU-2.

From the above risk analysis, for which almost all of the exposure parameters err on the side of conservatism, it can be concluded that a condition of “No Significant Risk” exists for benthic invertebrates, fish, mammals and birds that may inhabit and/or forage within OU-2.

7. Uncertainty Analysis

The degree of uncertainty in a BERA depends on the amount and quality of data available, information addressing site conditions and the accuracy of any assumptions. A qualitative evaluation of the major uncertainties associated with this BERA considers the following factors:

- Henry (2015) asserts that fish, though they bioaccumulate hydrophobic contaminants like PCBs in their tissue are generally resistant to any adverse systemic effects. HQs less than one estimated in the Revised Hudson River BERA are consistent with that position, particularly since USEPA (2000) relied on conservative laboratory-derived TRVs. Thus, this BERA's conclusion that fish are not at risk from the accumulation of PCBs is appropriate and unlikely to result in underestimation of ecological risks.

- Other compounds that are present in fish may interact with PCBs to produce effects that may be either greater or less than PCBs alone. Depending on the presence of any co-contaminants in fish, risks may be either overestimated or underestimated.

- The dietary endpoints used to derive the TRVs are often strongly biased toward a single study involving the exposure of birds or mammals to different forms and/or mixtures of PCBs.

- The similarity of responses of laboratory animals versus a site-specific receptor of interest or a wild type species (and COPECs) is unknown.

- Food ingestion rates specific for birds and mammals at OU-2 is lacking. These data were therefore estimated using allometric parameters, principally from Nagy (2001). The similarity of these estimated values to those for birds and mammals that may inhabit OU-2 is unknown.

- For the unadjusted scenario, it was assumed all of the home range of the receptors of interest fell completely within the boundaries of OU-2. In reality, individuals and breeding pairs move around depending on a number of variables, including territoriality, food availability and human disturbance. This unadjusted scenario strongly errs on the side of conservatism; the exposures adjusted for the animal's home range is more realistic.

- It is assumed that the types of mammals and birds in this BERA are receptive to the type and quality of habitat in OU-2. It is very likely that the type of habitat that was previously disturbed by human activity within OU-2 would not be conducive to nesting or foraging due to the presence of bulkheads and lack of suitable habitat. For example, river otters are likely to avoid bulkheads. If so, very few river otters would be expected to be exposed to site-related COPECs.

To evaluate how this OU-2 BERA compared with the results of the Revised Hudson River BERA, the exposure point concentrations and HQs are tabulated (Appendix C, Table C-1 and Table C-2, respectively). Table C-1 shows that, with the exception of white perch (whole body concentration) and the great blue heron (levels of PCBs in prey), the 95% UCLs are lower for media evaluated in the OU-2 BERA than they are for the Revised Hudson River BERA. Table C-2 illustrates that HQs calculated for OU-2 are remarkably similar to those estimated by USEPA (2000). Differences between the Revised Hudson River BERA's and the OU-2 BERA's HQs for river otters relate to differences in exposure assumptions and TRVs. When adjusted for the difference in these exposure and toxicity values, the results are identical.

8. Summary

This BERA was completed as a component of the TSCA RBDA for PCBs at the Former Anaconda Wire Project site located in Hastings-on-Hudson, New York. The TSCA RBDA was prepared pursuant to 40 CFR 761.61(c) and was performed in a manner consistent with guidance provided in USEPA's Risk Assessment Guidance for Superfund (1997) and supplements (USEPA, 1989; 1992; 1993; 1998). Although the BERA considered all data obtained from all media sampled in OU-2 during the BSAP conducted in 2013 and 2014, it principally relied on analysis of PCBs in fish targeted for that baseline study. The overall objective of the BERA is to determine whether the remedial action requirements of the ROD will be protective of the environment. Such a finding, in turn, supports this RBDA by validating that residual PCBs left in-place at the remediation levels specified in the ROD will not pose unacceptable risks to the environment.

There is no terrestrial habitat at the Site and the post-remedial conditions will include installation of a clean cover system over the entire Site, thereby preventing any direct exposure to or migration of residual PCBs in soil. Consequently, are no complete exposure pathways to PCBs in the upland environment under current and post-remedial conditions. Therefore, the BERA focused on the aquatic habitat within OU-2. The BERA evaluated the following populations of environmental receptors:

- Benthic invertebrates which could be exposed to PCBs in sediment via interstitial porewater;
- Fish, which could be exposed to PCBs via uptake from surface water and prey (e.g., benthic invertebrates or aquatic vegetation);
- Mammals, which could be exposed to PCBs via consumption of fish that have accumulated them via surface water and prey;
- Birds, which could be exposed to PCBs via consumption of fish that have accumulated them via surface water and prey.

Benthic invertebrates were evaluated using a two-pronged approach to assess habitat and the benthic community by conducting a comprehensive Sediment Profile Imagery (SPI) study (~220 locations imaged) that was augmented by traditional benthic grabs which obtained taxonomic information that is not possible to obtain using the SPI alone. These studies concluded that there is no real difference between the Site and reference stations in benthic community structure, thereby indicating that OU-2 does not pose an ecological risk of significance to benthic invertebrates. These conclusions are conceptually supported by the general lack of PCB detections in porewater, and surficial sediment PCB concentrations across most of OU-2 that are similar to upriver sediment PCB concentrations.

Risks to fish (based on PCB concentrations in fish tissue) were evaluated and determined to have hazard quotients of less than unity (1). The lack of aquatic vegetation adjacent to the Site places constraints on the habitat; herbivorous birds and mammals and species that require habitats with aquatic vegetation are not present at OU-2 and if habitat were to change in the future, the remedy would have addressed any PCB exposures. Therefore, the BERA focused on characterizing potential risks to fish-eating wildlife (piscivorous birds and mammals); these species would not be expected to inhabit OU-2, but rather use the aquatic environment at OU-2 as a foraging area.

Mammal and bird evaluation focused on representative species. The BERA evaluated three piscivorous birds (Great blue heron, bald eagle, and double-crested cormorant) and one piscivorous mammal (river otter). Risks were quantified by using the 95% UCL concentrations of total PCBs in whole body fish tissue with parameters that describe the ingestion rates and body weights of the indicator species to derive total PCB intakes. The intakes were then used with toxicity values that describe the PCB dose that would preclude lack of survivability, decrease in growth or impairment of reproduction. Overall, the parameters used to model exposures and the toxicity values were consistent with those used in the Revised Upper Hudson River BERA.

The results of the BERA indicate that hazard quotients for the river otter, Great Blue heron, double-crested cormorant and bald eagle are well less than unity for realistic exposure assumptions modelled in the BERA. These results indicate that ecological risks meet the USEPA acceptable risk benchmarks under the existing (pre-remedial) Site conditions.

Collectively, the results of the BERA demonstrate that the existing in-situ PCB concentrations in OU-2 sediments are not driving risks to levels that are appreciably different than ambient background conditions. These results are based on pre-remedial site conditions which reflect surficial sediment PCB concentrations in Nearshore and Deepwater Northwest Areas that are in excess of background conditions. The use of benthic invertebrate metrics and measured fish tissue concentrations that reflect these existing conditions, to estimate future risks, is very conservative because the remediation described in Volume 2 will remove sources of PCBs in sediments and eliminate any transport of PCBs from upland areas to river sediments. These actions will materially improve sediment quality from the pre-remediation conditions, ultimately resulting in surficial sediment concentrations that are, on average, consistent with up-river background conditions (i.e., averaging 1 mg/kg or less). Moreover, habitat substrate that will be created in the Nearshore Area will be constructed over sediments that have been remediated and backfilled with clean substrate, indicating that exposure pathways to PCBs in Nearshore Area sediments will be incomplete. As a result, post-remedy PCB concentrations in biota will decline for any species that are local to the Site, and risks associated with food chain exposures in the future will be lower than those estimated in the BERA.

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TABLES

TABLE 1
BIOTA SUMMARY STATISTICS AND EXPOSURE POINT CONCENTRATIONS FOR TOTAL PCBs
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

Location & Species	Number of Detects	Number of Results	Detection Frequency	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Mean Detected Concentration (mg/kg)	Upper Confidence Limit (mg/kg)	(statistic)	Exposure Point Concentration (mg/kg)	(basis)
North (Upstream)										
American eel	26	26	100%	0.34	2.5	0.99	1.16	[a]	1.16	UCL95
Hogchoker	7	7	100%	0.15	0.65	0.39	0.52	[a]	0.52	UCL95
Oyster toadfish	17	17	100%	0.034	0.41	0.18	0.22	[a]	0.22	UCL95
White perch	15	15	100%	0.73	2.6	1.6	1.81	[a]	1.81	UCL95
Adjacent (OU-2 Site)										
American eel	51	51	100%	0.44	6.1	2.1	2.39	[b]	2.39	UCL95
Hogchoker	15	17	88%	0.030	0.66	0.25	0.34	[c]	0.34	UCL95
Oyster toadfish	22	23	96%	0.021	1.1	0.19	0.39	[d]	0.39	UCL95
White perch	26	26	100%	0.83	7.9	2.5	3.06	[e]	3.06	UCL95
South (Downstream)										
American eel	26	26	100%	0.21	2.2	0.98	1.15	[a]	1.15	UCL95
Hogchoker	7	8	88%	0.10	0.96	0.36	0.56	[c]	0.56	UCL95
Oyster toadfish	19	19	100%	0.032	0.31	0.17	0.20	[a]	0.20	UCL95
White perch	20	20	100%	0.88	3.0	1.8	2.06	[a]	2.06	UCL95
All Locations										
American eel	103	103	100%	0.21	6.1	1.5	1.71	[b]	1.71	UCL95
Hogchoker	29	32	91%	0.030	0.96	0.31	0.38	[c]	0.38	UCL95
Oyster toadfish	58	59	98%	0.021	1.1	0.18	0.27	[d]	0.27	UCL95
White perch	61	61	100%	0.73	7.9	2.1	2.31	[f]	2.31	UCL95

Notes and Abbreviations:

mg/kg : milligrams per kilogram

(1) All results are Total PCB concentrations.
(2) Upper Confidence Limit (UCL95) estimates were calculated using USEPA ProUCL Statistical Software for Environmental Applications version 5.00.
Statistic key:

[a] 95% Student's-t UCL.
[b] 95% Approximate Gamma UCL
[c] 95% KM (t) UCL
[d] 95% KM (Chebyshev) UCL
[e] 95% Adjusted Gamma UCL
[f] 95% Modified-t UCL

(3) The basis for the EPC value identiifed:
UCL95. The recommended 95th percentile UCL value was used as the EPC.
Max. The maximum detected result is less than the recommended UCL95 value; therefore the maximum detected result is used as the EPC.

TABLE 2
EXPOSURE PARAMETERS FOR SELECTED ECOLOGICAL RECEPTORS
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

Exposure Parameter	Body Weight[1]	Wet Food Ingestion Rate[1]	Dietary Composition			Home[2] Range	Area Use Factor[3]
			Plants	Animal	Sediment		
Equation Identification	BW	IR_F	P_F	A_F	S_F	HR	AUF
Units	Kg	kg/kg BW/day	%	%	%	hectares	%
River Otter	8.13	0.16	0.0	100	1%	1361	1%
Double Crested Cormorant	1.80	0.156	0.0	100	0%	300	5%
Great Blue Heron	2.34	0.18	0.0	100	2%	300	5%
Bald Eagle	4.50	0.14	0.0	100	0%	3494	0.4%

Notes and Abbreviations:

BW: Body Weight
IR_F: Ingestion Rate (food)
P_F: Fraction Plants
A_F: Fraction Animal
S_F: Fraction Soil/Sediment
HR: Home Range
AUF: Area Use Factor
SUF: Seasonal Use Factor

[1]Unless indicated otherwise, values cited were calculated from Nagy (2001) or obtained from USEPA's Wildlife Exposure Factors Handbook (1993). Body weight for the Double Crested Cormorant was taken from USGS Patuxent Wildlife Research Center (www.pwrc.usgs.gov) and food intake was calculated from Nagy (2001) using equation for "Marine birds".

[2]Home ranges obtained from USEPA's Wildlife Exposure Factors Handbook (1993). Home range from river otter obtained from a comprehensive study by Wilson (2012).

[3]Area use factors (AUF) calculated by dividing the habitat available by the receptor of interest home range.

[4]Seasonal use factors (SUF) is an adjustment for migration that is calculated by dividing the residence time at the site (months) by 12 months/year.

TABLE 3
CALCULATION OF AVERAGE DAILY DOSE FOR THE RIVER OTTER
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

		AVERAGE DAILY DOSE VIA: VERTEBRATE PREY					
	EPC_{PREY}	A_F	NIR_A	NIR_S	ADD_T	AUF	ADD_{TOT}
PCBs in:	**Exposure Point Concentration (mg/kg)**	**Fraction Diet[1] (percent)**	**Wet Food Ingestion Rate (kg/kg BW/day)**	**Sediment[2] Ingestion Rate (kg/kg BW/day)**	**Unadjusted Average Daily Dose (mg/kg/day)**	**Area Use Factor (Foraging Area/Home Range)**	**Adjusted Total ADD (mg/kg/day)**
NORTH							
American Eel	1.162	40%	0.16	--	0.074	0.01	8.2E-04
Hogchoker	0.521	10%	0.16	--	0.008	0.01	9.2E-05
Oyster Toadfish	0.216	10%	0.16	--	0.003	0.01	3.8E-05
White Perch	1.808	40%	0.16	--	0.116	0.01	1.3E-03
Sediment	0.24	1%	--	0.002	0.0004	0.01	4.3E-06
				North ADD_{TOT} =	0.202		0.002
ADJACENT							
American Eel	2.392	40%	0.16	--	0.153	0.01	1.7E-03
Hogchoker	0.339	10%	0.16	--	0.005	0.01	6.0E-05
Oyster Toadfish	0.392	10%	0.16	--	0.006	0.01	7.0E-05
White Perch	3.056	40%	0.16	--	0.196	0.01	2.2E-03
Sediment	1.11	1%	--	0.002	0.0018	0.01	2.0E-05
				Adjacent ADD_{TOT} =	0.362		0.004

Notes and Abbreviations:

EPC_{PREY}: Exposure Point Concentration of Prey

A_F: Fraction Animal

NIR_A: Normalized Ingestion Rate; inadvertant sediment ingestion (NIR_S) assumed to b

ADD_T: Unadjusted Average Daily Dose

AUF: Area Use Factor

ADD_{TOT}: Adjusted Total Average Daily Dose

[1]For exposure, the "Fraction Diet" was based on professional judgment since there are no empirical field data available on the percentage of individual fish species in the diet.

[1]For sediment exposure, the inadvertant ingestion was based on the fraction used in the USEPA Revised Hudson River BERA.

TABLE 4
CALCULATION OF AVERAGE DAILY DOSE FOR THE DOUBLE CRESTED CORMORANT
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

		AVERAGE DAILY DOSE VIA: VERTEBRATE PREY				
	EPC_{PREY}	A_F	NIR_A	ADD_T	AUF	ADD_{TOT}
PCBs in:	**Concentration in Prey (mg/kg)**	**Fraction Diet (percent)**	**Wet Food Ingestion Rate (kg/kg BW/day)**	**Unadjusted Average Daily Dose (mg/kg/day)**	**Area Use Factor (Foraging Area/Home Range)**	**Adjusted Total ADD (mg/kg/day)**
NORTH						
American Eel	1.162	30%	0.16	0.054	0.05	2.7E-03
Hogchoker	0.521	10%	0.16	0.008	0.05	4.1E-04
Oyster Toadfish	0.216	10%	0.16	0.003	0.05	1.7E-04
White Perch	1.808	50%	0.16	0.141	0.05	7.1E-03
			North ADD_{TOT} =	0.207		0.01
ADJACENT						
American Eel	2.392	30%	0.16	0.112	0.05	5.6E-03
Hogchoker	0.339	10%	0.16	0.005	0.05	2.7E-04
Oyster Toadfish	0.392	10%	0.16	0.006	0.05	3.1E-04
White Perch	3.056	50%	0.16	0.238	0.05	1.2E-02
			Adjacent Total ADD_T =	0.362		0.02

Notes and Abbreviations:

EPC_{PREY}: Exposure Point Concentration of Prey

A_F: Fraction Animal

NIR_A: Normalized Ingestion Rate

ADD_T: Unadjusted Average Daily Dose

AUF: Area Use Factor

ADD_{TOT}: Adjusted Total Average Daily Dose

[1]For exposure, the "Fraction Diet" was based on professional judgment since there are no empirical field data available on the percentage of individual fish species in the diet.

TABLE 5
CALCULATION OF AVERAGE DAILY DOSE FOR THE GREAT BLUE HERON
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

		AVERAGE DAILY DOSE VIA: VERTEBRATE PREY					
	EPC_{PREY}	A_F	NIR_A	NIR_S	ADD_T	AUF	ADD_{TOT}
PCBs in:	**Exposure Point Concentration (mg/kg)**	**Fraction Diet (percent)**	**Wet Food Ingestion Rate (kg/kg BW/day)**	**Sediment Ingestion Rate (kg/kg BW/day)**	**Unadjusted Average Daily Dose (mg/kg/day)**	**Area Use Factor (Foraging Area/Home Range)**	**Adjusted Total ADD (mg/kg/day)**
NORTH							
American Eel	1.162	30%	0.18	--	0.063	0.05	3.1E-03
Hogchoker	0.521	10%	0.18	--	0.009	0.05	4.7E-04
Oyster Toadfish	0.216	10%	0.18	--	0.004	0.05	1.9E-04
White Perch	1.808	50%	0.18	--	0.163	0.05	8.1E-03
Sediment	0.24	2%	--	0.004	0.001	0.05	4.3E-05
				North ADD_{TOT} =	0.240		0.01
ADJACENT							
American Eel	2.392	30%	0.18	--	0.129	0.05	6.5E-03
Hogchoker	0.339	10%	0.18	--	0.006	0.05	3.1E-04
Oyster Toadfish	0.392	10%	0.18	--	0.007	0.05	3.5E-04
White Perch	3.056	50%	0.18	--	0.275	0.05	1.4E-02
Sediment	1.11	2%	--	0.004	0.004	0.05	2.0E-04
				Adjacent ADD_{TOT} =	0.421		0.02

Notes and Abbreviations:

EPC_{PREY}: Exposure Point Concentration of Prey

A_F: Fraction Animal

NIR_A: Normalized Ingestion Rate

ADD_T: Unadjusted Average Daily Dose

AUF: Area Use Factor

ADD_{TOT}: Adjusted Total Average Daily Dose

[1]For exposure, the "Fraction Diet" was based on professional judgment since there are no empirical field data available on the percentage of individual fish species in the diet.

[1]For sediment exposure, the inadvertant ingestion was based on the fraction used in the USEPA Revised Hudson River BERA.

TABLE 6
CALCULATION OF AVERAGE DAILY DOSE FOR THE BALD EAGLE
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

		AVERAGE DAILY DOSE VIA: VERTEBRATE PREY				
	EPC_{PREY}	A_F	NIR_A	ADD_T	AUF	ADD_{TOT}
PCBs in:	**Concentration in Prey (mg/kg)**	**Fraction Diet (percent)**	**Wet Food Ingestion Rate (kg/kg BW/day)**	**Unadjusted Average Daily Dose (mg/kg/day)**	**Area Use Factor (Foraging Area/Home Range)**	**Adjusted Total ADD (mg/kg/day)**
NORTH						
American Eel	1.162	30%	0.14	0.049	0.004	2.1E-04
Hogchoker	0.521	5%	0.14	0.004	0.004	1.6E-05
Oyster Toadfish	0.216	5%	0.14	0.002	0.004	6.5E-06
White Perch	1.808	60%	0.14	0.152	0.004	6.6E-04
			North ADD_{TOT} =	0.206		0.001
ADJACENT						
American Eel	2.392	30%	0.14	0.100	0.004	4.3E-04
Hogchoker	0.339	5%	0.14	0.002	0.004	1.0E-05
Oyster Toadfish	0.392	5%	0.14	0.003	0.004	1.2E-05
White Perch	3.056	60%	0.14	0.257	0.004	1.1E-03
			Total ADD_T =	0.362		0.002

Notes and Abbreviations:

EPC_{PREY}: Exposure Point Concentration of Prey
A_F: Fraction Animal
NIR_A: Normalized Ingestion Rate
ADD_T: Unadjusted Average Daily Dose
AUF: Area Use Factor
SUF: Seasonal Use Factor
ADD_{TOT}: Adjusted Total Average Daily Dose

[1]For exposure, the "Fraction Diet" was based on professional judgment since there are no empirical field data available on the percentage of individual fish species in the diet.

TABLE 7
TOXICITY REFERENCE VALUES FOR SELECTED ECOLOGICAL RECEPTORS
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

Toxicity Endpoint	Wildlife Receptor Toxicity Reference Value[1]			
	River Otter (mg/kg/day)	Double Crested Cormorant (mg/kg/day)	Great Blue Heron (mg/kg/day)	Bald Eagle (mg/kg/day)
LOAEL	0.41	7.1	7.1	7.1
NOAEL	0.17	1.8	1.8	1.8

Notes and Abbreviations:

mg/kg/day: milligram per kilogram per day
TRV: Toxicity Referenc Value
LOAEL: Lowest Observed Adverse Effect Level
NOAEL: No Observed Adverse Effect Level

[1]TRVs for mammals obtained from Fuchsman *et al*., 2008. TRVs for birds obtained from "Revised Baseline Ecological Risk Assessment" for the Hudson River PCBs Reassessment (TAMS & Menzie-Cura, 2000).

TABLE 8
HAZARD QUOTIENTS FOR PCBs ADJUSTED FOR AUF
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

Analyte	Reach	Wildlife Receptor Hazard Quotient[2] Estimated using the 'Lowest Observed Adverse Effects Level'			
		River Otter	Double Crested Cormorant	Great Blue Heron	Bald Eagle
Total PCBs	North	0.005	0.003	0.002	0.0001
	Adjacent	0.010	0.003	0.003	0.0002

Analyte	Reach	Wildlife Receptor Hazard Quotient[2] Estimated using the 'No Observed Adverse Effects Level'			
		River Otter	Double Crested Cormorant	Great Blue Heron	Bald Eagle
Total PCBs	North	0.01	0.01	0.01	0.0005
	Adjacent	0.02	0.01	0.01	0.0009

Notes and Abbreviations:

AUF: Area Use Factor
SUF: Seasonal Use Factor

[1]A Hazard Quotient is estimated by dividing the Exposure Point Concentration for that species by its respective Toxicity Reference Value for the COPEC (see Table 8).

TABLE 9
HAZARD QUOTIENTS FOR PCBs (UNADJUSTED FOR AUF[1])
BASELINE ECOLOGICAL RISK ASSESSMENT
FORMER ANACONDA WIRE AND CABLE COMPANY
OPERABLE UNIT 2

Analyte	Reach	Wildlife Receptor Hazard Quotient[2] Estimated using the 'Lowest Observed Adverse Effects Level'			
		River Otter	Double Crested Cormorant	Great Blue Heron	Bald Eagle
Total PCBs	North	0.49	0.06	0.03	0.03
	Adjacent	0.88	0.05	0.06	0.05

Analyte	Reach	Wildlife Receptor Hazard Quotient[2] Estimated using the 'No Observed Adverse Effects Level'			
		River Otter	Double Crested Cormorant	Great Blue Heron	Bald Eagle
Total PCBs	North	**1.2**	0.2	0.1	0.1
	Adjacent	**2.1**	0.2	0.2	0.2

Notes and Abbreviations:

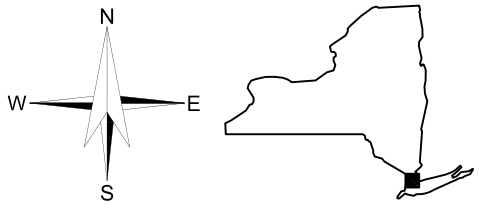
[1]Exposures are not adjusted for the proportion of OU2 that represents the animal's home range, i.e. it assumes 100% of its food supply comes from within OU2.

[2]A Hazard Quotient is estimated by dividing the Exposure Point Concentration for that species by its respective Toxicity Reference Value for the COPEC (see Table 7).

Shaded values indicate a Hazard Quotient exceeding 1.

FIGURES

SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

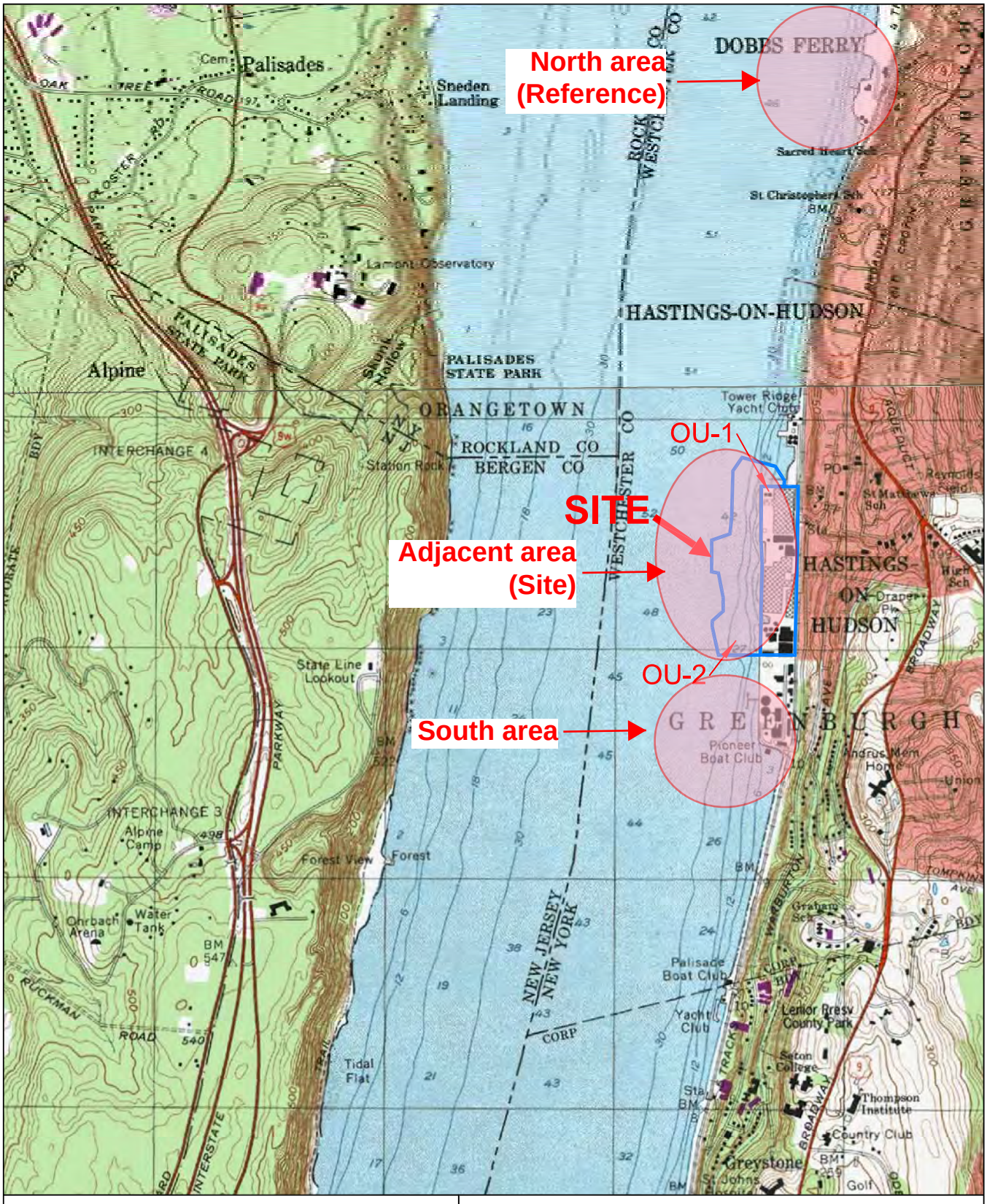
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

PROJECT LOCUS

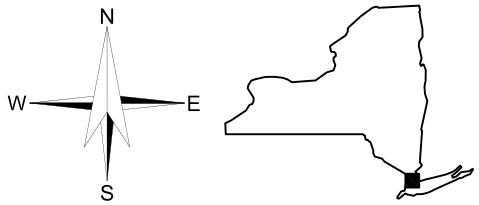
SCALE: 1:24000
MAY 2011

FIGURE 1

G:\PROJECTS\28612\250 - RFS\CAD\PLAN VIEWS & SECTIONS\28612-LOCUS_D1.DWG



SITE COORDINATES: 40°59'36"N 73°53'9"W



U.S.G.S. QUADRANGLE: HASTINGS-ON-HUDSON, NEW YORK

HALEY & ALDRICH

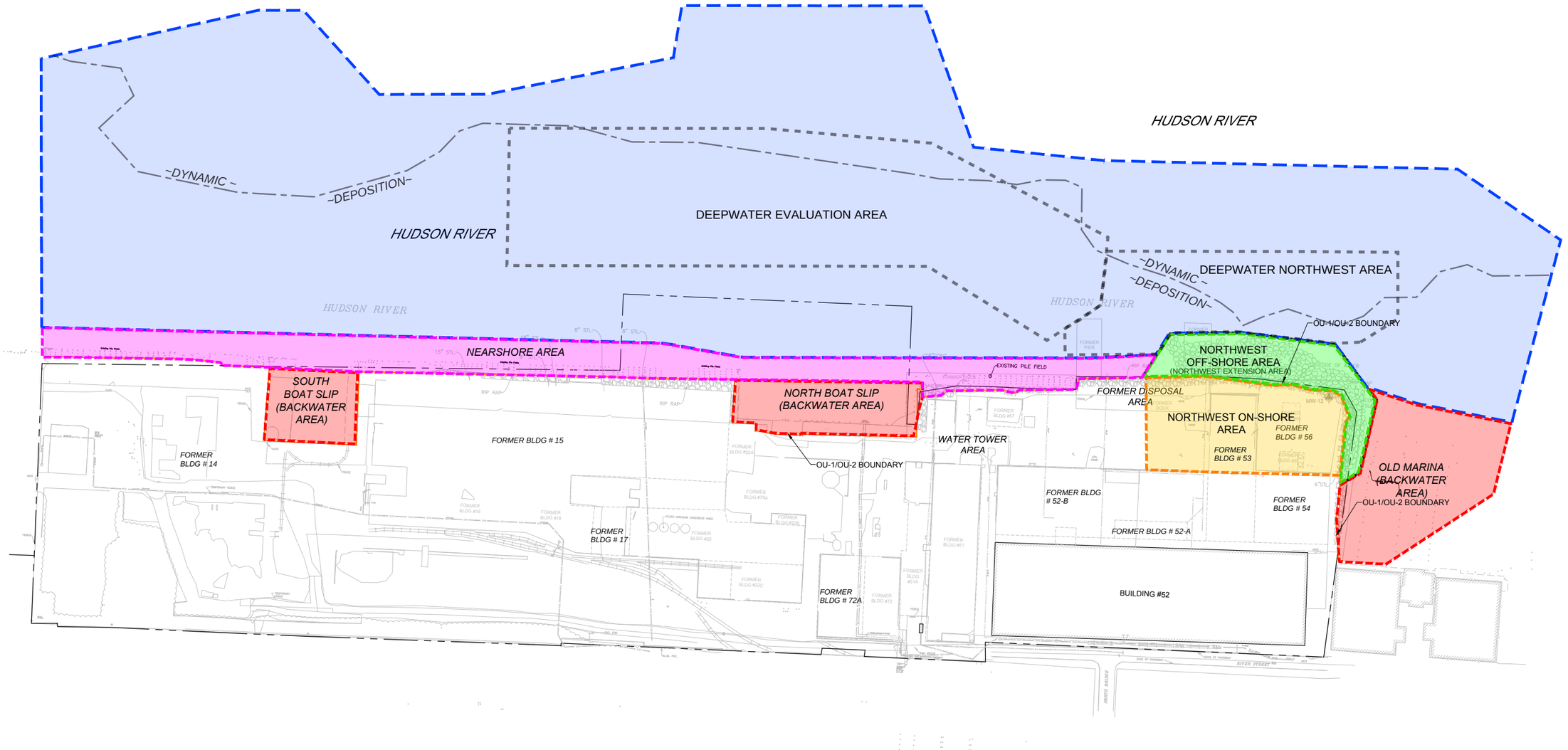
NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

STUDY AREA

SCALE: 1:24000
SEPTEMBER 2015

FIGURE 2

G:\PROJECTS\28612\250 - RFS\CAD\PLAN VIEWS & SECTIONS\28612-LOCUS_D1.DWG



LEGEND

- PROPERTY LINE
- RAIL ROAD
- EXISTING STRUCTURES
- FORMER STRUCTURES
- FENCE
- RETAINING WALL
- WOODED AREA
- EXISITNG STORM SEWER
- EXISITNG SANITARY SEWER
- RIP-RAP
- RIVER ENVIRONMENT BOUNDARY BETWEEN DEPOSITION AND DYNAMIC (DEPOSITION/EROSION)
- MONITORING WELL
- DEEPWATER AREA
- NEARSHORE AREA
- NORTHWEST OFF-SHORE AREA
- NORTHWEST ON-SHORE AREA
- BACKWATER AREA

NOTES

1. BASE PLAN BASED ON ELECTRONIC CAD FILE ENTITLED "TOPOGRAPHIC SURVEY" REVISED 22 JULY 2014 BY WENDEL WD ARCHITECTURE, ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE P.C. OF BUFFALO, NEW YORK.
2. RIP-RAP DESIGNATION IN THE RIVER IS BASED ON INTERPRETATION OF SIDE SCAN SONAR DATA PERFORMED BY OCEAN SURVEYS, INC. ON 10-16 DECEMBER 2012 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.
3. OTHER SITE FEATURES BASED ON VARIOUS HISTORICAL DOCUMENTS.
4. NUMEROUS MONITORING WELLS ARE LOCATED ON SITE. HOWEVER, ONLY MW-12 IS SHOWN AS IT IS THE FIRST LOCATION WHERE LIQUID PCB MATERIAL WAS OBSERVED.
5. MEAN HIGH AND MEAN LOW WATER ARE EL. +2.2 AND EL. -2.0, BASED ON HISTORICAL SITE REPORTS.
6. THE OU-2/OU-1 BOUNDARY IS LOCATED AT THE MHW.

N

0 100 200 300 400

SCALE IN FEET

HALEY ALDRICH

NYSDEC SITE #3-60-022
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

SITE FEATURES

SCALE: AS SHOWN
NOVEMBER 2015

FIGURE 3

APPENDIX A

BASELINE SAMPLING & ANALYSIS PLAN DATA

TABLE A-1
Summary of Surface Water Analytical Results: PCBs
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Date	Sample Depth	Total PCBs ug/L	Aroclor-1242 ug/L	Aroclor 1248 (ug/L)	Aroclor-1260 ug/L	DOC mg/L	TOC mg/L	TSS mg/L
SW-001	10/25/2013	2 - 7.5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**20.6**	**20.4**	**6.9**
SW-002	10/25/2013	2 - 8 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.9**	**3.9**	**6.5**
SW-003	10/25/2013	2 - 8 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.6**	**3.7**	**7.6**
SW-003 (dup)	10/25/2013	2 - 8 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**4.1**	**4.1**	**6.6**
SW-004	10/25/2013	2 - 7.8 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**6.6**	**6.8**	**8.5**
SW-005	10/25/2013	2.1 - 10.5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**7.0**	**7.4**	**7.4**
SW-006	10/25/2013	2 - 8.5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.9**	**4.0**	**6.5**
SW-001	12/12/2013	2 - 9 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.7**	**3.9**	**38.6**
SW-002	12/12/2013	2 - 5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**6.3**	**7.2**	**32.4**
SW-003	12/12/2013	2 - 7.5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**4.8**	**5.3**	**44.2**
SW-003 (dup)	12/12/2013	2 - 7.5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**4.8**	**5.4**	**66.6**
SW-004	12/12/2013	2 - 7.5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.6**	**4.4**	**57.8**
SW-005	12/12/2013	2 - 9.2 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**4.4**	**4.8**	**45.6**
SW-006	12/12/2013	2 - 7.4 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**23.6**	**24.6**	**40.5**
SW-001	4/9/2014	2 - 10 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.8**	**4.1**	**13.7**
SW-002	4/9/2014	2 - 4.9 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.2**	**3.5**	**17.6**
SW-003	4/9/2014	2 - 5.4 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.2**	**3.6**	**12.6**
SW-003 (dup)	4/9/2014	2 - 5.4 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.2**	**3.5**	**14.8**
SW-004	4/9/2014	2 - 6.8 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**8.3**	**8.7**	**15.9**
SW-005	4/9/2014	2 - 7.4 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**5.7**	**6.1**	**14.9**
SW-006	4/9/2014	2 - 5 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**6.7**	**7.3**	**12.3**
SW-001	5/7/2014	2.1 - 8.3 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.5**	**3.5**	**21.3**
SW-002	5/7/2014	2 - 6.7 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**4.6**	**4.8**	**24.1**
SW-003	5/7/2014	2.1 - 6.3 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**8.0**	**8.1**	**25.9**
SW-003 (dup)	5/7/2014	2.1 - 6.3 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**8.0**	**8.2**	**23.7**
SW-004	5/7/2014	2.2 - 8.4 (ft)	**0.0211 J**	ND(0.05)	**0.0211 J**	ND(0.05)	**10.3**	**10.5**	**30.0**
SW-005	5/7/2014	2.2 - 7.5 (ft)	**0.019 J**	ND(0.05)	**0.019 J**	ND(0.05)	**3.5**	**3.6**	**33.4**
SW-006	5/7/2014	2.1 - 5.8 (ft)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	**3.7**	**3.9**	**25.4**
SW-007	5/7/2014	2 - 22 (ft)	**0.0199 J**	ND(0.05)	**0.0199 J**	ND(0.05)	**3.2**	**3.6**	**39.6**
SW-001	6/9/2014	2.2 - 8.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.3**	**10.1**	**12.2**
SW-002	6/9/2014	2.1 - 8.1 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.8**	**4.6**	**11.7**
SW-003	6/9/2014	2 - 9.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.4**	**4.4**	**23.2**
SW-003 (dup)	6/9/2014	2 - 9.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.4**	**4.4**	**20.6**
SW-004	6/9/2014	2 - 7.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**13.3**	**13.7**	**20.2**
SW-005	6/9/2014	2 - 10.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.9**	**5.4**	**21.3**
SW-006	6/9/2014	2 - 7 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**4.7**	**21.2**
SW-001	7/8/2014	2.3 - 8.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**3.9**	**12.0**
SW-002	7/8/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**3.9**	**13.9**
SW-003	7/8/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.1**	**29.4**
SW-003 (dup)	7/8/2014	2 - 10 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.2**	**25.5**
SW-004	7/8/2014	2 - 9.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.3**	**4.3**	**18.3**
SW-005	7/8/2014	2 - 8.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.4**	**22.7**
SW-006	7/8/2014	2 - 7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**4.4**	**19.5**

1. Results in bold above the Method Detection Limit. Aroclor 1216, 1221, 1232, 1242, 1254 and 1268 were not detected.
2. ND - Not detected above MDL; J-estimate; TOC, Total Organic Carbon; DOC, Dissolved Organic Carbon; TSS, Total Suspended Solids

TABLE A-1
Summary of Surface Water Analytical Results: PCBs
Former Anaconda Wire and Cable Site
Hastings-on-Hudson, New York

Location	Date	Sample Depth	Total PCBs ug/L	Aroclor-1242 ug/L	Aroclor 1248 (ug/L)	Aroclor-1260 ug/L	DOC mg/L	TOC mg/L	TSS mg/L
SW-001	8/5/2014	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.4**	**12.6**
SW-002	8/5/2014	2 - 7 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.2**	**3.5**	**13.5**
SW-003	8/5/2014	2 - 6.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**4.8**	**12.0**
SW-003 (dup)	8/5/2014	2 - 6.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.9**	**4.8**	**10.5**
SW-004	8/5/2014	2 - 6 (ft)	**0.0193 J**	ND(0.0186)	ND(0.0186)	**0.0193 J**	**3.2**	**4.7**	**24.0**
SW-005	8/5/2014	2 - 9 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.5**	**4.4**	**21.5**
SW-006	8/5/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**12.2**	**13.9**	**16.5**
SW-007	8/5/2014	2 - 25 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.0**	**3.4**	**16.0**
SW-001	9/4/2014	2 - 7.3 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.6**	**3.8**	**9.8**
SW-002	9/4/2014	2 - 4.2 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.5**	**3.8**	**9.2**
SW-003	9/4/2014	2 - 13.1 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.7**	**4.0**	**9.4**
SW-003 (dup)	9/4/2014	2 - 13.1 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**4.3**	**13.4**
SW-004	9/4/2014	2 - 7.1 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.6**	**4.0**	**16.8**
SW-005	9/4/2014	2 - 8 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**3.8**	**3.9**	**6.7**
SW-006	9/4/2014	2 - 7.5 (ft)	ND(0.0186)	ND(0.0186)	ND(0.0186)	ND(0.0186)	**4.0**	**4.3**	**10.1**
SW-001	10/3/2014	2 - 7.5 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.7**	**14.4**
SW-002	10/3/2014	2.2 - 8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**3.6**	**15.3**
SW-003	10/3/2014	2 - 8.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**6.4**	**6.8**	**42.1**
SW-003 (dup)	10/3/2014	2 - 8.2 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**6.4**	**6.8**	**38.9**
SW-004	10/3/2014	2.2 - 7.8 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.6**	**3.9**	**21.0**
SW-005	10/3/2014	2.1 - 8.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.7**	**4.4**	**19.1**
SW-006	10/3/2014	2.1 - 8.3 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**4.1**	**4.1**	**16.9**
SW-007	10/3/2014	-	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.5**	**4.1**	**32.4**
SW-001	5/12/2015	2 - 9.6 (ft)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**3.2**	**3.2**	**18.0**
SW-002	5/12/2015	2.1 - 8.4 (ft)	**0.0132**	**0.0132**	ND(0.01)	ND(0.01)	**3.0**	**3.0**	**46.0**
SW-003	5/12/2015	2 - 9.6 (ft)	**0.0153**	**0.0153**	ND(0.01)	ND(0.01)	**2.8**	**2.8**	**48.0**
SW-003 (dup)	5/12/2015	2 - 9.6 (ft)	**0.0229**	**0.0229**	ND(0.01)	ND(0.01)	**2.9**	**2.9**	**52.4**
SW-004	5/12/2015	2 - 8 (ft)	**0.0193**	**0.0193**	ND(0.01)	ND(0.01)	**2.9**	**2.9**	**55.0**
SW-005	5/12/2015	2 - 9.6 (ft)	**0.0208**	**0.0208**	ND(0.01)	ND(0.01)	**2.9**	**2.9**	**85.9**
SW-006	5/12/2015	1.9 - 10.9 (ft)	**0.0152**	**0.0152**	ND(0.01)	ND(0.01)	**2.9**	**2.9**	**54.4**
SW-007	5/12/2015	2.2 - 27.9 (ft)	**0.0245**	**0.0245**	ND(0.01)	ND(0.01)	**2.8**	**2.8**	**113.0**

1. Results in bold above the Method Detection Limit. Aroclor 1216, 1221, 1232, 1242, 1254 and 1268 were not detected.
2. ND - Not detected above MDL; J-estimate; TOC, Total Organic Carbon; DOC, Dissolved Organic Carbon; TSS, Total Suspended Solids

TABLE A-2
ANALYTICAL SUMMARY OF PCBs IN POREWATER[1]
FORMER ANACONDA WIRE & CABLE SITE
1 RIVER STREET
HASTINGS-ON-HUDSON, NEW YORK

Location[2]	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs	TOC
PW-001 (SS-001)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.2**
PW-002 (SS-003)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**10.6**
PW-003 (SS-005)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	ND(0.0069)	**8.67**
PW-004 (SS-006)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	ND(0.0085)	**16.0**
PW-005 (SS-007)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	**8.15**
PW-006 (SS-009)	ND(0.0063)	ND(0.0063)	ND(0.0063)	ND(0.0063)	**0.0139**	**0.0157**	ND(0.0063)	ND(0.0063)	ND(0.0063)	**0.0296**	**8.64**
PW-007 (SS-011)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	ND(0.0081)	**6.86**

Notes:

1. All sample results expressed as micrograms/liter (ug/L); TOC expressed as mg/L. Results in **bold** above the detection limit.
2. Samples PW-001 and -002 are North (upstream) of the Site; samples PW-003 through -007 are Adjacent to the Site.
3. ND - Not detected above reporting limit

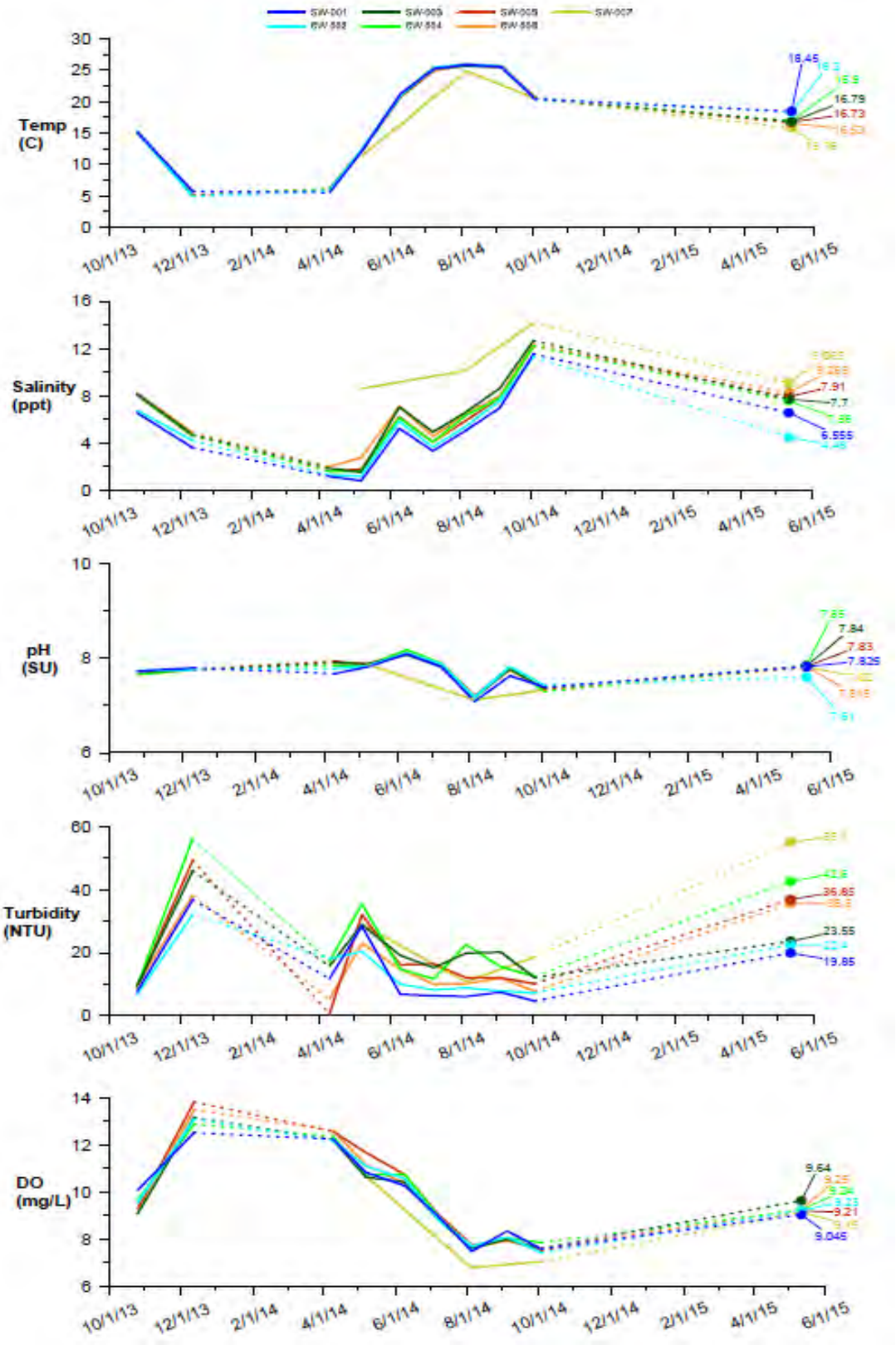
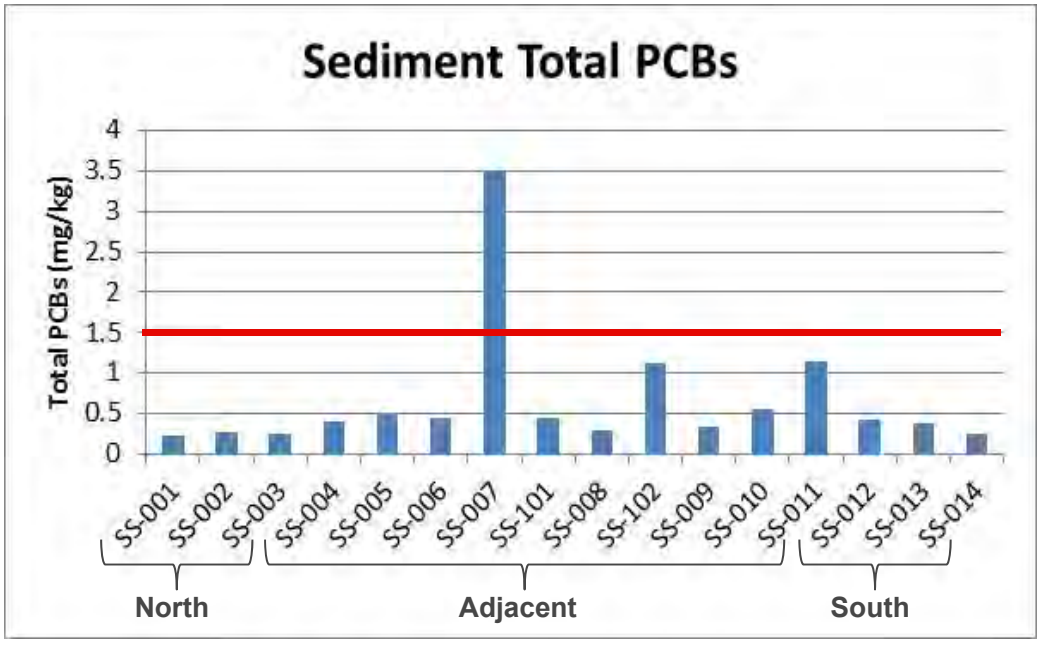


Figure A-1. Conventional water quality parameters measured in surface water North, Adjacent to and South of the site. The dotted lines represent intervals of time that water could not be monitored, typically due to unsafe open water conditions.



