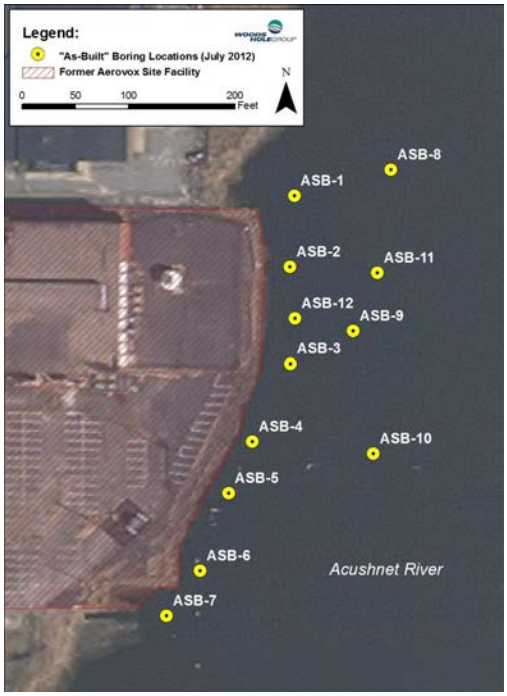
FINAL REPORT

SEDIMENT BORING COLLECTION AND ANALYSIS OFF THE FORMER AEROVOX SITE PROPERTY SHORELINE, NEW BEDFORD, MA

APRIL 2013

NEW BEDFORD HARBOR SUPERFUND SITE, OU #1

Contract No. W912WJ-09-D-0001-0010-05



Prepared For:
United States Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

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April 2013

SDMS Doc ID 533436

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Table of Contents

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1

1.1 BACKGROUND 1

1.1.1 Remedial Actions on the Aerovox Site 1

1.1.2 Remedial Actions on the Harbor Site adjacent to Aerovox Site 1

1.2 PROJECT OBJECTIVES AND SCOPE 2

1.3 KEY PERSONNEL AND SUBCONTRACTORS 7

2.0 METHODS 9

2.1 BORING LOCATIONS 9

2.2 BORING COLLECTION 9

2.3 SEDIMENT BORING ANALYTICAL SAMPLING 11

2.4 SEDIMENT BORING DESCRIPTIONS 12

2.5 ANALYTICAL METHODS 13

2.5.1 Polychlorinated Biphenyls 13

2.5.2 Volatile Organic Compounds 13

2.5.3 Semivolatile Organic Compounds 13

2.6 QUALITY ASSURANCE/QUALITY CONTROL 14

2.6.1 Decontamination 14

2.6.2 Field-Based Quality Control Samples 14

2.6.3 Laboratory-Based Quality Control Samples 15

2.7 SAMPLE IDENTIFICATION 15

2.8 REPORTING 16

3.0 CHRONOLOGY OF OPERATIONS 17

4.0 RESULTS 21

4.1 BORING COLLECTION 21

4.2 PHYSICAL CHARACTERISTICS 21

4.3 ANALYTICAL RESULTS 22

4.3.1 Polychlorinated Biphenyls as Aroclors 22

4.3.2 Volatile Organic Compounds 23

4.3.3 Semi-volatile Organic Compounds 24

4.4 FIELD BASED QUALITY CONTROL SAMPLES 25
4.5 DATA VALIDATION 25
5.0 REFERENCES 59
APPENDIX A. FIELD NOTES A-1
APPENDIX B. FINAL BORING LOGS PRODUCED BY JACOBS ENGINEERING B-1
APPENDIX C. LIST OF ANALYTICAL COMPOUNDS C-1
APPENDIX D. ALPHA ANALYTICAL LABORATORIES REPORTS AND ANALYTICAL DATA D-1
APPENDIX E. DATA VALIDATION REPORTS AND WORKSHEETS E-1

List of Figures

Figure 1. Basemap of New Bedford Harbor Superfund Site in Southeastern, MA 3
Figure 2. As-built locations of the twelve (12) sediment borings off the former Aerovox Site facility. 4
Figure 3. Mini-sonic drill rig mounted over moon pool on barge spudded off the former Aerovox Site property. 10

List of Tables

Table 1. Summary of "as-built" borings locations collected off the shoreline of the former Aerovox Site in July 2012. 5
Table 2. Examples of the NBHSS sample identification format 16
Table 3. Summary of analytical results for specific contaminants of concern in boring ASB-1 29
Table 4. Summary of analytical results for specific contaminants of concern in boring ASB-2 31
Table 5. Summary of analytical results for specific contaminants of concern in boring ASB-3 33
Table 6. Summary of analytical results for specific contaminants of concern in boring ASB-4 35
Table 7. Summary of analytical results for specific contaminants of concern in boring ASB-5 37
Table 8. Summary of analytical results for specific contaminants of concern in boring ASB-6 39
Table 9. Summary of analytical results for specific contaminants of concern in boring ASB-7 41
Table 10. Summary of analytical results for specific contaminants of concern in boring ASB-8 43
Table 11. Summary of analytical results for specific contaminants of concern in boring ASB-9 45
Table 12. Summary of analytical results for specific contaminants of concern in boring ASB-10 47
Table 13. Summary of analytical results for specific contaminants of concern in boring ASB-11 49
Table 14. Summary of analytical results for specific contaminants of concern in boring ASB-12 51
Table 15. Summary of the twelve most-frequently detected SVOCs 53
Table 16. Summary of Equipment Blank Results 55