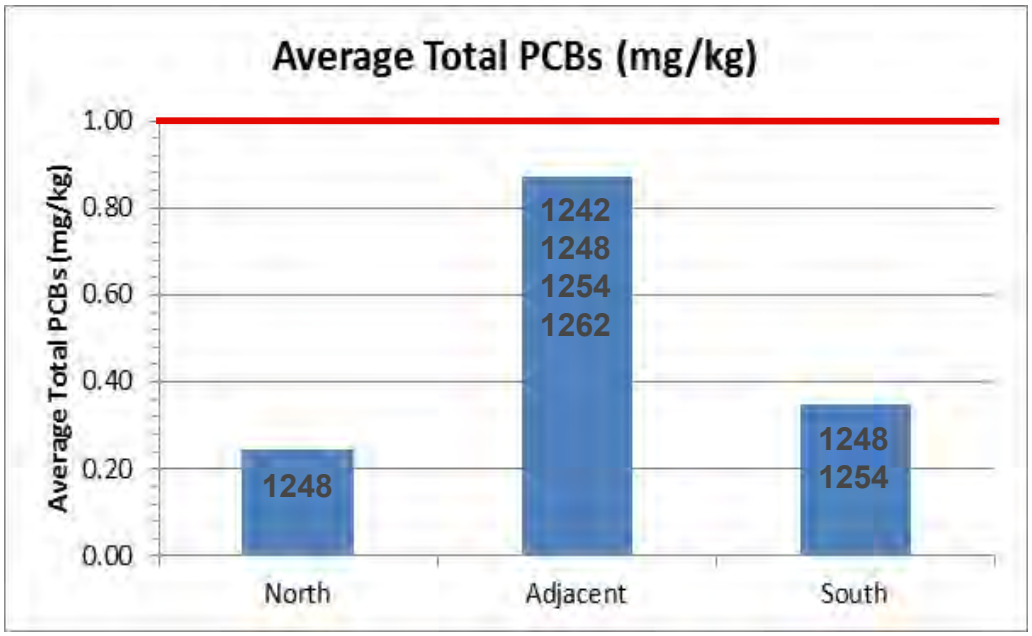


Figure A-2. PCB concentrations measured in sediment North, Adjacent to, and South of OU-2 (2013 BSAP). Aroclor 1248 was observed in all three river sections; Aroclor 1262 was only observed in the Adjacent section.

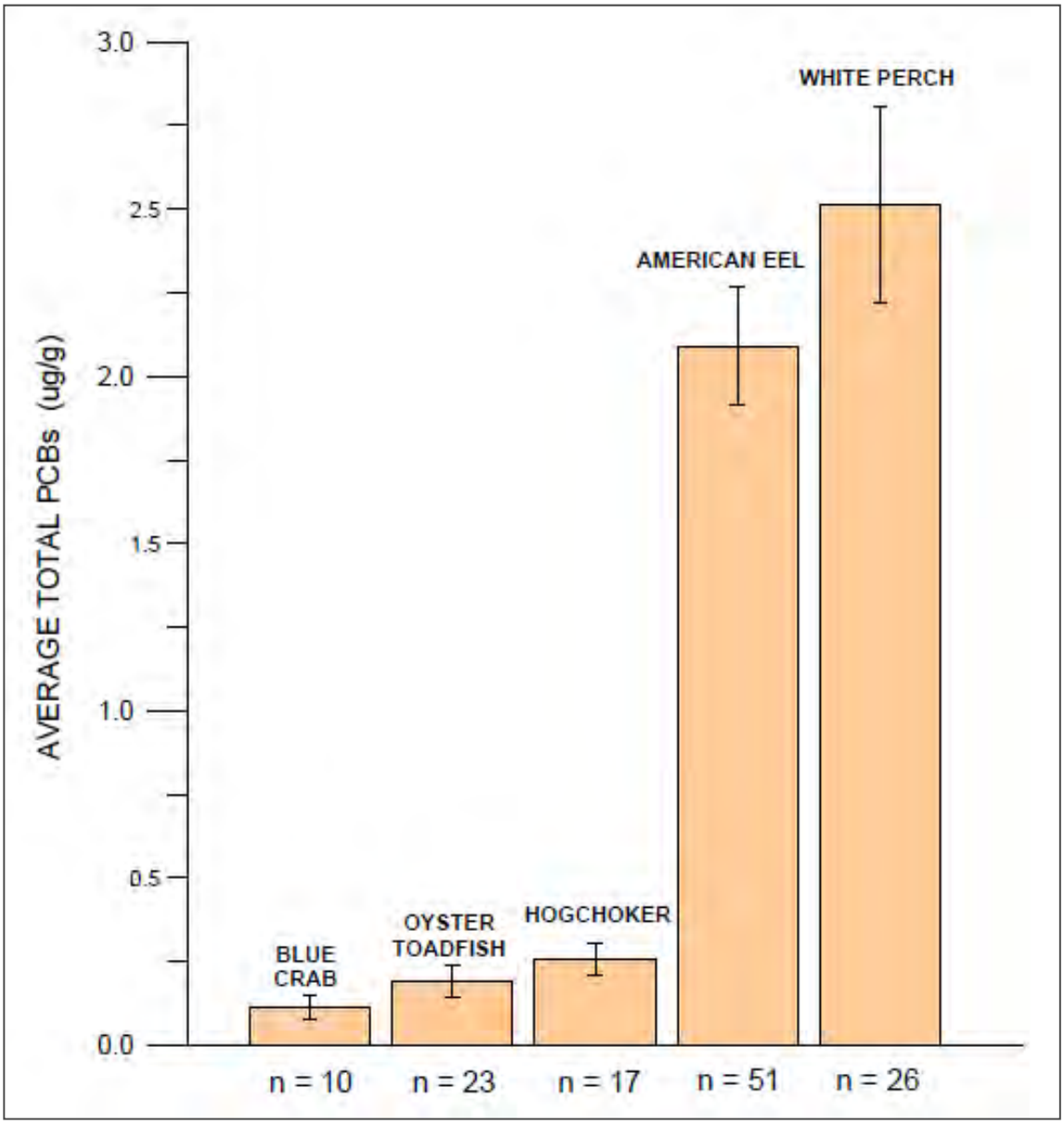


Figure A-3. Whole body PCB concentrations measured in target fish species caught adjacent to OU-2 (2013 and 2014 BSAP data combined).

APPENDIX B

SEDIMENT PROFILE IMAGING REPORT
Germano & Associates, Inc.

HALEY ALDRICH

Sediment Profile Imaging Report

June 2014

Benthic Habitat Condition Survey at Hastings on Hudson

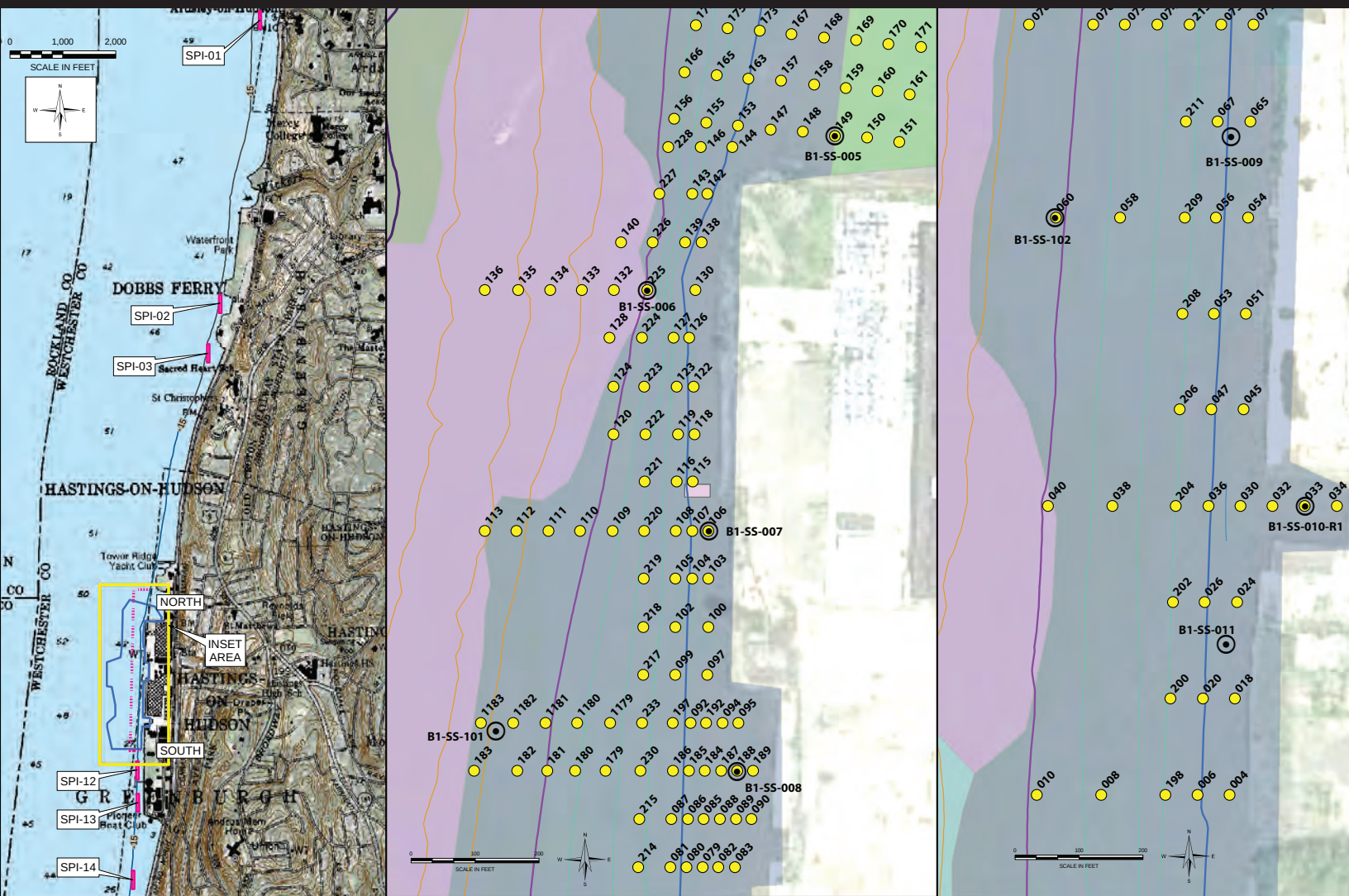
Prepared for

Haley & Aldrich, Inc.
70 Blanchard Road, Suite 204
Burlington, MA 01803

H&A File Number: 28612-295

Prepared by

Germano & Associates, Inc.
12100 SE 46th Place
Bellevue, WA 98006



Sediment Profile Imaging Report

BENTHIC HABITAT CONDITION SURVEY AT HASTINGS ON HUDSON

Prepared for

Haley & Aldrich, Inc
70 Blanchard Road, Suite 204
Burlington, MA 01803

H&A File Number: 28612-295

Prepared by

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June, 2014

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1.0
INTRODUCTION

In April, 2013, Haley & Aldrich of New York (H&A) developed a Baseline Sampling and Analysis Plan (BSAP) as one requirement of the pre-construction monitoring investigations being done at the former Anaconda Wire & Cable Company site (herein Site). Along with colleagues at Ocean Surveys, Inc. (OSI), scientists from Germano & Associates, Inc. (G&A) were retained as an integral part of the H&A team, tasked with the responsibility for meeting two data quality objectives (DQOs) which was to observe the current condition of:

- the benthic habitat at selected Site and background locations employing Sediment Profile Imaging (SPI) technology;
- the benthic community at selected Site and background locations (by obtaining sediment grab samples to analyze both the numbers and types of organisms).

The results of these monitoring activities will provide a benchmark against which future post-construction performance monitoring can be compared in order to determine if there is any change in benthic habitat as a result of the selected remedial alternatives.

While the data presented in the initial remedial investigation (RI) could be considered as a baseline (Earth Tech 2000), this information is more than a decade old; because most of the offshore area is delineated as a depositional area (Bell *et al*., 2006a,b), conditions have most likely changed since the initial characterization studies performed as part of the RI due to the accumulation of suspended sediment.

2.0
MATERIALS AND METHODS

Between October 16-24, 2013, G&A scientists aboard the *R/V Willing* (Ocean Surveys, Inc., Old Saybrook, CT) collected SPI images and grab samples in the Hudson River above, adjacent to and below the Site. Using an Ocean Imaging Systems Model 3731 sediment profile camera, a total of 614 sediment profile images were collected at 182 stations (generally three photographs per location). To be consistent with historical information obtained during the RI (Tetra Tech, 2000), contemporaneous sediment samples were also obtained using a Petite Ponar grab at 16 stations (Figure 1) during the field sampling operations. The grab samples from the 16 stations were sieved through a 0.5 mm screen, preserved in buffered formalin, and shipped to Barry A.Vittor & Associates, Inc. (Mobile, AL) for sorting, identification and evaluation of the benthic community.

SPI was developed more than three decades ago as a rapid reconnaissance tool for characterizing physical, chemical, and biological seafloor processes and has been used in numerous benthic surveys throughout North America, Asia, Europe, and Africa (Rhoads and Germano 1982, 1986, 1990; Revelas et al. 1987; Diaz and Schaffner, 1988; Valente et al. 1992; Germano et al. 2011). The sediment profile camera works like an inverted periscope. A Nikon D7000 SLR camera (16.2-megapixel) with two 16-gigabyte secure digital (SD) memory cards is mounted horizontally inside a watertight housing on top of a wedge-shaped prism. The prism has a Plexiglas® faceplate at the front with a mirror placed at a 45° angle at the back. The camera lens looks down at the mirror, which is reflecting the image from the faceplate. The prism has an internal strobe mounted inside at the back of the wedge to provide illumination for the image; this chamber is filled with distilled water, so the camera lens always has an optically clear path. The whole wedge and camera assembly is mounted on a moveable carriage within a large stainless steel frame. The frame is lowered to the seafloor on a winch wire, and the tension on the wire keeps the prism in the "up" position. When the frame comes to rest on the seafloor, the winch wire goes slack and the camera prism descends into the sediment at a slow, controlled rate by the dampening action of a hydraulic piston so as not to disturb the sediment-water interface. As the unit descends into the sediment, the frame trips a trigger that activates a time-delay circuit of variable length (operator-selected) to allow the camera to penetrate the seafloor before any image is taken (Figure 2). The knife-sharp edge of the prism transects the sediment, and the prism penetrates the bottom. The strobe is discharged after the appropriate time delay to obtain a cross-sectional image of the upper 20 cm of the sediment bed. The resulting images give the viewer the same perspective as looking through the side of an aquarium half-filled with sediment. After the first image is obtained at the first location, the camera is then raised up about 2 to 3 meters off the bottom to allow the strobe to recharge; a wiper blade mounted on the frame

removes any mud adhering to the faceplate. The strobe recharges within 5 seconds, and the camera is ready to be lowered again for a replicate image. Surveys can be accomplished rapidly by "pogo-sticking" the camera across the sediment bed while automatically recording geopositional fixes on the surface vessel.

Two types of adjustments to the SPI system are typically made in the field: physical adjustments to the chassis stop collars (or adding/subtracting lead weights to the chassis to control penetration in harder or softer sediments) and electronic software adjustments to the Nikon D7000 to control camera settings. Camera settings (f-stop, shutter speed, ISO equivalents, digital file format, color balance, etc.) are selectable through a water-tight USB port on the camera housing and the Nikon Control Pro® software. At the beginning of the survey, the time on the sediment profile camera's internal data logger was synchronized with the internal clock on the computerized navigation system to local time. Details of the camera settings for each digital image are available in the associated parameters file embedded in the electronic image file; for this survey, the ISO-equivalent was set at 640. The additional camera settings used were as follows: shutter speed was 1/250, f9, white balance set to flash, color mode to Adobe RGB, sharpening to none, noise reduction off, and storage in compressed raw Nikon Electronic Format (NEF) files (approximately 20 MB each). Electronic files were converted to high-resolution jpeg (8-bit) format files (3264 x 4928 pixels) using Nikon Capture NX2® software (Version 2.2.7).

A minimum of three replicate images were taken at each station; each SPI replicate is identified by the time recorded on the digital image file in the camera and on disk along with vessel position on the navigation computer. The unique time stamp on the digital image was then cross-checked with the time stamp in the navigational system computer data file. The field crew also recorded redundant written sample logs. Images were downloaded periodically (sometimes after each station) to verify successful sample acquisition or to assess what type of sediment/depositional layer was present at a particular station. Digital image files were renamed with the appropriate station name immediately after downloading on deck as a further quality assurance step.

Test exposures of the Kodak® Color Separation Guide (Publication No. Q-13) were made on deck at the beginning and end of each survey to verify that all internal electronic systems were working to design specifications and to provide a color standard against which final images could be checked for proper color balance. A spare camera and charged battery were carried in the field at all times to insure uninterrupted sample acquisition. After deployment of the camera at each station, the frame counter was checked to make sure that the requisite number of replicates had been taken. In addition, a prism penetration depth indicator on the camera frame was checked to verify that the optical prism had actually penetrated the bottom to a sufficient depth. If images were missed (frame counter indicator or verification from digital download) or the penetration depth was insufficient (penetration indicator), chassis stops were adjusted and/or weights

were added or removed, and additional replicate images were taken. Changes in prism weight amounts, the presence or absence of mud doors, and chassis stop positions were recorded for each replicate image. Images were inspected at high magnification to determine whether any stations needed resampling with different stop collar or weight settings.

Following completion of the field operations, the raw NEF image files were converted to high-resolution jpeg (8-bit) format files (3264 x 4928 pixels) using Nikon Capture NX2 software. Once converted to jpeg format, the intensity histogram (RGB channel) for each image was adjusted in Adobe Photoshop® to maximize contrast without distortion. The jpeg images were then imported to Sigmascan Pro® (Aspire Software International) for image calibration and analysis; one image from each station was selected for analysis. Calibration information was determined by measuring 1-cm gradations from the Kodak® Color Separation Guide. This calibration information was applied to all SPI images analyzed. Linear and area measurements were recorded as number of pixels and converted to scientific units using the calibration information.

Measured parameters were recorded on a Microsoft Excel© spreadsheet. G&A's senior scientist (Dr. J. Germano) subsequently checked all these data as an independent quality assurance/quality control review of the measurements before final interpretation was performed.

2.1 MEASURING, INTERPRETING, AND MAPPING SPI PARAMETERS

2.1.1 Sediment Type

The sediment grain-size mode and range were visually estimated from the color images by overlaying a grain-size comparator that was at the same scale. This comparator was prepared by photographing a series of standard sediment samples that ranged from coarse silt/granule to sand sized particles (Udden-Wentworth size classes) with the SPI camera. Seven grain-size classes were on this comparator: >4 phi (silt-clay), 4-3 phi (very fine sand), 3-2 phi (fine sand), 2 - 1 phi (medium sand), 1-0 phi (coarse sand), 0 - (-1) phi (very coarse sand), < -1 phi (granule and larger). The lower limit of optical resolution of the photographic system was about 62 microns, allowing recognition of grain sizes equal to or greater than coarse silt ($\geq$ 4 phi). The accuracy of this method has been documented by comparing SPI estimates with grain-size statistics determined from laboratory sieve analyses (Germano et al. 2011).

The comparison of the SPI images with Udden-Wentworth sediment standards photographed through the SPI optical system was also used to map near-surface

stratigraphy such as sand-over-mud and mud-over-sand. When mapped on a local scale, this stratigraphy can provide information on relative transport magnitude and frequency.

2.1.2 Prism Penetration Depth

The SPI prism penetration depth was measured from the bottom of the image to the sediment-water interface. The area of the entire cross-sectional sedimentary portion of the image was digitized, and this number was divided by the calibrated linear width of the image to determine the average penetration depth. Linear maximum and minimum depths of penetration were also measured. All three measurements (maximum, minimum, and average penetration depths) were recorded in the data file.

Prism penetration is a noteworthy parameter; if the number of weights used in the camera is held constant throughout a survey, the camera functions as a static-load penetrometer. Comparative penetration values from sites of similar grain size give an indication of the relative water content of the sediment. Sediments that are turned over by the feeding and burrowing activity of the macroinvertebrate community (bioturbation) and/or rapidly accumulating sediments tend to have the highest water contents and greatest prism penetration depths.

The depth of penetration also reflects the bearing capacity and shear strength of the sediments. Overconsolidated or relic sediments and shell-bearing sands resist camera penetration. Highly bioturbated, sulfitic, or methanogenic muds are the least consolidated, and deep penetration is typical. Seasonal changes in camera prism penetration have been observed at the same station in other studies and are related to the control of sediment geotechnical properties by bioturbation (Rhoads and Boyer 1982). The effect of water temperature on bioturbation rates appears to be important in controlling both biogenic surface relief and prism penetration depth (Rhoads and Germano 1982).

2.1.3 Small-Scale Surface Boundary Roughness

Surface boundary roughness was determined by measuring the vertical distance between the highest and lowest points of the sediment-water interface. The surface boundary roughness (sediment surface relief) measured over the width of sediment profile images typically ranges from 0.02 to 3.8 cm, and may be related to either physical structures (ripples, rip-up structures, mud clasts) or biogenic features (burrow openings, fecal mounds, foraging depressions). Biogenic roughness typically changes seasonally and is related to the interaction of bottom turbulence and bioturbational activities.

The camera must be level in order to take accurate boundary roughness measurements. In sandy sediments, boundary roughness can be a measure of sand wave height. On silt-clay bottoms, boundary roughness values often reflect biogenic features such as fecal

mounds or surface burrows. The size and scale of boundary roughness values can have dramatic effects on both sediment erodibility and localized oxygen penetration into the bottom (Huettel et al., 1996).

2.1.4 Thickness of Depositional Layers

Because of the camera's unique design, SPI can be used to detect the thickness of depositional and dredged material layers. SPI is effective in measuring layers ranging in thickness from 1 mm to 20 cm (the height of the SPI optical window). During image analysis, the thickness of the newly deposited sedimentary layers can be determined by measuring the distance between the pre- and post-depositional sediment-water interface. Recently deposited material is usually evident because of its unique optical reflectance and/or color relative to the underlying material representing the pre-disposal surface. Also, in most cases, the point of contact between the two layers is clearly visible as a textural change in sediment composition, facilitating measurement of the thickness of the newly deposited layer.

2.1.5 Mud Clasts

When fine-grained, cohesive sediments are disturbed, either by physical bottom scour or faunal activity (such as decapod foraging), intact clumps of sediment are often scattered about the seafloor. These mud clasts can be seen at the sediment-water interface in SPI images. During analysis, the number of clasts was counted, the diameter of a typical clast was measured, and their oxidation state was assessed. The abundance, distribution, oxidation state, and angularity of mud clasts can be used to make inferences about the recent pattern of seafloor disturbance in an area.

Depending on their place of origin and the depth of disturbance of the sediment, mud clasts can be reduced or oxidized. In SPI images, the oxidation state is apparent from the reflectance (see Section 2.1.6). Also, once at the sediment-water interface, these mud clasts are subject to the effects of currents and/or changes in levels of dissolved oxygen. Evidence from laboratory microcosm observations of reduced sediments placed within an aerobic environment indicates that oxidation of reduced surface layers by diffusion alone is quite rapid, occurring within 6 to 12 hours (Germano 1983). Consequently, the detection of reduced mud clasts in an obviously aerobic setting suggests a recent origin. The size and shape of the mud clasts are also revealing; some clasts seen in the profile images are artifacts caused by the camera deployment (mud clots falling off the back of the prism or the wiper blade). Naturally-occurring mud clasts may be moved and broken by bottom currents and animals (macro- or meiofauna; Germano 1983). Over time, these naturally-occurring, large angular clasts become small and rounded.

2.1.6 Apparent Redox Potential Discontinuity Depth

Aerobic near-surface marine sediments typically have higher reflectance relative to underlying hypoxic or anoxic sediments. Surface sands washed free of mud also have higher optical reflectance than underlying muddy sands. These differences in optical reflectance are readily apparent in SPI images; the oxidized surface sediment contains particles coated with ferric hydroxide (an olive or tan color), while reduced iron sulfides below this oxygenated layer are darker, generally gray to black (Fenchel 1969; Lyle 1983). The boundary between the colored ferric hydroxide surface sediment and underlying gray to black sediment is called the apparent redox potential discontinuity (aRPD).

The depth of the apparent RPD in the sediment column is an important time-integrator of dissolved oxygen conditions within sediment porewaters. In the absence of bioturbating organisms, this high reflectance layer (in muds) will typically reach a thickness of 2 mm below the sediment-water interface (Rhoads 1974). This RPD depth is controlled by the diffusion rate of molecular oxygen into the sediment/water interface and the oxygen demand of the sediment and associated microflora. In sediments that have very high sediment oxygen demand (SOD), the sediment may lack a lighter (high reflectance) layer even when the overlying water column is aerobic.

In the presence of bioturbating macrofauna, the thickness of the high reflectance layer may be several centimeters. The relationship between the thickness of this high reflectance layer and the presence or absence of free molecular oxygen in the associated porewaters must be considered with caution. The actual RPD is the boundary or horizon that separates the positive Eh region of the sediment column from the underlying negative Eh region. The exact location of the Eh = 0 boundary can be determined accurately only with microelectrodes; hence, the relationship between the change in optical reflectance, as imaged with the SPI camera, and the actual RPD could only be determined by making *in situ* Eh measurements. For this reason, the optical reflectance boundary, as imaged, was described in this study as the "apparent" RPD and it was mapped as a mean value. In general, the depth of the actual Eh = 0 horizon will be either equal to or slightly shallower than the depth of the optical reflectance boundary (Rosenberg *et al*., 2001). This is because bioturbating organisms can mix ferric hydroxide-coated particles downward into the bottom below the Eh = 0 horizon. As a result, the apparent mean RPD depth can be used as an estimate of the depth of porewater exchange, usually through diffusion or porewater irrigation (bioturbation). Biogenic particle mixing depths can be estimated by measuring the maximum and minimum depths of imaged feeding voids in the sediment column. This parameter represents the particle mixing depths of head-down feeders, mainly polychaetes.

The rate of depression of the apparent RPD within the sediment is relatively slow in organic-rich muds, on the order of 200 to 300 micrometers per day; therefore this

parameter has a long time constant (Germano and Rhoads 1984). The rebound in the apparent RPD is also slow (Germano 1983). Measurable changes in the apparent RPD depth using the SPI optical technique can be detected over periods of 1 or 2 months. This parameter is used effectively to document changes (or gradients) that develop over a seasonal or yearly cycle related to water temperature effects on bioturbation rates, seasonal hypoxia, SOD, and infaunal recruitment. Time-series RPD measurements following a disturbance can be a critical diagnostic element in monitoring the degree of recolonization in an area by the ambient benthos (Rhoads and Germano 1986).

The apparent mean RPD depth also can be affected by local erosion. The peaks of disposal mounds are commonly scoured by divergent flow over the mound. This scouring can wash away fines and shell or gravel lag deposits, and can result in a very thin surface oxidized layer. During storm periods, erosion may completely remove any evidence of the apparent RPD (Fredette *et al*., 1988).

Another important characteristic of the apparent RPD is the contrast in reflectance at this boundary. This contrast is related to the interactions among the degree of organic loading, the bioturbation activity in the sediment, and the concentrations of dissolved oxygen in an area. High inputs of labile organic material increase SOD and, subsequently, sulfate reduction rates and the associated abundance of sulfide end products. This results in more reduced (lower-reflectance) sediments at depth and higher RPD contrasts. In a large region with low apparent RPD contrasts, smaller discrete areas with images of higher RPD contrasts may be indicative of an input of organic-rich material such as phytoplankton, other naturally-occurring organic detritus, dredged material, or sewage sludge.

Because the determination of the apparent RPD requires discrimination of optical contrast between oxidized and reduced particles, it is difficult, if not impossible, to determine the depth of the apparent RPD in well-sorted sands of any size that have little to no silt or organic matter in them (Painter *et al*, 2007). When using SPI technology on sand bottoms, little information other than grain-size, prism penetration depth, and boundary roughness values can be measured; while oxygen has no doubt penetrated the sand beneath the sediment-water interface due to physical forcing factors acting on surface roughness elements (Ziebis *et al*., 1996; Huettel *et al*., 1998), estimates of the mean apparent RPD depths in these types of sediments are indeterminate with conventional light photography.

2.1.7 Organic Loading, Sedimentary Methane, and Thiophilic Bacterial Colonies

If organic loading is extremely high, porewater sulfate is depleted and methanogenesis occurs. The process of methanogenesis is indicated by the appearance of methane bubbles in the sediment column, and the number and total area covered by all methane

pockets is measured. These gas-filled voids are readily discernable in SPI images because of their irregular, generally circular aspect and glassy texture (due to the reflection of the strobe off the gas bubble).

A primary diagnostic feature indicating an area is suffering from hypoxic conditions due to organic enrichment is the presence of the *Beggiatoa* or *Beggiatoa*-like colonies (note: while we cannot state with certainty that any bacterial colonies seen in profile or plan view images are indeed the genus *Beggiatoa* without microscopic identification, we can state with certainty that these are definitely in the same family of sulfur-oxidizing bacteria that only appear in hypoxic or anoxic conditions). These colonies have diagnostic morphology that has been documented in numerous other sediment profile imaging surveys (Karakassis et al., 2002; Nilsson & Rosenberg, 1997; Rosenberg et al., 2001; Germano et al. 2011). The presence of sulfur-oxidizing bacterial colonies appear when boundary-layer dissolved oxygen concentrations drop into the "hypoxic" range between 0 - 1 mg/L (Rosenberg and Diaz, 1993).

2.1.8 Infaunal Successional Stage

The mapping of infaunal successional stages is readily accomplished with SPI technology. These stages are recognized in SPI images by the presence of dense assemblages of near-surface polychaetes and/or the presence of subsurface feeding voids; both may be present in the same image. Mapping of successional stages is based on the theory that organism-sediment interactions in fine-grained sediments follow a predictable sequence after a major perturbation of the sediment. This theory states that primary succession results in "the predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance. These invertebrates interact with sediment in specific ways. Because functional types are the biological units of interest, our definition does not demand a sequential appearance of particular invertebrate species or genera (Rhoads and Boyer 1982). This theory is presented in Pearson and Rosenberg (1978) and further developed in Rhoads and Germano (1982) and Rhoads and Boyer (1982).

This continuum of change in animal communities after a disturbance (primary succession) has been divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial community of tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders (Figure 3).

After an area of bottom is disturbed by natural or anthropogenic events, the first invertebrate assemblage (Stage 1) appears within days after the disturbance. Stage 1 consists of assemblages of tiny tube-dwelling marine polychaetes that reach population

densities of 10^4 to 10^6 individuals/m². These animals feed at or near the sediment-water interface and physically stabilize or bind the sediment surface by producing a mucous "glue" that they use to build their tubes. Sometimes deposited dredged material layers contain Stage 1 tubes still attached to mud clasts from their location of origin; these transported individuals are considered as part of the *in situ* fauna in our assignment of successional stages.

If there are no repeated disturbances to the newly colonized area, then these initial tube-dwelling suspension or surface-deposit feeding taxa are followed by burrowing, head-down deposit-feeders that rework the sediment deeper and deeper over time and mix oxygen from the overlying water into the sediment. The animals in these later-appearing communities (Stage 2 or 3) are larger, have lower overall population densities (10 to 100 individuals/m²), and can rework the sediments to depths of 3 to 20 cm or more. The feeding and burrowing activity of these animals "loosen" the sedimentary fabric, increase the water content in the sediment, lower the sediment shear strength, and actively recycle nutrients because of the high exchange rate with the overlying waters.

In dynamic estuarine and coastal environments, it is simplistic to assume that benthic communities always progress completely and sequentially through all four stages in accordance with the idealized conceptual model depicted in Figure 3. Various combinations of these basic successional stages are possible. For example, secondary succession can occur (Horn, 1974) in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms co-existing at the same time and place with Stage 3, resulting in the assignment of a "Stage 1 on 3" or "Stage 2 on 3" designation.

While the successional dynamics of invertebrate communities in fine-grained sediments have been well-documented, the successional dynamics of invertebrate communities in sand and coarser sediments are not well-known. Subsequently, the insights gained from sediment profile imaging technology regarding biological community structure and dynamics in sandy and coarse-grained bottoms are fairly limited.

2.1.9 Biological Mixing Depth

During the past two decades, there has been a considerable emphasis on studying the effects of bioturbation on sediment geotechnical properties as well as sediment diagenesis (Ekman *et al*., 1981; Nowell et al., 1981; Rhoads and Boyer, 1982; Grant *et al*., 1982; Boudreau, 1986; 1994; 1998). However, an increasing focus of research is centering on the rates of contaminant flux in sediments (Reible and Thibodeaux, 1999; François *et al*., 2002; Gilbert *et al*., 2003). The two parameters that affect the rate of contaminant flux the greatest are erosion and bioturbation (Reible and Thibodeaux, 1999). The depth to which sediments are bioturbated, or the biological mixing depth, can be an important parameter for studying either nutrient or contaminant flux in sediments. While the

apparent RPD is one potential measure of biological mixing depth, it is quite common in profile images to see evidence of biological activity (burrows, voids, or actual animals) well below the mean apparent RPD. Both the minimum and maximum linear distance from the sediment surface to both the shallowest and deepest feature of biological activity are measured along with a notation of the type of biogenic structure measured. From these, either the minimum, maximum, or average biological mixing depth can be mapped across a surveyed area of interest.

2.2 USING SPI DATA TO ASSESS BENTHIC QUALITY & HABITAT CONDITIONS

While various measurements of water quality such as dissolved oxygen, contaminant levels, or nutrients are often used to assess regional ecological quality, interpretation is difficult because of the transient nature of water-column phenomena. Measurement of a particular value of any water-column variable represents an instantaneous "snapshot" that can change within minutes after the measurement is taken. By the time an adverse signal in the water column such as a low dissolved oxygen concentration is persistent, the system may have degraded to the point where resource managers can do little but map the spatial extent of the phenomenon while gaining a minimal understanding of factors contributing to the overall degradation.

The seafloor, on the other hand, is a long-term integration of sediment processes and overlying water quality; values for any variable measured are the result of physical, chemical, and biological interactions on time scales much longer than those present in a rapidly moving fluid. The seafloor is thus an excellent indicator of environmental quality, both in terms of historical impacts and of future trends for any particular variable.

Physical measurements made from the "optical cores" obtained with the SPI system provide background information about gradients in physical disturbance (caused by dredging, disposal, oil platform cuttings and drilling muds discharge, trawling, or storm resuspension and transport) in the form of maps of sediment grain size, boundary roughness, sediment textural fabrics, and structures. The levels of organic matter and the degree of SOD can be inferred from the optical reflectance of the sediment column and the apparent RPD depth. Organic matter is an important indicator of the relative value of the sediment as a carbon source for both bacteria and infaunal deposit feeders. SOD is an important measure of ecological quality; an accumulation of organic matter can quickly deplete oxygen in sediment by stimulating bacterial respiration, which places an oxygen demand on porewater. Bottom dwellng animals will subsequently have a potentially limited oxygen resource (Kennish, 1986).

The apparent RPD depth is useful in assessing the quality of a habitat for epifauna and infauna from both physical and biological points of view. The apparent RPD depth in

profile images has been shown to be directly correlated to the quality of the benthic habitat in polyhaline and mesohaline estuarine zones (Rhoads and Germano, 1986; Revelas *et al*. 1987; Valente *et al*., 1992). Controlling for differences in sediment type and physical disturbance factors, apparent RPD depths < 1 cm can indicate chronic benthic environmental stress or recent catastrophic disturbance.

The distribution of successional stages in the context of the mapped disturbance gradients is one of the most sensitive indicators of the ecological quality of the seafloor (Rhoads and Germano 1986). The presence of Stage 3 equilibrium taxa (mapped from subsurface feeding voids as observed in profile images) can be a good indication of benthic habitat stability and quality. A Stage 3 assemblage indicates that the sediment surrounding these organisms has not been disturbed in the recent past and that the levels of bioavailable contaminants may be relatively low. These inferences are based on past work, primarily in temperate latitudes, showing that Stage 3 species are relatively intolerant of sediment disturbance, organic enrichment, and sediment contamination. Stage 3 species expend metabolic energy on sediment bioturbation (both particle advection and porewater irrigation) that alters sediment properties, including porewater profiles of sulfate, nitrate, and RPD depth in the sedimentary matrix near their burrows or tubes (Aller and Stupakoff, 1996; Rice and Rhoads, 1989). This bioturbation enhances the breakdown of organic matter by stimulating microbial decomposition ("microbial gardening"). Stage 3 benthic assemblages are very stable and are also called climax or equilibrium seres.

The metabolic energy expended in bioturbation is rewarded by creating a sedimentary environment where refractory organic matter is converted to usable food. Stage 3 bioturbation has been likened to processes such as stirring and aeration used in tertiary sewage treatment plants to accelerate organic decomposition. Physical disturbance, contaminant loading, and/or over-enrichment result in habitat destruction and in local extinction of the climax seres. Loss of Stage 3 species results in the loss of efficiency in bioturbation and may be followed by a buildup of organic matter (sediment eutrophication). Once Stage 3 species are depleted or excluded from an area, they may not reappear for several years. This is due to relatively low rates of recruitment, population increase and ontogenetic growth (Rhoads and Germano, 1986).

The presence of Stage 1 seres (in the absence of Stage 3 seres) can indicate that the bottom is an advanced state of organic enrichment, has been contaminated, or experienced a substantial physical disturbance. Unlike Stage 3 communities, Stage 1 seres have a relatively high tolerance for organic enrichment and contaminants. These opportunistic species have high rates of recruitment, high ontogenetic growth rates, and live and feed near the sediment-water interface, typically in high densities. Stage 1 seres often co-occur with Stage 3 seres in marginally enriched areas. In this case, Stage 1 seres feed on labile organic detritus settling onto the sediment surface, while the subsurface Stage 3 seres tend to specialize on the more refractory buried organic reservoir of detritus.

Stage 1 and 3 seres have dramatically different effects on the geotechnical properties of the sediment (Rhoads and Boyer, 1982). With their high population densities and their feeding efforts concentrated at or near the sediment-water interface, Stage 1 communities tend to bind fine-grained sediments physically, making them less susceptible to resuspension and transport. Just as a thick cover of grass will prevent erosion on a terrestrial hillside, so too will these dense assemblages of tiny polychaetes serve to stabilize the sediment surface. Conversely, Stage 3 taxa increase the water content of the sediment and lower its shear strength through their deep burrowing and pumping activities, rendering the bottom more susceptible to erosion and resuspension. In shallow areas of fine-grained sediments that are susceptible to storm-induced or orbital wave energy, it is quite possible for Stage 3 taxa to be carried along in the water column in suspension with fluid muds. When redeposition occurs, these Stage 3 taxa can become reestablished in an otherwise physically disturbed surface sedimentary fabric.