Table 17. Summary of Trip Blank Results 56

EXECUTIVE SUMMARY

The primary objective of this project was to obtain a vertical profile of contaminants along the former Aerovox Site facility shoreline, from the sediment water interface to bedrock. The secondary goal was to identify potential pathways for contaminant transport within the sediment using analytical data and geotechnical data. The objectives of the project were achieved with twelve (12) sediment borings using a barge mounted sonic drill rig as the sampling platform. Sediment boring stations were identified as ASB-1 through ASB-12. The subtidal and intertidal areas where sediment borings were collected had been previously dredged by the EPA in 1994 and 2008.

One hundred twenty-three (123) analytical field samples, plus QC, were collected from the boring sections. Each sample was collected from a half-foot (0.5) interval of sediment and was submitted for analysis of PCBs (Aroclors), VOCs, and SVOCs, and an archive sample for possible PCB 209 Congeners analysis. All split sediment boring sections were measured, photographed, described, and logged by a trained soil scientist. Textural, sorting, consistency/firmness, and color descriptions were performed according to USCS and Munsell standards. Other characteristic information regarding odor, PID readings, stratigraphy, and analytical sample collection intervals are provided on the boring logs. In all cases, boring collection ceased at bedrock, whether verified with the recovery of a plug of stone, or through drill rig characteristics and feedback provided by the driller.

In general, the borings contained a top-to-bottom stratigraphic sequence of: 1) marine deposits; 2) glacial outwash deposits; 3) glacial till deposits; and 4) bedrock. Marine deposits consisted of organic silts, silts, sands, and gravel with sand, with varying color from black to grey. Glacial outwash deposits were coarse in texture, consisting of mixes of sand and gravel, with varied color between yellow, brown, and grey. Glacial till deposits were comprised of a fine-grained matrix but texturally variable, poorly sorted within the stratigraphic unit, and colored olive, greenish grey, and grey. Bedrock or weathered bedrock was observed between an elevation of -26.3 and -37.4 feet NGVD29, with an average elevation of -30.8 feet, NGVD29. Two borings, ASB-7 and ASB-12, contained a thin layer of peat in the upper sections of the borings between the marine and glacial outwash strata.

A group of seven (7) site specific contaminants-of-concern, chosen by the USACE-NAE and USEPA, are presented in this document. These seven analytes include: Aroclor 1242, Aroclor 1254, Tetrachloroethene (PCE), Trichloroethene (TCE), cis-1,2-Dichloroethene, Vinyl Chloride, and 1,2,4-Trichlorobenzene. The rationale for reporting the analytical results for these specific target analytes is based on: 1) historical usage of these compounds by the Aerovox Corporation and respective degradation compounds, and 2) observations of high concentrations in New Bedford Harbor sediment from this area.

Aroclor 1242 is present in all borings except ASB-6. Aroclor 1254 is present in all borings except ASB-9. Concentrations vary considerably between boring sites, but there is an area of higher concentrations at the northern part of the study area around stations

ASB-1, ASB-3, and ASB-8. Generally, PCB concentrations are highest in the surface sediment and decrease with depth in the boring. The highest concentration of Aroclor 1242 was 4,800,000 µg/kg at -5.2 to -5.7 feet NGVD29 in ASB-8, and the highest concentration of Aroclor 1254 was 8,350,000 µg/kg at -9.5 to -10.0 feet NGVD29 in ASB-1. Aroclors were detected in the glacial till sediment of all borings except for ASB-6 at concentrations between 22.2 and 238 µg/kg.

Concentrations of VOCs were highest in the borings located in the northern part of the study area. Tetrachloroethene was not prevalent in the boring samples. The compound was not detected in eight of the borings. Although not commonly detected, the highest observed concentration of PCE was 230,000 µg/kg in the top sample from boring ASB-3. Trichloroethene was observed throughout the sediment column, and down to the basal glacial till of every boring. Trichloroethene concentrations were highest in borings ASB-2, ASB-3, ASB-4, ASB-8, and ASB-9, located in the northern half of the study area. The maximum concentration detected in the sediment samples was 24,000,000 µg/kg (or 2.4 percent) in sample S-12L-B003-0.6-1.1 collected from ASB-3. These high concentrations of TCE are not present in the other borings, but concentrations of ≥ 81,000 µg/kg were detected in borings ASB-2, ASB-4, ASB-8 and ASB-9. The other seven borings contained lower concentrations of TCE with a range from 12 to 14,000 µg/kg.

The TCE degradation products cis-1,2-Dichloroethene and Vinyl Chloride were commonly detected in the samples. These two degradation compounds present strong evidence that there is anaerobic microbial degradation occurring in the northern half of the study area, especially in the upper sections of the sediment column. The compound cis-1,2-Dichloroethene was detected in all borings, and was present in the glacial till of nine of the twelve borings. The maximum concentration of cis-1,2-Dichloroethene was 2,200,000 µg/kg, detected in ASB-2. Similar to the occurrence of TCE, the highest concentrations of cis-1,2-Dichloroethene were detected in borings from the northern half of the study area. Vinyl Chloride was observed in nine of the twelve borings. In general Vinyl Chloride was confined to the marine stratigraphy and other sediment in the upper sections of the sediment column. The compound was detected in the glacial till of only two borings, and at low concentrations (≤ 20 µg/kg). The highest concentrations, with detections ≥1,500 µg/kg, were observed in borings located in the northern part of the study area. The samples from ASB-2, ASB-3, and ASB-12 are closely located off the drainage swales of the former Aerovox Site facility, and contained detections of Vinyl Chloride at 160,000 µg/kg, 180,000 µg/kg, and 110,000 µg/kg, respectively. The highest observed concentration of Vinyl Chloride was detected in the marine strata of boring ASB-8 at 240,000 µg/kg.

The compound1,2,4-Trichlorobenzene was detected in seven of the twelve borings, with the highest concentrations in borings from the northern part of the study area. Boring ASB-8 contained the highest concentration of 1,2,4-Trichlorobenzene at 320,000 µg/kg in the marine strata. Detections in glacial outwash sediment were generally low and decreased with boring depth. The analyte was detected in the glacial till of one sample from ASB-8 at a very low concentration of 9.9 µg/kg.

In general SVOC detections were limited to the upper sample interval of the borings. Twenty of the sixty-seven SVOC compounds were detected in the boring samples. The majority of these SVOCs are pyrogenic polycyclic aromatic hydrocarbons (PAHs).

Based on the Tier I+ validation of the analytical results, all data were considered usable based on a comparison to the project specific QAPP requirements, with the understanding of the potential uncertainty (bias) in the qualified results.

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1.0 INTRODUCTION

1.1 BACKGROUND

The New Bedford Harbor Superfund Site (Harbor Site), located in Bristol County, Massachusetts, extends from the shallow northern reaches of the Acushnet River estuary south through the commercial harbors of New Bedford and Fairhaven and into 17,000 adjacent acres of Buzzards Bay (Figure 1). Based on human health concerns and ecological risk assessments, the United States Environmental Protection Agency (USEPA) added New Bedford Harbor to the National Priorities List in 1983 as a designated Superfund Site. The Harbor Site is divided into three geographic areas: the upper, lower and outer harbors, based on geographic features, basin morphology and gradients of contamination (Figure 1). The upper harbor, the primary focus of this report, is approximately 187 acres and contains sediments contaminated with polychlorinated biphenyls (PCBs) that range from below detection to approximately 4,000 parts per million (ppm).

The former Aerovox Corporation property (Aerovox Site), located along the western shoreline of the Acushnet River, was the main source of PCBs discharged to the upper harbor, primarily in the northern extents. EPA environmental monitoring has shown that harbor sediments adjacent to the Aerovox property contained high concentrations of PCBs, volatile organic compounds (VOCs), and other contaminants. Groundwater samples collected on the Aerovox Site property displayed the same suite of contaminants (MACTEC, 2010). Several remedial actions have been taken to control the contamination from the Aerovox Site and to remediate contaminants that have been released into the Harbor Site.

1.1.1 Remedial Actions on the Aerovox Site

In a 1984 action Aerovox installed a steel sheet pile wall along the shoreline to prevent continued contaminant transport from the Aerovox Site property to the upper harbor. The length of the sheet piles used in the wall is not certain, but is thought to be either 9 or 13 feet. Based on an assumed sheet length of 13 feet and the surveyed elevation at the top of the sheets, the wall penetrates into the sediments to a bottom elevation between -6.7 and -8.3 feet NGVD29. Additional actions as part of Administrative Settlement Agreement and Order on Consent for Aerovox Site were also conducted. These actions included the Non-Time Critical Removal Action (NTCRA), completed in 2011 and 2012, which consisted of the demolition of the buildings on the Aerovox Site, offsite disposal of waste material, capping, and implementation of post-removal site control measures. Under this agreement, the Aerovox Site will also undergo further subsurface investigation and response action in accordance with the Massachusetts Ch. 21 E cleanup program.

1.1.2 Remedial Actions on the Harbor Site adjacent to Aerovox Site

As part of the Harbor Site remedial actions, environmental dredging in the upper harbor, adjacent to the Aerovox Site, was performed in 1994 during the “Hot Spot” remedial action. During the 2006 dredging season, EPA confirmed the presence of high concentrations of PCBs and VOCs in the harbor sediment in the area immediately adjacent to the Aerovox Site. In 2008, EPA mechanically dredged the subtidal and

intertidal sediment adjacent to the property. Although some of these areas have been dredged multiple times, PCB and VOC contamination has persisted in proximity to the Aerovox Site and this prompted the EPA to propose exploratory environmental sampling of sediment immediately offshore of the Aerovox Site. This report describes the environmental sediment sampling investigation performed in July 2012, based on that proposal.

1.2 PROJECT OBJECTIVES AND SCOPE

The primary objective of this project was to obtain a vertical profile of contaminants along the former Aerovox Site facility shoreline, from the sediment water interface to bedrock. Previous borings indicated bedrock between 20 to 30 feet below the sediment water interface (Foster Wheeler, 2001). The secondary goal was to identify potential pathways for contaminant transport within the sediment using analytical data and geotechnical data. The subtidal and intertidal areas where sediment borings were collected had been previously dredged by the EPA in 1994 and 2008.