SPI has been shown to be a powerful reconnaissance tool that can efficiently map gradients in sediment type, biological communities, or disturbances from physical forces or organic enrichment. The conclusions reached at the end of this report are about dynamic processes that have been deduced from imaged structures; as such, they should be considered hypotheses available for further testing/confirmation. Past experience has shown that the most parsimonious explanation is usually the one borne out by subsequent data confirmation.

2.3 BENTHIC SAMPLE COLLECTION AND PROCESSING

A single sediment grab sample was collected for benthic community analysis at each of 16 sediment sampling stations (Figure 1). Upon arrival at the target station, the grab sampler was set in the open position and lowered to the bottom. Upon reaching the bottom, the device was slowly retrieved, causing the bucket to close and retain a sediment sample from the 0 – 6” depth interval. The grab sampler then was pulled up using an electric winch and placed on an outboard stand secured to the survey vessel.

Once each grab sample was determined to be of acceptable quality (i.e., minimal disturbance to the sediment surface and the presence of overlying water within the grab), the sediment was transferred to a stainless steel sieve (0.5 mm mesh screen). The sieve was placed on the outboard stand and river water was pumped through a hose which was used to gently wash away the sediment. Extreme care was taken to ensure that no material on the screen was lost over the side of the sieve while agitating or washing the sample.

The organisms and material (e.g., shells, plant detritus, rock fragments, etc.) retained on the screen were placed into labeled, wide-mouth plastic sample jars and immediately preserved using 10% buffered formalin. Each benthic infaunal sample jar was labeled externally and internally. All samples were delivered to Barry A. Vittor & Associates, Inc.

(BVA) of Mobile, AL for detailed benthic analysis: sorting, enumeration and identification to Lowest Practicable Identification Level (LPIL).

At the BVA laboratory, each benthic sample was sorted with a dissecting microscope, and the preserved specimens identified and counted. Individual organisms were removed from each sample and placed in vials, then labeled by major taxonomic group. Taxonomists with a specialization within each major taxonomic group proceeded to identify the preserved organisms to the LPIL. Quality Assurance and Control procedures (QA/QC) associated with the benthic taxonomic analyses are described in BVA's standard laboratory Quality Assurance Plan.

2.4 DATA ANALYSIS METHODS

Multidimensional scaling (MDS) is an exploratory ordination tool that is useful for reducing multiple variables into a simpler graphical representation to illustrate the dominant structure of relationships among stations in a multivariate dataset.

MDS attempts to reconstruct the relationships among stations, as described by the chosen dissimilarity coefficient, using a specified number of dimensions. The MDS method used here was nonmetric MDS (N-MDS) which is suitable for datasets containing non-normal variables, or variables on mixed measurement scales (e.g., infaunal densities). The N-MDS solution is the result of a numerical iterative search for an ordination of stations, typically in 2 or 3 dimensions, which has the same rank ordering as the original dissimilarities. If the dataset can be reduced to, for example, a two-dimensional plot with low stress (<10 percent), then the N-MDS plot can be viewed as a good representation of the relationships among stations for the full dataset. If a 2- or 3-dimensional representation has high stress, then one can conclude that the variables in the dataset are not highly inter-correlated, and the relationships among stations are not easily simplified to a few dimensions.

The two-dimensional N-MDS plot is an effort to portray all pairwise dissimilarity relationships among stations in two dimensions with an arrangement whose rank ordering matches as closely as possible the rank ordering of all pairwise dissimilarity relationships on the full, original dataset. The two-dimensional representation is found by minimizing "stress" which is a measure of how much the two-dimensional plot deviates from the original relationships. Kruskal's "stress formula one" was used to quantify stress:

$$Stress = 100 \sqrt{\sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \left(d_{ij} - \hat{d}_{ij}\right)^2 \Big/ \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \hat{d}_{ij}^{\,2}}$$

Where d_{ij} is the dissimilarity between the *i*th and *j*th point in the complete dataset, and $\hat{d}_{ij}$ is the Euclidean distance between the same two stations in the two-dimensional N-MDS plot. The smaller the stress value, the better the representation shown in the two-dimensional plot matches the original relationships. The intent for the N-MDS plot is to illustrate the relationships among stations, and not necessarily to use the two dimensions for data reduction (unless stress is sufficiently low). Large-scale patterns in station relationships will still be visible even when the stress value is high. The stress value simply provides a measure of how well the two dimensions capture the structure among stations.

For the N-MDS on the benthic abundance data, the Bray-Curtis dissimilarity coefficient was applied after the data were square-root transformed to reduce the influence of the skewed taxonomic group densities.

The N-MDS configurations were generated using the ***metaMDS*** function in the *vegan* package (Oksanen, *et al*. 2013) in R (R Core Team 2013). The Bray-Curtis coefficients were calculated using the *distance* function in the *ecodist* package (Goslee and Urban, 2007).

Interpretation of the taxonomic drivers, as well as identification of the structuring habitat variables, for the two-dimensional ordination shown in the N-MDS plot was supported by smoothed contour plots. In these contour plots a single variable (e.g., one of the benthic variables contributing to the N-MDS ordination, or an independent habitat variable) was predicted from the MDS axis values via a generalized additive model (GAM). The resulting smoothed response curves are similar to isopleths of the response variable predicted from the two-dimensional orientation of points on the N-MDS plot. From one of these contour plots we can interpret how the contoured variable is related to the similarity, or difference, between stations based on their distance in the N-MDS ordination.

The contour plots were generated using the *ordisurf* function in the *vegan* package (Oksanen *et al*., 2013) in R (R Core Team 2013).

3.0
RESULTS

3.1 SEDIMENT PROFILE IMAGING RESULTS

One replicate image was analyzed from each of the stations surveyed. A complete set of all the summary data measured from each sediment profile image is presented in Appendix A.

Parameters such as boundary roughness and mud clast data (number, size) provide supplemental information pertaining to the physical regime and bottom sediment transport activity at a site. Even though mud clasts are definitive characteristics whose presence can indicate physical disturbance of some form, the mud clasts noted in the images from this survey were either biogenic in origin or artifacts due to sampling (mud clumps clinging to the frame base) and not indicative of physical disturbance or sediment transport activities. Therefore, mud clast data were not used as individual parameters for interpretation.

The results for some SPI parameters are sometimes indicated in the data appendix or on the maps as being "Indeterminate" (Ind). This is a result of the sediments being either: 1) too compact for the profile camera to penetrate adequately, preventing observation of surface or subsurface sediment features, 2) too soft to bear the weight of the camera, resulting in over-penetration to the point where the sediment/water interface was above the window (imaging area) on the camera prism (the sediment/water interface must be visible to measure most of the key SPI parameters like aRPD depth, penetration depth, and infaunal successional stage), or 3) the sediment consisted of uniformly-colored sand lacking a visible aRPD contrast and for which infaunal successional dynamics, generally speaking, are not well-known. All mapped values represent the measurement obtained from a single image.

3.1.1 Grain Size

With the exception of seven stations, the sediments throughout the entire area surveyed were either one of two types: 1) primarily muds (fine-grained, silt-clay sediments with a major mode of $\geq$4 phi Figure 4a-c) or 2) a surface layer of silty, very fine sand over a silt clay foundation (Figure 5). At six locations (3 in the Inset Area North and 3 in the northern reference area; see Figure 4 b-c) rocks, oyster shells, or debris on the bottom prevented the camera prism from penetrating the bottom and getting any useful information (Figure 6). There was one station close to shore in the Inset Area North (Figure 4b) that had poorly-sorted coarse sand (Figure 7). This area is adjacent to a stormwater outfall so this observation may be associated with this type of feature.

3.1.2 Prism Penetration Depth

With the exception of the seven stations mentioned in the previous section where silt-clay sediments were not the dominant grain-size, the variation in prism penetration found throughout the Site (Figure 8 a-c) was a function of infaunal reworking depth, presence of subsurface methane gas, and presence/absence of rocks/shells providing some surface armoring (Figure 9). Prism penetration depth throughout the whole study area (all sampled stations) ranged from 0 – 19.9 cm, with an overall average penetration value of 13.1 cm; with the exception of the three nearshore stations where rocks/shell debris were present, most of the locations sampled in the area adjacent to OU-2 (Figure 8 a-b) had similar penetration values.

3.1.3 Surface Boundary Roughness

Surface boundary roughness ranged from 0.12 to 6.24 cm, with an overall Site average value of 0.75 (Figure 10 a-c); the origin of these small-scale topographic elevations was primarily due to biogenic processes (Appendix A). The larger values measured were caused by physical effects or sampling artifacts caused by the camera prism catching on a shell or rock and dragging it down while disrupting the sediment-water interface (Figure 11); the majority of the values measured in the area adjacent to OU-2 (Figure 10 a-b) had values less than 1.5 cm.

3.1.4 Apparent Redox Potential Discontinuity Depth

The distribution of mean apparent RPD depths ranged from 0.1 – 7.8 cm, with an overall Site average depth of 2.3 cm; the spatial distribution of aRPD depths is shown in Figure 12 a-c. There is a noticeable pattern in aRPD depths at the stations in the OU-2 Site; values are generally higher closer to the shore and decrease with increasing distance from shore (and water depth), until the 30-ft contour is reached and aRPD values reach their nadir, especially at the northwest corner of the Site (Figure 12 b).

3.1.5 Organic Loading, Sedimentary Methane, and Thiophilic Bacterial Colonies

There were no stations surveyed where the overlying water was hypoxic nor was sediment oxygen demand at a level that thiophilic bacterial colonies bloomed; while no *Beggiatoa* mats were detected, there were stations where excess organic enrichment caused subsurface methane to be generated (Figure 13a-c); the presence of subsurface methane generally occurred more often in nearshore stations (indicating organic enrichment is from nearby land run-off; Figure 14) although there were also a few stations in water depths exceeding 30 ft (e.g. Stations 113, 133, and 183) where subsurface methane was found (Figure 13b).

3.1.6 Infaunal Successional Stage

The mapped distribution of infaunal successional stages is shown in Figure 15 a-c; while Stage 3 taxa were prevalent at the reference stations to the north and south of the Site (Figure 15c), they were also quite common at stations adjacent to the Site (Figures 15 a-b and 16). However, the spatial distribution of early successional seres seen in Figure 15b reflects patterns of both physical disturbance (Figure 17) and organic enrichment (Figure 18) occurring in the sediments adjacent to the Site.

3.1.7 Biological Mixing Depth

The range of depths to which animals were actively deposit-feeding in the sediments was from 1.7 to 18.5 cm, with an overall Site average feeding void depth of 15.8 cm (Figure 19 a-c); these should be considered minimum estimates, because many of the stations showed evidence of bioturbation that exceeded prism penetration depth (see comment field in Appendix A; Figure 20). These bioturbation depths exceed the general average range cited for mixing zones in the scientific literature of approximately 10 cm (Boudreau, 1992, 1998, 2004; Mermillod-Blondin *et al*., 2003).

3.2 BENTHIC MACROINVERTEBRATES

Benthic macrofauna were identified to the LPIL, and a complete list of all species identified from each grab is presented in Appendix B. At three of the sediment sampling locations (one from each of the north and south reference areas, and one from the Site), triplicate grabs were taken to get an idea of within-station variability. The summary results are presented in Table 3.1, with a list of the dominant species (those comprising 90% of the abundance) for each station presented in Table 3.2.

Table 3.1
Summary of Benthic Community Results

STATION NAME	NUMBER OF INDIVIDUALS	TOTAL # OF TAXA (SPECIES RICHNESS)	DENSITY (#/M^2)	DIVERSITY (H')	EVENNESS (J')	SIMPSON'S INDEX (D)	GRAIN SIZE (PERCENT SILT)	TOC (%)
B1-SS-001	1056	19	21120	1.12	0.38	0.55	92.0	2.2
B1-SS-002	1604	26	32080	1.33	0.41	0.45	98.9	2.8
B1-SS-003-R1	1213	15	24260	1.47	0.54	0.33	96.4	2.4
B1-SS-003-R2	1076	16	21520	1.31	0.47	0.36	96.4	2.4
B1-SS-003-R3	2018	19	40360	1.16	0.39	0.40	96.4	2.4
B1-SS-004	1777	10	35540	0.61	0.26	0.72	96.4	2.7
B1-SS-005	1172	15	23440	1.86	0.69	0.22	97.3	2.8
B1-SS-006	1840	19	36800	1.86	0.63	0.23	98.0	3.5
B1-SS-007	1424	18	28480	1.37	0.47	0.39	93.8	2.6
B1-SS-008	795	15	15900	1.35	0.50	0.43	93.2	2.7
B1-SS-009	1113	17	22260	1.10	0.39	0.56	80.9	1.6
B1-SS-010-R1	1331	21	26620	1.16	0.38	0.55	98.6	2.2
B1-SS-010-R2	1030	21	20600	1.39	0.46	0.43	98.6	2.2
B1-SS-010-R3	578	19	11560	1.36	0.46	0.46	98.6	2.2
B1-SS-011	867	21	17340	1.17	0.39	0.49	88.4	2.3
B1-SS-012	434	12	8680	1.49	0.60	0.31	93.7	2.9
B1-SS-013	954	14	19080	1.40	0.53	0.39	96.0	2.3
B1-SS-014-R1	1400	13	28000	1.28	0.50	0.40	93.5	1.7
B1-SS-014-R2	1616	14	32320	1.43	0.54	0.35	93.5	1.7
B1-SS-014-R3	842	17	16840	1.59	0.56	0.33	93.5	1.7
B1-SS-101	888	15	17760	1.20	0.44	0.48	92.5	2.1
B1-SS-102	812	17	16240	1.49	0.53	0.33	93.5	2.2

Table 3.2
Dominant Species (90% total abundance) by Station

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-001	Arthropoda	*Leucon americanus*	774	1056	73.3%	774	73.3%
	Annelida	Tubificidae (LPIL)	112	1056	10.6%	886	83.9%
	Mollusca	*Ischadium recurvum*	56	1056	5.3%	942	89.2%
	Annelida	*Heteromastus filiformis*	26	1056	2.5%	968	91.7%
B1-SS-002	Mollusca	Littorina (LPIL)	1024	1604	63.8%	1024	63.8%
	Arthropoda	*Leucon americanus*	292	1604	18.2%	1316	82.0%
	Annelida	Tubificidae (LPIL)	108	1604	6.7%	1424	88.8%
	Mollusca	*Macoma balthica*	30	1604	1.9%	1454	90.6%
B1-SS-003-R1	Arthropoda	*Leucon americanus*	600	1213	49.5%	600	49.5%
	Mollusca	Littoraria (LPIL)	314	1213	25.9%	914	75.4%
	Annelida	Tubificidae (LPIL)	144	1213	11.9%	1058	87.2%
	Annelida	*Heteromastus filiformis*	40	1213	3.3%	1098	90.5%
B1-SS-003-R2	Arthropoda	*Leucon americanus*	522	1076	48.5%	522	48.5%
	Mollusca	Littoraria (LPIL)	374	1076	34.8%	896	83.3%
	Annelida	Tubificidae (LPIL)	90	1076	8.4%	986	91.6%
B1-SS-003-R3	Arthropoda	*Leucon americanus*	954	2018	47.3%	954	47.3%
	Mollusca	Littoraria (LPIL)	846	2018	41.9%	1800	89.2%
	Annelida	Tubificidae (LPIL)	104	2018	5.2%	1904	94.4%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-004	Arthropoda	*Leucon americanus*	1488	1777	83.7%	1488	83.7%
	Annelida	Tubificidae (LPIL)	212	1777	11.9%	1700	95.7%
B1-SS-005	Annelida	Tubificidae (LPIL)	408	1172	34.8%	408	34.8%
	Arthropoda	*Leptocheirus plumulosus*	312	1172	26.6%	720	61.4%
	Arthropoda	*Leucon americanus*	132	1172	11.3%	852	72.7%
	Mollusca	Bivalvia (LPIL)	84	1172	7.2%	936	79.9%
	Annelida	*Heteromastus filiformis*	76	1172	6.5%	1012	86.3%
	Nemertea	Nemertea (LPIL)	56	1172	4.8%	1068	91.1%
B1-SS-006	Arthropoda	*Leucon americanus*	628	1840	34.1%	628	34.1%
	Annelida	Tubificidae (LPIL)	568	1840	30.9%	1196	65.0%
	Mollusca	Littoraria (LPIL)	228	1840	12.4%	1424	77.4%
	Annelida	*Heteromastus filiformis*	120	1840	6.5%	1544	83.9%
	Mollusca	*Macoma balthica*	48	1840	2.6%	1592	86.5%
	Annelida	*Streblospio benedicti*	44	1840	2.4%	1636	88.9%
	Arthropoda	*Cyathura polita*	40	1840	2.2%	1676	91.1%
B1-SS-007	Arthropoda	*Leucon americanus*	796	1424	55.9%	796	55.9%
	Annelida	Tubificidae (LPIL)	376	1424	26.4%	1172	82.3%
	Annelida	*Heteromastus filiformis*	80	1424	5.6%	1252	87.9%
	Mollusca	*Macoma balthica*	44	1424	3.1%	1296	91.0%
B1-SS-008	Arthropoda	*Leucon americanus*	500	795	62.9%	500	62.9%
	Annelida	Tubificidae (LPIL)	122	795	15.3%	622	78.2%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-008	Mollusca	Bivalvia (LPIL)	44	795	5.5%	666	83.8%
(cont)	Mollusca	Littoraria (LPIL)	42	795	5.3%	708	89.1%
	Annelida	*Heteromastus filiformis*	26	795	3.3%	734	92.3%
B1-SS-009	Arthropoda	*Leucon americanus*	828	1113	74.4%	828	74.4%
	Annelida	Tubificidae (LPIL)	90	1113	8.1%	918	82.5%
	Annelida	*Heteromastus filiformis*	54	1113	4.9%	972	87.3%
B1-SS-009	Mollusca	Littoraria (LPIL)	44	1113	4.0%	1016	91.3%
B1-SS-010-R1	Mollusca	Littoraria (LPIL)	974	1331	73.2%	974	73.2%
	Arthropoda	*Leucon americanus*	140	1331	10.5%	1114	83.7%
	Mollusca	Bivalvia (LPIL)	42	1331	3.2%	1156	86.9%
	Mollusca	*Tellina agilis*	32	1331	2.4%	1188	89.3%
	Annelida	Tubificidae (LPIL)	28	1331	2.1%	1216	91.4%
B1-SS-010-R2	Mollusca	Littoraria (LPIL)	654	1030	63.5%	654	63.5%
	Arthropoda	*Leucon americanus*	160	1030	15.5%	814	79.0%
	Mollusca	Bivalvia (LPIL)	57	1030	5.5%	871	84.6%
	Mollusca	Tellina agilis	40	1030	3.9%	911	88.4%
	Annelida	Tubificidae (LPIL)	27	1030	2.6%	938	91.1%
B1-SS-010-R3	Mollusca	Littoraria (LPIL)	383	578	66.3%	383	66.3%
	Arthropoda	*Leucon americanus*	72	578	12.5%	455	78.7%
	Mollusca	*Tellina agilis*	25	578	4.3%	480	83.0%
	Annelida	Tubificidae (LPIL)	22	578	3.8%	502	86.9%
	Annelida	*Heteromastus filiformis*	15	578	2.6%	517	89.4%
	Annelida	*Nereis succinea*	13	578	2.2%	530	91.7%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-011	Arthropoda	*Leucon americanus*	584	867	67.4%	584	67.4%
	Annelida	Tubificidae (LPIL)	142	867	16.4%	726	83.7%
	Annelida	*Heteromastus filiformis*	44	867	5.1%	770	88.8%
	Mollusca	Littoraria (LPIL)	37	867	4.3%	807	93.1%
B1-SS-012	Arthropoda	*Leucon americanus*	186	434	42.9%	186	42.9%
	Annelida	Tubificidae (LPIL)	150	434	34.6%	336	77.4%
	Annelida	*Heteromastus filiformis*	22	434	5.1%	358	82.5%
B1-SS-012	Mollusca	*Macoma balthica*	22	434	5.1%	380	87.6%
	Mollusca	Littoraria (LPIL)	19	434	4.4%	399	91.9%
B1-SS-013	Arthropoda	*Leucon americanus*	566	954	59.3%	566	59.3%
	Annelida	Tubificidae (LPIL)	138	954	14.5%	704	73.8%
	Mollusca	Littoraria (LPIL)	118	954	12.4%	822	86.2%
	Mollusca	Bivalvia (LPIL)	36	954	3.8%	858	89.9%
	Annelida	*Heteromastus filiformis*	34	954	3.6%	892	93.5%
B1-SS-014-R1	Arthropoda	*Leucon americanus*	820	1400	58.6%	820	58.6%
	Mollusca	Littoraria (LPIL)	256	1400	18.3%	1076	76.9%
	Annelida	Tubificidae (LPIL)	206	1400	14.7%	1282	91.6%
B1-SS-014-R2	Arthropoda	*Leucon americanus*	860	1616	53.2%	860	53.2%
	Mollusca	Littoraria (LPIL)	312	1616	19.3%	1172	72.5%
	Annelida	Tubificidae (LPIL)	248	1616	15.3%	1420	87.9%
	Annelida	*Heteromastus filiformis*	76	1616	4.7%	1496	92.6%

Station	Phylum	Taxa or LPIL	Number of individuals	Station Total	Taxa proportion of total	Cumulative Total	Cumulative proportion
B1-SS-014-R3	Arthropoda	*Leucon americanus*	444	842	52.7%	444	52.7%
	Annelida	Tubificidae (LPIL)	142	842	16.9%	586	69.6%
	Mollusca	Littoraria (LPIL)	104	842	12.4%	690	81.9%
	Annelida	*Heteromastus filiformis*	46	842	5.5%	736	87.4%
	Mollusca	*Macoma balthica*	28	842	3.3%	764	90.7%
B1-SS-101	Annelida	Tubificidae (LPIL)	592	888	66.7%	592	66.7%
	Annelida	*Heteromastus filiformis*	140	888	15.8%	732	82.4%
	Mollusca	*Macoma balthica*	70	888	7.9%	802	90.3%
B1-SS-102	Annelida	Tubificidae (LPIL)	410	812	50.5%	410	50.5%
	Arthropoda	*Leucon americanus*	168	812	20.7%	578	71.2%
	Annelida	*Heteromastus filiformis*	130	812	16.0%	708	87.2%
	Mollusca	*Macoma balthica*	34	812	4.2%	742	91.4%

Patterns in the benthic data set (Appendix B) were evaluated with an N-MDS ordination based on the Bray-Curtis dissimilarities among the 22 samples (Table 3.1). The stress for the two dimensional N-MDS ordination plot (Figure 21) was 13%, considered to be a 'fair' to 'poor' representation of the multivariate data set (McCune and Grace, 2002, after Kruskal, 1964). This indicates that the relationships among samples based on the Bray-Curtis dissimilarities for the 53 taxa observed in this study are not easily summarized into a two dimensional representation. Of the 53 total unique taxa identified, 41 of these taxa were present in fewer than half the samples and at very low abundance values, i.e., 10 individuals or less in any one sample. With so many taxa present at low abundance levels, the dissimilarities in the benthic communities were complex and not easily generalized.

The ordination results were driven by the variability in the more dominant taxa found in the samples, particularly the oligochaetes (Tubificidae), the cumacean *Leucon americanus*, the polychaete *Heteromastus filiformis*, and small gastropods (Littorinidae). The relationship between these taxonomic drivers and the N-MDS ordination axes are illustrated via pairwise scatterplots (Figures 22), as well as through the contour plots which model these taxonomic variables as a smoothed function of the N-MDS ordination axes (Figure 23). The highest Tubificidae and *H. filiformis* abundances are found at the stations in the top-left quadrant of the ordination plot (Stations SS-101, SS-006, SS-102, and SS-005), and the lowest abundances are found at the stations on the right side (Station SS-010 all three reps; see Figure 24). The bivalve *Tellina agilis* was present only at the three replicates of station SS-010, thus providing exclusive delineation of those three samples.

The physical habitat variables for the benthic stations were derived from the nearest SPI survey stations (Figure 1; Table 3.3). When a benthic station did not coincide with a SPI station, the average of the nearest SPI stations was used for this comparison, e.g., benthic station SS-009 was associated with the SPI results averaged for Stations 065 and 067. The relationship between the physical habitat variables (i.e., water depth, camera penetration depth, aRPD depth, percent TOC and percent silt) were plotted against the N-MDS ordination axes to illustrate how physical habitat may be correlated with the benthic community patterns (Figure 24). There tended to be very little association of the benthic community patterns with these habitat variables, except for water depth (Figures 24 & 25).

The small-scale spatial variability was measured by the similarity among the three field replicates at each of three stations (Stations SS-003, SS-010, and SS-014). For benthic abundance, the variability among field replicates (measured by the coefficient of variation, CV) was comparable or slightly greater than the variability among the 16 station values (within station CVs ranged from 31% to 39%, while between station CV was 35%; Table 3.4). Abundance values could be quite variable among replicates within a station for some of the more common taxa; for example, *Leucon americanus* ranged from 522 to 864 individuals among field replicates at Station SS-003, or gastropods in the family Littorinidae ranged from 383 to 974 individuals among replicates at Station SS-010 (Figure 26, top); however, much of this within-

station variability appears to controlled by population density and disappears when these dominants are viewed by percent total abundance in the sample (Figure 26, bottom). The variability among replicates for taxa richness was substantially lower within stations (6 to 14%) compared to between stations (23%; Table 3.4). Individual taxa, if present at a station, tended to be present in all three replicates. The general level of similarity of the communities within each station is illustrated by the clustering of the three replicates within each station in the ordination plot (Figures 21, 23, and 25).

Table 3.3
Association Between Benthic & SPI Station Locations

Benthic station	SPI Station(s)
B1-SS-001	413
B1-SS-002	420
B1-SS-003-R1-3	430
B1-SS-004	
B1-SS-005	149
B1-SS-006	225
B1-SS-007	106
B1-SS-008	188
B1-SS-009	Average of (65,67)
B1-SS-010-R1-3	33
B1-SS-011	Average of (18,24)
B1-SS-012	522
B1-SS-013	534
B1-SS-014-R1-3	541
B1-SS-101	Average of (1182,1183)
B1-SS-102	60

Table 3.4
Summary of Benthic Community Parameters

Summary Parameter	Number of Individuals	# of Taxa (Richness)	Density (#/m^2)	Diversity (H')	Evenness (J')	Simpson's Index (D)
Minimum	434	10	8680	0.61	0.26	0.22
Maximum	2018	26	40360	1.86	0.69	0.72
CV among station values	33%	23%	35%	20%	20%	28%
CV among SS-003 reps	35%	12%	35%	12%	16%	10%
CV among SS-010 reps	39%	6%	39%	9%	10%	13%
CV among SS-014 reps	31%	14%	31%	11%	6%	10%

CV = coefficient of variation (standard deviation divided by the mean)

4.0
DISCUSSION

The results from the SPI survey and benthic grab results have provided a thorough baseline characterization of the submerged habitat near the Site against which future changes can be measured, and the value of using both types of survey techniques was illustrated by the combined results. The grab sample results confirmed the sediment grain-size results from the SPI image analysis and provided both species names and abundance/richness measurements which cannot be derived from the profile images. The profile images, on the other hand, provided much more detailed spatial information on the existing benthic community structure as well as providing information on sediment transport and disturbance regimes not available from the benthic grab analysis. In fact, without the additional information provided by the sediment profile images, one would have been left with a very biased view and (mis)interpretation of what forces are influencing benthic community structure.

The area next to the Site is primarily a fine-grained bottom (silt-clay), with the exception of a handful of nearshore stations where either coarser sands exist or armored shell coverings provide a surface for epifaunal organisms (barnacles, mussels, bryozoans, hydroids) to thrive (Figures 4 and 7). In river systems, it is the rule (rather than the exception) that sediments will be deposited, banks will erode, and floodplains, islands, and side channels will undergo either very slow or dramatically rapid changes over time (Simons and Sentürk, 1992). At the sediments adjacent to the Site, even though sediment grain size is fairly uniform (Figure 4, Table 3.1), short-term sediment disturbance appears to be a function of water depth (Figure 12a) which is most likely related to ship traffic (either from normal river traffic or offshore activities associated with the land-based operations at the Site). If one examines Figure 12a, there is a noticeable, consistent decrease in aRPD depth as one moves offshore; this disturbance appears to be caused by erosion and transport of the surface oxidized layer most likely due to ship propwash. All of the profile images show a similar pattern as one moves offshore along these perpendicular sampling transects: a relatively healthy sedimentary habitat with a thick surface oxidized layer that changes rapidly as that higher-water content, lower shear strength, dilated, oxidized surface layer was eroded and resuspended from ship's propwash and then re-settled on the bottom (Figure 27). This disturbance pattern was also reflected in the status of the infaunal successional stages at these locations (compare Figure 12a with Figure 15a).

The macroinvertebrate assemblage documented in the initial RI (Earth Tech 2000) indicated a community that was primarily dominated by relatively pollution tolerant organisms such as polychaetes, amphipods, crustaceans, and bivalves. That study showed no apparent difference in the benthic metrics (e.g. abundance, diversity, biotic indices) between the Site and background stations. While the species composition has changed slightly in the time that has passed since the initial investigation, the overall conclusion has not; by traditional benthic metrics alone, there is no real difference between the Site or reference stations (Figure 21) in benthic community

structure. Both the Site and the Reference stations are very similar and dominated by pollution tolerant (Stage 1 in Figure 3) organisms; none of the organisms identified in this study could be classified as 'sensitive' to pollution (Pelletier *et al*., 2010) and no organisms listed could be categorized as 'rare, threatened or endangered' species.
The results from traditional benthic community analyses are heavily influenced by the numerically dominant taxa and do not take into account either size or biomass. For example, a 2 mm juvenile or 10 cm adult polychaete are counted as equivalent if they are the same species, and 1000 cumaceans of mm size that stay on the sediment surface and are very transient will have a much larger influence on multivariate statistical plots than 1 large bivalve that may be mixing the sediment at depth. A look at Table 3.2 and Figure 28 show that all the benthic samples, regardless of whether they were from sediment adjacent to the Site or from the north or south reference area, were dominated by cumaceans, small snails, and oligochaetes, and these 3 groups were the primary "ordination drivers" when looking for differences in the benthic community results. The cumacean *Leucon americanus* was the most prevalent benthic organism in the grab samples and usually the dominant taxon at the majority of stations (Table 3.2); these tiny creatures live partially buried in the sediment, feeding on small particles in the upper few millimeters or by grazing material from the surfaces of individuals grains, and many species are known to migrate into the water column diurnally and become part of the plankton (Watling, 1979). The next most common taxon found were tiny gastropods (snails) from the family Littorinidae; during the initial exploratory data analysis, Station SS-002 sorted out as unique from the others because the 1,024 individual snails out of the total 1,604 animals found in that grab were members of the genus *Littorina*, while all of the other benthic samples that also had high numbers of gastropods were members of the genus *Littoraria* (Appendix B).

The real "infaunal" dominant, i.e., one that actually burrows into the sediment, that influenced the benthic analyses were the tubificid oligochaetes and the capitellid polychaete, *Heteromastus filiformis* (Figure 28) which are both "pollution tolerant" organisms and classified as "Stage 1" taxa (Figure 3) in the sediment profile image analysis results (Appendix A). What were present in very low numbers and did not affect the "traditional" benthic community analyses but whose effects were quite visible in the profile images were the Stage 3 taxa (which have a profound influence on both the biological mixing depth as well as the aRPD depth; see Figure 20). So, while the traditional benthic community analyses show no real differences among stations in either grain size (Table 3.1) or benthic community structure (Figures 21-25) that could be correlated with any effects due to the Site (no differences between the adjacent area stations versus the reference stations), the SPI results did show variation in both grain size from localized sediment transport (Figure 4 a-c), differences in aRPD depth due to localized disturbance (Figure 12 a-c), and the typical small-scale spatial variation in benthic community structure due to both physical disturbance and anthropogenic activities (Figure 15 a-c) that one would expect to see in any urban estuarine setting (Rhoads et al. 1978; Rhoads and Germano, 1982; Elliott and Quintino 2007). However, neither the SPI nor the traditional benthic community analyses show any adverse effects in the benthic habitat that could be directly attributed to sources at the former Anaconda Wire and Cable Company site.

5.0
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FIGURES

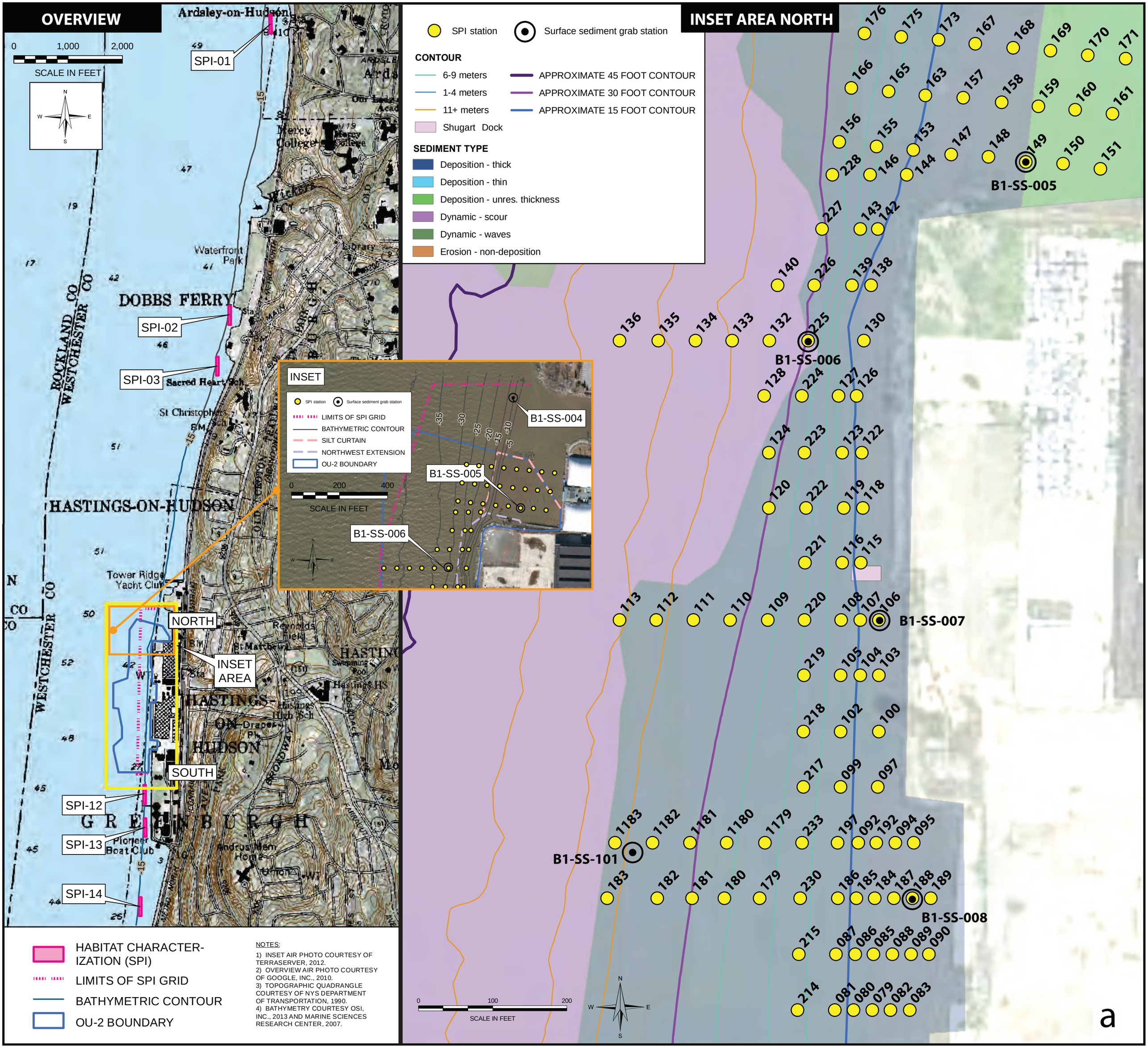


Figure 1a: Location of SPI and benthic grab stations surveyed in the Hudson River in October, 2013.

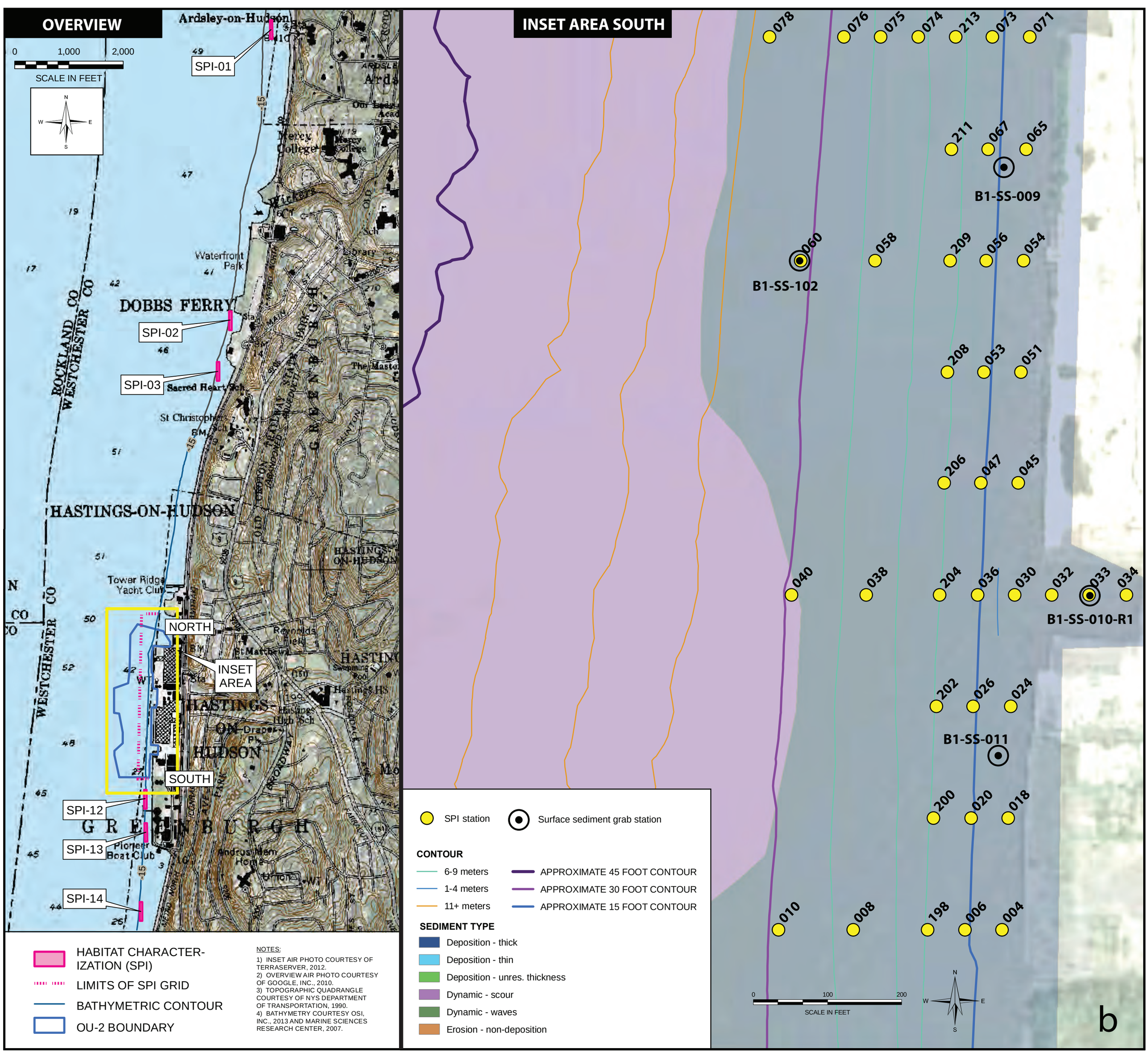


Figure 1b: Location of SPI and benthic grab stations surveyed in the Hudson River in October, 2013.

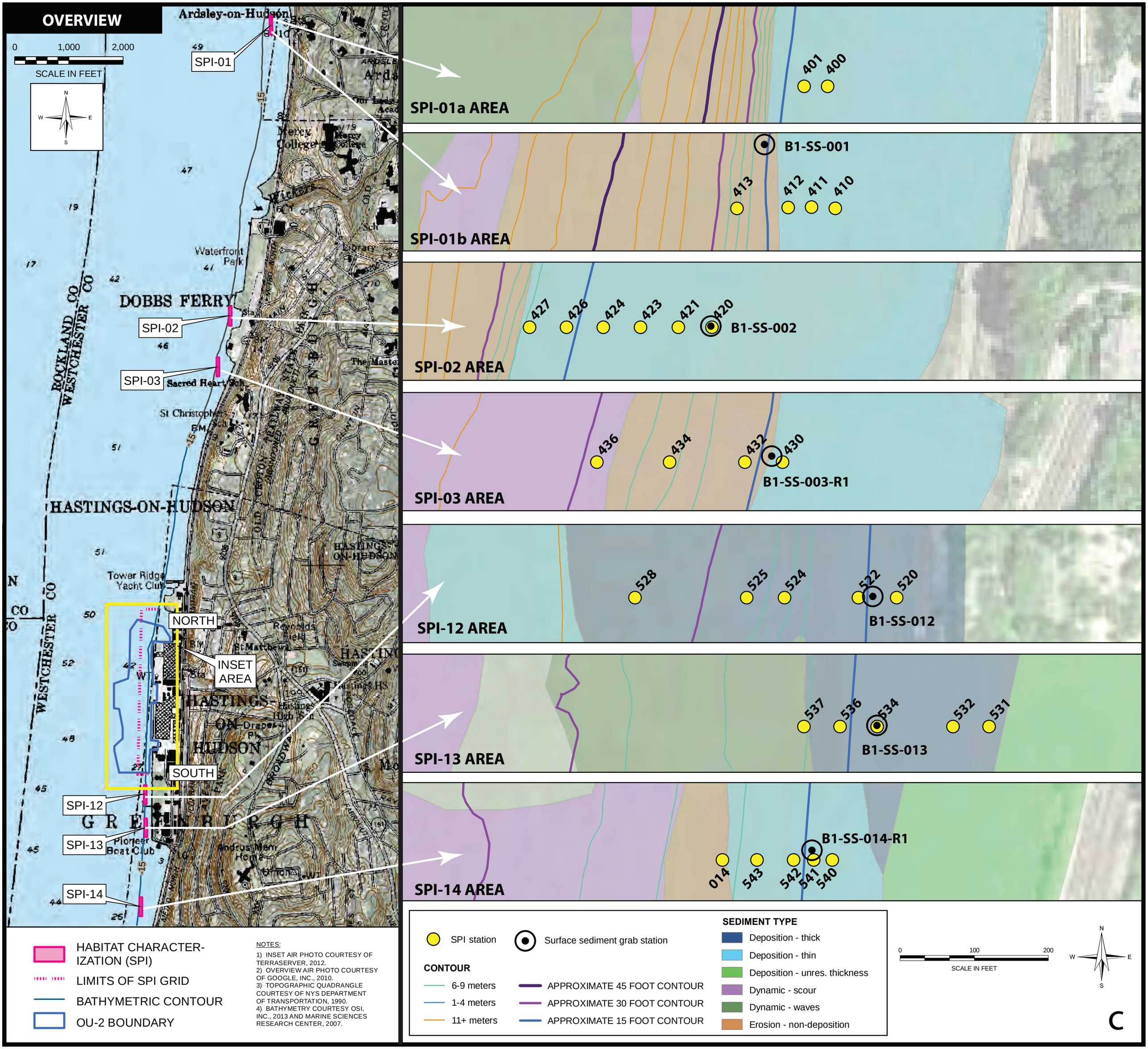


Figure 1c: Location of SPI and benthic grab stations surveyed in the Hudson River in October, 2013.