The objectives of the project were achieved with the collection of twelve (12) sediment borings using a barge mounted sonic drill rig as the sampling platform (Figure 2, Table 1). The Boart Longyear Company was the environmental drilling contractor.

The project was successfully completed by maintaining coordination between two operational crews: 1) a field collection crew working with the sonic drill rig; and 2) a field laboratory crew to process samples. The field collection crew was stationed on the barge to oversee boring collection. The field laboratory crew was stationed in the New Bedford Superfund Site laboratory trailer to process discrete analytical samples, and to provide geological descriptions of the borings.

Figure 1. Basemap of New Bedford Harbor Superfund Site in Southeastern, MA

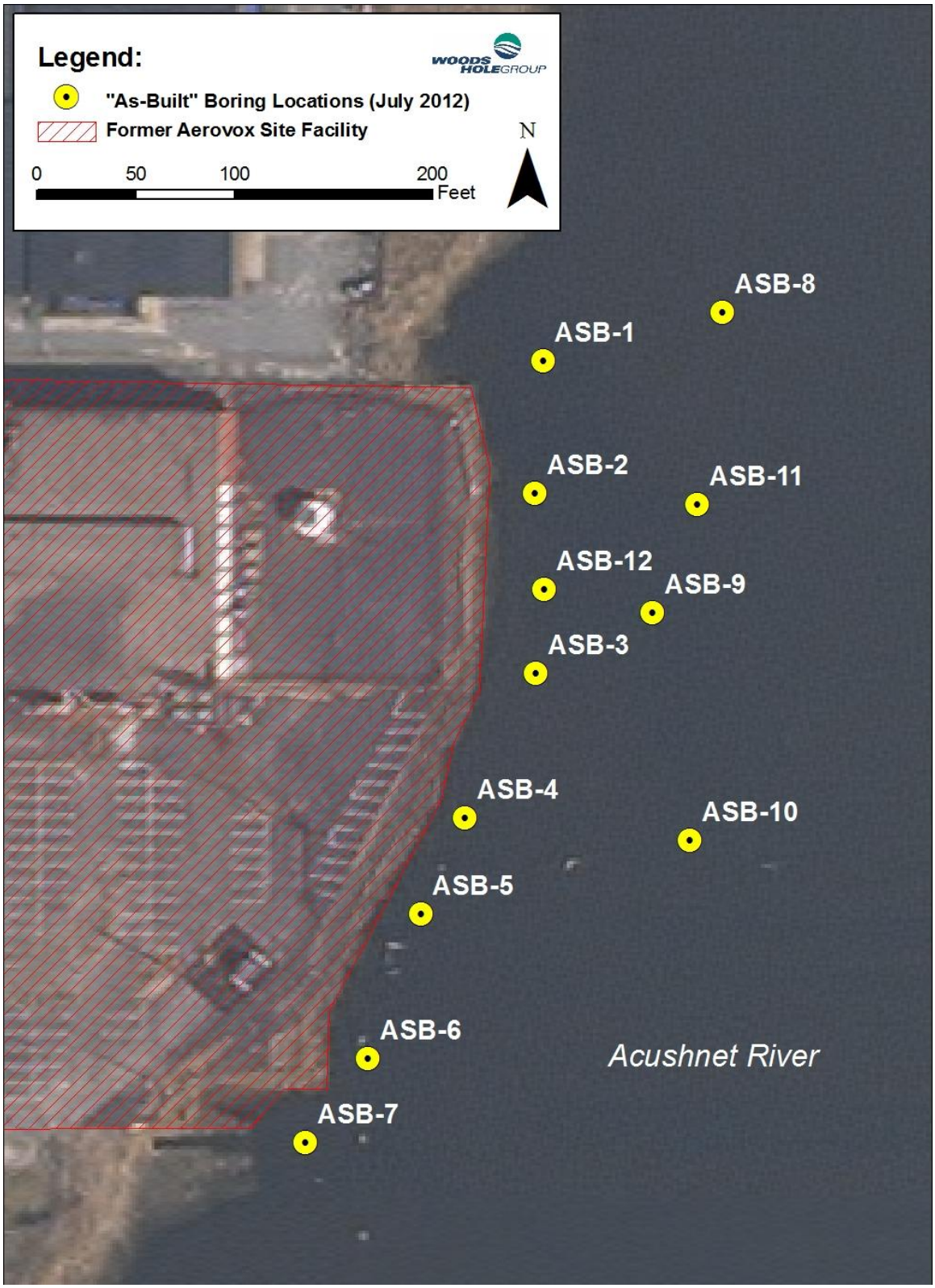

Figure 2. As-built locations of the twelve (12) sediment borings off the former Aerovox Site facility.

Table 1. Summary of "as-built" borings locations collected off the shoreline of the former Aerovox Site in July 2012.