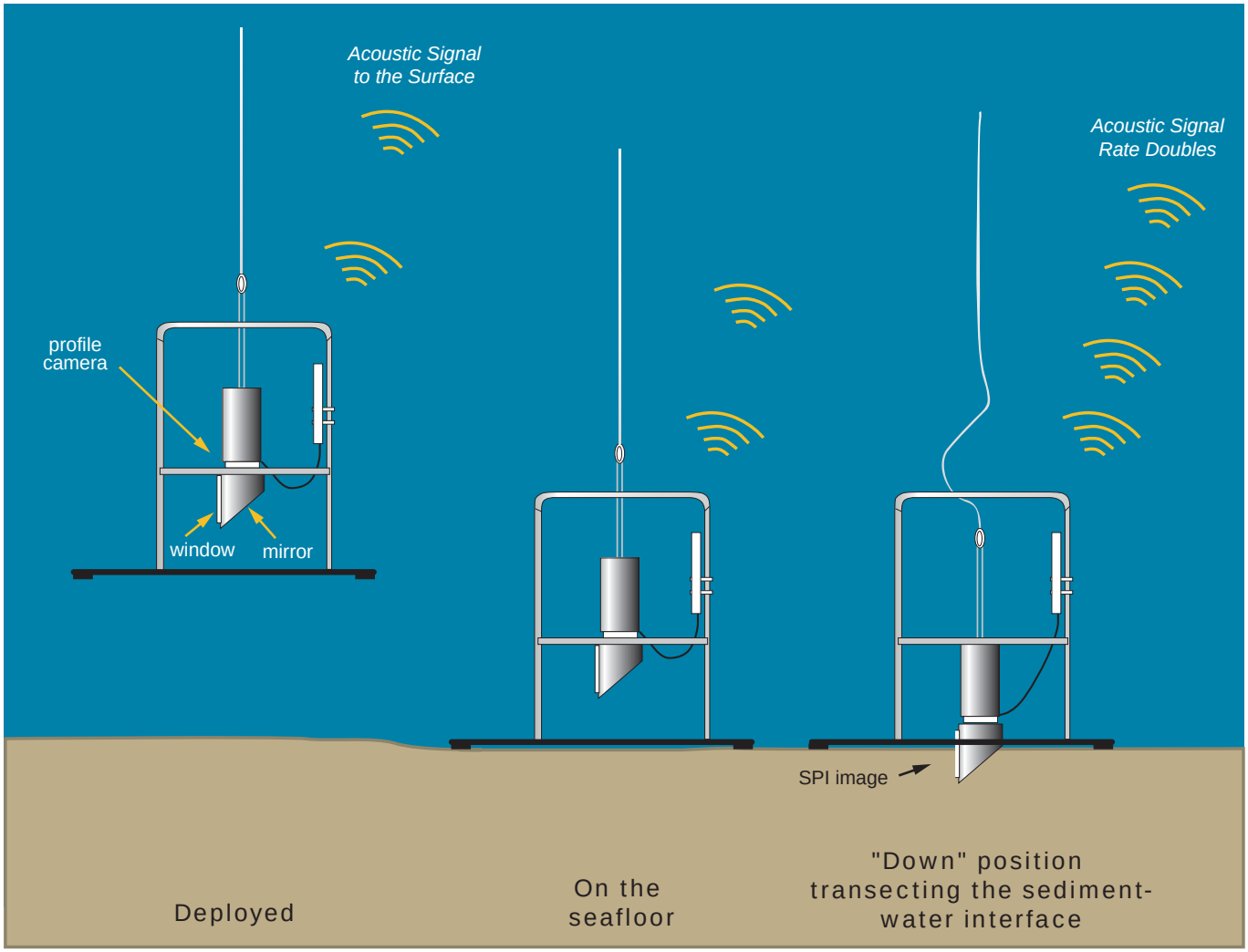


Figure 2: Deployment and operation of the Ocean Imaging Model 3731 Sediment Profile camera.

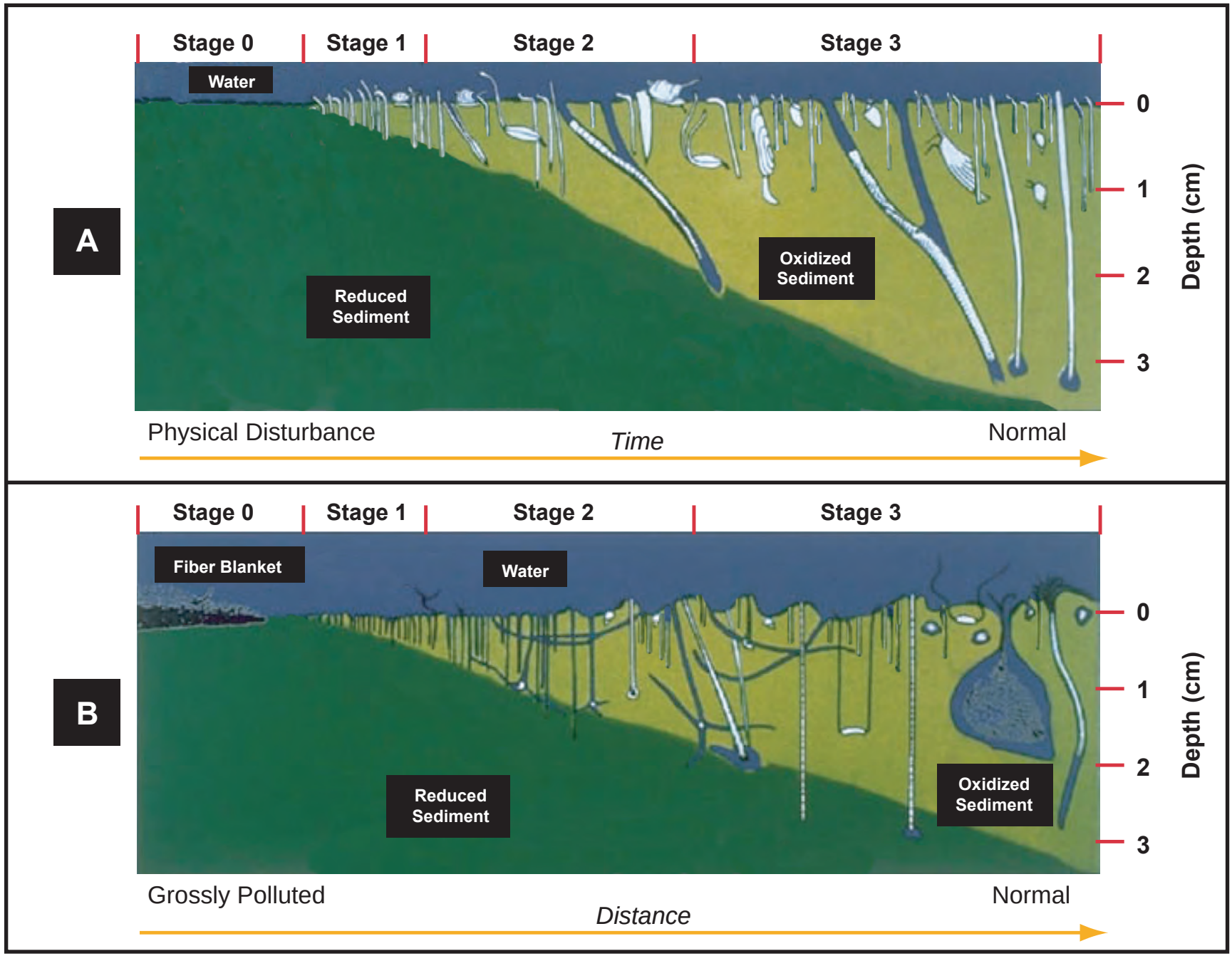


Figure 3: Soft-bottom benthic community response to physical disturbance (top panel) or organic enrichment (bottom panel). From Rhoads and Germano (1982).

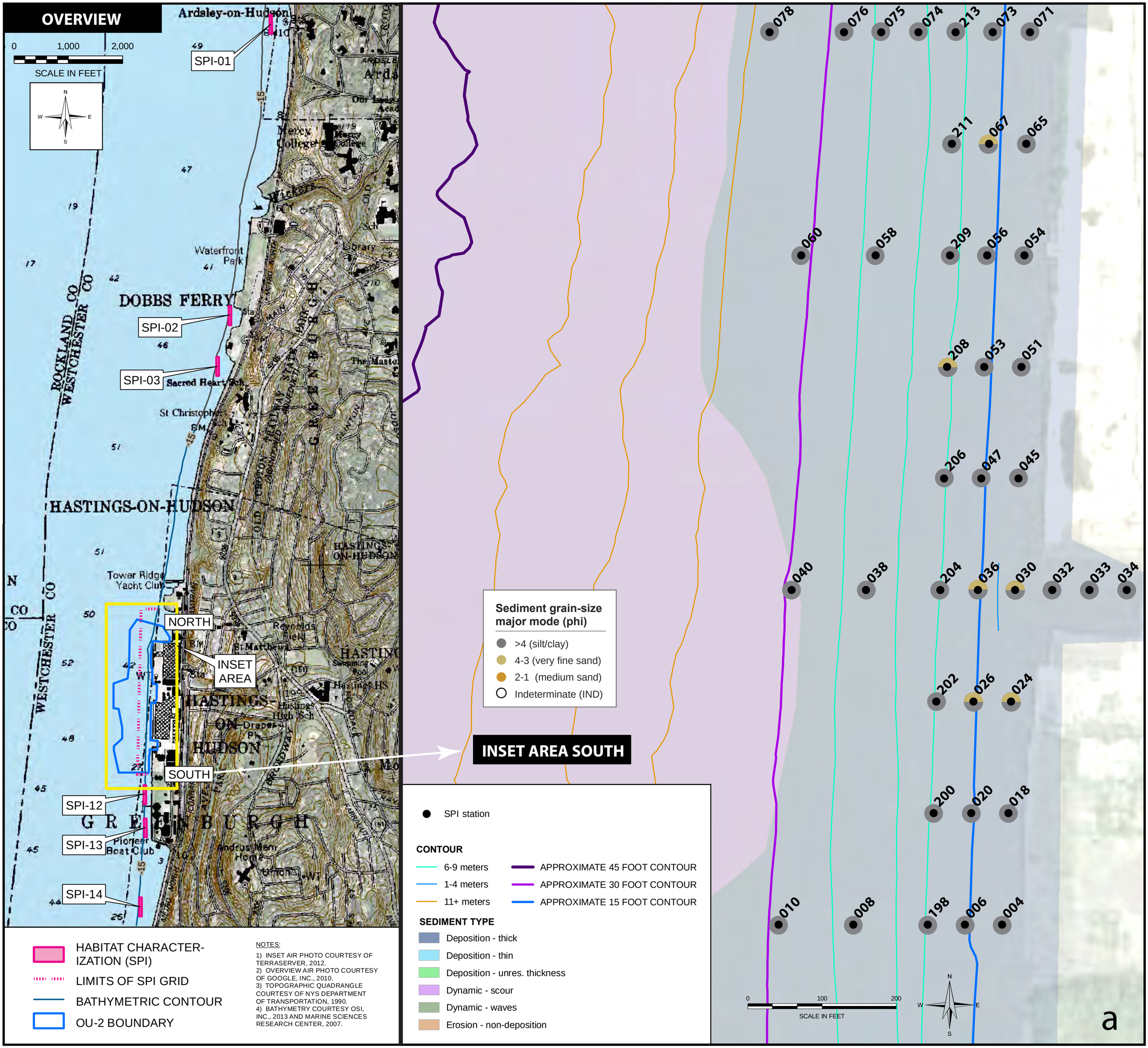


Figure 4a. Spatial distribution of sediment grain size major mode (phi units) at Hastings on Hudson in October, 2013.

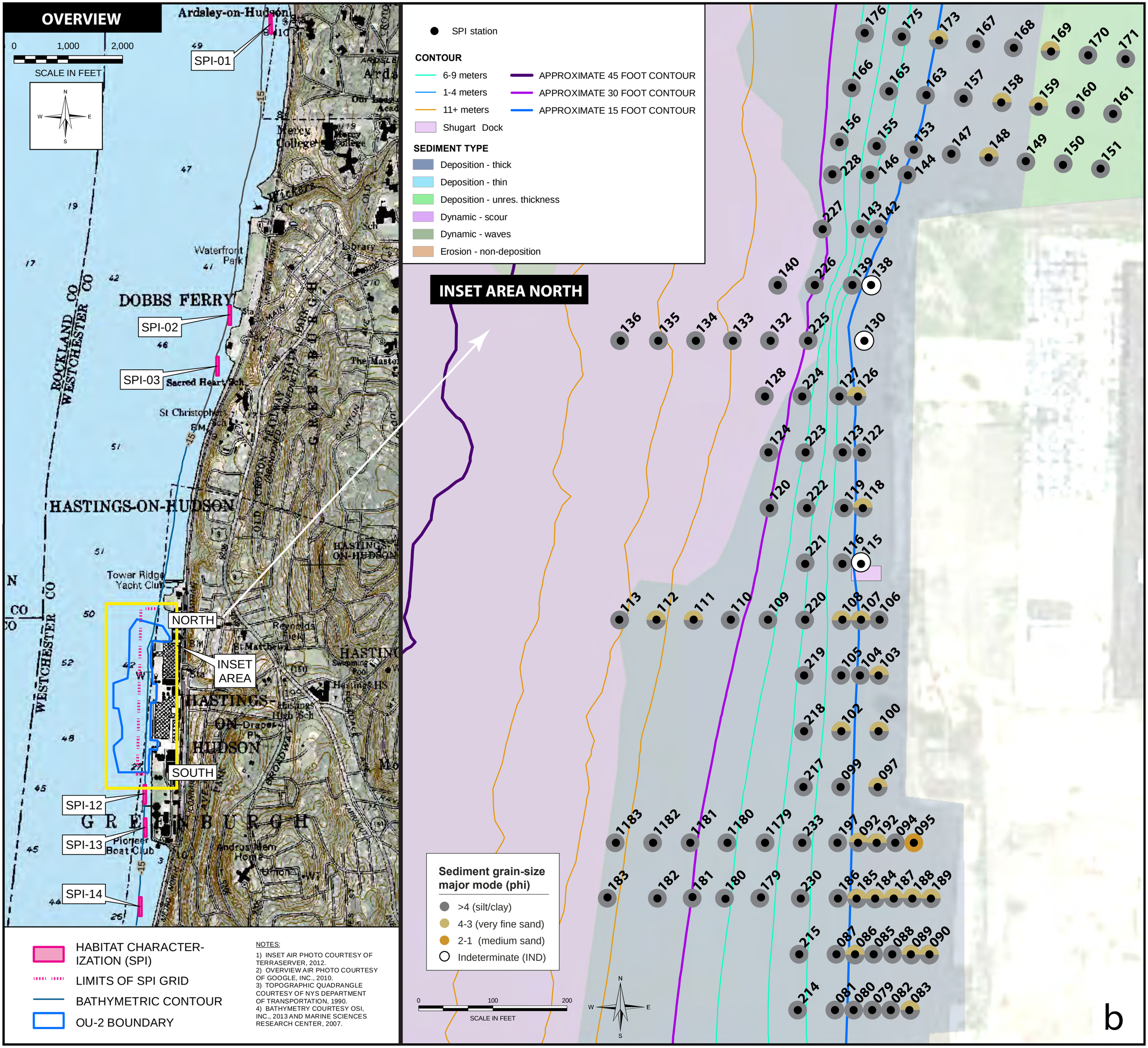


Figure 4b. Spatial distribution of sediment grain size major mode (phi units) at Hastings on Hudson in October, 2013.

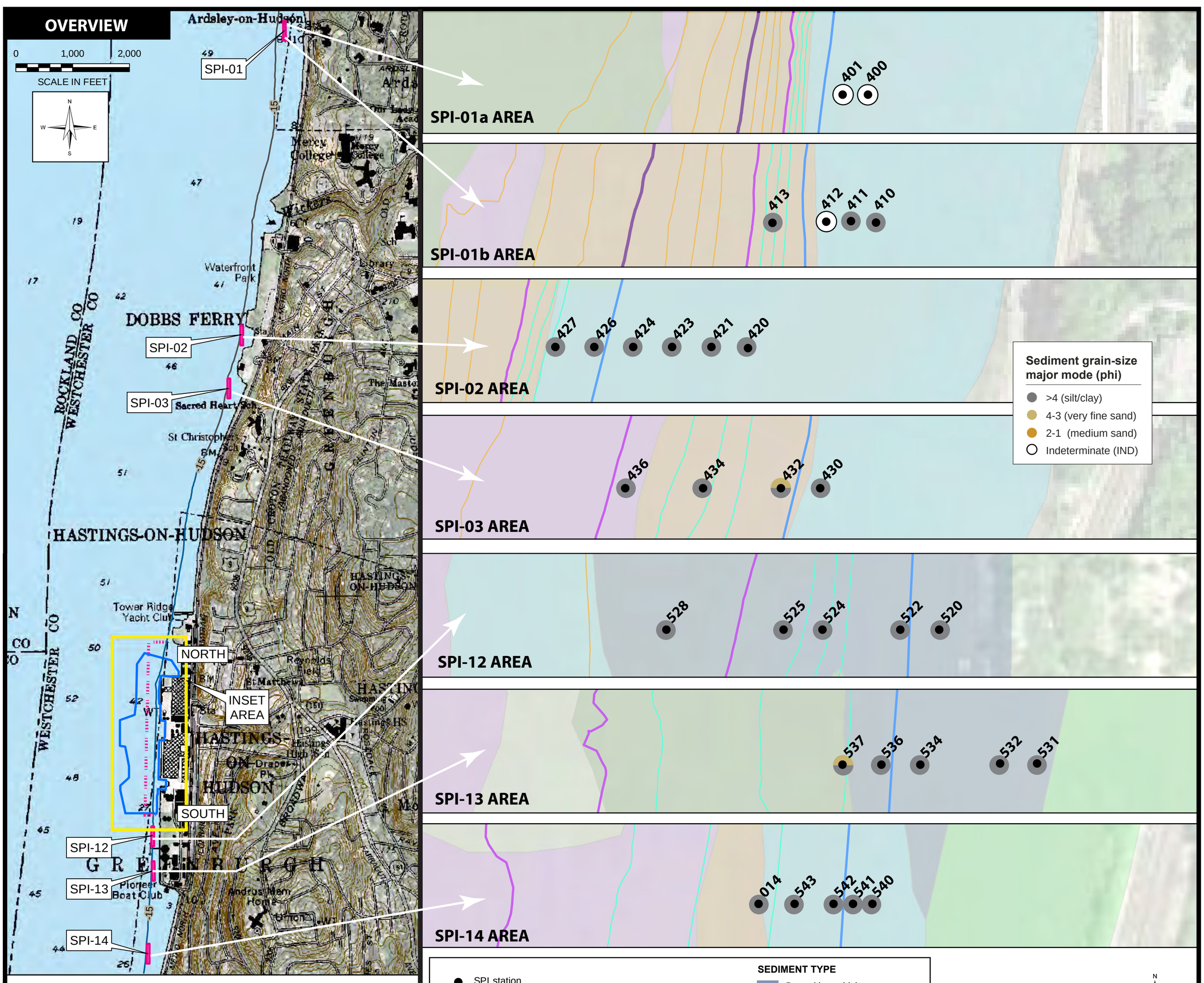
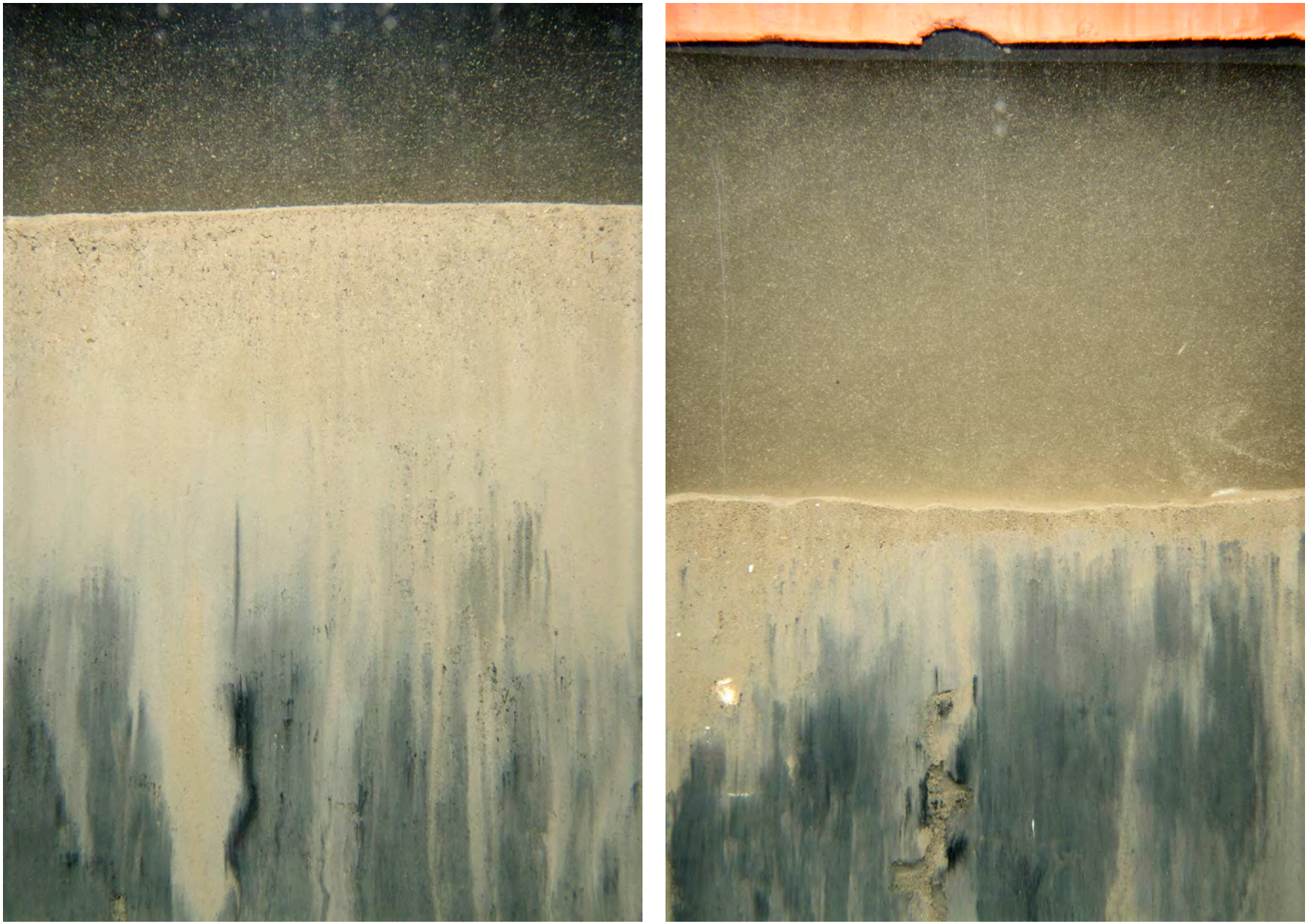
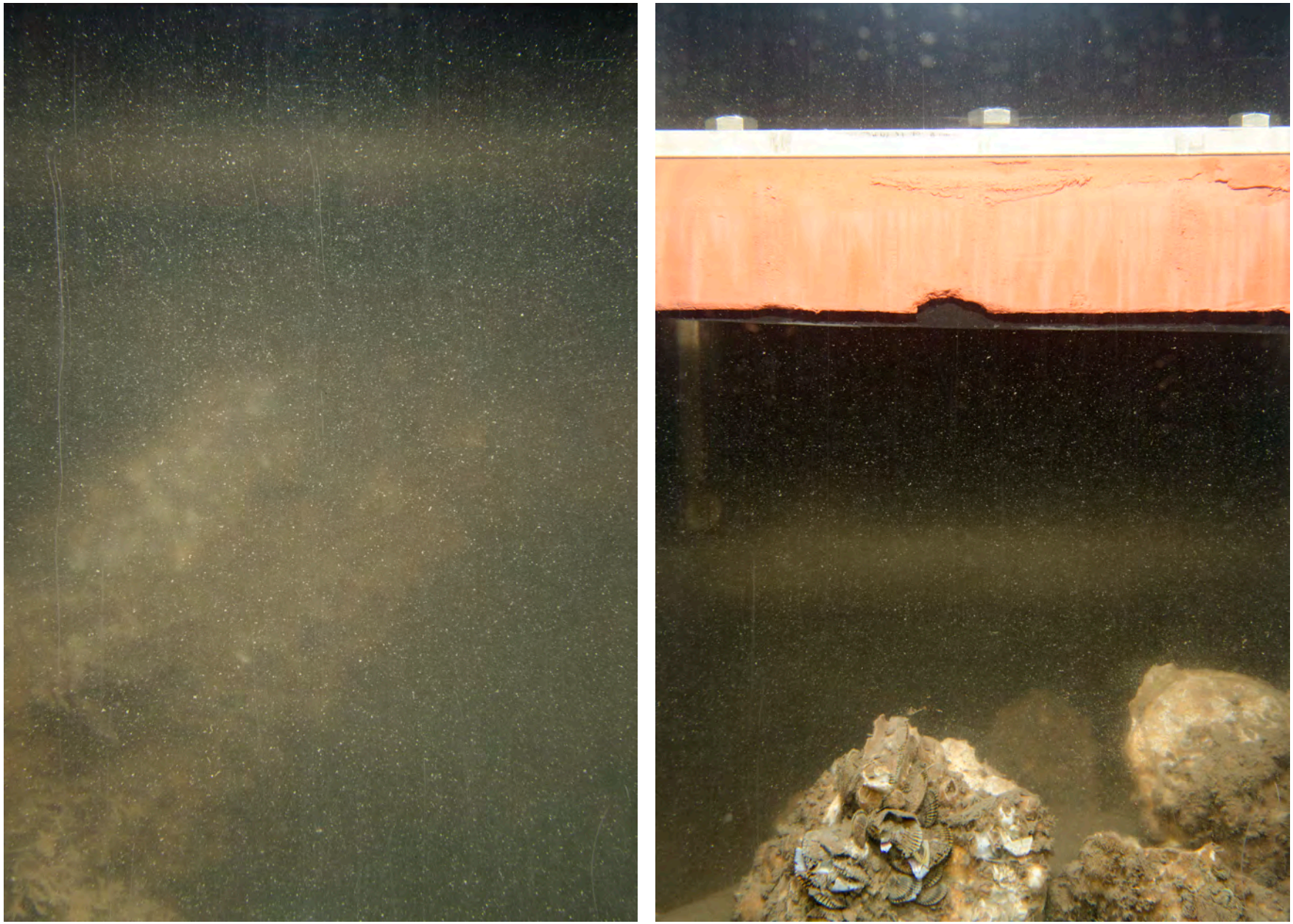


Figure 4c. Spatial distribution of sediment grain size major mode (phi units) at Hastings on Hudson in October, 2013.



Station 30 Station 38

Figure 5: These profile images from Station 30 (left) and 38 (right) show the two dominant sediment types found throughout the site: either a surface layer of silty fine sand over mud (Station 30) or a sediment grain-size major mode of silt-clay (Station 38). Scale: width of each profile image = 14.5 cm.



Station 115 Station 401

Figure 6: These profile images from Station 115 (left) and 401 (right) show debris (section of an old piling in the background, left image) or oyster shells on the surface (right image) that prevented the camera prism from penetrating the bottom. Scale: width of each image = 14.5 cm.

Figure 7: This profile image from Station 95 shows poorly-sorted coarse sand at a shallow (4 ft. water depth) location close to shore in the Inset Area North. Scale: width of profile image = 14.5 cm.

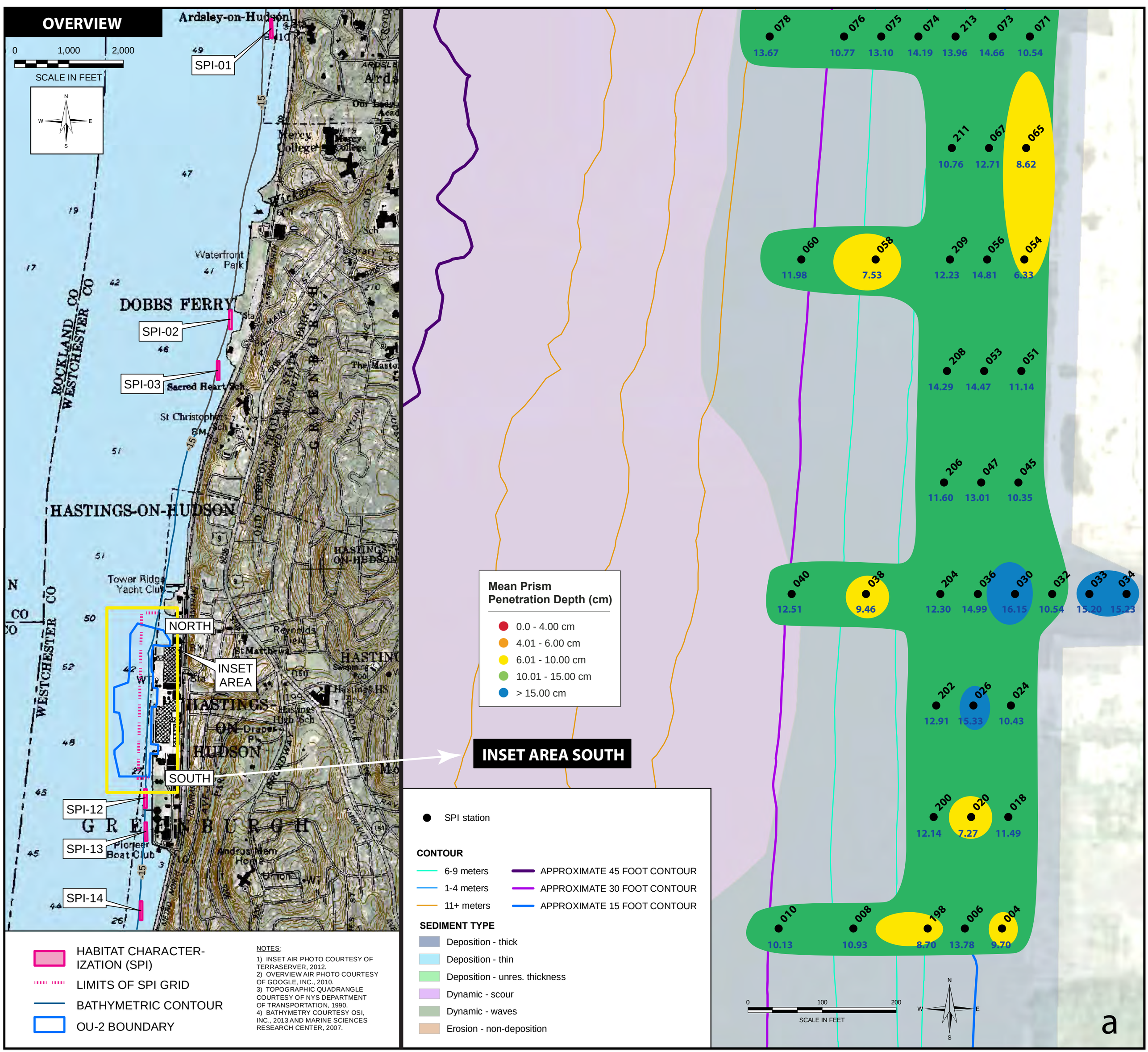


Figure 8a. Spatial distribution of mean prism penetration depth (cm) at Hastings on Hudson in October, 2013.

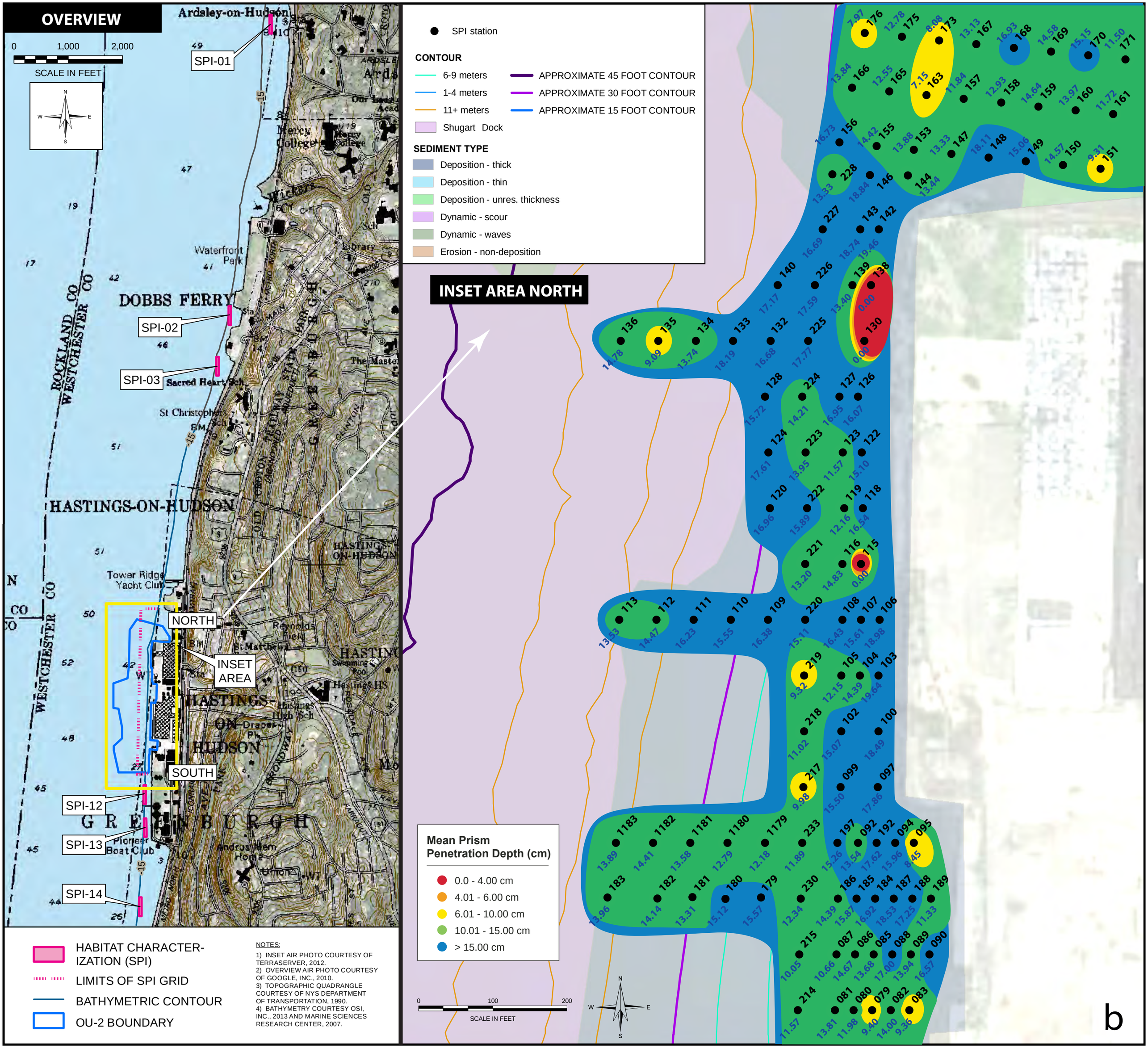


Figure 8b. Spatial distribution of mean prism penetration depth (cm) at Hastings on Hudson in October, 2013.

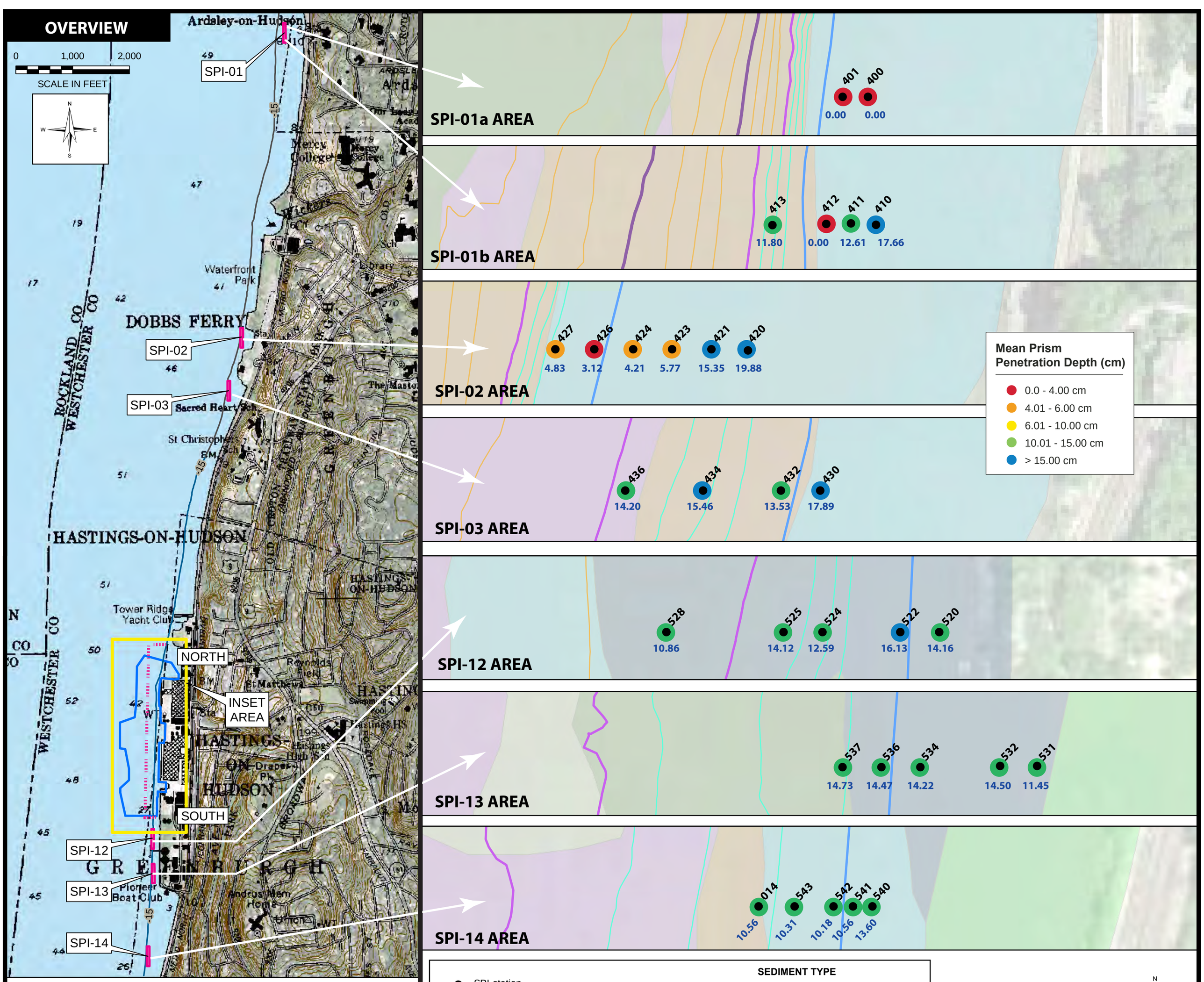
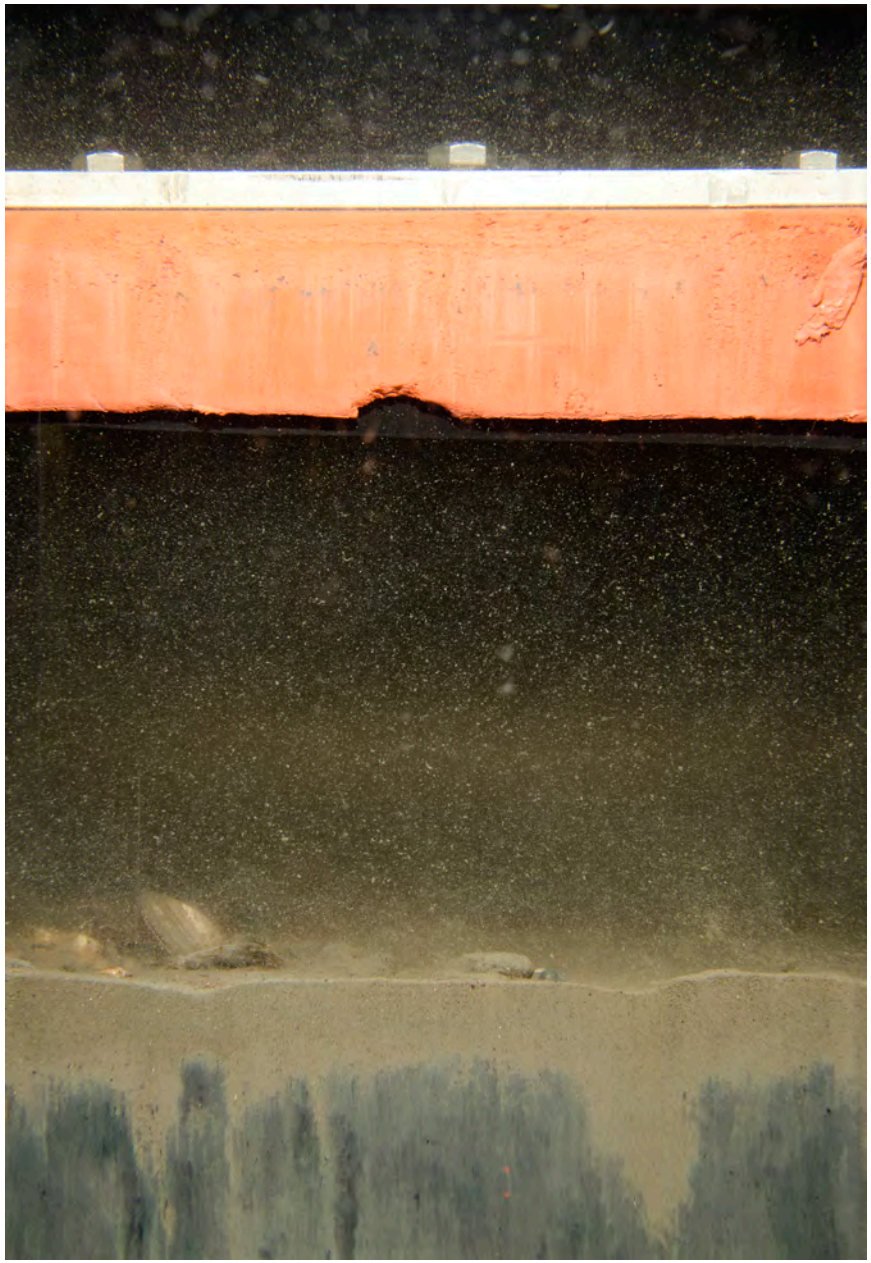


Figure 8c. Spatial distribution of mean prism penetration depth (cm) at Hastings on Hudson in October, 2013.



Station 6

Station 88

Figure 9: These profile images from Station 6 (left) and 88 (right) show the variation in prism penetration due to surface shell/cobble (left) or subsurface methane (right) and their effects on sediment bearing strength. Scale: width of each image = 14.5 cm.

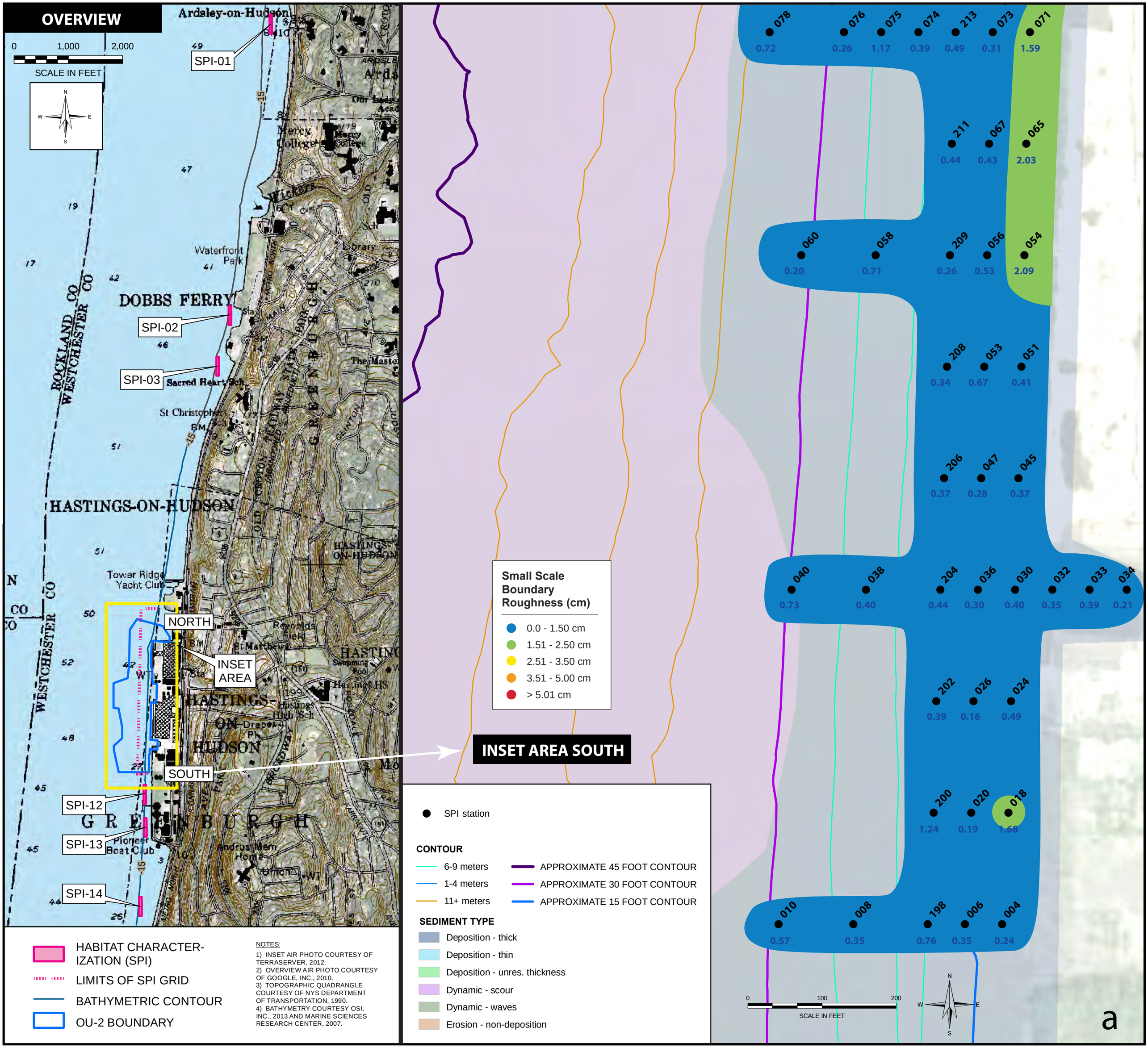


Figure 10a. Spatial distribution of small-scale boundary roughness (cm) at Hastings on Hudson in October, 2013.

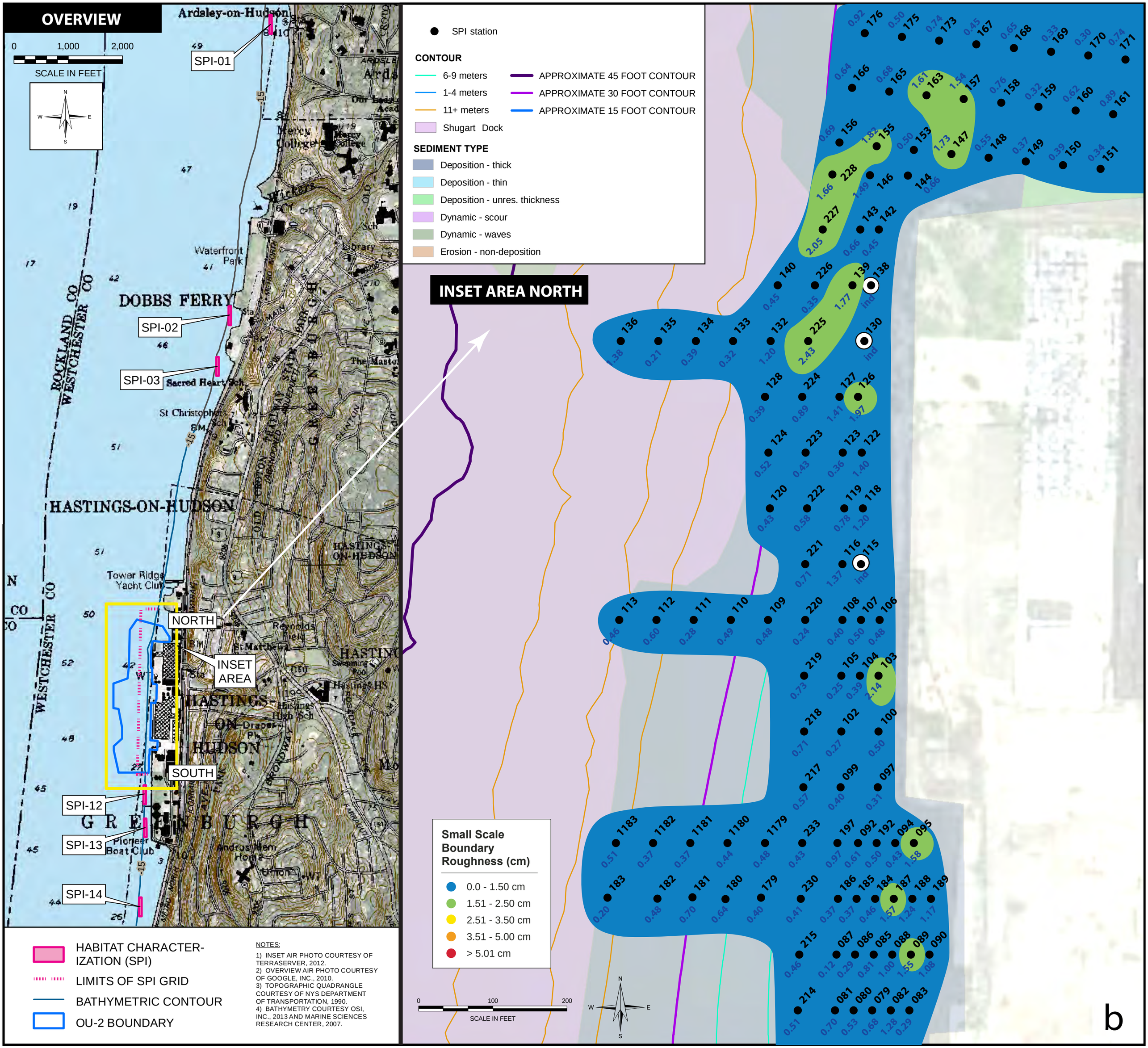


Figure 10b. Spatial distribution of small-scale boundary roughness (cm) at Hastings on Hudson in October, 2013.

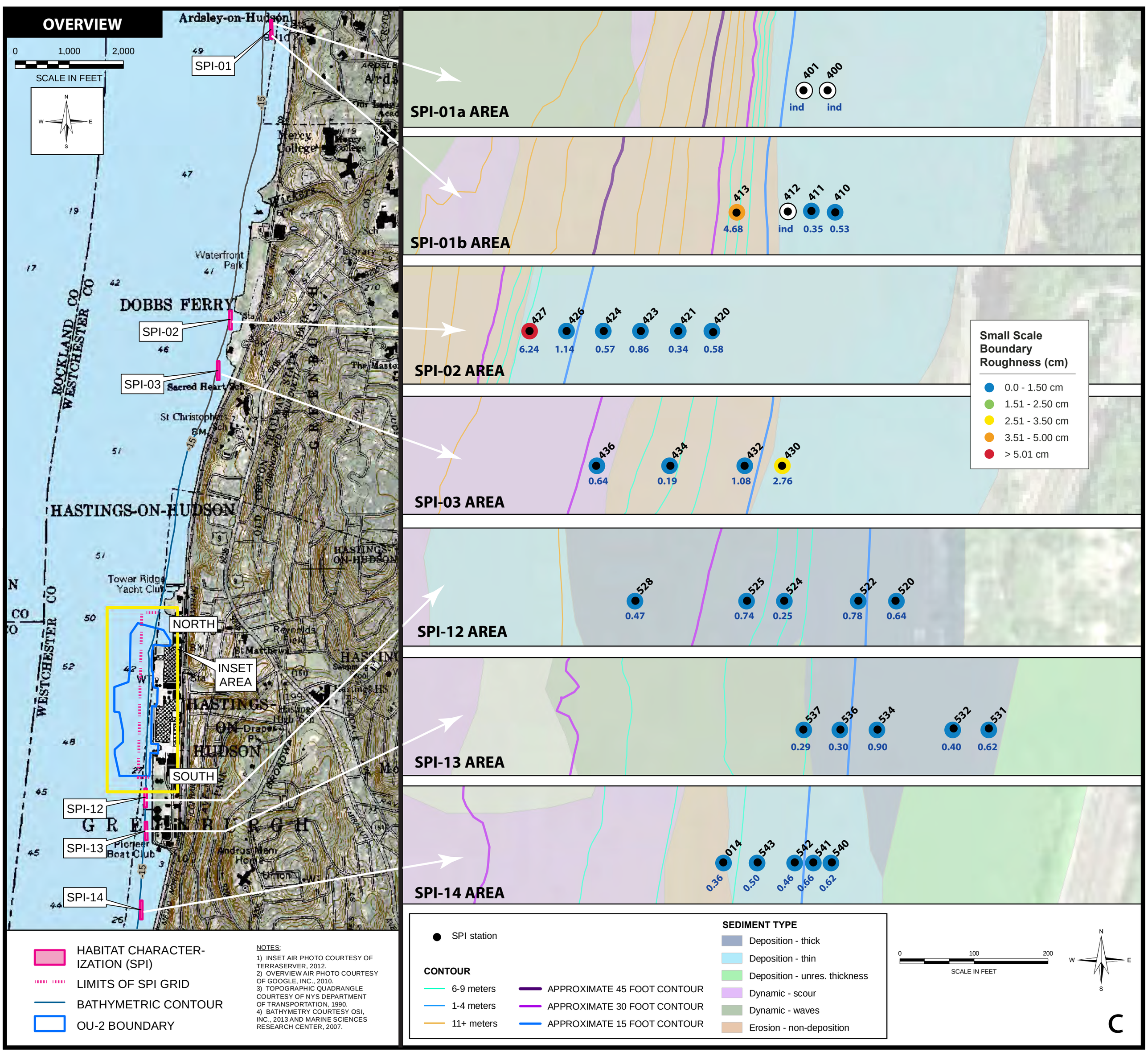


Figure 10c. Spatial distribution of small-scale boundary roughness (cm) at Hastings on Hudson in October, 2013.

Figure 11: The largest surface boundary roughness value measured was at Station 427, where a rock or shell was dragged down on the right side of the image to create a relatively large change in surface topography. Scale: width of profile image = 14.5 cm.

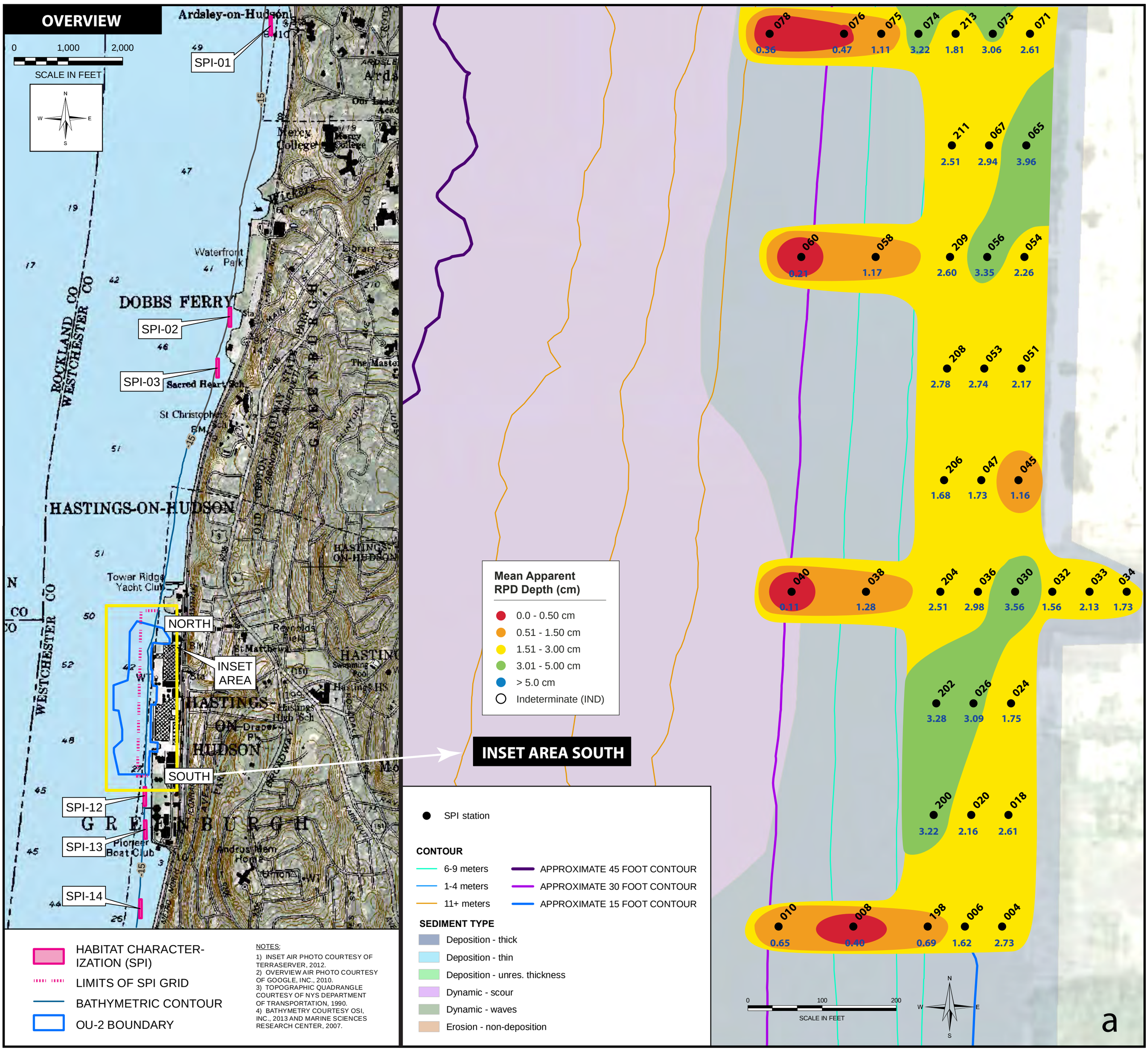


Figure 12a. Spatial distribution of mean aRPD depth (cm) at Hastings on Hudson in October, 2013.

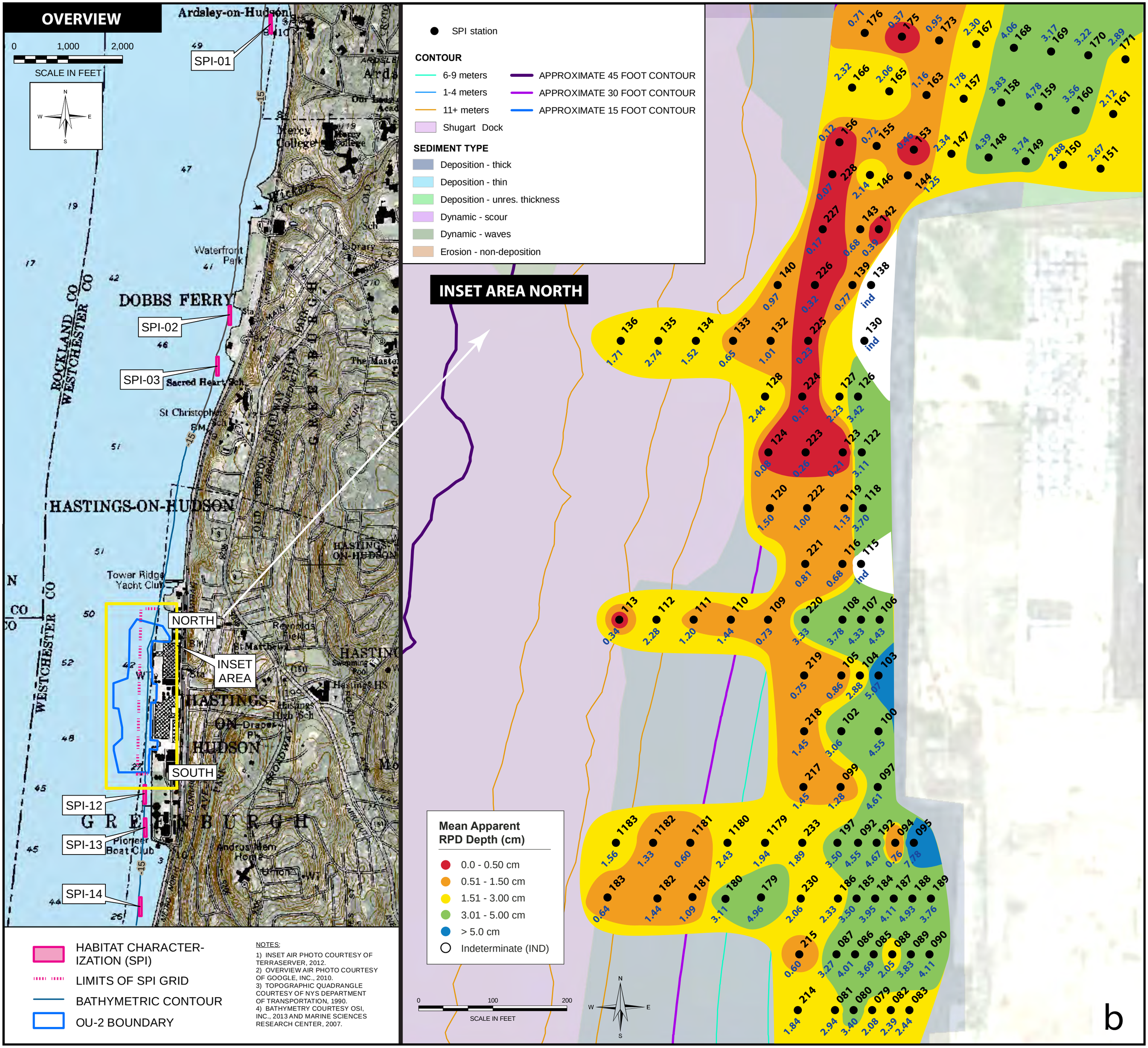


Figure 12b. Spatial distribution of mean aRPD depth (cm) at Hastings on Hudson in October, 2013..

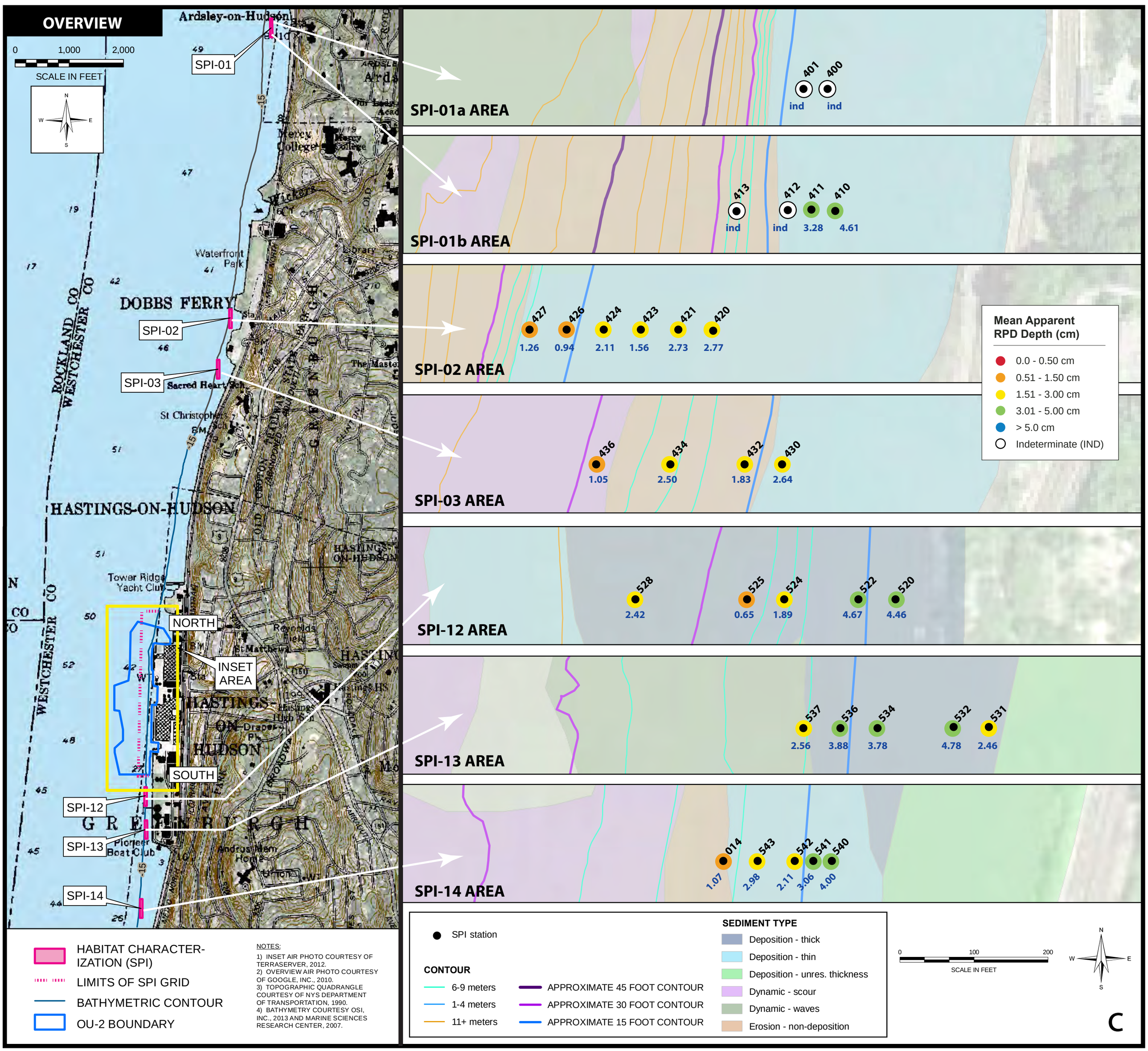


Figure 12c. Spatial distribution of mean aRPD depth (cm) at Hastings on Hudson in October, 2013.

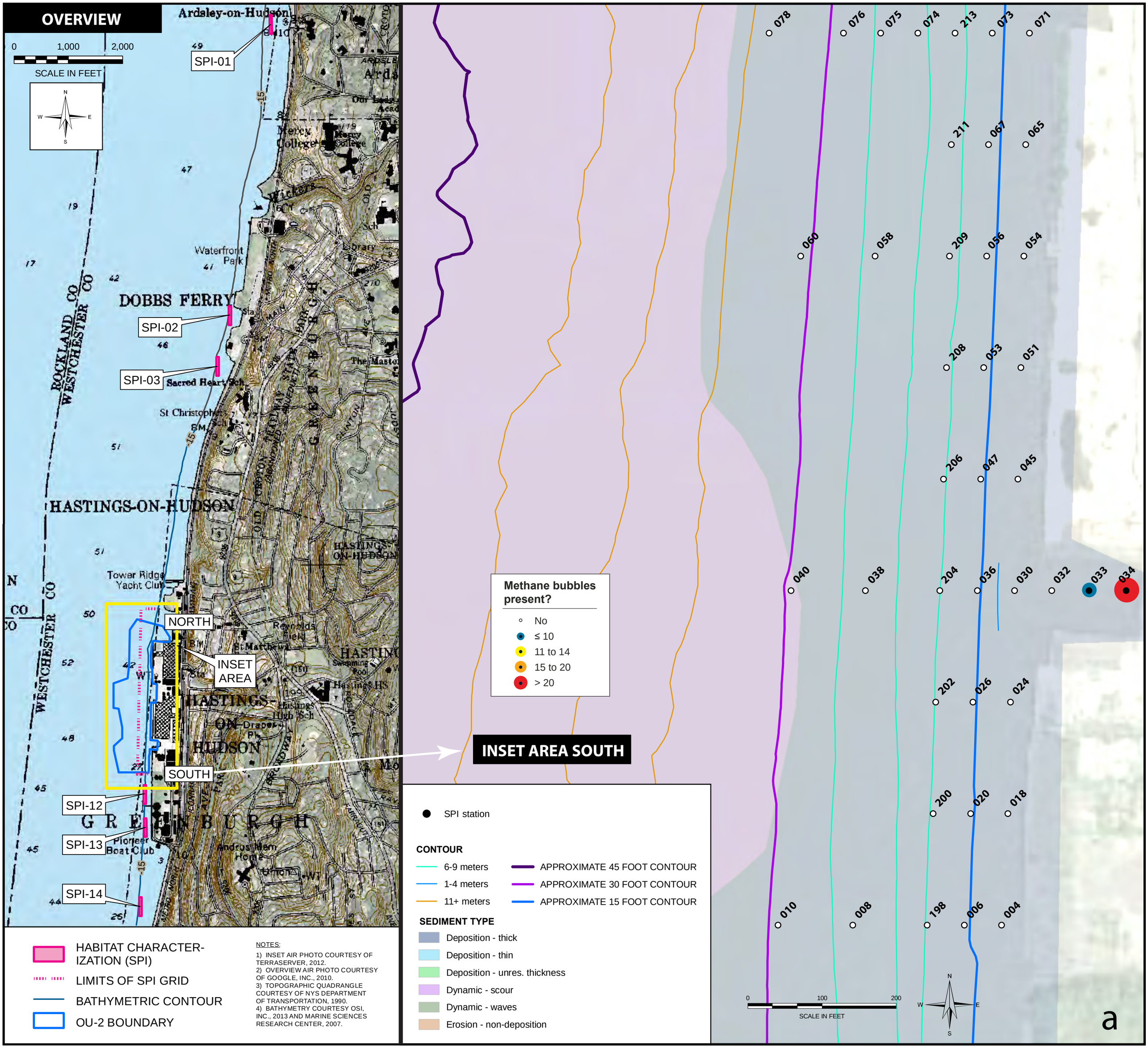


Figure 13a. Stations where subsurface methane was detected at Hastings on Hudson in October, 2013.

OVERVIEW

SPI-01
SPI-02
SPI-03
NORTH
SOUTH
SPI-12
SPI-13
SPI-14
INSET AREA

0 1,000 2,000
SCALE IN FEET

N W E S

Ardsley-on-Hudson
DOBBS FERRY
HASTINGS-ON-HUDSON
HASTINGS ON-HUDSON
GREENBURGH
Waterfront Park
Tower Ridge Yacht Club
Pioneer Boat Club
Sacred Heart Sch
St Christopher's Sch
Merry College
Our Lady Acad
Reynolds Field
St Matthews
Hastings High Sch
Andrus Mem Home
Swimming Pool
Library
ROCKLAND CO
WESTCHESTER CO

HABITAT CHARACTER-IZATION (SPI)
LIMITS OF SPI GRID
BATHYMETRIC CONTOUR
OU-2 BOUNDARY

NOTES:

1) INSET AIR PHOTO COURTESY OF TERRASERVER, 2012.
2) OVERVIEW AIR PHOTO COURTESY OF GOOGLE, INC., 2010.
3) TOPOGRAPHIC QUADRANGLE COURTESY OF NYS DEPARTMENT OF TRANSPORTATION, 1990.
4) BATHYMETRY COURTESY OSI, INC., 2013 AND MARINE SCIENCES RESEARCH CENTER, 2007.

SPI station

CONTOUR

- 6-9 meters
- 1-4 meters
- 11+ meters
- Shugart Dock
- APPROXIMATE 45 FOOT CONTOUR
- APPROXIMATE 30 FOOT CONTOUR
- APPROXIMATE 15 FOOT CONTOUR

SEDIMENT TYPE

- Deposition - thick
- Deposition - thin
- Deposition - unres. thickness
- Dynamic - scour
- Dynamic - waves
- Erosion - non-deposition

INSET AREA NORTH

Methane bubbles present?

- No
- ≤ 10
- 11 to 14
- 15 to 20
- > 20

0 100 200
SCALE IN FEET

N W E S

b

Figure 13b. Stations where subsurface methane was detected at Hastings on Hudson in October, 2013.

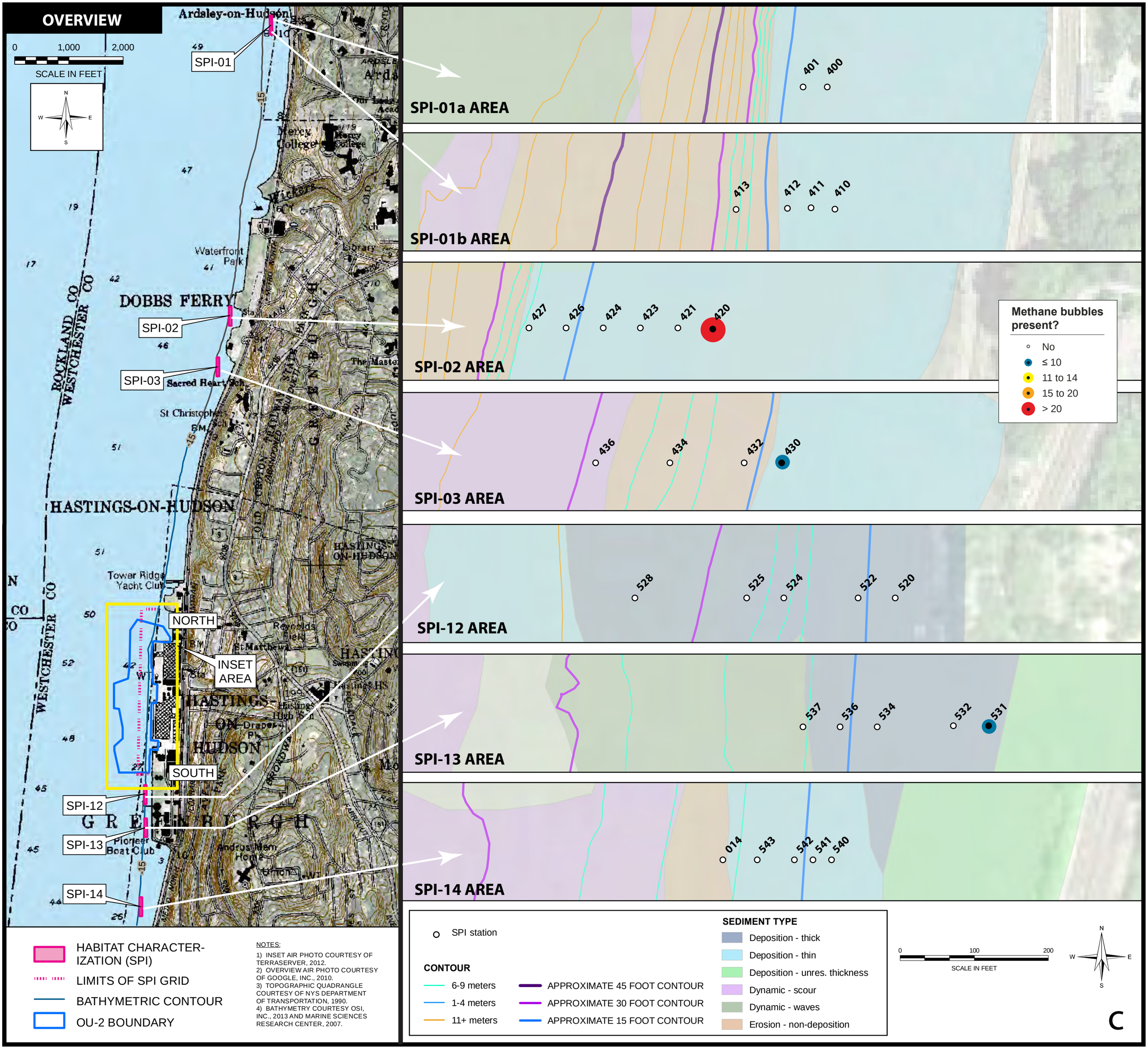


Figure 13c. Stations where subsurface methane was detected at Hastings on Hudson in October, 2013.

Figure 14: This profile image from Station 33 located in less than 5 feet of water near the southern boundary of the OU-2 site shows a large pocket of methane in the lower right corner. Scale: width of profile image = 14.5 cm.

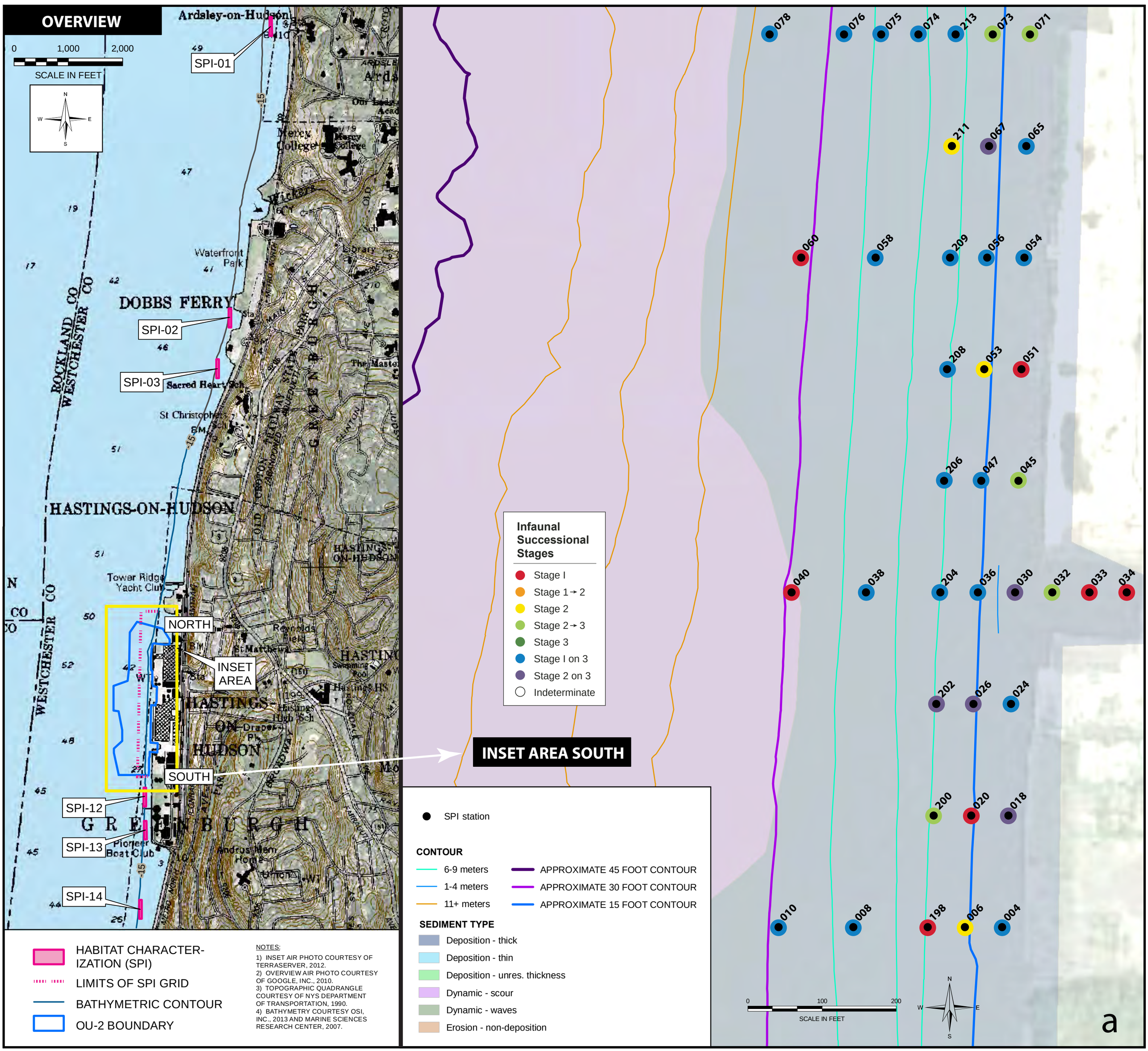


Figure 15a. Spatial distribution of infaunal successional stages at Hastings on Hudson in October, 2013.

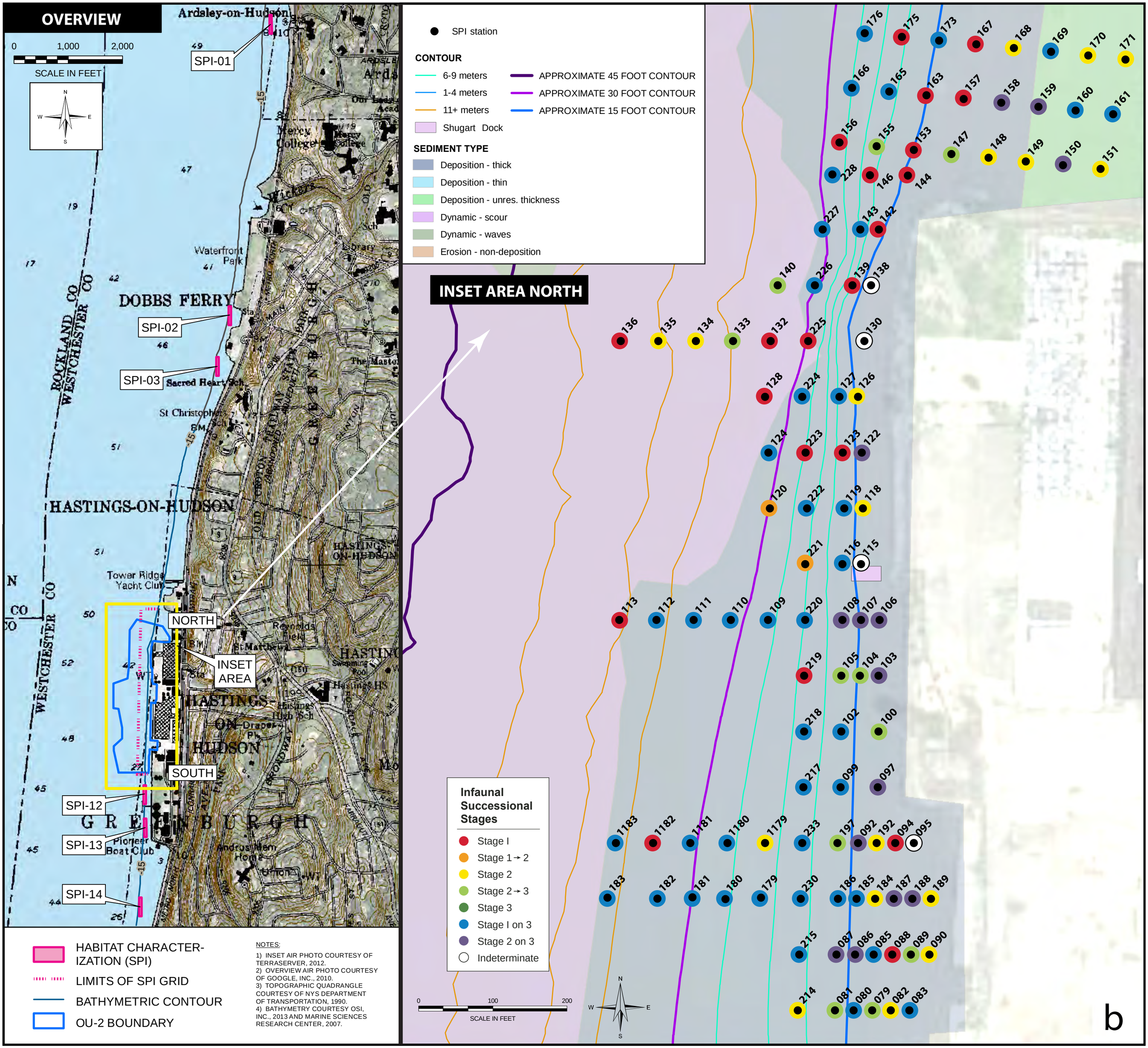


Figure 15b. Spatial distribution of infaunal successional stages at Hastings on Hudson in October, 2013.

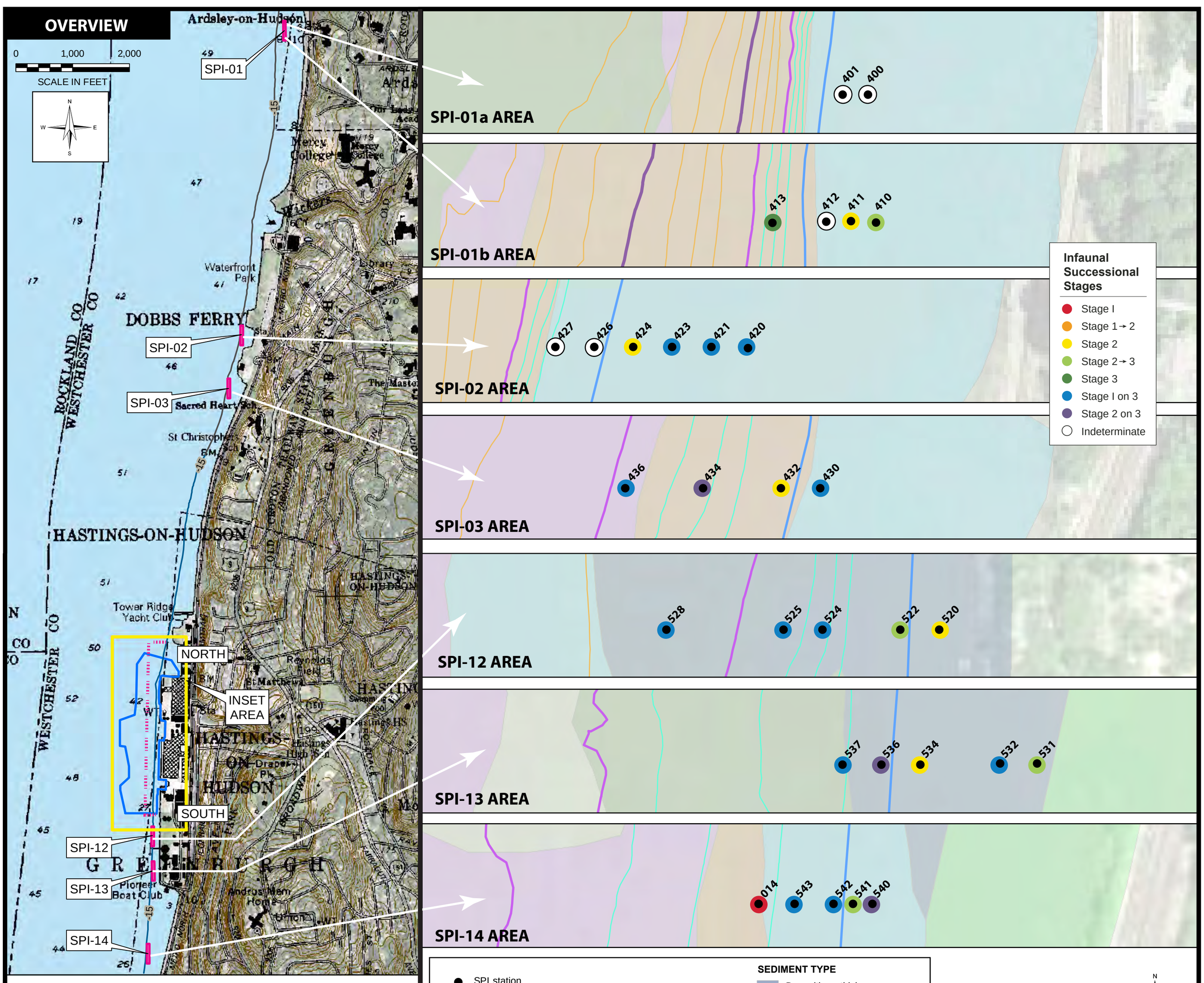


Figure 15c. Spatial distribution of infaunal successional stages at Hastings on Hudson in October, 2013.

Figure 16: This profile image from Station 213 from the Inset Area South (Figure 15a) adjacent to the OU-2 site shows multiple occurrences of subsurface burrows and feeding voids (arrows), a positive observation of Stage 3 taxa. Scale: width of profile image = 14.5 cm.

Figure 17: This profile image from Station 132 shows the surface oxidized layer eroded away from propwash action resulting from the barge drilling activities in the northwest corner of the site. There is no evidence of the presence of deposit feeding taxa. Scale: width of profile image = 14.5 cm

Figure 18: This profile image from Station 144 shows low reflectance subsurface sediments along with trapped methane gas (organic enrichment) as well as recent surface erosion (resuspension and re-settlement of oxidized layer) from boating activity, resulting in retrograde successional seres. Scale: width of profile image = 14.5 cm.