Station ID	Northing (MASPM, feet)	Easting (MASPM, feet)	Boring Length (feet)	Boring Top Elevation (NGVD29, feet)	Boring Bottom Elevation (NGVD29, feet)	Collection Date
ASB-1	2707037.53	815657.42	28.0	-5.5	-33.5	7/12/2012
ASB-2	2706970.69	815653.32	27.0	-4.9	-31.9	7/13/2012
ASB-3	2706879.60	815653.94	24.0	-6.8	-30.8	7/13/2012
ASB-4	2706806.47	815618.01	21.25	-5.6	-26.85	7/14/2012
ASB-5	2706757.73	815595.58	21.7	-5.7	-27.4	7/14/2012
ASB-6	2706684.66	815568.76	32.5	-4.4	-36.9	7/16/2012
ASB-7	2706641.93	815537.18	36.2	-2.0	-38.2	7/14/2012
ASB-8	2707062.44	815748.31	23.5	-4.7	-28.2	7/17/2012
ASB-9	2706910.37	815712.93	22.9	-7.0	-29.9	7/16/2012
ASB-10	2706795.10	815731.93	25.5	-7.2	-32.7	7/17/2012
ASB-11	2706965.18	815735.32	26.5	-6.9	-33.4	7/17/2012
ASB-12	2706922.14	815658.20	22.5	-4.2	-26.7	7/18/2012

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1.3 KEY PERSONNEL AND SUBCONTRACTORS

Woods Hole Group was contracted by the U.S. Army Corps of Engineers New England District (USACE-NAE) for the Shoreline Drilling and Sampling at the Former Aerovox Property. The USACE-NAE Project Manager for the NBHSS was Ms. Ellen Iorio. The USACE-NAE technical lead for this project was Mr. Peter Hugh. The on-site USACE-NAE Project Engineer was Mr. Paul L'Heureux.

The following were the key personnel for the Woods Hole Group Team on this project:

- USACE Program Manager: Lee Weishar
- Project Manager: Robert Hamilton
- Chief Scientist: David Walsh
- Field Crew: Dack Stuart, Dan Rogers, Emerson Hasbrouck, Patrick Curran

Environmental boring collection, using a sonic drill rig, was subcontracted to the Boart Longyear Company (BLY). Head driller was Mr. Kevin Smith. The drill rig was mounted on a self-propelled steel hull barge with a moon pool (an opening in the deck of the platform to provide access to the water below). Barge operations were subcontracted to New England Harbor Services, Inc. (NEHS).

During this project, WHG worked cooperatively with Jacobs Engineering (JE), the NBHSS engineering contractor under a separate USACE-NAE contract. The following were the key personnel from JE who worked closely with WHG during this project:

- Drill Rig Operations Support: Don Melcher
- Boring Descriptions: Mike Morris
- Health & Safety: Carl Wilson
- Logistics: Mark Gouveia

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2.0 METHODS

The methods used to meet the objective of this project are summarized below and described in detail in the project Field Sampling Plan (Woods Hole Group, 2012a) and the project specific Quality Assurance Project Plan (QAPP) (Woods Hole Group, 2012b).

2.1 BORING LOCATIONS

Boring locations were chosen to provide a vertical profile of the subsurface sediment bordering the former Aerovox Site facility property. Borings were collected at twelve (12) locations, with seven (7) locations chosen by the USACE-NAE and EPA prior to field activities and five (5) locations determined during field operations after consideration of field observations and review of preliminarily reported analytical data.

2.2 BORING COLLECTION

The field crew included two WHG (D. Walsh and D. Rogers) and one JE (D. Melcher) staff members stationed on the barge to oversee the sediment boring collection work. All activities, boring information and field descriptions were carefully logged in a field book. Field notes were logged by Mr. Don Melcher of JE; a copy of the field notes is provided in Appendix A.

Sediment borings were collected using a Boart Longyear mini-sonic 200C drill rig, number 01636. The mini-sonic drill rig was securely mounted on a self-propelled barge equipped with a moon pool, spuds, crane, and support vessel (Figure 3). The mini-sonic drill rig operated through the moon pool of the barge.

All boring positions were located via a Garmin 76CSx GPS to within 10-feet of the proposed position, consistent with the accuracy of the unit (approximately 9 feet). Once on station, the barge position was secured using two spuds. At the start of drilling activity the water surface elevation, relative to NGVD29, was recorded in the field log. The water level reading was observed from a tide board mounted to a sheet pile located approximately 250-feet east of the project site. The tide board was fixed to a sheet piling and aligned with a surveyed benchmark to the vertical datum NGVD29 (feet) by JE personnel. Also recorded was the water depth through the moon pool to the top of the mini-sonic rig wrenches, and the distance between the moon pool water surface and the top of wrenches.

All tooling and drill bits were decontaminated on the barge prior to use at each boring station. The decontamination procedure was a three step process using: 1) an initial steam power washer cleanse; followed by 2) scrubbing with Alconox detergent; and 3) a final steam power wash rinse. The water used for decontamination was City of New Bedford tap water held in a clean tank on the barge. All decontamination rinsate was captured into drums for proper waste disposal. PID readings were taken near the drill hole during operations and each boring section was analyzed after recovery prior to being capped.

Figure 3. Mini-sonic drill rig mounted over moon pool on barge spudded off the former Aerovox Site property.