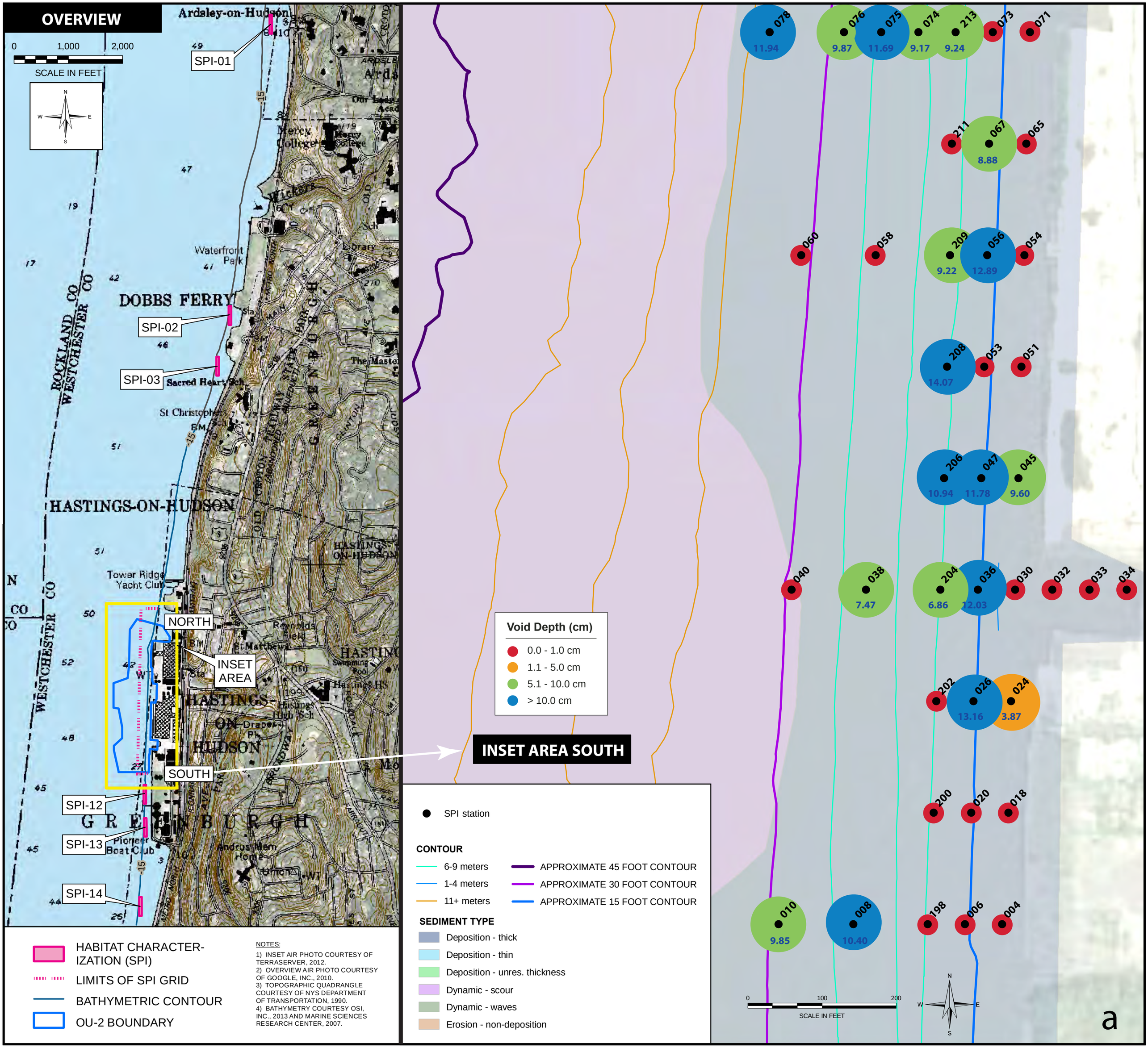


Figure 19a. Spatial distribution of average feeding void depth (cm) at Hastings on Hudson in October, 2013.

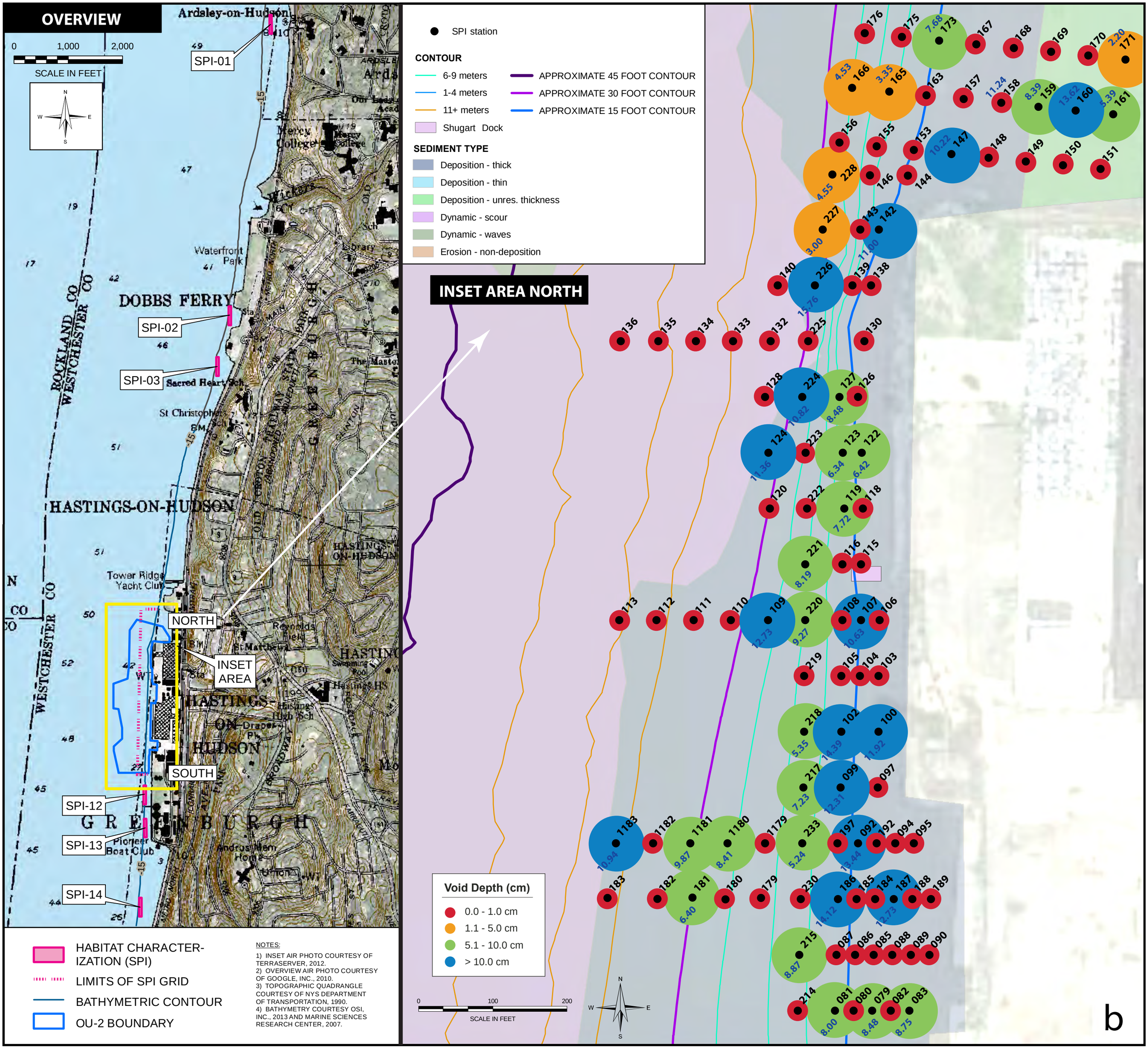


Figure 19b. Spatial distribution of average feeding void depth (cm) at Hastings on Hudson in October, 2013.

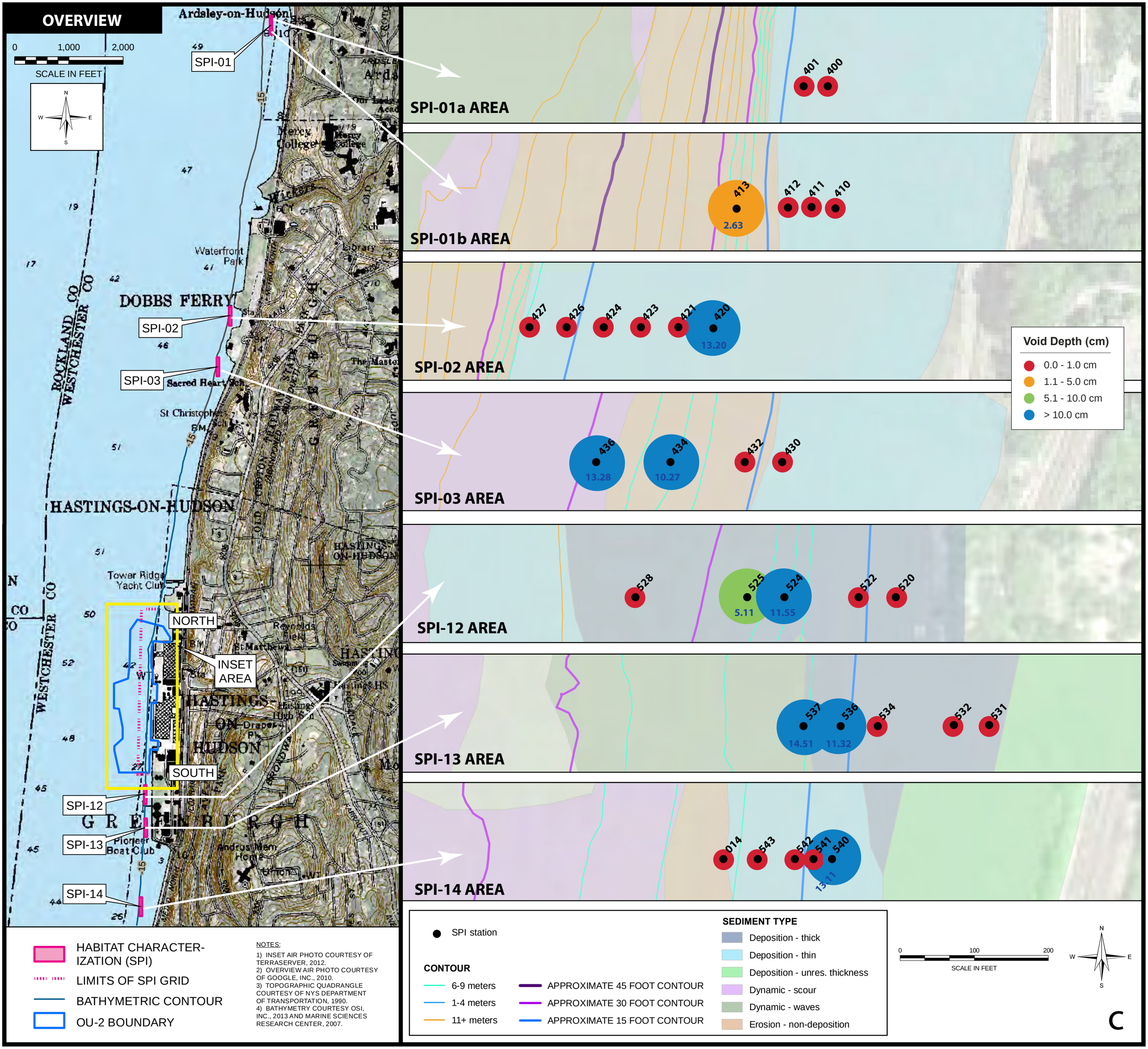


Figure 19c. Spatial distribution of average feeding void depth (cm) at Hastings on Hudson in October, 2013.

Figure 20: This profile image from Station 56 shows transected burrows and the top portion of a feeding void at the base of the image (arrow), indicating that the biological mixing depth at this location exceeds the depth of the camera prism penetration. Scale: width of profile image = 14.5 cm.

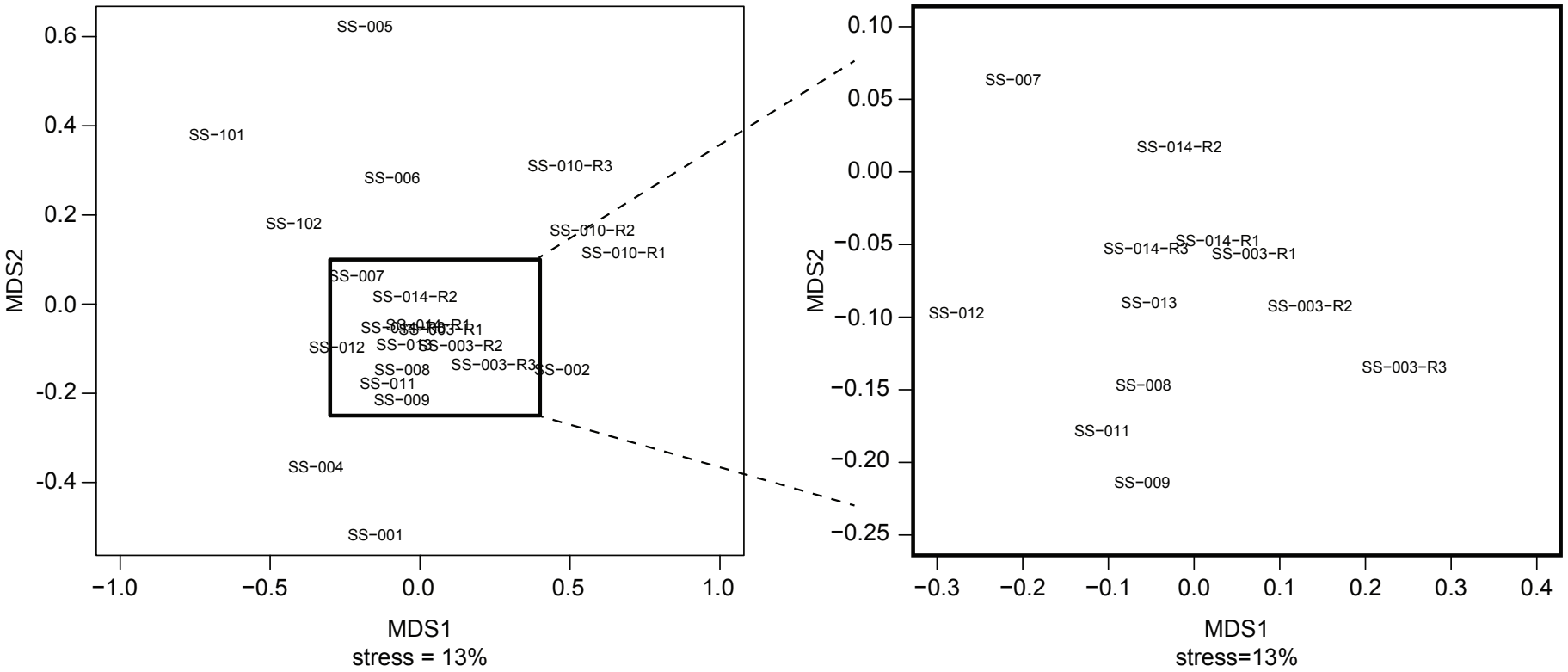


Figure 21: N-MDS ordination of Bray-Curtis dissimilarities for Hastings on Hudson benthic station samples, with zoom-in detail for area outlined.

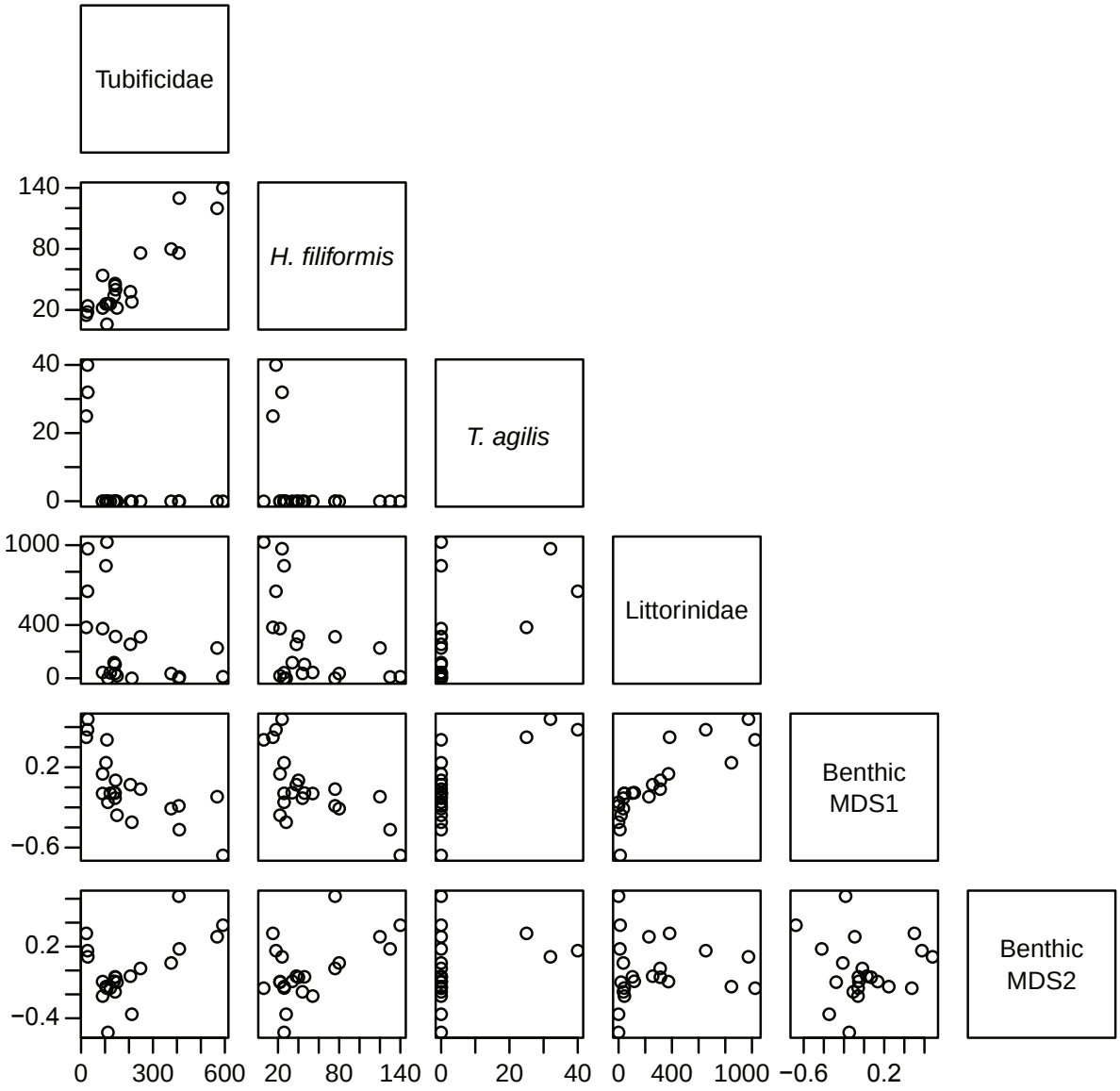


Figure 22: Pairwise scatterplots of benthic N-MDS variables with dominant taxa.

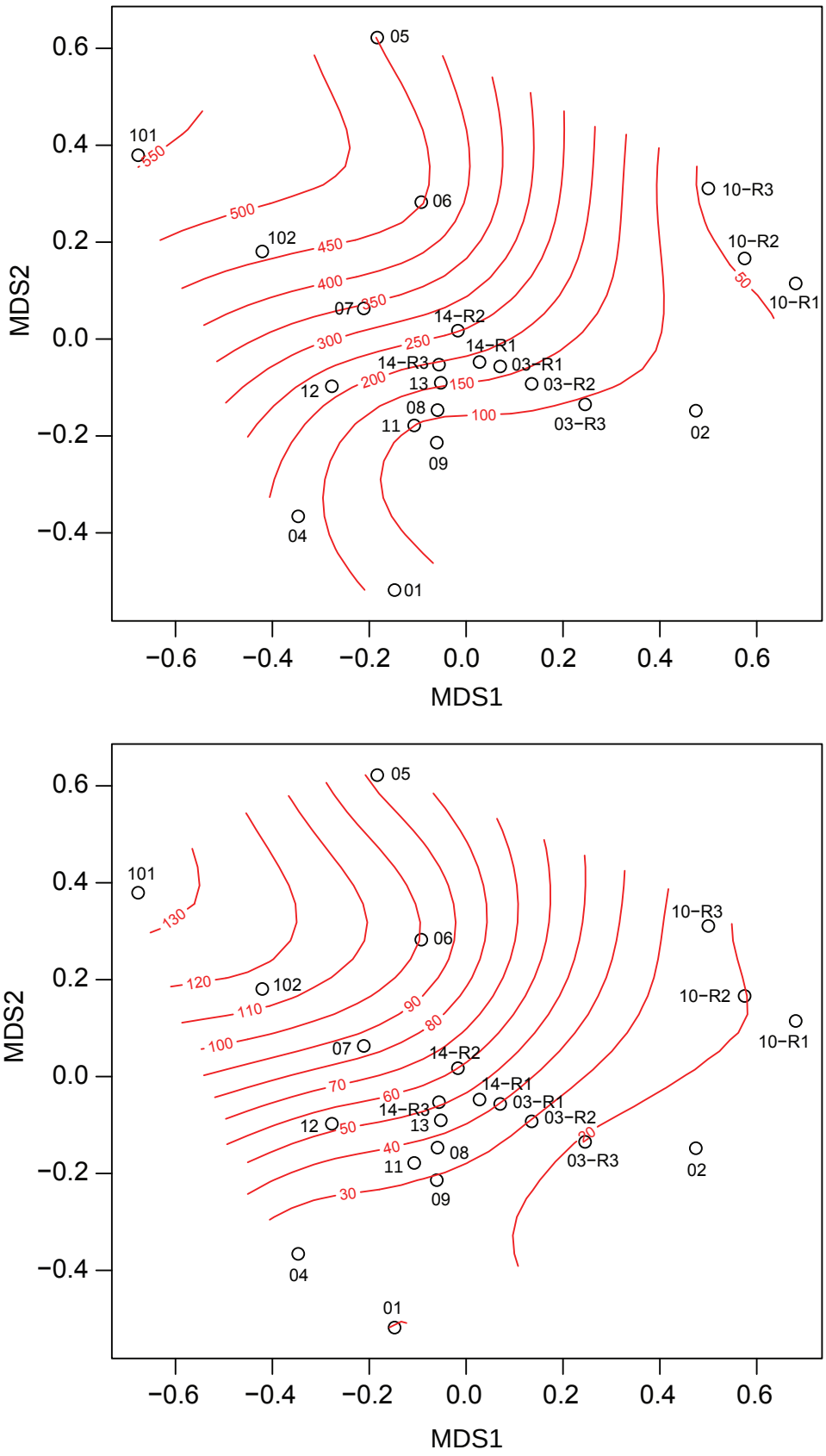


Figure 23: Benthic contours by oligochaete (top) and *Heteromastus filiformis* (bottom) abundance.

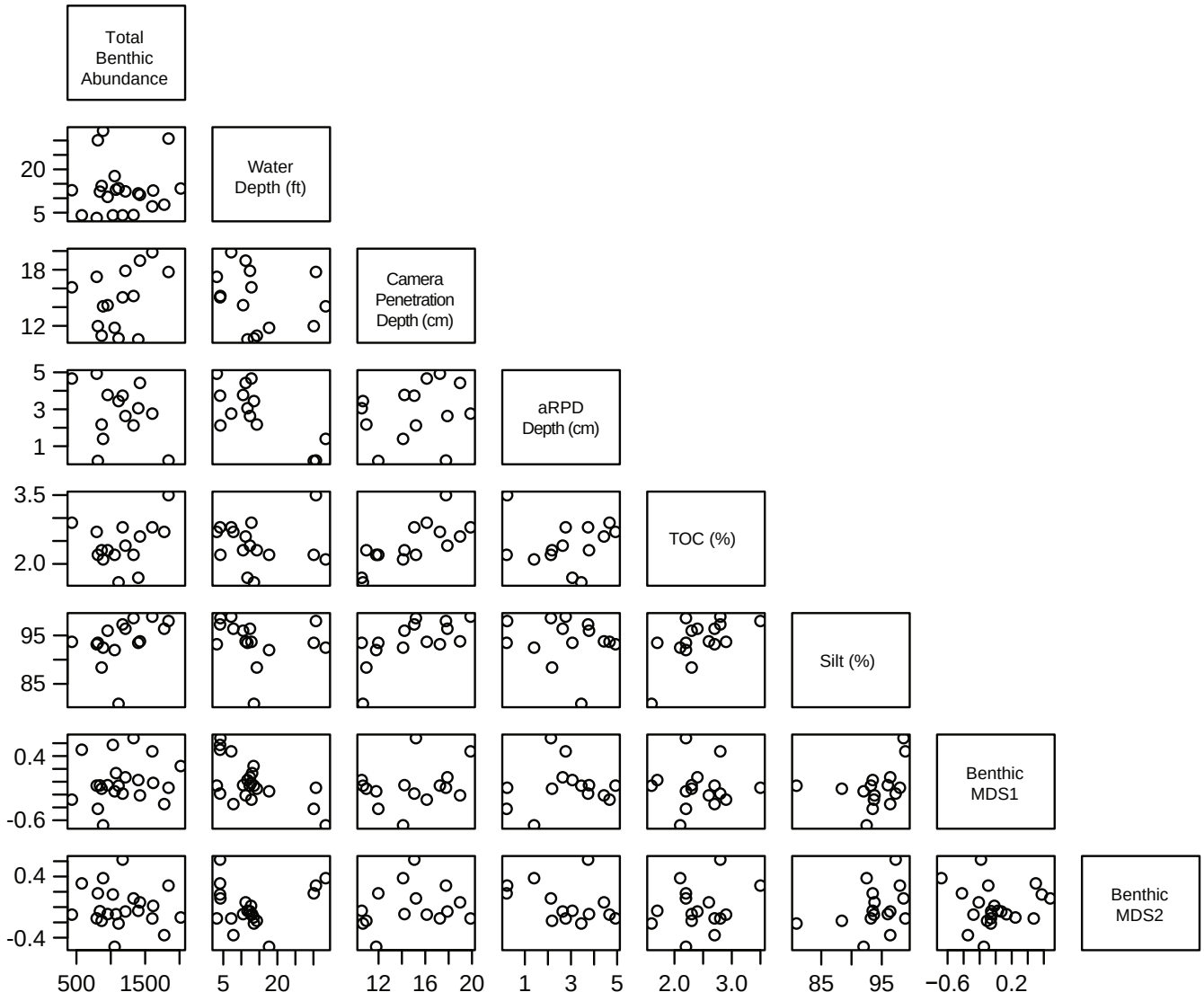


Figure 24: Pairwise scatterplots of benthic N-MDS variables with environmental parameters.

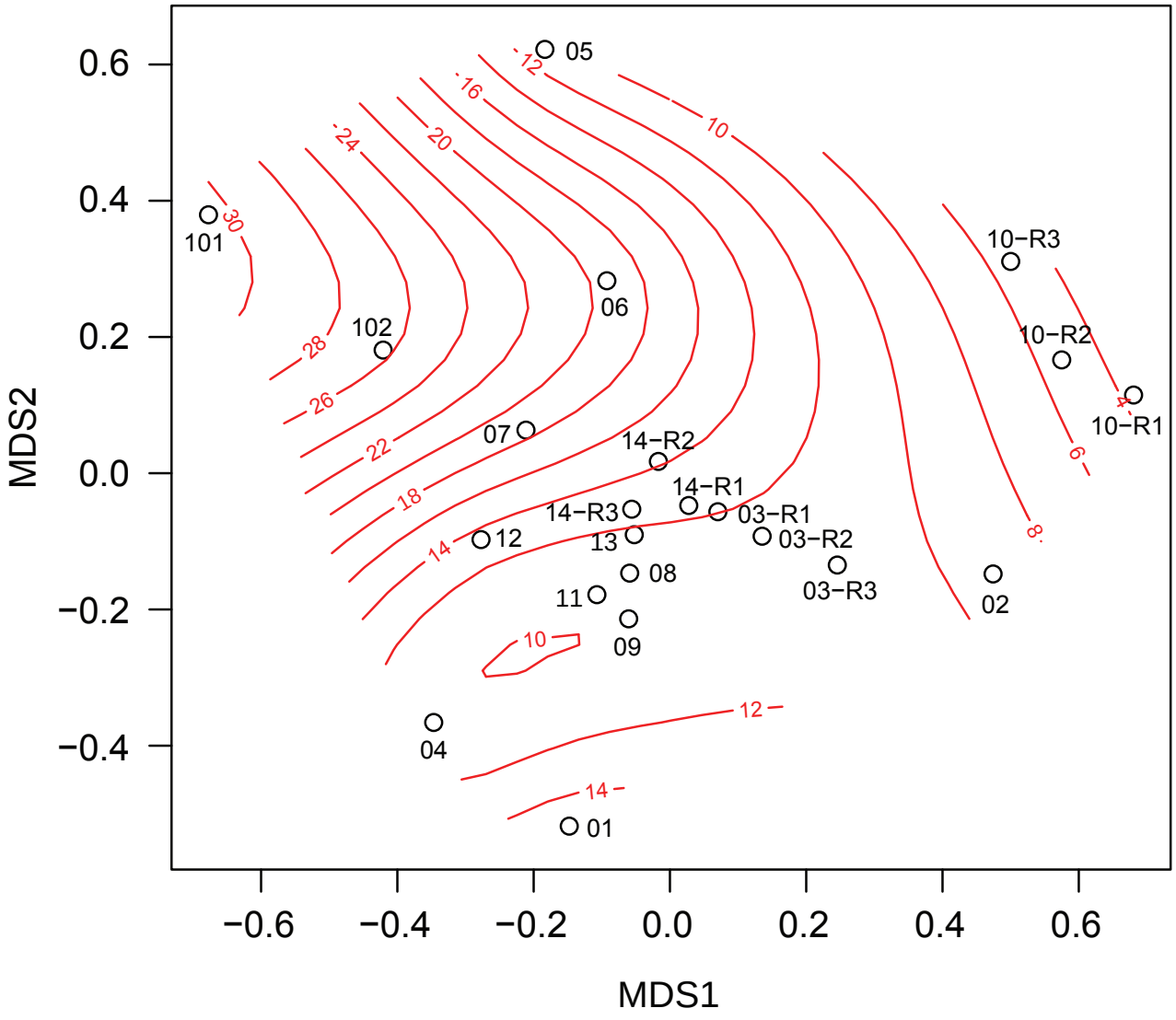


Figure 25: Benthic contours by water depth (ft).

Figure 26: Barplot of dominant taxa for the 3 stations with field replicates by number of individuals per grab (top) and by percent total sample abundance (bottom). Note how the variability in abundance disappears when viewed as proportion of total sample abundance.

Station 56 **Station 58** **Station 60**

Figure 27: Note the decrease in thickness of the surface oxidized layer from resuspension and re-settlement (sharp contact boundary between aRPD and subsurface sediments) of the surface oxidized particles as one moves offshore in these 3 representative images from the same transect: Station 56 (left), Station 58 (center), and Station 60 (right). Scale: width of each profile image = 14.5 cm.

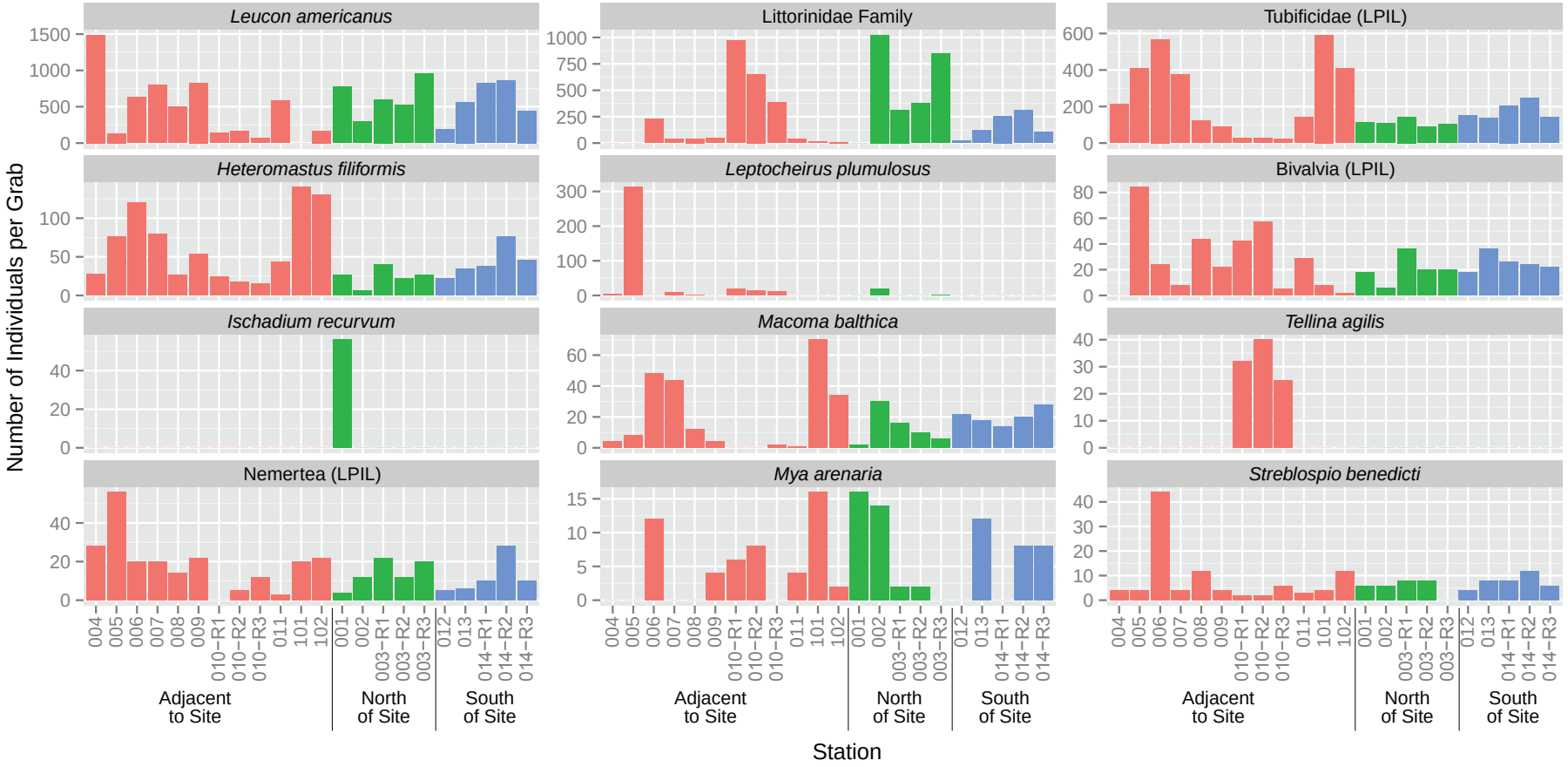


Figure 28: Barplots of counts of dominant taxa for each station (note scale differences on Y-axis).

APPENDIX A

Sediment Profile Image Analysis Results

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
4	A	10/16/2013	9:13:27	12	0	15.6	14.451	>4	>4	1	>4 to 1	140.103	9.70	9.57	9.81	0.24	Biological	39.42	2.73	0	-
6	E	10/17/2013	8:29:19	13.5	3	18.3	14.451	>4	>4	1	>4 to 1	199.1058	13.78	13.62	13.97	0.35	Biological	23.40	1.62	1	reduced
8	C	10/23/2013	7:56:59	15	1	25.1	14.451	>4	>4	1	>4 to 1	157.8933	10.93	10.78	11.12	0.35	Biological	5.79	0.40	0	-
10	A	10/23/2013	8:01:21	15	1	28.6	14.451	>4	>4	1	>4 to 1	146.3906	10.13	9.91	10.48	0.57	Biological	9.46	0.65	0	-
14	C	10/24/2013	9:51:36	15	1	20	14.451	>4	>4	1	>4 to 1	152.6163	10.56	10.43	10.79	0.36	Biological	15.46	1.07	5	both
18	A	10/16/2013	9:30:08	12	0	15.8	14.451	>4	>4	1	>4 to 1	165.9709	11.49	10.69	12.37	1.68	Physical	37.75	2.61	0	-
20	A	10/16/2013	9:37:57	12	0	17.6	14.451	>4	>4	1	>4 to 1	105.1185	7.27	7.16	7.35	0.19	Biological	31.21	2.16	0	-
24	A	10/16/2013	9:44:09	12	0	15.2	14.451	4 to 3/ >4	>4	1	>4 to 1	150.725	10.43	10.23	10.72	0.49	Biological	25.22	1.75	0	-
26	F	10/17/2013	8:22:43	13.5	3	17.6	14.451	4 to 3/ >4	>4	1	>4 to 1	221.5835	15.33	15.29	15.45	0.16	Biological	44.66	3.09	0	-
30	F	10/17/2013	8:38:12	13.5	3	15	14.451	4 to 3/ >4	>4	1	>4 to 1	233.3338	16.15	15.88	16.28	0.40	Biological	51.46	3.56	0	-
32	C	10/16/2013	10:05:54	12	0	4.2	14.451	>4	>4	2	>4 to 2	152.2848	10.54	10.34	10.70	0.35	Biological	22.57	1.56	10+	reduced
33	A	10/23/2013	12:24:39	15	2	4.8	14.451	>4	>4	2	>4 to 2	219.6178	15.20	14.96	15.35	0.39	Biological	30.75	2.13	0	-
34	E	10/17/2013	8:42:53	13.5	3	4.9	14.451	>4	>4	1	>4 to 1	220.1255	15.23	15.14	15.35	0.21	Biological	25.01	1.73	10+	both
36	D	10/17/2013	8:48:14	13.5	3	17.6	14.451	4 to 3/ >4	>4	1	>4 to 1	216.6266	14.99	14.81	15.11	0.30	Biological	43.01	2.98	0	-
38	A	10/23/2013	8:08:52	15	1	25	14.451	>4	>4	1	>4 to 1	136.6846	9.46	9.30	9.70	0.40	Biological	18.47	1.28	0	-
40	B	10/23/2013	8:16:03	15	1	28.6	14.451	>4	>4	2	>4 to 2	180.8353	12.51	12.15	12.87	0.73	Biological	1.66	0.11	0	-
45	C	10/16/2013	10:24:12	12	0	13.9	14.451	>4	>4	1	>4 to 1	149.5895	10.35	10.18	10.55	0.37	Biological	16.71	1.16	0	-
47	D	10/17/2013	8:53:27	13.5	3	18.7	14.451	>4	>4	1	>4 to 1	188.0742	13.01	12.87	13.16	0.28	Biological	24.94	1.73	0	-
51	A	10/16/2013	10:33:45	12	0	14.6	14.451	>4	>4	1	>4 to 1	161.0031	11.14	10.91	11.32	0.41	Biological	31.34	2.17	0	-
53	D	10/17/2013	9:05:17	13.5	3	19	14.451	>4	>4	1	>4 to 1	209.0614	14.47	14.10	14.77	0.67	Biological	39.54	2.74	10+	oxidized
54	E	10/17/2013	9:12:11	13.5	3	12.8	14.451	>4	>4	-6	>4 to -6	91.44901	6.33	5.22	7.31	2.09	Biological	32.65	2.26	0	-
56	F	10/17/2013	9:17:49	13.5	3	18.6	14.451	>4	>4	1	>4 to 1	213.9574	14.81	14.62	15.15	0.53	Biological	48.34	3.35	0	-
58	B	10/23/2013	8:23:34	15	1	25.3	14.451	>4	>4	2	>4 to 2	108.844	7.53	7.28	7.99	0.71	Biological	16.86	1.17	2	reduced
60	B	10/23/2013	8:30:21	15	1	29.9	14.451	>4	>4	2	>4 to 2	173.1107	11.98	11.88	12.08	0.20	Biological	3.03	0.21	0	-
65	E	10/17/2013	9:22:35	13.5	3	14.3	14.451	>4	>4	1	>4 to 1	124.5076	8.62	7.45	9.48	2.03	Biological	57.18	3.96	0	-
67	E	10/17/2013	9:27:15	13.5	3	18	14.451	4 to 3/ >4	>4	1	>4 to 1	183.66	12.71	12.41	12.84	0.43	Biological	42.47	2.94	10+	both
71	C	10/16/2013	11:14:42	12	0	15.6	14.451	>4	>4	1	>4 to 1	152.3288	10.54	9.69	11.28	1.59	Biological	37.73	2.61	4	reduced

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
73	D	10/17/2013	9:32:03	13.5	3	20	14.451	>4	>4	1	>4 to 1	211.796	14.66	14.50	14.81	0.31	Biological	44.16	3.06	0	-
74	C	10/17/2013	10:17:07	13.5	3	25.6	14.451	>4	>4	1	>4 to 1	205.0068	14.19	14.01	14.39	0.39	Biological	46.58	3.22	1	reduced
75	A	10/17/2013	10:25:10	13.5	3	27.9	14.451	>4	>4	2	>4 to 2	189.2574	13.10	12.49	13.66	1.17	Biological	16.05	1.11	0	-
76	A	10/23/2013	8:38:08	15	1	27.6	14.451	>4	>4	1	>4 to 1	155.6749	10.77	10.67	10.93	0.26	Biological	6.80	0.47	0	-
78	A	10/23/2013	8:44:08	15	1	27.2	14.451	>4	>4	2	>4 to 2	197.497	13.67	13.44	14.16	0.72	Physical	5.15	0.36	0	-
79	B	10/16/2013	11:35:06	12	0	13.1	14.451	>4	>4	1	>4 to 1	135.9048	9.40	9.14	9.82	0.68	Biological	30.05	2.08	3	both
80	C	10/24/2013	11:49:01	15	1	15.9	14.451	>4	>4	1	>4 to 1	173.0864	11.98	11.67	12.20	0.53	Biological	49.17	3.40	5	oxidized
81	E	10/17/2013	9:39:46	13.5	3	20.2	14.451	>4	>4	1	>4 to 1	199.5303	13.81	13.48	14.18	0.70	Biological	42.55	2.94	0	-
82	D	10/23/2013	13:26:03	15	0	8.2	14.451	>4	>4	1	>4 to 1	202.3304	14.00	13.41	14.68	1.28	Biological	34.52	2.39	0	-
83	C	10/16/2013	11:30:57	12	0	2.7	14.451	4 to 3/ >4	>4	1	>4 to 1	135.2007	9.36	9.27	9.56	0.29	Biological	35.32	2.44	10+	both
85	B	10/24/2013	11:25:40	15	1	14.8	14.451	>4	>4	1	>4 to 1	197.6327	13.68	13.21	14.03	0.81	Biological	53.36	3.69	0	-
86	C	10/23/2013	12:08:15	15	2	16.9	14.451	4 to 3/ >4	>4	0	>4 to 0	211.9609	14.67	14.52	14.81	0.29	Biological	57.94	4.01	0	-
87	A	10/24/2013	11:40:29	15	1	17.6	14.451	>4	>4	1	>4 to 1	154.0804	10.66	10.60	10.72	0.12	Biological	47.27	3.27	0	-
88	D	10/24/2013	11:16:06	15	1	8.2	14.451	>4	>4	1	>4 to 1	245.7213	17.00	16.59	17.58	1.00	Biological	29.68	2.05	0	-
89	A	10/24/2013	11:10:03	15	1	3	14.451	4 to 3/ >4	>4	1	>4 to 1	201.495	13.94	13.17	14.72	1.55	Biological	55.40	3.83	0	-
90	A	10/23/2013	11:51:00	15	2	4.5	14.451	4 to 3/ >4	>4	1	>4 to 1	239.4848	16.57	15.90	16.98	1.08	Biological	59.40	4.11	0	-
92	C	10/24/2013	11:01:39	15	1	15.8	14.451	4 to 3/ >4	>4	1	>4 to 1	195.6518	13.54	13.33	13.94	0.61	Biological	65.73	4.55	5	oxidized
94	A	10/24/2013	10:55:14	15	1	3.9	14.451	>4	>4	1	>4 to 1	230.6924	15.96	15.77	16.20	0.43	Biological	10.94	0.76	0	-
95	A	10/23/2013	11:44:32	15	2	4	14.451	2 to1	>4	-4	>4 to -4	122.1568	8.45	7.69	9.27	1.58	Physical	112.39	7.78	0	-
97	B	10/23/2013	11:33:57	15	2	14.9	14.451	4 to 3/ >4	>4	1	>4 to 1	258.0552	17.86	17.70	18.01	0.31	Biological	66.64	4.61	10+	both
99	A	10/23/2013	11:37:57	15	2	18.7	14.451	>4	>4	1	>4 to 1	223.9501	15.50	15.30	15.70	0.40	Biological	18.55	1.28	0	-
100	C	10/16/2013	14:30:56	13.5	3	12.3	14.451	4 to 3/ >4	>4	1	>4 to 1	267.2159	18.49	18.21	18.71	0.50	Biological	65.80	4.55	0	-
102	A	10/16/2013	14:35:35	13.5	3	16.6	14.451	4 to 3/ >4	>4	1	>4 to 1	217.8152	15.07	14.90	15.16	0.27	Biological	44.16	3.06	0	-
103	C	10/23/2013	11:12:10	15	2	12.7	14.451	4 to 3/ >4	>4	1	>4 to 1	283.7806	19.64	18.60	20.74	2.14	Biological	73.31	5.07	10+	both
104	A	10/23/2013	11:16:30	15	2	16.1	14.451	>4	>4	1	>4 to 1	208.0153	14.39	14.22	14.61	0.39	Biological	41.67	2.88	2	oxidized
105	B	10/23/2013	11:22:50	15	2	18.8	14.451	>4	>4	2	>4 to 2	175.5443	12.15	12.01	12.26	0.25	Biological	12.42	0.86	10+	both
106	A	10/16/2013	14:57:10	13.5	3	11.2	14.451	>4	>4	1	>4 to 1	274.2751	18.98	18.75	19.23	0.48	Biological	64.01	4.43	0	-
107	B	10/16/2013	15:04:02	13.5	3	15.9	14.451	4 to 3/ >4	>4	1	>4 to 1	225.6453	15.61	15.37	15.87	0.50	Biological	62.62	4.33	1	oxidized

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
108	B	10/16/2013	15:10:51	13.5	3	16.9	14.451	4 to 3/ >4	>4	0	>4 to 0	237.4712	16.43	16.22	16.62	0.40	Biological	54.59	3.78	0	-
109	B	10/23/2013	15:09:56	15	1	29.2	14.451	>4	>4	1	>4 to 1	236.6374	16.38	16.16	16.64	0.48	Biological	10.48	0.73	4	both
110	B	10/23/2013	9:03:07	15	1	29.9	14.451	>4	>4	1	>4 to 1	224.6908	15.55	15.23	15.72	0.49	Biological	20.87	1.44	0	-
111	A	10/23/2013	15:15:15	15	1	34.5	14.451	4 to 3/ >4	>4	1	>4 to 1	234.5624	16.23	16.08	16.36	0.28	Biological	17.35	1.20	0	-
112	A	10/23/2013	9:08:12	15	1	35.6	14.451	4 to 3/ >4	>4	1	>4 to 1	209.087	14.47	14.13	14.73	0.60	Biological	32.90	2.28	0	-
113	A	10/23/2013	15:21:16	15	1	39.6	14.451	>4	>4	1	>4 to 1	195.5177	13.53	13.25	13.72	0.46	Biological	4.93	0.34	0	-
115	C	10/23/2013	14:55:52	15	2	16.2	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	Physical	ind	ind	0	-
116	C	10/23/2013	15:01:35	15	2	21.1	14.451	>4	>4	1	>4 to 1	214.2966	14.83	14.37	15.73	1.37	Biological	9.80	0.68	4	reduced
118	B	10/23/2013	10:53:04	15	2	15.2	14.451	4 to 3/ >4	>4	1	>4 to 1	239.087	16.54	16.03	17.22	1.20	Biological	53.51	3.70	0	-
119	A	10/23/2013	11:03:27	15	2	20.0	14.451	>4	>4	0	>4 to 0	175.784	12.16	11.77	12.55	0.78	Biological	16.29	1.13	10+	both
120	A	10/23/2013	9:58:43	15	1	28.8	14.451	>4	>4	1	>4 to 1	245.137	16.96	16.82	17.25	0.43	Biological	21.70	1.50	0	-
122	B	10/19/2013	8:34:52	15	1	11.6	14.451	>4	>4	1	>4 to 1	218.1936	15.10	14.70	16.10	1.40	Biological	44.88	3.11	0	-
123	B	10/19/2013	8:40:32	15	1	18.2	14.451	>4	>4	2	>4 to 2	167.2452	11.57	11.37	11.72	0.36	Biological	2.97	0.21	10+	reduced
124	C	10/23/2013	9:53:39	15	1	30.3	14.451	>4	>4	2	>4 to 2	254.4195	17.61	17.37	17.89	0.52	Biological	1.20	0.08	0	-
126	C	10/19/2013	14:08:18	15	2	12.5	14.451	4 to 3/ >4	>4	1	>4 to 1	232.2725	16.07	15.12	17.09	1.97	Biological	49.43	3.42	0	-
127	B	10/19/2013	14:15:50	15	2	20.5	14.451	>4	>4	2	>4 to 2	244.987	16.95	16.48	17.89	1.41	Biological	32.23	2.23	10+	both
128	B	10/24/2013	7:30:59	15	1	30.8	14.451	>4	>4	2	>4 to 2	227.201	15.72	15.55	15.94	0.39	Biological	35.32	2.44	2	reduced
130	B	10/19/2013	8:52:13	15	1	7.6	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
132	A	10/24/2013	7:35:39	15	1	30.3	14.451	>4	>4	2	>4 to 2	241.0545	16.68	16.04	17.25	1.20	Biological	14.63	1.01	4	reduced
133	B	10/23/2013	9:17:58	15	1	34.9	14.451	>4	>4	2	>4 to 2	262.8625	18.19	18.06	18.38	0.32	Biological	9.38	0.65	0	-
134	B	10/23/2013	9:23:16	15	1	36.6	14.451	>4	>4	1	>4 to 1	198.5239	13.74	13.51	13.90	0.39	Biological	21.96	1.52	10+	both
135	A	10/23/2013	9:31:37	15	1	38.5	14.451	>4	>4	1	>4 to 1	131.3574	9.09	9.01	9.22	0.21	Biological	39.60	2.74	0	-
136	B	10/23/2013	9:38:49	15	1	40.3	14.451	>4	>4	1	>4 to 1	213.5736	14.78	13.97	15.35	1.38	Biological	24.69	1.71	0	-
138	B	10/19/2013	13:54:05	15	2	8.6	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	Biological	ind	ind	0	-
139	C	10/19/2013	14:02:25	15	2	16.6	14.451	>4	>4	1	>4 to 1	193.5724	13.40	12.59	14.36	1.77	Biological	11.06	0.77	0	-
140	A	10/24/2013	7:46:28	15	1	31.9	14.451	>4	>4	2	>4 to 2	248.1149	17.17	16.94	17.39	0.45	Biological	14.05	0.97	0	-
142	C	10/19/2013	13:41:48	15	2	19.2	14.451	>4	>4	1	>4 to 1	281.2047	19.46	19.32	19.77	0.45	Biological	5.65	0.39	0	-

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
143	B	10/19/2013	13:46:50	15	2	24.9	14.451	>4	>4	1	>4 to 1	270.8464	18.74	18.50	19.16	0.66	Biological	9.77	0.68	0	-
144	A	10/19/2013	13:26:18	15	2	16.8	14.451	>4	>4	1	>4 to 1	194.2156	13.44	13.08	13.74	0.66	Biological	17.99	1.25	0	-
146	C	10/19/2013	13:33:24	15	2	23.0	14.451	>4	>4	1	>4 to 1	272.2377	18.84	17.98	19.46	1.49	Biological	30.96	2.14	3	reduced
147	F	10/20/2013	10:23:26	15	1	2.6	14.451	>4	>4	1	>4 to 1	192.5623	13.33	12.22	13.94	1.73	Biological	33.84	2.34	10+	both
148	B	10/19/2013	9:38:20	15	2	4.0	14.451	4 to 3/ >4	>4	0	>4 to 0	261.6712	18.11	17.67	18.22	0.55	Biological	63.42	4.39	0	-
149	A	10/19/2013	9:28:06	15	2	4.2	14.451	>4	>4	1	>4 to 1	217.6382	15.06	14.86	15.23	0.37	Biological	54.08	3.74	1	oxidized
150	C	10/19/2013	9:24:02	15	2	4.0	14.451	>4	>4	1	>4 to 1	210.5455	14.57	14.49	14.88	0.39	Biological	41.68	2.88	0	-
151	C	10/19/2013	9:17:27	15	1	3.5	14.451	>4	>4	1	>4 to 1	134.5917	9.31	9.16	9.49	0.34	Biological	38.54	2.67	0	-
153	C	10/19/2013	13:08:20	15	2	16.5	14.451	>4	>4	1	>4 to 1	200.5668	13.88	13.72	14.22	0.50	Biological	6.59	0.46	0	-
155	A	10/19/2013	13:18:26	15	2	19.5	14.451	>4	>4	2	>4 to 2	208.333	14.42	13.51	15.33	1.82	Biological	10.44	0.72	0	-
156	A	10/20/2013	9:48:33	15	1	28.0	14.451	>4	>4	2	>4 to 2	241.7812	16.73	16.31	17.00	0.69	Biological	1.74	0.12	10+	both
157	D	10/20/2013	10:27:47	15	1	9.2	14.451	>4	>4	1	>4 to 1	171.0426	11.84	11.27	12.81	1.54	Biological	25.66	1.78	0	-
158	B	10/19/2013	10:22:06	15	2	4.4	14.451	4 to 3/ >4	>4	1	>4 to 1	186.8045	12.93	12.63	13.39	0.76	Biological	55.34	3.83	10+	both
159	C	10/19/2013	10:16:21	15	2	4.0	14.451	4 to 3/ >4	>4	1	>4 to 1	211.5845	14.64	14.49	14.81	0.32	Biological	69.04	4.78	0	-
160	C	10/19/2013	10:11:47	15	2	4.3	14.451	>4	>4	1	>4 to 1	201.8344	13.97	13.58	14.20	0.62	Biological	51.38	3.56	0	-
161	A	10/19/2013	10:01:53	15	2	4.2	14.451	>4	>4	1	>4 to 1	169.3789	11.72	11.35	12.24	0.89	Biological	30.58	2.12	0	-
163	B	10/19/2013	12:45:04	15	2	18.8	14.451	>4	>4	1	>4 to 1	103.3497	7.15	6.40	8.01	1.61	Biological	16.82	1.16	0	-
165	C	10/19/2013	12:52:38	15	2	21.2	14.451	>4	>4	1	>4 to 1	181.3642	12.55	12.77	13.45	0.68	Biological	29.71	2.06	0	-
166	C	10/20/2013	11:12:17	15	1	28.5	14.451	>4	>4	1	>4 to 1	199.9925	13.84	13.53	14.17	0.64	Biological	33.47	2.32	0	-
167	D	10/20/2013	10:34:01	15	1	6.1	14.451	>4	>4	1	>4 to 1	189.747	13.13	12.81	13.26	0.45	Biological	33.25	2.30	0	-
168	B	10/19/2013	11:00:55	15	2	3.8	14.451	4 to 3/ >4	>4	1	>4 to 1	244.6249	16.93	16.60	17.25	0.65	Biological	58.61	4.06	0	-
169	A	10/19/2013	10:53:55	15	2	4.0	14.451	4 to 3/ >4	>4	0	>4 to 0	210.6536	14.58	14.33	14.66	0.33	Biological	45.76	3.17	0	-
170	A	10/19/2013	10:46:30	15	2	4.0	14.451	>4	>4	1	>4 to 1	218.9086	15.15	14.98	15.28	0.30	Biological	46.52	3.22	0	-
171	A	10/19/2013	10:33:38	15	2	4.1	14.451	>4	>4	0	>4 to 0	166.1972	11.50	11.06	11.80	0.74	Biological	41.75	2.89	10+	both
173	A	10/19/2013	12:22:37	15	2	17	14.451	4 to 3/ >4	>4	0	>4 to 0	116.7271	8.08	7.72	8.46	0.74	Biological	13.66	0.95	0	-

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
175	B	10/19/2013	12:30:46	15	2	21.6	14.451	>4	>4	2	>4 to 2	184.7423	12.78	12.53	13.03	0.50	Biological	5.38	0.37	2	reduced
176	B	10/20/2013	10:58:41	15	1	26.4	14.451	>4	>4	1	>4 to 1	115.216	7.97	7.40	8.32	0.92	Biological	10.30	0.71	0	-
179	B	10/16/2013	13:49:04	13.5	3	23	14.451	>4	>4	1	>4 to 1	224.9348	15.57	15.39	15.79	0.40	Biological	71.69	4.96	0	-
180	B	10/16/2013	13:55:11	13.5	3	25.5	14.451	>4	>4	1	>4 to 1	218.5269	15.12	14.98	15.62	0.64	Biological	44.96	3.11	0	-
181	C	10/23/2013	15:30:21	15	1	30.4	14.451	>4	>4	1	>4 to 1	192.4114	13.31	12.80	13.50	0.70	Biological	15.80	1.09	10+	both
182	A	10/23/2013	8:52:30	15	1	31.9	14.451	>4	>4	1	>4 to 1	204.3931	14.14	13.90	14.38	0.48	Biological	20.87	1.44	0	-
183	A	10/23/2013	15:33:51	15	1	36.4	14.451	>4	>4	1	>4 to 1	201.8037	13.96	13.89	14.09	0.20	Biological	9.23	0.64	0	-
184	D	10/16/2013	13:21:41	13.5	3	10.2	14.451	4 to 3/ >4	>4	0	>4 to 0	244.5748	16.92	16.57	17.04	0.46	Biological	57.12	3.95	0	-
185	F	10/16/2013	13:28:22	13.5	3	14.5	14.451	4 to 3/ >4	>4	1	>4 to 1	229.3174	15.87	15.73	16.10	0.37	Biological	50.62	3.50	0	-
186	A	10/16/2013	13:32:01	13.5	3	16.3	14.451	>4	>4	1	>4 to 1	207.9515	14.39	14.17	14.54	0.37	Biological	33.72	2.33	0	-
187	C	10/16/2013	13:02:27	13.5	1	5.8	14.451	4 to 3/ >4	>4	1	>4 to 1	267.7356	18.53	18.09	19.65	1.57	Biological	59.38	4.11	6	oxidized
188	A	10/17/2013	9:54:16	13.5	3	5.0	14.451	4 to 3/ >4	>4	0	>4 to 0	249.2763	17.25	16.31	17.55	1.24	Biological	71.24	4.93	0	-
189	A	10/17/2013	9:47:39	13.5	3	4.9	14.451	4 to 3/ >4	>4	1	>4 to 1	163.7394	11.33	10.61	11.78	1.17	Biological	54.37	3.76	0	-
192	C	10/16/2013	14:05:50	13.5	3	12.2	14.451	4 to 3/ >4	>4	1	>4 to 1	254.6778	17.62	17.38	17.89	0.50	Biological	67.44	4.67	0	-
197	B	10/16/2013	14:09:46	13.5	3	16.3	14.451	>4	>4	1	>4 to 1	220.5381	15.26	14.77	15.74	0.97	Biological	50.59	3.50	0	-
198	A	10/23/2013	13:38:06	15	2	21.1	14.451	>4	>4	2	>4 to 2	125.7251	8.70	8.26	9.02	0.76	Biological	10.03	0.69	10+	both
200	C	10/23/2013	13:46:37	15	2	22.3	14.451	>4	>4	1	>4 to 1	175.4282	12.14	11.62	12.86	1.24	Biological	46.56	3.22	0	-
202	B	10/23/2013	13:51:22	15	2	22.0	14.451	>4	>4	1	>4 to 1	186.5637	12.91	12.79	13.18	0.39	Biological	47.36	3.28	6	both
204	C	10/23/2013	13:57:26	15	2	21.9	14.451	>4	>4	1	>4 to 1	177.7626	12.30	12.10	12.54	0.44	Biological	36.33	2.51	10+	both
206	A	10/23/2013	14:02:04	15	2	23.8	14.451	>4	>4	1	>4 to 1	167.676	11.60	11.37	11.74	0.37	Biological	24.31	1.68	0	-
208	A	10/23/2013	14:07:38	15	2	23.4	14.451	4 to 3/ >4	>4	0	>4 to 0	206.5169	14.29	14.19	14.52	0.34	Biological	40.14	2.78	0	-
209	A	10/23/2013	14:12:55	15	2	23.4	14.451	>4	>4	1	>4 to 1	176.7338	12.23	12.10	12.36	0.26	Biological	37.58	2.60	0	-
211	C	10/23/2013	14:19:59	15	2	24.5	14.451	>4	>4	1	>4 to 1	155.461	10.76	10.63	11.07	0.44	Biological	36.22	2.51	2	oxidized
213	A	10/17/2013	10:05:02	13.5	3	23.0	14.451	>4	>4	1	>4 to 1	201.7544	13.96	13.66	14.15	0.49	Biological	26.13	1.81	10+	both
214	A	10/23/2013	14:26:15	15	2	22.4	14.451	>4	>4	1	>4 to 1	167.2361	11.57	11.30	11.81	0.51	Biological	26.58	1.84	0	-
215	C	10/23/2013	14:32:31	15	2	23.2	14.451	>4	>4	1	>4 to 1	145.2745	10.05	9.75	10.21	0.46	Biological	8.71	0.60	10+	both
217	A	10/23/2013	14:36:54	15	2	24.1	14.451	>4	>4	0	>4 to 0	144.281	9.98	9.60	10.17	0.57	Biological	20.97	1.45	0	-
218	C	10/16/2013	14:42:43	13.5	3	20.8	14.451	>4	>4	2	>4 to 2	159.2336	11.02	10.61	11.33	0.71	Biological	21.01	1.45	10+	both
219	B	10/23/2013	14:43:15	15	2	24.9	14.451	>4	>4	2	>4 to 2	134.6555	9.32	8.91	9.64	0.73	Biological	10.87	0.75	10+	both
220	C	10/16/2013	15:20:43	13.5	3	23.0	14.451	>4	>4	1	>4 to 1	218.3801	15.11	14.96	15.20	0.24	Biological	48.10	3.33	0	-
221	C	10/23/2013	14:49:49	15	2	25.8	14.451	>4	>4	2	>4 to 2	190.6867	13.20	12.93	13.64	0.71	Biological	11.71	0.81	10+	both
222	A	10/23/2013	10:03:53	15	1	24.8	14.451	>4	>4	2	>4 to 2	229.6368	15.89	15.66	16.24	0.58	Biological	14.47	1.00	10+	both

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
223	B	10/20/2013	8:31:43	15	1	26.4	14.451	>4	>4	2	>4 to 2	201.5796	13.95	13.70	14.13	0.43	Biological	3.81	0.26	4	both
224	B	10/20/2013	8:42:07	15	1	26.2	14.451	>4	>4	2	>4 to 2	205.3785	14.21	13.76	14.65	0.89	Biological	2.22	0.15	4	reduced
225	A	10/20/2013	8:47:08	15	1	29.5	14.451	>4	>4	2	>4 to 2	256.7409	17.77	16.79	19.21	2.43	Biological	3.35	0.23	0	-
226	B	10/20/2013	8:52:47	15	1	29.5	14.451	>4	>4	2	>4 to 2	254.2621	17.59	17.49	17.84	0.35	Biological	4.62	0.32	10+	both
227	B	10/20/2013	9:19:40	15	1	28.8	14.451	>4	>4	1	>4 to 1	241.2527	16.69	15.77	17.81	2.05	Biological	2.41	0.17	3	reduced
228	B	10/20/2013	9:56:11	15	1	28.4	14.451	>4	>4	1	>4 to 1	192.6038	13.33	12.54	14.20	1.66	Biological	1.08	0.07	10+	both
230	C	10/16/2013	13:41:39	13.5	3	19.6	14.451	>4	>4	1	>4 to 1	178.2941	12.34	12.11	12.52	0.41	Biological	29.71	2.06	0	-
233	A	10/16/2013	14:16:16	13.5	3	19.8	14.451	>4	>4	1	>4 to 1	171.8101	11.89	11.49	12.15	0.66	Biological	27.29	1.89	0	-
400	B	10/18/2013	7:37:55	13.5	3	12.8	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
401	B	10/18/2013	7:44:30	13.5	3	13.6	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
410	C	10/22/2013	15:02:08	15	2	10.3	14.451	>4	>4	1	>4 to 1	255.1887	17.66	17.31	17.84	0.53	Biological	66.64	4.61	0	-
411	B	10/22/2013	15:14:00	15	2	10.7	14.451	>4	>4	1	>4 to 1	182.2031	12.61	12.40	12.75	0.35	Biological	47.37	3.28	0	-
412	B	10/22/2013	15:19:05	15	2	10.8	14.451	ind	>4	ind	ind	0	0.00	0.00	0.00	ind	indeterminat	ind	ind	0	-
413	B	10/22/2013	15:24:42	15	2	23.2	14.451	>4	>4	2	>4 to 2	170.4661	11.80	8.91	13.58	4.68	Physical	ind	ind	0	-
420	A	10/22/2013	15:33:21	15	2	5.9	14.451	>4	>4	2	>4 to 2	287.3413	19.88	19.55	20.13	0.58	Biological	40.03	2.77	0	-
421	A	10/22/2013	15:39:11	15	2	8.3	14.451	>4	>4	1	>4 to 1	221.7818	15.35	15.19	15.53	0.34	Biological	39.46	2.73	10+	both
423	C	10/22/2013	15:45:39	15	2	11.9	14.451	>4	>4	1	>4 to 1	83.38152	5.77	5.26	6.12	0.86	Biological	22.49	1.56	0	-
424	C	10/22/2013	15:50:45	15	2	12.6	14.451	>4	>4	1	>4 to 1	60.77874	4.21	3.93	4.50	0.57	Biological	30.51	2.11	0	-
426	C	10/22/2013	15:57:42	15	2	13.5	14.451	>4	>4	1	>4 to 1	45.12728	3.12	2.55	3.69	1.14	Biological	13.61	0.94	0	-
427	C	10/22/2013	16:03:11	15	2	18.7	14.451	>4	>4	1	>4 to 1	69.8677	4.83	0.00	6.24	6.24	Physical	18.15	1.26	0	-
430	A	10/22/2013	16:18:46	15	2	8.2	14.451	>4	>4	1	>4 to 1	258.5829	17.89	16.30	19.06	2.76	Biological	38.14	2.64	0	-
432	C	10/22/2013	16:26:22	15	2	14.9	14.451	4 to 3/ >4	>4	1	>4 to 1	195.5434	13.53	13.06	14.15	1.08	Biological	26.49	1.83	0	-
434	A	10/22/2013	16:35:08	15	2	23.0	14.451	>4	>4	0	>4 to 0	223.3568	15.46	15.42	15.61	0.19	Biological	36.15	2.50	0	-
436	C	10/22/2013	16:42:49	15	2	28.0	14.451	>4	>4	1	>4 to 1	205.1497	14.20	13.93	14.57	0.64	Biological	15.16	1.05	0	-
520	D	10/24/2013	10:07:39	15	0	11.2	14.451	>4	>4	1	>4 to 1	204.6333	14.16	13.69	14.33	0.64	Biological	64.41	4.46	10+	oxidized
522	D	10/24/2013	10:12:23	15	0	15.1	14.451	>4	>4	1	>4 to 1	233.1637	16.13	15.06	15.83	0.78	Biological	67.44	4.67	0	-
524	A	10/24/2013	8:16:19	15	1	23.7	14.451	>4	>4	1	>4 to 1	181.8816	12.59	12.44	12.69	0.25	Biological	27.29	1.89	0	-
525	A	10/24/2013	8:11:16	15	1	26.0	14.451	>4	>4	1	>4 to 1	204.0506	14.12	13.81	14.56	0.74	Biological	9.43	0.65	0	-
528	B	10/24/2013	8:04:06	15	1	31	14.451	>4	>4	1	>4 to 1	156.9623	10.86	10.64	11.11	0.47	Biological	35.00	2.42	3	reduced
531	C	10/24/2013	8:43:47	15	1	2.8	14.451	>4	>4	1	>4 to 1	165.4467	11.45	11.15	11.78	0.62	Biological	35.53	2.46	0	-
532	B	10/24/2013	8:48:44	15	1	4.8	14.451	>4	>4	1	>4 to 1	209.4763	14.50	14.33	14.73	0.40	Biological	69.04	4.78	2	oxidized

Station	Replicate	Date	Time	Stop Collar Setting (in)	# of Weights (per side)	Water Depth (ft)	Calibration Constant	Grain Size Major Mode (phi)	Grain Size Minimum (phi)	Grain Size Maximum (phi)	Grain Size RANGE (phi)	Penetration Area (sq.cm)	Penetration Mean (cm)	Penetration Minimum (cm)	Penetration Maximum (cm)	Boundary Roughness (cm)	Boundary Roughness Type	RPD Area (sq.cm)	Mean RPD (cm)	Mud Clast Number	Mud Clast State
534	C	10/24/2013	9:01:34	15	1	10.2	14.451	>4	>4	1	>4 to 1	205.5549	14.22	13.80	14.70	0.90	Biological	54.69	3.78	3	oxidized
536	B	10/24/2013	9:12:19	15	1	15.5	14.451	>4	>4	0	>4 to 0	209.0587	14.47	14.31	14.61	0.30	Biological	56.03	3.88	10+	both
537	A	10/24/2013	9:17:32	15	1	18.9	14.451	4 to 3/ >4	>4	1	>4 to 1	212.8912	14.73	14.57	14.86	0.29	Biological	36.93	2.56	0	-
540	A	10/24/2013	9:28:15	15	1	6.5	14.451	>4	>4	1	>4 to 1	196.5322	13.60	13.30	13.93	0.62	Biological	57.85	4.00	8	both
541	A	10/24/2013	9:33:41	15	1	12	14.451	>4	>4	1	>4 to 1	152.6017	10.56	10.20	10.86	0.66	Biological	44.15	3.06	2	reduced
542	B	10/24/2013	9:41:21	15	1	15.8	14.451	>4	>4	1	>4 to 1	147.1437	10.18	10.01	10.47	0.46	Biological	30.51	2.11	2	reduced
543	A	10/24/2013	9:44:46	15	1	17.4	14.451	>4	>4	1	>4 to 1	148.925	10.31	10.06	10.55	0.50	Biological	43.11	2.98	0	-
1179	A	10/24/2013	10:27:56	15	1	24	14.451	>4	>4	0	>4 to 0	176.0207	12.18	11.94	12.42	0.48	Biological	28.10	1.94	0	-
1180	C	10/24/2013	10:34:10	15	1	26.1	14.451	>4	>4	1	>4 to 1	184.7749	12.79	12.56	13.00	0.44	Biological	35.13	2.43	0	-
1181	A	10/24/2013	10:37:14	15	1	29.9	14.451	>4	>4	1	>4 to 1	196.268	13.58	13.41	13.78	0.37	Biological	8.65	0.60	0	-
1182	A	10/24/2013	10:41:50	15	1	33.0	14.451	>4	>4	1	>4 to 1	208.2534	14.41	14.18	14.55	0.37	Biological	19.26	1.33	0	-
1183	A	10/24/2013	10:47:42	15	1	35.0	14.451	>4	>4	1	>4 to 1	200.7024	13.89	13.65	14.17	0.51	Biological	22.47	1.56	0	-

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
4	A	n	n	Silt-clay admixed with very fine sand evidence of deeper burrowers	0	-	-	-	1 on 3
6	E	n	n	Silt-clay with minor fraction of very fine sand; mud clast wiper blade artifact; fecal pellets; some burrowing at depth; low reflectance subsurface sediment	0	-	-	-	2
8	C	n	n	Thin layer of silty very fine sand over silt-clay; half bivalve shell at surface on left; thin aRPD; active void mostly filled with oxidized sed	1	10.01	10.79	10.40	1 on 3
10	A	n	n	Silt-clay with minor fraction of very fine sand ; aRPD deeper on right; shallow burrowing; some evidence of deeper burrowers on right	1	9.22	10.48	9.85	1 on 3
14	C	n	n	Silt-clay with minor fraction of very fine sand in top 2 cm; small reduced mud clasts on surface wiper blade artifacts; shell frag at surface; patches of gray sed at SWI and smeared against faceplate (also camera artifacts)	0	-	-	-	1
18	A	n	n	Silt clay with silty very fine sand in upper 2-3 cm; shallow burrowing and through aRPD; evidence of larger burrower in relict aRPD just to left of center; polychaete at 7.5cm on right	0	-	-	-	2 on 3
20	A	n	n	Silt-clay with very fine sand in upper 2-3 cm; small polychaete against faceplate on left	0	-	-	-	1
24	A	n	n	Silty very fine sand over silt-clay; shallow burrowing; voids in upper 5 cm, large worm against faceplate at left	2	3.33	4.40	3.87	1 on 3
26	F	n	n	Silty very fine sand in upper 2-3 cm over silt-clay; fecal pellets at SWI; couple amphipod tubes visible in background; void at depth on right	1	13.05	13.27	13.16	2 on 3
30	F	n	n	Silty very fine sand over silt-clay, fecal pellets at SWI; couple small polychaetes at base of aRPD; small polychaete at 13cm, transected burrows at depth	0	-	-	-	2 on 3
32	C	n	n	Silt-clay with some admixed very fine sand; small mud clasts on surface are wiper blade artifacts; bits of microalgal growth on surface; shallow burrowing; relict aRPD; polychaete at 5cm	0	-	-	-	2 -> 3
33	A	1	n	Silt clay with minor fraction of very fine sand; bits of microalgal growth on surface; shallow burrowing; relict aRPD; polychaete, maybe capitellid, at base of aRPD on left; 1 large methane bubble at depth on right	0	-	-	-	1
34	E	20+	n	Silt clay with some very fine sand; small to medium mud clasts on surface (artifacts); shallow burrowing; relict aRPD; relict aRPD; methane bubbles from 6.5cm to depth	0	-	-	-	1
36	D	n	n	Silty very fine sand over silt; fecal pellets at SWI; shallow burrowing and through aRPD; larger polychaete at 8.75cm; active voids at depth	3	9.55	14.50	12.03	1 on 3
38	A	n	n	Silt-clay with minor fraction of very fine sand; bivalve shell on surface in background; aRPD deeper on left, w bivalve shell visible; voids in series at center	3	5.71	9.22	7.47	1 on 3
40	B	n	n	Silt-clay; few fecal pellets at SWI; very thin, patchy aRPD, small polychaete at 9cm	0	-	-	-	1
45	C	n	n	Silt-clay with minor fraction of very fine sand; fecal pellets; burrowing through aRPD	1	9.44	9.76	9.60	2 -> 3
47	D	n	n	Silt-clay with fecal pellets at SWI; burrowing in aRPD; voids at depth as well as transected burrows	2	10.95	12.60	11.78	1 on 3
51	A	n	n	Homogeneous silt-clay with minor fraction of very fine sand; shallow burrowing.	0	-	-	-	1
53	D	n	n	Silt-clay with some very fine sand and plant debris in upper 2 cm; small mud clasts on surface (camera artifacts); fecal pellets; burrowing through aRPD	0	-	-	-	2
54	E	n	n	Mixture of silt-clay with rocks on surface and some very fine to fine sand in upper 2-3 cm; fecal pellets; aRPD is deeper on left, burrowing throughout profile	0	-	-	-	1 on 3
56	F	n	n	Silt-clay with surface layer enriched with very fine sand; fecal pellets on surface; biorturbation exceeds prism penetration depth	4	11.31	14.47	12.89	1 on 3
58	B	n	n	Silt-clay with some reduced mud clast artifacts from wiper blade on surface;aRPD deeper on left; fauna (bivalve) at ~2cm on right; transected vertical burrow oxygenated halo on left; large opening at depth is drag-down artifact by prism blade (most likely caught edge of bivalve shell)	0	-	-	-	1 on 3
60	B	n	n	Well-sorted silt-clay; fecal pellets; thin aRPD	0	-	-	-	1
65	E	n	n	Silt-clay with some admixed very fine sand in upper 2-4 cm; burrowing through aRPD; evidence of deeper burrower on right edge ~5 cm	0	-	-	-	1 on 3
67	E	n	n	Silty very fine sand over silt-clay; small mud clasts on surface (sampling artifacts); bits of debris at SWI and in upper cm; relict aRPD; small polychaete at 4.9cm; void at depth and small burrow next to it on right	1	8.78	8.97	8.88	2 on 3
71	C	n	n	Silt clay with some very fine sand in upper 2 cm, small mud clasts (camera artifacts) on surface; long polychaete at 6.6cm	0	-	-	-	2 -> 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
73	D	n	n	Silt-clay with very fine sand in upper 2 cm, shallow burrowing and through aRPD; relict aRPD; small polychaete at ~8cm	0	-	-	-	2 -> 3
74	C	n	n	Silt-clay with very fine sand in top half-cm; reduced mud clast is camera artifact, shell frag on surface; fecal pellets; shallow burrowing; voids at depth	3	8.12	10.22	9.17	1 on 3
75	A	n	n	Silt-clay with some shell fragments on SWI, bioturbation exceeds prism penetration depth	2	9.72	13.66	11.69	1 on 3
76	A	n	n	Silt-clay with very fine sand in upper surface cm; thin aPRD; fecal pellets; small thin polychaete at 4.5cm.	1	9.75	9.98	9.87	1 on 3
78	A	n	n	Silt-clay with thin aRPD, surface appears erosional with evidence of particle transport; portions of Stage 1 worms against faceplate, active void at lower right	1	11.27	12.61	11.94	1 on 3
79	B	n	n	Silt-clay with some very fine sand at surface, mud clasts on surface are camera artifacts; one large void at depth	1	7.48	9.47	8.48	2 -> 3
80	C	n	n	Well-sorted silt-clay with some mud clast artifacts on surface;bioturbation depth exceeds prism penetration depth	0	-	-	-	1 on 3
81	E	n	n	Silt clay with some very fine sand in upper 2 cm; fecal pellets; burrowing through aRPD; void and transected burrow at depth	1	7.85	8.15	8.00	2 -> 3
82	D	n	n	Silt-clay with surface half-cm enriched with very fine sand; shallow burrowing; relict aRPD, homogeneous sub-surface fabric	0	-	-	-	2
83	C	n	n	Silty very fine sand over silt-clay; small to med mud clasts (camera artifacts) on surface; voids at depth	2	8.54	8.95	8.75	1 on 3
85	B	n	n	Silt-clay with some very fine sand in the top 1-2 cm; small tubes at SWI, burrowing through aRPD; polychaete burrow at 9.5cm	0	-	-	-	1 on 3
86	C	n	n	Silty very fine sand over silt-clay; fecal pellets; few small bits of debris in upper cm; small polychaetes in aRPD down to 6.6cm; larger polychaete at 8cm	0	-	-	-	2 on 3
87	A	n	n	Silt clay enriched with very fine sand in surface layer; fecal pellets; burrowing evident throughout profile, thin polychate at base of relict aRPD at 5.8cm	0	-	-	-	2 on 3
88	D	3	n	Silt -clay with mud clast artifacts & smearing from camera disturbance; methane bubbles at depth	0	-	-	-	1
89	A	2	n	Silty very fine sand over silt-clay; evidence of burrowing at depth	0	-	-	-	2 -> 3
90	A	2	n	Silty very fine sand over silt; shallow burrowing; relict aRPD; small polychaete at 7.5cm; two small methane bubbles at depth	0	-	-	-	2
92	C	n	n	Silty very fine sand over silt-clay; small mud clasts on surface (camera artifacts); small burrows through aRPD; relict aRPD; small polychaete at 9.8cm; void at depth	1	12.94	13.94	13.44	2 on 3
94	A	20+	n	Silt-clay with distinct depositional layer on surface with sharp contact boundary, most likely re-settlement of propwash resuspension; methane bubbles from 7cm to depth	0	-	-	-	1
95	A	n	n	Poorly sorted medium to coarse sand; pebbles on surface; bit of green algae in background; some void-like gaps in upper cms, low reflectance but deep aRPD, most likely hydraulically-driven.	0	-	-	-	indeterminate
97	B	n	n	Sitly very fine sand over silt-clay; small to medium mud clasts (camera artifact) at surface; small burrowing in aRPD;	0	-	-	-	2 on 3
99	A	n	n	Silt-clay with fecal pellets at SWI; shallow burrowing; active void at depth	1	10.67	13.94	12.31	1 on 3
100	C	n	n	Silty very fine sand over silt-clay; small burrows through aRPD; deep relict aRPD; void is small	1	11.86	11.98	11.92	2 -> 3
102	A	n	n	Silty very fine sand over silt-clay; fecal pellets at SWI; burrowing evident throughout depth of profile; transected burrow at depth	1	14.30	14.39	14.39	1 on 3
103	C	n	n	Silty very fine sand over silt-clay; small to med mud clasts (camera artifacts) on surface, thin polychaete at 4.8cm; evidence of deeper burrowers.	0	-	-	-	2 on 3
104	A	n	n	Silt-clay with some very fine sand in top cm;small mud clasts (camera artifacgt0 on surface; fecal pellets; bits of shell frag and small bits of debris in upper couple cms; some shell frag at depth; evidence of burrowing at depth	0	-	-	-	2 -> 3
105	B	n	n	Silt-clay with small mud clasts (camera artifacts) and bits of debris on surface; shell frag on surface; fecal pellets; thin aRPD; some evidence of deeper burrowing- burrow on right, transected burrow on left	0	-	-	-	2 -> 3
106	A	n	n	Silt-clay with some very fine sand in top layer; small burrows through aRPD; deep relict aRPD, evidence of burrowing at depth	0	-	-	-	2 on 3
107	B	n	n	Silty very fine sand over silt-clay; mud clast is camera artifact; fecal pellets at SWI and in upper cm; burrowing through aRPD and throughout profile	5	8.28	12.99	10.63	2 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
108	B	n	n	Silty very fine sand over silt-clay;burrowing through aRPD as well as subsurface sediment; medium polychaete at ~6cm	0	-	-	-	2 on 3
109	B	n	n	Silt-clay with mud clast artifacts from camera on surface; fecal pellets; thin aPRD; relict aRPD; large void on left	2	11.06	14.41	12.73	1 on 3
110	B	n	n	Silt clay with fecal pellet layer; burrowing evident through profile; patch of gray sediment in center of image is smear artifact from faceplate; relict aRPD; few thin polychaetes from 5 cm to 11+cm, transected burrow halo at lower left quadrant.	0	-	-	-	1 on 3
111	A	n	n	Silty very fine sand over silt-clay; burrowing visible at depth; relict aRPD; couple thin polychaetes below aRPD.	0	-	-	-	1 on 3
112	A	n	n	Silty very fine sand centimeter layer over silt-clay; fecal pellets at SWI; small white shell frag at surface; evidence of burrowing at depth (transected burrow halos)	0	-	-	-	1 on 3
113	A	2	n	Homogeneous silt-clay fabric with fecal pellets at SWI; very thin patchy aRPD; small methane bubbles at depth	0	-	-	-	1
115	C	n	n	No images with penetration - hard bottom, large rocks visible in background	-	-	-	-	indeterminate
116	C	11	n	Silt-clay with mud clast artifacts on surface from camera sled; very thin aRPD; polychaete visible at ~4cm; methane bubbles at 9cm; Stage 3 taxa apparently present but in very low densities	0	-	-	-	1 on 3
118	B	n	n	Silty very fine sand over silt-clay; fecal pellets; burrowing through aRPD; small polychaete at 5.5 cm; relict aRPD	0	-	-	-	2
119	A	6	n	Silt-clay with enriched subsurface organics; transected burrows at depth with biogenic sorted particles inside them; bioturbation exceeds prism penetration depth	1	7.39	8.04	7.72	1 on 3
120	A	6	n	Homogeneous textured silt-clay with fecal pellets at SWI and in upper 1 cm; shallow burrowing; long thin polychaetes at 8 cm	0	-	-	-	1 -> 2
122	B	n	n	Silt clay with minor fraction of very fine sand in top 2 cm; small burrows through aRPD; small void as well as transected burrows at depth	1	6.25	6.58	6.42	2 on 3
123	B	n	n	Silt-clay; very thin aRPD; reduced mud clasts (camera artifact) and small pebbles at SWI; void is thin	1	6.23	6.44	6.34	1
124	C	n	n	Silt-clay; fecal pellets and small patch of oxidized sed; small polychaetes at 7cm, fecal pellets visible in one; transected burrows at right. aRPD slightly deeper in other replicates from this station	1	11.08	11.64	11.36	1 on 3
126	C	n	n	Silty very fine sand over silt-clay; small burrows through aRPD; small polychaete near base of aRPD on left	0	-	-	-	2
127	B	20+	n	Silt-clay with surface layer enriched with some very fine sand; shallow burrowing; two small polychaetes ~5 cm; methane bubbles from 6cm to depth	2	7.49	9.48	8.48	1 on 3
128	B	n	n	Silt-clay with surface layer enriched with some very fine sand; subsurface sediment homogeneous fabric	0	-	-	-	1
130	B	n	n	No images with penetration; hard bottom/rocks present	-	-	-	-	indeterminate
132	A	n	n	Homogeneous silt-clay fabric with v thin aRPD, area at center couple cm deep with fecal pellets; small mud clasts (camera artifact) at surface; small thin polychaete at 5cm to left; propwash erosion	0	-	-	-	1
133	B	6	n	Homogeneous silt-clay fabric with shell fragments and some very fine sand in top half cm; fecal pellets; shallow burrowing; large polychaete with fecal pellets at 7.8cm at right; methane bubbles at depth; propwash erosion	0	-	-	-	2 -> 3
134	B	n	n	Homogeneous silt-clay fabric with fecal pellets throughout upper 1 cm; shallow burrowing; polychaete with fecal pellets at 7.5cm; propwash erosion	0	-	-	-	2
135	A	n	n	Silt-clay with few shell frag on surface; fecal pellets layer on surface; shallow burrowing through aRPD; relict aRPD; small polychaete at 5.5cm; propwash erosion	0	-	-	-	2
136	B	n	n	Silt-clay, shallow burrowing; polychaete with fecal pellets at 4.5cm; surface looks like eroded from propwash	0	-	-	-	1
138	B	n	n	Oyster shells visible in this rep, surface must be armored with shells - no penetration in other reps	-	-	-	-	indeterminate
139	C	n	n	Silt-clay with re-settled oxidized particles from propwash erosion; shallow burrowing; thin aRPD; long polychaete at ~8cm	0	-	-	-	1
140	A	n	n	Silt-clay with homogeneous subsurface fabric; transected burrows at depth, sharp contact boundary of aRPD layer indicating re-settlement of propwash suspension	0	-	-	-	2 -> 3
142	C	13	n	Silt; thin aRPD, layer of light gray sed, relict aRPD below; shallow burrowing; fecal pellets; small polychaetes at ~ 4cm; voids and methane bubbles at depth	1	10.13	11.88	11.00	1