Sonic drill rig borings were cased and drilled to bedrock, or to estimation of bedrock based on drilling characteristics. Bedrock was minimally penetrated only a handful of times to ensure that the sediment column had been fully captured. A concerted effort was made to reduce the amount of heat produced by the sonic rig. To this end, sediment were collected in five-foot core sections within Lexan liners. Immediately upon recovery, the ends of the boring liners were capped with aluminum foil sheeting to prevent escape of VOCs, and subsequently a HDPE core tube cap was added. The cap was secured in place using tape. Capped Lexan boring sections were labeled in permanent marker to denote:

- Boring ID
- Depth Interval (e.g., 15.0' – 20.0')
- Upper End (marked with an arrow pointing upward)
- Date and Time of Collection
- Presence of PID readings for VOCs

The field crew was responsible for capping, cutting, and labeling the boring sections.

Following capping and labeling of the boring liners, each 5-foot liner was cut into shortened sections of approximately 2.5-feet (30-inches) in length. This was performed so the boring section could fit under the laboratory fume hood during analytical sampling. The NBHSS laboratory fume hood is 36-inches wide; therefore, each core section was cut to no longer than 30-inches. A cleaned, decontaminated Sabre Saw or hack saw was used

to cut the Lexan liners. Following the cut, each exposed liner end was capped using the process used in the field as described above. Core sections were stored vertically in covered barrels until a bore hole was complete. Upon completion of each bore hole, the vertical core sections were transported in a pickup truck to the NBHSS field laboratory for analytical subsampling, geological descriptions, and cold storage.

2.3 SEDIMENT BORING ANALYTICAL SAMPLING

Sediment boring sections were processed in the field laboratory located at the NBHSS as soon as each bore hole was completed. Most boring sections were processed the day they were collected, but several sections were placed in cold storage and processed a day or two after initial collection. The laboratory crew was responsible for core processing, analytical subsampling, geologic descriptions, and sample custody. The field laboratory crew consisted of two WHG personnel (D. Stuart and E. Hasbrouck) and one JE staff member (M. Morris).

After transport to the NBH field laboratory, the boring sections were stored in a vertical orientation until placed into the laboratory's fume hood for processing. It took several hours to geologically describe and subsample an entire boring. In the fume hood, the boring sections were placed on the bench top horizontally, and cut with cleaned/decontaminated power shears or a circular saw, lengthwise, at two points 180° apart. This approach allowed for half of the Lexan liner section to be removed, leaving the core sediment accessible for simultaneous analytical sampling and geologic description.

Analytical field samples were collected from the boring sections at an average of one sample every 2.5' section. This frequency of samples results in 12 samples in an assumed 30' boring to bedrock. Each sample was collected from a half-foot (0.5) interval of sediment (e.g., 15.0–15.5'). Samples were collected for analysis of VOCs, PCBs (Aroclors), and SVOCs, and an archive sample for potential future analysis for PCB 209 Congeners.

Samples were collected from a boring section if it contained a significant transition in stratigraphy. Using this approach, an analytical sample was collected from above and below the transition to characterize the presence of measurable contaminant concentrations in the two layers. The trained scientists that processed and described these samples used site experience and professional judgment to determine whether a transition between sediment lithology was significant. Potential examples of a significant transition between sediment lithology occurred where well-graded sand lay below silt, or if a peat layer lay above or below silt (or other sediment type).

Samples for VOC analysis were collected from the boring section before all other samples to minimize the loss of the VOC compounds to the atmosphere and disturbance. Collection of laboratory samples for VOCs was performed using a modified 5 ml syringe sampler. The Alpha Analytical supplied syringe was modified by removing the end to expand the mouth and imitate an Encore (™) sampler. The syringe was used to collect approximately 2 to 3 ml of sediment from the core section and deposit sediment into 40 ml VOA vials. A total of three vials were collected per VOC sample; the three vials

comprised one "high-level" and two "low-level" samples. The low VOC vials had white caps and the high VOC vials had red caps, so the two would not be confused in the laboratory. The high-level (Method 5030B) sample was collected in a 40 ml VOA vial containing 5 ml of methanol preservative (WHG Project Specific Aerovox UFP-QAPP, Woods Hole Group, 2012b). The low-level (Method 5035) samples were collected in two VOA vials containing 5 ml of deionized water (DI), sodium thiosulfate preservative and a stir bar (Woods Hole Group, 2012b). Once sediment was added, each VOA vial was immediately capped with the appropriate cap and VOC septum. VOC results from the high-level samples were to be reported on 24-hour turnaround time (TAT) period. The low-level VOC samples were analyzed to quantify VOC target analyte concentrations if the high level sample does not result in detectable VOC concentrations.

The SVOC and PCB Aroclor sample was collected after the VOC sample collection. This sample was collected in one 8-oz amber glass jar, used for analysis of SVOCs, PCB Aroclors, and Percent Solids. Sediment was collected along the length of a 0.5-foot sub-section to ensure a representative sample, while avoiding the Lexan liner side wall (Woods Hole Group, 2012a). Sediment was removed using a clean/decontaminated stainless steel spoon. SVOC and PCB Aroclor samples were not homogenized in the NBH field laboratory. The TATs for the PCB Aroclors and Percent Solids was 24-hours and results were reported on a dry weight basis. The PCB Aroclor samples were not air-dried to reduce the percent moisture, as they needed to be extracted by microwave extraction (US EPA SW-846 Method 3546) and reported within 24-hours (Woods Hole Group, 2012b). SVOCs did not required a 24-Hour rush TAT and was extracted by Method 3540C (Soxhlet Extraction) on a 15 business day TAT (Woods Hole Group, 2012b).

An archive sample jar for the potential future PCB 209 Congeners analysis was collected from the boring section last. This sample was collected into one 8-oz glass jar filled to approximately ¾ capacity to allow for room to expand during freezing. This sample was submitted to Alpha Analytical for archiving using modified 8270D-SIM for the 209 PCB Congeners and extraction by Method 3540C by Soxhlet Extraction (Woods Hole Group, 2012b). To date, these samples have not been analyzed, and will not be unless authorized by USACE-NAE/EPA as an optional analysis.

Once collected and properly labeled, all samples were packed in coolers filled with ice. Samples were delivered to Alpha Analytical Laboratories (AAL) via courier at the end of each processing day. All samples were received at AAL at or below 6°C.

2.4 SEDIMENT BORING DESCRIPTIONS

All split sediment boring sections were measured, photographed, described, and logged by a trained soil scientist from JE (M. Morris). Textural, sorting, consistency/firmness, and lithology descriptions were performed according to USCS standards. Color descriptions followed the Munsell color classification standards. Other information regarding odor, PID readings, stratigraphy, and analytical sample collection intervals are provided on the boring logs. Final boring logs, provided by JE, are presented in Appendix B.

2.5 ANALYTICAL METHODS

Alpha Analytical Laboratory performed all analyses. Analysis for VOCs, SVOCs, PCB Aroclors, and Percent Solids was performed at the Westborough, MA laboratory facility. Samples were also archived for analysis of 209 PCB Congeners, in the event a more accurate quantitative analytical method (209 PCB Congeners by modified 8270D-SIM and extraction by Method 3540C by Soxhlet Extraction) is requested later by the USACE-NAE. The methods used by AAL are referenced below and described in more detail, including laboratory SOPs, in the Aerovox project specific Uniform Federal Policy - Quality Assurance Project Plan (Woods Hole Group, 2012b). A complete list of analytes is provided in Appendix C and in the UFP-QAPP (Woods Hole Group, 2012b).

2.5.1 Polychlorinated Biphenyls

PCB Aroclors were extracted from the sediment matrix using US EPA SW-846 Method 3546 by microwave extraction and analyzed by Method 8082 PCB Aroclors by Gas Chromatography/Electron Capture Detector (GC/ECD). All methods used in this study followed USEPA Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846, Third Edition, Method 8082, Rev. 1, dated February 2007 (please refer to the project specific UFP-QAPP, Woods Hole Group 2012b).

The laboratory reported concentrations of nine (9) PCB Aroclors, as required by the QAPP (Woods Hole Group, 2012b).

Should the analysis be requested, archived PCB Congener (209) samples will be extracted from the archived sediment matrix using Soxhlet extraction method 3540C and analyzed using GC/MS-SIM method 680/8270C-SIM. The archived samples will remain frozen up to one-year, which is the NBH/EPA standard holding time requirement.

2.5.2 Volatile Organic Compounds

The high-level VOC sample was collected in a VOA vial containing methanol, and prepped using method 5030B. The low-level method (5035A) uses a tared 40 ml VOA vial with 5 ml of DI water with sodium thiosulfate preservative or VOC free water, which includes a small stir bar. The lab calculated the weight of the wet sample analyzed, along with the % solids results, and reported the VOC results on a dry weight basis. Analysis was performed using: Volatile Organic Compounds by Gas Chromatography / Mass Spectrometry (GC/MS) in EPA's Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846, Third Edition, Method 8260B, Rev. 2, December 1996, using low-level aqueous preservation (sodiumthiosulfate) and high-level methanol preservation by SW-846 Method 5035A for field samples.

The laboratory reported concentrations of fifty-three (53) project specific VOCs, as required by the project specific UFP QAPP (Woods Hole Group, 2012b).

2.5.3 Semivolatile Organic Compounds

SVOC samples were extracted from the sediment matrix using the Soxhlet extraction method 3450C, and analyzed using: Semivolatile Organic Compounds by Gas Chromatography / Mass Spectrometry (GC/MS) in EPA's Test Methods for Evaluating

Solid Waste, Physical Chemical Methods, SW-846, Third Edition, Method 8270D, Rev. 4, February 2007.

The laboratory reported concentrations of sixty-seven (67) SVOCs, as required by the project specific UFP QAPP (Woods Hole Group, 2012b).

2.6 QUALITY ASSURANCE/QUALITY CONTROL

2.6.1 Decontamination

Decontamination is the process of neutralizing, washing, and rinsing exposed surfaces of equipment to minimize the potential for contaminant migration and/or cross-contamination. All of the sampling equipment was decontaminated prior to use in the field and between boring stations to prevent cross-contamination. Decontamination was also performed during decommissioning of the drill rig. The decontamination procedure specified in EPA Region II, CERCLA Quality Assurance Manual (October 1989, Revision 1) was implemented prior to each station for sampling equipment that comes into direct contact with the sampled media (e.g., drill head bit, internal core barrels, sampling spoons or spatulas, etc.). The EPA Region II procedures used for decontamination are summarized below (solvents used during decontamination activities were collected and stored for proper waste disposal at the laboratory):

1) Rinse with tap water for gross decontamination
2) Clean with non-phosphate detergent (e.g. Liquinox) and tap water (or site water) – may require manual removal of debris/sediment, as needed
3) Rinse with tap water
4) Rinse with isopropyl alcohol and a subsequent rinse of AAL supplied VOC-free water[a]
5) Let air-dry

[a] Used if oily contamination is apparent and only on metal/stainless steel surfaces.