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
143	B	n	n	Silt-clay; thin aRPD; 2 polychaetes at 4cm; relict aRPD below layer of gray sed; transected burrow halos at depth	0	-	-	-	1 on 3
144	A	1	n	Silt-clay; shallow burrowing; large methane bubble at 5.5cm; oxidized surface layer redeposisted from resuspended material (propwash or storm)	0	-	-	-	1
146	C	6	n	Silt-clay; reduced mud clasts (camera artifact) on surface; shallow burrowing; relict aRPD; methane bubbles at 4cm; oxidized surface layer redeposited material that had been resuspended from storm or propwash	0	-	-	-	1
147	F	n	n	Silt clay with some very fine sand in upper cm; small-med mud clasts (camera artifact) on surface; shallow burrows; relict aRPD; small void at depth	1	10.11	10.33	10.22	2 -> 3
148	B	n	n	Silty very fine sand over silt-clay;small burrowing through aRPD; few small bits of debris in upper cm; relict aRPD	0	-	-	-	2
149	A	n	n	Silty clay with some very fine sand in upper 2 cm; burrowing through aRPD; homogeneous subsurface fabric	0	-	-	-	2
150	C	n	n	Silt-clay with minor fraction of very fine sand in upper 1-2 cm; small to medium burrows in aRPD; polychaetes at 5, 7,11cm, transected burrow at depth	0	-	-	-	2 on 3
151	C	n	n	Silt-clay with very fine sand admixed in top 1-2 cm; transected burrows at depth	0	-	-	-	2
153	C	n	n	Silt-clay with homogeneous subsurface fabric; sharp contact boundary of aRPD layer indicating re-settlement of resuspended sediment from propwash or storm	0	-	-	-	1
155	A	0	n	Silt-clay with transected burrow at right, piece of wood fragment dragged down by prism to left of burrow that has smeared down oxidized sediment; oxidized layer contact boundary on left shows area experiences periodic resuspension of sediments	0	-	-	-	2 -> 3
156	A	n	n	Silt-clay with very thin aRPD of mostly fecal pellets; small polychaete at 2.8cm. Surface recently eroded	0	-	-	-	1
157	D	9	n	Silt-clay with depositional aRPD from re-settlement of resuspended particles; fecal pellets; shallow burrowing; relict aRPD; methane bubbles from 5cm to depth	0	-	-	-	1
158	B	n	n	Silty very fine sand over silt-clay; small mud clasts (camera artifact) on surface; small burrows through aRPD; void at depth	1	11.15	11.33	11.24	2 on 3
159	C	n	n	Silty very fine sand over silt-clay; fecal pellets; small burrows in upper cm; reduced sediment smears on aRPD layer are wiper artifacts; small yellowish worm at ~8cm on right; void at left at ~8cm	1	7.83	8.94	8.39	2 on 3
160	C	n	n	Silt-clay withsmall burrows in oxidized layer; transected burrows at depth.	1	13.23	14.01	13.62	1 on 3
161	A	n	n	Silt-clay with minor fraction of very fine sand in top cm; shallow burrowing through aRPD; relict aRPD; polychaete at 5.2 cm; small void at 5.3cm at left	1	5.31	5.47	5.39	1 on 3
163	B	n	n	Silt-clay with sharp contact boundary of oxidized surface layer, re-settlement of resuspended material; some fecal pellets at surface; algal debris at surface on right.	0	-	-	-	1
165	C	4	n	Silt-clay with shallow burrowing; small tubes at SWI and polychaete at base of aRPD at left; large burrow on right ; methane bubbles from 4.5 cm to depth	1	2.12	4.59	3.35	1 on 3
166	C	n	n	Silt clay with most of surface oxidized layer eroded away (propwash?); fecal pellets at SWI; shallow burrowing; polychaete ~4.5cm; evidence of burrowing at depth	1	4.41	4.65	4.53	1 on 3
167	D	6	n	Silt clay with re-settled oxidized layer above lighter oxidized sed (resuspension and subsequent deposition); small burrows through aRPD; long polychaete with fecal pellets at 5.5 cm; methane bubbles from 2.5cm to depth	0	-	-	-	1
168	B	5	n	2-3 cm layer of silty very fine sand over silt-clay; small burrows throughout aRPD; methane bubble at 8.5 cm and small ones at depth	0	-	-	-	2
169	A	3	n	Silty very fine sand over silt-clay; patch of gray sed at SWI and just below on right is smear from wiper blade on faceplate; small burrows in aRPD; evidence of deeper burrows in relict aRPD; small methane bubbles at depth	0	-	-	-	1 on 3
170	A	2	n	Silt clay with minor fractionof very fine sand in top 2 cm; small to med burrowing activity in aRPD; small methane bubbles at depth on left	0	-	-	-	2
171	A	n	n	Silt-clay with very fine sand in upper 1-2 cm; small-med mud clasts on surface; fecal pellets; small to med burrowing activity and small void at base of aRPD; relict aRPD	1	1.95	2.45	2.20	2
173	A	10	n	Silty very fine sand (recently settled resuspended layer) over silt-clay ; shallow burrowing; at 3cm infaua/deeper burrow; transected burrows/voids at depth, methane extremely small bubbles at mid depth on right	3	6.95	8.41	7.68	1 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
175	B	n	n	Silt-clay; thin aRPD of re-settled oxidized particles that were formerly resuspended; few bits of debris on surface; fecal pellets, shallow burrowing	0	-	-	-	1
176	B	n	n	Silt-clay; thin aRPD; bits of debris on surface; tubes & fecal pellets; transected burrows at depth	0	-	-	-	1 on 3
179	B	n	n	Silt-clay with fecal pellets @ SWI; deep relict aRPD, transected vertical burrow	0	-	-	-	1 on 3
180	B	n	n	Silt-clay with fecal pellets at SWI; evidence of deeper burrowers	0	-	-	-	1 on 3
181	C	n	n	Silt-clay with small-med mud clasts (camera artifact) at surface; bivalve shell fragment on left; fecal pellets; small thin polychaete at ~2cm, transected burrows at depth	2	1.74	11.06	6.40	1 on 3
182	A	n	n	Silt-clay with small bits of shell debris in upper cm; fecal pellets; relict aRPD; evidence of deeper burrowing; small polychaete at ~10cm	0	-	-	-	1 on 3
183	A	5	n	Silt-clay with shell frag on surface; bits of debris in upper cm; fecal pellets; patchy aRPD (recently eroded surface) and polychaete at 11 cm; methane bubbles at depth on left	0	-	-	-	1 on 3
184	D	2	n	Silty very fine sand over silt-clay; few bits of debris in upper cms; burrowing through aRPD; methane bubbles at depth on right	0	-	-	-	2
185	F	n	n	Silty very fine sand over silt-clay; few bits of debris in upper cms; evidence of burrowing throughout profile	0	-	-	-	1 on 3
186	A	n	n	Silt-clay with minor fraction of very fine sand in top cm; fecal pellets @ SWI; small opening of larger burrow at base of relict aRPD; void at depth	1	13.89	14.35	14.12	1 on 3
187	C	15	n	Silty very fine sand over silt-clay; large mud clasts (camera sled artifact) on surface; small bits of debris in upper cms; small polychaete at 5.3cm; small void and methane bubbles at depth	1	12.70	12.76	12.73	2 on 3
188	A	3	n	Silty very fine sand over silt-clay; bits of plant debris to 3-4 cm below SWI; burrowing throughout profile; methane bubbles at depth; transected burrow bottom right	0	-	-	-	2 on 3
189	A	n	n	Silty very fine sand over silt-clay; small burrows through aRPD; small polychaete at 2.5cm at right	0	-	-	-	2
192	C	12	n	Silty very fine sand over silt-clay; fecal pellets at SWI; few bits of plant debris in upper cm; methane bubbles at depth	0	-	-	-	2
197	B	n	n	Silt-clay with minor fraction of very fine sand in upper 2 cm; organic enrichment at depth, small worms visible against faceplate, portion of transected burrow lower left corner	0	-	-	-	2 -> 3
198	A	n	n	Silt-clay; surface covered with small to med-large mud clasts; thin aRPD indicative of propwash re-settlement	0	-	-	-	1
200	C	n	n	Silt-clay with minor fraction of very fine sand in upper 2 cm; evidence of burrowing throughout profile	0	-	-	-	2 -> 3
202	B	n	n	Silt-clay with minor fraction of very fine sand in upper 2 cm; small to med mud clasts (camera artifacts) on surface; fecal pellets; burrowing through aRPD; evidence of deeper burrowing at depth	0	-	-	-	2 on 3
204	C	n	n	Silt-clay with some silty very fine sand in surface layer; small-med mud clasts (camera artifact) on surface; void on right at depth	1	6.53	7.18	6.86	1 on 3
206	A	n	n	Silt-clay with very fine sand and fecal pellets @ SWI; deeper burrowers visible throughout profile	1	10.68	11.19	10.94	1 on 3
208	A	n	n	Silty very fine sand over silt-clay; fecal pellets; transected burrowslead to filled void - with some fecal pellets- below aRPD at center	1	13.61	14.52	14.07	1 on 3
209	A	n	n	Silt-clay with fecal pellets in upper cm; voids at depth	2	6.62	11.81	9.22	1 on 3
211	C	n	n	Silt-clay with layer of fecal pellets @ SWI; homogeneous fabric	0	-	-	-	2
213	A	n	n	Silty very fine sand over silt-clay; fecal pellets; voids at depth	2	6.04	12.45	9.24	1 on 3
214	A	n	n	Silt-clay with leaf at surface, with small arthopod on left side; fecal pellets; small polychaetes at 3 and 4 cm.	0	-	-	-	2
215	C	n	n	Silt-clay with mud clasts (camera artifact) on surface; fecal pellets; voids are small and at depth	2	8.30	9.43	8.87	1 on 3
217	A	n	n	Silt-clay with fecal pellets @ SWI; bivalve shell at ~3-4cm; small void	1	6.61	7.84	7.23	1 on 3
218	C	n	n	Silt-clay with mud clasts (camera artifact) on surface; fecal pellets @ SWI; transected burrows at depth	3	3.90	6.79	5.35	1 on 3
219	B	n	n	Silt-clay; small mud clast artifacts on surface; bivalve shell frag on surface; shallow burrowing, few fecal pellets.	0	-	-	-	1
220	C	n	n	Silt-clay with layer of fecal pellets at surface; transected burrow and two small voids at depth.	3	4.68	13.87	9.27	1 on 3
221	C	n	n	Silt-clay with mud clast artifacts on surface; few fecal pellets at SWI; void at depth on left	1	7.10	9.27	8.19	1 -> 2
222	A	n	n	Silt-clay with small mud clasts at surface; thin layer of fecal pellets at SWI relict aRPD; burrow with stack of fecal pellets at 8.75cm at left	0	-	-	-	1 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
223	B	n	n	Silt-clay with thin aRPD; fecal pellets at SWI; long polychaete at 6cm; burrow with fecal pellets at 8 cm; two other polychetes from 8cm to depth	0	-	-	-	1
224	B	n	n	Silt-clay with thin aRPD; fecal pellets at SWI; polychaete at 3 and 6cms, deeper one with fecal pellets, evidence of burrowing at depth	1	10.73	10.91	10.82	1 on 3
225	A	n	n	Silt-clay; bivalve shells at surface on right; very thin aRPD with fecal pellets at SWI; two large polychaetes at 7.5cm (probably Capitellids)	0	-	-	-	1
226	B	n	n	Silt-clay with small mud clast artifacts from camera and fecal pellets at SWI; small polychaete at 6 cm on left; narrow void at depth	1	15.20	16.32	15.76	1 on 3
227	B	n	n	Silt-clay with eroded oxidized surface layer; bivalve shell frag on surface; fecal pellets at SWI; small void; relict aRPD; evidence of deeper burrowing; transected burrows at depth on right	1	2.82	3.19	3.00	1 on 3
228	B	n	n	Silt-clay with fecal pellets at SWI; patchy aRPD; relict aRPD; small polychaete at 3 cm	1	4.18	4.92	4.55	1 on 3
230	C	n	n	Silt-clay with fecal pellets @ SWI; evidence of subsurface burrowing	0	-	-	-	1 on 3
233	A	n	n	Silt-clay with fecal pellets @ SWI; transected burrow at depth	1	4.51	5.97	5.24	1 on 3
400	B	n	n	No penetration; surface covered with oyster shells	-	-	-	-	indeterminate
401	B	n	n	No penetration; surface covered with barnacle-covered oyster shells	-	-	-	-	indeterminate
410	C	n	n	Silt-clay with light gray sediment smeared over redox layer (prism blade artifact); evidence of deeper burrowers below aRPD and at depth	0	-	-	-	2 -> 3
411	B	n	n	Silt-clay with homogeneous subsurface fabric	0	-	-	-	2
412	B	n	n	Hard bottom with no effective penetration; one mound of very fine sand at center visible;	0	-	-	-	indeterminate
413	B	n	n	Silt-clay, uneven surface disturbed by camera prism catching on bivalve shells and dragging them down through sediment column.	1	2.01	3.25	2.63	3
420	A	20+	n	Silt-clay with small tubes at SWI; relict aRPD; small void at mid-depth with methane bubbles, more methane bubbles at depth;	2	7.85	18.54	13.20	1 on 3
421	A	n	n	Silt-clay; many mud clasts on surface; fecal pellets; shallow burrowing; aRPD deeper on left; relict aRPD; evidence of burrowing at depth	0	-	-	-	1 on 3
423	C	n	n	Silt-clay; evidence of deeper burrowers just below aRPD to left of center	0	-	-	-	1 on 3
424	C	n	n	Silty very fine sand; shallow burrowing	0	-	-	-	2
426	C	n	n	Silt clay with surface armoring of bivalve shells; successional stage impossible to determine because of limited penetration.	0	-	-	-	indeterminate
427	C	n	n	Silt-clay with armored bottom (confirmed by other replicates); penetration too shallow for successional stage determination	0	-	-	-	indeterminate
430	A	1	n	Silt-clay; fecal pellets in upper cms; relict aRPD; indications of deeper burrowers at depth; methane bubble at depth	0	-	-	-	1 on 3
432	C	n	n	Silty very fine sand over silt-clay; fecal pellets in upper cms; relict aRPD; 2 polychaetes at 4 cm	0	-	-	-	2
434	A	n	n	Silt-clay with minor fraction of very fine sand in upper cm; burrowing through aRPD to 3 cm; aRPD deeper on left; relict aRPD; voids at depth	2	8.73	11.81	10.27	2 on 3
436	C	n	n	Silt-clay with some very fine sand admixed in upper cm; transected burrows at depth	1	12.42	14.15	13.28	1 on 3
520	D	n	n	Silty very fine sand over silt-clay; many small mud clasts (camera artifact) on surface; some fecal pellets at surface; small burrows through aRPD; deep relict aRPD	0	-	-	-	2
522	D	n	n	Silt-clay with minor fraction of very fine sand in upper 2-3 cm; evidence of shallow subsurface burrowing; homogeneous subsurface fabric, high albedo (low organics) in sediment	0	-	-	-	2 -> 3
524	A	n	n	Silt-clay with minor fraction of very fine sand in surface cm; some fecal pellets in upper cm; relict aRPD; burrow with fecal pellets at 8 cm	1	10.94	12.16	11.55	1 on 3
525	A	n	n	Silt-clay with few fecal pellets in upper cm; shallow burrowing	1	4.95	5.27	5.11	1 on 3
528	B	n	n	Silt-clay; mud clasts (camera artifacts) on surface; fecal pellets in upper cms; bits of debris below aRPD; edge of burrow/void transected mid subsurface on right	0	-	-	-	1 on 3
531	C	1	n	Silt-clay with some fecal pellets in upper cm; shallow burrowing and larger one at 2.7 cm at left; rellict aRPD; small polychaetes at 6.7cm; methane bubble at 3.5cm	0	-	-	-	2 -> 3
532	B	n	n	Silt-clay with shallow burrowing and some fecal pellets incorporated in aRPD; relict aRPD; evidence of deeper burrowing/voids at depth on right	0	-	-	-	1 on 3

Station	Replicate	Methane?	Low DO?	COMMENT	# of Feeding Voids	Void Minimum Depth (cm)	Void Maximum Depth (cm)	Void Average Depth (cm)	Successional Stage
534	C	n	n	Silt-clay; small mud clasts (camera artifacts) on surface; small burrowing through aRPD; relict aRPD	0	-	-	-	2
536	B	n	n	Silty very fine sand over silt-clay; surface covered with small mud clasts (camera artifacts); some fecal pellets at SWI; burrowing throught aRPD; bit of large polychaete at 4.8cm; voids are small	1	11.19	11.44	11.32	2 on 3
537	A	n	n	Silty very fine sand over silt-clay; short tubes on surface; fecal pellets incorporated into upper cms; shallow burrowing; small polychaete with fecal pellets at 3.7cm; active void at depth	1	14.16	14.86	14.51	1 on 3
540	A	n	n	Silt-clay with small to small-med mud clasts on surface; burrowing through aRPD; deeper burrow at 8cm with infauna partially visible; void at depth on right	1	12.91	13.30	13.11	2 on 3
541	A	n	n	Silt clay with some fecal pellets in upper cms; shallow burrowing down to 2.3cm; small polychaete at 7 cm	0	-	-	-	2 -> 3
542	B	n	n	Silt-clay with some very fine sand and few pellets in upper cm; small polychaete at 4cm; transected burrow at depth	0	-	-	-	1 on 3
543	A	n	n	Silt-clay with small tubes in background, bioturbation exceeds prism penetration depth, transected burrow at depth.	0	-	-	-	1 on 3
1179	A	n	n	Silt-clay with some very fine sand admixed in upper cm; low organics and homogeneous subsurface fabric	0	-	-	-	2
1180	C	n	n	Silt clay with some very fine sand admixed in upper 2 cm; some fecal pellets on surface and in upper cm; gray sediment at SWI at center is smear artifact from wiper blade; two small polychaetes at depth on right	1	7.88	8.94	8.41	1 on 3
1181	A	n	n	Silt clay with some very fine sand and fecal pellets in upper cm; shallow burrowing; relict aRPD; polychaete at 3cm; few small polychaetes at 7.5cm	1	9.72	10.02	9.87	1 on 3
1182	A	n	n	Silt clay with some very fine sand and fecal pellets in upper cm; shallow burrowing; small polychaete at 3cm	0	-	-	-	1
1183	A	n	n	Silt-clay with fecal pellets and shell fragments at SWI and in upper cm; polychaete with fecal pellets at 9.5 cm; voids at depth	2	9.33	12.54	10.94	1 on 3

APPENDIX B

Sediment Grab Benthic Identification Results

Haley and Aldrich - NY

October, 2013

Raw Data Table

Station	Phylum	Class	Order	Family	Taxa or LPIL	Number Rep 1	Total
B1-SS-001	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	112	112
B1-SS-001	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-001	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	4	4
B1-SS-001	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-001	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	26	26
B1-SS-001	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-001	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	774	774
B1-SS-001	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-001	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	2	2
B1-SS-001	Arthropoda	Malacostraca	Amphipoda	Melitidae	Melitidae (LIPL)	2	2
B1-SS-001	Mollusca	Bivalvia	Mytiloida	Mytilidae	Ischadium recurvum	56	56
B1-SS-001	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	16	16
B1-SS-001	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	2	2
B1-SS-001	Mollusca	Bivalvia	Veneroida	Veneridae	Veneridae (LPIL)	4	4
B1-SS-001	Mollusca	Bivalvia	Veneroida	Dressenidae	Mytilopsis leucophaeata	4	4
B1-SS-001	Mollusca	Gastropoda			Gastropoda (LPIL)	16	16
B1-SS-001	Mollusca	Bivalvia			Bivalvia (LPIL)	18	18
B1-SS-001	Mollusca	Bivalvia	Veneroida	Dreissenidae	Dreissena polymorpha	4	4
B1-SS-001	Nemertea				Nemertea (LPIL)	4	4
B1-SS-002	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	108	108
B1-SS-002	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-002	Annelida	Polychaeta	Spionida	Spionidae	Dipolydora socialis	2	2
B1-SS-002	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	4	4
B1-SS-002	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-002	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	6	6
B1-SS-002	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-002	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroides	8	8
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	20	20
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Gammaridae	Gammarus (LPIL)	2	2
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	4	4
B1-SS-002	Arthropoda	Ostracoda	Podocopida		Podocopida (LPIL)	2	2
B1-SS-002	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-002	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	292	292
B1-SS-002	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	30	30
B1-SS-002	Mollusca	Gastropoda	Neotaenioglossa	Littorinidae	Littorina (LPIL)	1024	1024
B1-SS-002	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	14	14
B1-SS-002	Mollusca	Bivalvia	Veneroida	Mactridae	Rangia cuneata	6	6
B1-SS-002	Mollusca	Bivalvia	Veneroida	Mactridae	Mactridae (LPIL)	18	18
B1-SS-002	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	10	10
B1-SS-002	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellinidae (LPIL)	16	16
B1-SS-002	Mollusca	Bivalvia			Bivalvia (LPIL)	6	6
B1-SS-002	Nemertea				Nemertea (LPIL)	12	12
B1-SS-002	Platyhelminthes	Turbellaria			Turbellaria (LPIL)	2	2
B1-SS-002	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	4	4

		Haley and Aldrich - NY					
			October, 2013				
			Raw Data Table				
Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-003-R1	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	144	144
B1-SS-003-R1	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	6	6
B1-SS-003-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	6	6
B1-SS-003-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	40	40
B1-SS-003-R1	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-003-R1	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	14	14
B1-SS-003-R1	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-003-R1	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-003-R1	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	600	600
B1-SS-003-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	16	16
B1-SS-003-R1	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	2	2
B1-SS-003-R1	Mollusca	Bivalvia			Bivalvia (LPIL)	36	36
B1-SS-003-R1	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	314	314
B1-SS-003-R1	Nemertea				Nemertea (LPIL)	22	22
B1-SS-003-R1	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-003-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	22	22
B1-SS-003-R2	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	90	90
B1-SS-003-R2	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-003-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-003-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	2	2
B1-SS-003-R2	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	6	6
B1-SS-003-R2	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	522	522
B1-SS-003-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-003-R2	Nemertea				Nemertea (LPIL)	12	12
B1-SS-003-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	10	10
B1-SS-003-R2	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	2	2
B1-SS-003-R2	Mollusca	Bivalvia			Bivalvia (LPIL)	20	20
B1-SS-003-R2	Mollusca	Bivalvia	Mytiloida	Mytilidae	Mytilidae (LPIL)	2	2
B1-SS-003-R2	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	374	374
B1-SS-003-R2	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-003-R2	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1
B1-SS-003-R3	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	104	104
B1-SS-003-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	26	26
B1-SS-003-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus ambiseta	2	2
B1-SS-003-R3	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	8	8
B1-SS-003-R3	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Phyllodocidae (LPIL)	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	14	14
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-003-R3	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	954	954
B1-SS-003-R3	Mollusca	Bivalvia	Veneroida	Mactridae	Mactridae (LPIL)	2	2
B1-SS-003-R3	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	4	4
B1-SS-003-R3	Mollusca	Bivalvia			Bivalvia (LPIL)	20	20

		Haley and Aldrich - NY					
			October, 2013				
			Raw Data Table				
Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-003-R3	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	846	846
B1-SS-003-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	6	6
B1-SS-003-R3	Nemertea				Nemertea (LPIL)	20	20
B1-SS-003-R3	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-003-R3	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1
B1-SS-004	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	212	212
B1-SS-004	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	28	28
B1-SS-004	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-004	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	4	4
B1-SS-004	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	4	4
B1-SS-004	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	4	4
B1-SS-004	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	1488	1488
B1-SS-004	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	4	4
B1-SS-004	Nemertea				Nemertea (LPIL)	28	28
B1-SS-004	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-005	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	408	408
B1-SS-005	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	36	36
B1-SS-005	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	76	76
B1-SS-005	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	16	16
B1-SS-005	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-005	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	8	8
B1-SS-005	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	312	312
B1-SS-005	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	12	12
B1-SS-005	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	132	132
B1-SS-005	Arthropoda	Malacostraca	Isopoda	Idoteidae	Synidotea (LPIL)	4	4
B1-SS-005	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	8	8
B1-SS-005	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	8	8
B1-SS-005	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	8	8
B1-SS-005	Mollusca	Bivalvia			Bivalvia (LPIL)	84	84
B1-SS-005	Nemertea				Nemertea (LPIL)	56	56
B1-SS-006	Arthropoda	Malacostraca	Isopoda	Idoteidae	Synidotea sp. E	28	28
B1-SS-006	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia (LPIL)	16	16
B1-SS-006	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	40	40
B1-SS-006	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	20	20
B1-SS-006	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	628	628
B1-SS-006	Arthropoda	Malacostraca	Mysida	Mysidae	Mysidae (LPIL)	4	4
B1-SS-006	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	8	8
B1-SS-006	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	48	48
B1-SS-006	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	12	12
B1-SS-006	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	8	8
B1-SS-006	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	228	228
B1-SS-006	Mollusca	Bivalvia			Bivalvia (LPIL)	24	24
B1-SS-006	Nemertea				Nemertea (LPIL)	20	20
B1-SS-006	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	568	568
B1-SS-006	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	120	120

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-006	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	44	44
B1-SS-006	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	4	4
B1-SS-006	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	8	8
B1-SS-006	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	12	12
B1-SS-007	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	8	8
B1-SS-007	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	4	4
B1-SS-007	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	8	8
B1-SS-007	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	8	8
B1-SS-007	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	4	4
B1-SS-007	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	796	796
B1-SS-007	Nemertea				Nemertea (LPIL)	20	20
B1-SS-007	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	44	44
B1-SS-007	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	36	36
B1-SS-007	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	8	8
B1-SS-007	Mollusca	Bivalvia	Veneroida	Mactridae	Mactridae (LPIL)	4	4
B1-SS-007	Mollusca	Bivalvia			Bivalvia (LPIL)	8	8
B1-SS-007	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	80	80
B1-SS-007	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	376	376
B1-SS-007	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	8	8
B1-SS-007	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4
B1-SS-007	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-007	Arthropoda	Malacostraca	Mysida	Mysidae	Neomysis americana	4	4
B1-SS-008	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-008	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	122	122
B1-SS-008	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	2	2
B1-SS-008	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	12	12
B1-SS-008	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	26	26
B1-SS-008	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2
B1-SS-008	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-008	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	12	12
B1-SS-008	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	2	2
B1-SS-008	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	500	500
B1-SS-008	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	12	12
B1-SS-008	Mollusca	Bivalvia	Veneroida	Mactridae	Rangia cuneata	2	2
B1-SS-008	Mollusca	Bivalvia			Bivalvia (LPIL)	44	44
B1-SS-008	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	42	42
B1-SS-008	Nemertea				Nemertea (LPIL)	14	14
B1-SS-009	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	6	6
B1-SS-009	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	10	10
B1-SS-009	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	828	828
B1-SS-009	Nemertea				Nemertea (LPIL)	22	22
B1-SS-009	Mollusca	Bivalvia	Veneroida	Mactridae	Rangia cuneata	4	4
B1-SS-009	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	4	4
B1-SS-009	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	44	44
B1-SS-009	Mollusca	Bivalvia			Bivalvia (LPIL)	22	22

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Station	Phylum	Class	Order	Family	Taxa or LPIL	Number Rep 1	Total
B1-SS-009	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	4	4
B1-SS-009	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	4	4
B1-SS-009	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	12	12
B1-SS-009	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	90	90
B1-SS-009	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	54	54
B1-SS-009	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	2	2
B1-SS-009	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-009	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-009	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	20	20
B1-SS-010-R1	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	6	6
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	20	20
B1-SS-010-R1	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	140	140
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-010-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	4	4
B1-SS-010-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina agilis	32	32
B1-SS-010-R1	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	10	10
B1-SS-010-R1	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	6	6
B1-SS-010-R1	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	974	974
B1-SS-010-R1	Mollusca	Gastropoda			Gastropoda (LPIL)	4	4
B1-SS-010-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellinidae (LPIL)	2	2
B1-SS-010-R1	Mollusca	Bivalvia			Bivalvia (LPIL)	42	42
B1-SS-010-R1	Platyhelminthes	Turbellaria			Turbellaria (LPIL)	4	4
B1-SS-010-R1	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	6	6
B1-SS-010-R1	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-010-R1	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-010-R1	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	28	28
B1-SS-010-R1	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	2	2
B1-SS-010-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	24	24
B1-SS-010-R1	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	14	14
B1-SS-010-R2	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	3	3
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	11	11
B1-SS-010-R2	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	1	1
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	2	2
B1-SS-010-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	1	1
B1-SS-010-R2	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	160	160
B1-SS-010-R2	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	8	8
B1-SS-010-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina agilis	40	40
B1-SS-010-R2	Mollusca	Bivalvia	Mytiloida	Mytilidae	Mytilidae (LPIL)	1	1
B1-SS-010-R2	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	654	654
B1-SS-010-R2	Mollusca	Bivalvia			Bivalvia (LPIL)	57	57
B1-SS-010-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina (LPIL)	14	14
B1-SS-010-R2	Nemertea				Nemertea (LPIL)	5	5
B1-SS-010-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-010-R2	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	27	27
B1-SS-010-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	5	5
B1-SS-010-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	18	18
B1-SS-010-R2	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	2	2
B1-SS-010-R2	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	2	2
B1-SS-010-R2	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-010-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Laeonereis culveri	1	1
B1-SS-010-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	13	13
B1-SS-010-R3	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	22	22
B1-SS-010-R3	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-010-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	15	15
B1-SS-010-R3	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	1	1
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	2	2
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Leptocheirus plumulosus	12	12
B1-SS-010-R3	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-010-R3	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	72	72
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-010-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	1	1
B1-SS-010-R3	Nemertea				Nemertea (LPIL)	12	12
B1-SS-010-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	2	2
B1-SS-010-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Tellina agilis	25	25
B1-SS-010-R3	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	1	1
B1-SS-010-R3	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	383	383
B1-SS-010-R3	Mollusca	Bivalvia			Bivalvia (LPIL)	5	5
B1-SS-010-R3	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	1	1
B1-SS-011	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	1	1
B1-SS-011	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	4	4
B1-SS-011	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	584	584
B1-SS-011	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	1	1
B1-SS-011	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroide	1	1
B1-SS-011	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	3	3
B1-SS-011	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	4	4
B1-SS-011	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	37	37
B1-SS-011	Mollusca	Bivalvia			Bivalvia (LPIL)	29	29
B1-SS-011	Nemertea				Nemertea (LPIL)	3	3
B1-SS-011	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	1	1
B1-SS-011	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	142	142
B1-SS-011	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-011	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	44	44
B1-SS-011	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-011	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	3	3
B1-SS-011	Annelida	Polychaeta	Scolecida	Capitellidae	Capitellidae (LPIL)	1	1
B1-SS-011	Annelida	Polychaeta	Scolecida	Capitellidae	Mediomastus (LPIL)	2	2
B1-SS-011	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	1	1
B1-SS-011	Arthropoda	Insecta	Diptera	Chironomidae	Polypedilum halterale grou	1	1

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-011	Arthropoda	Insecta	Diptera	Chironomidae	Coelotanypus (LPIL)	1	1
B1-SS-012	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	1	1
B1-SS-012	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	150	150
B1-SS-012	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	22	22
B1-SS-012	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-012	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	1	1
B1-SS-012	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	5	5
B1-SS-012	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	186	186
B1-SS-012	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	22	22
B1-SS-012	Mollusca	Bivalvia			Bivalvia (LPIL)	18	18
B1-SS-012	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	19	19
B1-SS-012	Mollusca	Gastropoda			Gastropoda (LPIL)	1	1
B1-SS-012	Nemertea				Nemertea (LPIL)	5	5
B1-SS-013	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	4	4
B1-SS-013	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	34	34
B1-SS-013	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	138	138
B1-SS-013	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-013	Arthropoda	Malacostraca	Mysida	Mysidae	Neomysis americana	2	2
B1-SS-013	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	4	4
B1-SS-013	Arthropoda	Malacostraca	Isopoda	Idoteidae	Synidotea (LPIL)	2	2
B1-SS-013	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	566	566
B1-SS-013	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	18	18
B1-SS-013	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	12	12
B1-SS-013	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	6	6
B1-SS-013	Mollusca	Bivalvia			Bivalvia (LPIL)	36	36
B1-SS-013	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	118	118
B1-SS-013	Nemertea				Nemertea (LPIL)	6	6
B1-SS-014-R1	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	206	206
B1-SS-014-R1	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	38	38
B1-SS-014-R1	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	8	8
B1-SS-014-R1	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-014-R1	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	8	8
B1-SS-014-R1	Arthropoda	Malacostraca	Amphipoda	Aoridae	Grandidierella bonnieroides	6	6
B1-SS-014-R1	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	820	820
B1-SS-014-R1	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	14	14
B1-SS-014-R1	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	2	2
B1-SS-014-R1	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	256	256
B1-SS-014-R1	Mollusca	Bivalvia			Bivalvia (LPIL)	26	26
B1-SS-014-R1	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	4	4
B1-SS-014-R1	Nemertea				Nemertea (LPIL)	10	10
B1-SS-014-R2	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	76	76
B1-SS-014-R2	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	12	12
B1-SS-014-R2	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	248	248
B1-SS-014-R2	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4
B1-SS-014-R2	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	12	12

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Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-014-R2	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	860	860
B1-SS-014-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	4	4
B1-SS-014-R2	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Oedicerotidae (LPIL)	4	4
B1-SS-014-R2	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	312	312
B1-SS-014-R2	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	20	20
B1-SS-014-R2	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	8	8
B1-SS-014-R2	Mollusca	Bivalvia			Bivalvia (LPIL)	24	24
B1-SS-014-R2	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	4	4
B1-SS-014-R2	Nemertea				Nemertea (LPIL)	28	28
B1-SS-014-R3	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	142	142
B1-SS-014-R3	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	46	46
B1-SS-014-R3	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	4	4
B1-SS-014-R3	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	6	6
B1-SS-014-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	2	2
B1-SS-014-R3	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	4	4
B1-SS-014-R3	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	10	10
B1-SS-014-R3	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	6	6
B1-SS-014-R3	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	2	2
B1-SS-014-R3	Arthropoda	Malacostraca	Amphipoda	Aoridae	Aoridae (LPIL)	2	2
B1-SS-014-R3	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	444	444
B1-SS-014-R3	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	28	28
B1-SS-014-R3	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	8	8
B1-SS-014-R3	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	104	104
B1-SS-014-R3	Mollusca	Bivalvia			Bivalvia (LPIL)	22	22
B1-SS-014-R3	Mollusca	Bivalvia	Myoida	Myidae	Myidae (LPIL)	2	2
B1-SS-014-R3	Nemertea				Nemertea (LPIL)	10	10
B1-SS-101	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-101	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	4	4
B1-SS-101	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	70	70
B1-SS-101	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	10	10
B1-SS-101	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	16	16
B1-SS-101	Mollusca	Bivalvia			Bivalvia (LPIL)	8	8
B1-SS-101	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	12	12
B1-SS-101	Nemertea				Nemertea (LPIL)	20	20
B1-SS-101	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	592	592
B1-SS-101	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	140	140
B1-SS-101	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereis succinea	4	4
B1-SS-101	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	2	2
B1-SS-101	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	4	4
B1-SS-101	Annelida	Polychaeta	Terebellida	Ampharetidae	Ampharetidae (LPIL)	2	2
B1-SS-101	Annelida	Polychaeta	Terebellida	Pectinariidae	Pectinaria gouldii	2	2
B1-SS-102	Arthropoda	Malacostraca	Isopoda	Anthuridae	Cyathura polita	2	2
B1-SS-102	Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	Ameroculodes sp. A	4	4
B1-SS-102	Arthropoda	Malacostraca	Isopoda	Idoteidae	Edotia triloba	2	2
B1-SS-102	Arthropoda	Malacostraca	Amphipoda		Amphipoda (LPIL)	2	2

		Haley and Aldrich - NY					
			October, 2013				
			Raw Data Table				
Station	**Phylum**	**Class**	**Order**	**Family**	**Taxa or LPIL**	**Number Rep 1**	**Total**
B1-SS-102	Arthropoda	Malacostraca	Cumacea	Leuconidae	Leucon americanus	168	168
B1-SS-102	Mollusca	Bivalvia	Veneroida	Tellinidae	Macoma balthica	34	34
B1-SS-102	Mollusca	Bivalvia	Veneroida	Mactridae	Mulinia lateralis	6	6
B1-SS-102	Mollusca	Bivalvia	Neotaenioglossa	Littorinidae	Littoraria (LPIL)	10	10
B1-SS-102	Mollusca	Bivalvia	Myoida	Myidae	Mya arenaria	2	2
B1-SS-102	Mollusca	Bivalvia			Bivalvia (LPIL)	2	2
B1-SS-102	Nemertea				Nemertea (LPIL)	22	22
B1-SS-102	Annelida	Polychaeta	Spionida	Spionidae	Streblospio benedicti	12	12
B1-SS-102	Annelida	Polychaeta	Spionida	Spionidae	Marenzelleria jonesi	2	2
B1-SS-102	Annelida	Polychaeta	Phyllodocida	Phyllodocidae	Hypereteone fauchaldi	2	2
B1-SS-102	Annelida	Oligochaeta	Tubificida	Tubificidae	Tubificidae (LPIL)	410	410
B1-SS-102	Annelida	Polychaeta	Scolecida	Capitellidae	Heteromastus filiformis	130	130
B1-SS-102	Annelida	Polychaeta	Phyllodocida	Nereididae	Nereididae (LPIL)	2	2

APPENDIX C

HUDSON RIVER BERA DATA

Table C-1

Comparison of Exposure Point Concentrations: Revised [Lower] Hudson River BERA vs. OU-2 BERA

Former Anaconda Wire and Cable Company Site

Hastings-on-Hudson, NY

Media Assessed	Units	Location[1]	Revised Hudson River BERA PCB EPCs		OU-2 BERA EPCs	Reference[2]
			Average	95% UCL	95% UCL	
Surface Water	ug/L	River Mile 25.8	0.021	0.095	<0.010	Table 3-5
Sediment	mg/kg	River Mile 25.8	0.578	1.563	1.11	Table 3-6
Benthic Invertebrates[3]	mg/kg	River Mile 25.8	0.197	0.335	--	Table 3-10
FISH						
Forage Fish	mg/kg	River Mile 25.8	0.98	1.18	0.39	Table 3-12
Striped Bass	mg/kg	River Mile 29.0	1.92	2.74	--	Table 3-14
White Perch[4]	mg/kg	River Mile 50.0	0.56	0.67	3.06	Table 3-17
BIRDS						
Great Blue Heron, Female[4]	mg/kg	River Mile 25.8	0.15	0.19	0.42	Table 3-39, -40
Bald Eagle, Female[4]	mg/kg	River Mile 25.8	0.86	1.70	0.36	Table 3-43, -44
MAMMALS						
River Otter, Female[4]	mg/kg	River Mile 25.8	0.83	1.64	0.36	Table 3-83, -84

[1]The number of miles from the mouth of the Hudson River. River mile 25.8 is a few miles south of the Tappan Zee Bridge. The location of OU-2 is between River Mile 21.3 and 21.3.

[2]The 95th UCL values were obtained from tables in the Revised Hudson River BERA (USEPA, 2000).

[3]The 95th UCL is higher than the maximum value measured in OU-2 during the 2000 RI (0.32 mg/kg) (USEPA, 2000).

[4]These concentrations are "predicted" in OU-2 fish (prey) for 2015 using a bioaccumulation model. RM 50 encompasses the reach from RM 63.5 - 33.5.

[5]These OU-2 exposure point concentrations are the levels in fish (prey) obtained from the BSAP (95th UCL).

Table C-2
Revised [Lower] Hudson River BERA Data: Hazard Quotients for Selected Receptors
Former Anaconda Wire and Cable Company Site
Hastings-on-Hudson, NY

Media Assessed	Location[1]	95% UCL NOAEL	95% UCL LOAEL	Reference[2]
FISH				
Forage Fish (Pumpkinseed)	River Mile 25.8	0.60	0.10	Table 5-10
Forage Fish (Spot-tail Shiner)	River Mile 25.8	0.20	0.10	Table 5-10
Striped Bass	River Mile 29	0.90	0.30	Table 5-31
White Perch[2]	River Mile 50	0.20	0.10	Table 5-22, 5-23
BIRDS				
Tree Swallow	River Mile 25.8	NA	0.02	Table 5-32
Female Mallard	River Mile 25.8	0.30	0.03	Table 5-38
Belted Kingfisher	River Mile 25.8	0.20	0.06	Table 5-44
Great Blue Heron	River Mile 25.8	0.10	0.03	Table 5-45
Bald Eagle, Female	River Mile 25.8	0.90	0.20	Table 5-46
MAMMALS				
Brown Bat, Female	River Mile 25.8	0.40	0.08	Table 5-62
Raccoon, Female	River Mile 25.8	0.10	0.02	Table 5-66
Mink, Female	River Mile 25.8	18.0	1.8	Table 5-71
River Otter, Female	River Mile 25.8	411	41	Table 5-72

[1]The number of miles from the mouth of the Hudson River. River mile 25.8 is a few miles south of the Tappan Zee Bridge. The location of OU-2 is between River Mile 21.3 and 21.3.

[2]The 95th UCL values were obtained from tables in the Revised Hudson River BERA (USEPA, 2000).

APPENDIX D

RECEPTOR PROFILES

RIVER OTTER (PISCIVOROUS MAMMAL)

The river otter (*Lutra canadensis*) is an almost exclusively aquatic mammal endemic to North America and found in freshwater, estuarine, and some marine environments all the way from coastal areas to mountain lakes. River otters measure 66 to 76 cm with a 30 to 43 cm tail and average 8 kilograms in weight (~18 lbs). They consume about one fifth of their body weight in food per day. Sexual dimorphism in size is seen among all subspecies. The river otter makes its den in banks and hollow logs. Individuals range over large areas (up to 5 square miles) with their diet comprised almost entirely of fish. Because of its piscivorous diet and high trophic level, the river otter is a noteworthy indicator of bioaccumulative pollution in aquatic ecosystems. Although otters have few natural predators, while on land, they may be taken by coyotes, foxes, or dogs.

Otters usually are typically most active in the evening and from dawn to midmorning. The bulk of the river otter's diet is fish; however, otters are opportunistic and will feed on a variety of prey depending on availability and ease of capture. River otters take different fish species according to their availability and how well the fish can escape capture. Depending on availability, otters also may also consume crustaceans (especially crayfish), aquatic insects (e.g., stonefly nymphs, aquatic beetles), amphibians, insects, birds (e.g., ducks), mammals (e.g., young beavers), and turtles.

The river otter's home range encompasses the area needed for foraging and reproduction. All parts of a home range are not used equally; instead, several activity centers may be interconnected by a stream or coast. Food has the greatest influence on habitat use, but adequate shelter in the form of temporary dens and resting sites also plays a role. River otters use dens dug by other animals or natural shelters such as hollow logs, logjams, or drift piles. River otters maintain distinct territories within their home ranges: females maintain a feeding area for their families, males for breeding purposes. Adult and subadult males have larger, more variable home ranges than females.

DOUBLE-CRESTED CORMORANT (PISCIVOROUS BIRD)

The double-crested cormorant (*Phalacrocorax auritus*) is waterbird native to North America. Their average weight is 1.8 kg (~4 lbs.). Double-crested cormorants can be found in many locations throughout the country , including along the coast and inland on lakes, rivers, and estuaries. The double-crested cormorant is the most abundant of six species of cormorants occurring in North America. The largest concentrations of double-crested cormorants are found on the Great Lakes and the lakes of the Canadian prairie provinces. Cormorants breed in colonies ranging from several pairs to a few thousand. They build their nests of twigs and branches beginning in April (usually in trees or the ground) on islands favored also by other colonial nesting birds, like great blue herons, great egrets, gulls, and terns.

Double-crested Cormorants float low on the surface of water and dive to catch small fish which make up the majority of their diet. After fishing, they stand on docks, rocks, or tree limbs with wings spread open to dry. Double-crested cormorants eat mainly fish but may also feed on amphibians, reptiles, and crustaceans. Adults eat an average of one pound per day, usually composed of small (less than 6 inch) bottom dwelling or schooling “forage” fish. They are opportunistic and generalist feeders, preying on many species of fish, but concentrating on those that are easiest to catch. Because the ease with which a fish can be caught depends on a number of factors (distribution, relative abundance, behavior, etc.), the composition of a cormorant’s diet can vary considerably from site to site and throughout the year.

Cormorants may take sufficient numbers of sport fish to negatively affect angler catch rates. Research studies have revealed that summer resident and migrating cormorants can diminish the number of fish of catchable size available to anglers. Cormorants also kill trees, shrubs, and other vegetation, due to accumulation of their guano, which is highly acidic, and removal of foliage for nesting material. Evidence of locally-significant impacts on other colonial waterbirds has been observed by many biologists, particularly in the Great Lakes States and provinces. In some regions, wildlife management agencies have authorize the take of cormorants, their eggs, and nests, via permits, in order to alleviate specific damages.

GREAT BLUE HERON (PISCIVOROUS BIRD)

The great blue heron (*Ardea herodias*) is a large wading bird in North America that feeds primarily on aquatic organisms (principally fish). It is widely distributed in both saltwater and freshwater environments. Males average slightly heavier in weight than females (average is 2.3 kg or 5 lbs.). Great blue herons inhabit all types of freshwater, estuarine and and marine environments, particularly where small fish are plentiful in shallow areas. They are often seen on tidal flats and sandbars and occasionally forage in wet meadows, pastures, and other terrestrial habitats. Great blue herons tend to nest in dense colonies, or heronries. The location of the heronry is generally close to foraging grounds, and tall trees are preferred over shorter trees or bushes for nest sites. They also may nest on the ground, on rock ledges, or on sea cliffs.

Fish are the preferred prey, but great blue herons also eat amphibians, reptiles, crustaceans, insects, birds, and mammals. When fishing, they mainly use two foraging techniques: standing still and waiting for fish to swim within striking distance or slow wading to catch more sedentary prey. Great blue herons sometimes forage in wet meadows and pastures in pursuit of lizards, small mammals, and large insects. In northern areas, small mammals such as meadow voles may be an important part of the diet early in the breeding season, possibly because some aquatic foraging areas may still be partially frozen when the herons arrive.

In the northern part of its range, most great blue herons are migratory, some moving to the southern Atlantic and Gulf States to overwinter with the resident populations of herons, others continuing on to Cuba and Central and South America. Most migrating herons leave their breeding grounds by October or November and return between February and April. Breeding colonies are generally close to foraging grounds. Each breeding pair defends a small territory around the nest, the size of which depends on local habitat and the birds stage of reproduction; herons in some areas also defend feeding territories. In other areas, great blues appear to be opportunistic foragers, lacking strict fidelity to particular feeding sites.

BALD EAGLE (PISCIVOROUS BIRD)

The bald eagle (*Haliaeetus leucocephalus*) is a large bird of prey and is both the national bird and national animal of the United States of America. Females are significantly larger than males, but otherwise the sexes look alike. Relatively common in Alaska, populations in the lower 48 States were diminished, although they have rapidly recovered and have been removed from the List of Endangered and Threatened Wildlife in the lower 48 states. Bald eagles generally are restricted to coastal areas, lakes, and rivers, although some may winter in areas not associated with water. Bald eagles reach maximum densities in areas of minimal human activity and are almost never found in areas of heavy human use.

Primarily carrion feeders, bald eagles eat dead or dying fish when available but also will catch live fish swimming near the surface or fish in shallow waters. In general, bald eagles are opportunistic feeders, taking advantage of whatever food source is most plentiful and easy to scavenge or to capture, including birds and mammals. In many areas, especially in winter, waterfowl and shore birds may be an important food source. Because bald eagles scavenge dead or dying prey, they are particularly vulnerable to environmental contaminants and pesticides (e.g., from feeding on birds that died from pesticides, consuming lead shot from waterfowl killed or disabled by hunters). Bald eagles also are vulnerable to biomagnification of contaminants in food chains.

Bald eagles migrate out of areas where lakes are completely frozen over in winter, but will remain as far north as the availability of open water and a reliable food supply allow. During the winter, eagles roost communally in large aggregations and share a foraging home range. During the breeding season, eagles require large areas in the vicinity of open water, with an adequate supply of nesting trees. Distance from human disturbance is an important factor in nest site selection. During incubation and brooding, eagles show territorial defense of an area around the nest site. Following fledging, there is little need for nest defense, and eagles are opportunistic in their search for abundant sources of prey.

References

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