Onboard the barge, City of New Bedford tap water was used for the gross decontamination process and rinses. The tap water was pumped from two (2) clean tanks.

2.6.2 Field-Based Quality Control Samples

The field based quality control samples discussed here include: 1) Field Replicates; 2) Equipment Blanks; and 3) Trip Blanks.

Replicate, or field duplicate, sediment samples were collected for every ten (10) field samples. The purpose of the field replicate was to evaluate the field sampling and to evaluate the heterogeneity of the matrix. The analytical precision is evaluated by calculating the precision in %RPD between the parent sample and the field duplicate. Field replicate samples are also used to ensure that field sampling techniques do not bias analytical results. The sample was collected using the same techniques and was handled, containerized, preserved, stored and transported in the same manner as field samples.

Equipment rinseate blanks (EBs) were collected from decontaminated sampling equipment before use at each boring station. The EB samples were collected by pouring VOC-Free certified water over the decontaminated sampling equipment and into appropriate sample containers provided by the laboratory for analysis of VOCs, SVOCs, and PCB Aroclors. The equipment blanks samples corresponding to VOCs analysis, were analyzed using low-level aqueous VOC methods. Two other equipment blank samples were collected from: 1) the City of New Bedford tap water tank used for decontamination of all boring equipment; and 2) the laboratory sampling equipment, including tools used to split the Lexan liners.

Trip blanks (TBs) were prepared at Alpha Analytical Laboratory and remained sealed until analyzed. These samples accompanied the sample container coolers on their transit between the laboratory and the NBHSS laboratory trailer, round-trip. The trip blank samples were analyzed for VOCs only, and accompanied each sample cooler containing VOC samples. Trip blanks samples were analyzed using low-level aqueous VOC methods.

2.6.3 Laboratory-Based Quality Control Samples

A routine suite of laboratory-based quality control (QC) samples were prepared with each set of field samples to evaluate data quality in terms of accuracy and precision. For each batch of 20 or fewer samples, the QAPP calls for analysis of quality control samples including one procedural blank (also called a method blank or procedural method blank), one laboratory control sample (LCS), one matrix spike (MS) and one matrix spike duplicate (MSD).

2.7 SAMPLE IDENTIFICATION

Sediment samples selected for analysis were identified in accordance with previously established conventions for the NBHSS under the Data Management Plan (Battelle, 2002). The sample identification format is described below:

S – PPP – B### – top depth – bottom depth

Where,

S	= Sediment prefix
PPP	= Sampling Year and Month (2 digit year plus 1 alpha character)
B###	= Boring station identifier (prefix B followed by 3 digits)
Top depth	= Numeric top depth of sample from sediment-water interface (in tenths of feet)
Bottom depth	= Numeric bottom depth of sample

The single character code representative of the sample collection month for July is “L”. The sample identification convention uses unique codes for quality control samples, and the appropriate QC code was added to the sample ID as a suffix or prefix. Examples of the sample identification format used for field samples and QC samples are provided in Table 2.

Table 2. Examples of the NBHSS sample identification format

Sample Type	Suffix or Prefix	Format	Example ID
Field Sample	-	"SampleID"	S-12L-B001-15.0-15.5
Field Duplicate/Replicate	REP	"SampleID"REP	S-12L-B001-15.0-15.5REP
Matrix Spike, Matrix Spike Duplicate	MSMSD	"SampleID"MSMSD	S-12L-B001-15.0-15.5MSMSD
Equipment Blank	EB	EB-MMDDYY-##	EB-071012-01
Trip Blank	TB	TB-MMDDYY-##	TB-071012-01

2.8 REPORTING

Data reporting requirements for this project included: 1) this summary report of the field data collection event; 2) analytical data with Level 4 reporting; and 3) data validation at a Tier I+ level. Analytical data reporting requirements are described in the project specific QAPP (Woods Hole Group, 2012b).

3.0 CHRONOLOGY OF OPERATIONS

Field sampling and analytical subsampling activities were completed over a period of eleven (11) days from July 9 through July 20.

7/9/2012 – Monday

New England Harbor Services (NEHS) barge "Bob Cat" arrived at New Bedford Harbor Superfund Site (NBHSS) dock for loading. Barge measured 43' in length and 18' in width. Boart Longyear (BLY) personnel arrived on site at 0800 to unload equipment from trucks and load the barge with the drill rig and sampling equipment. Barge "Bob Cat" is loaded with the Minisonic 200C drill rig (#01636). The rig was driven down the NBHSS Area C dock and loaded onto barge using a wooden ramp. The rig was secured to the barge deck with chain. USACE-NAE, JE, and Sevenson Environmental Services, Inc. (SES) personnel (subcontractor to JE) supervised and assisted with mobilization operations.

7/10/2012 – Tuesday to 7/12/2012 Thursday (AM)

WHG Team attended NBHSS the morning tailgate health and safety meeting to discuss operations at the site and to coordinate movement of the barge through the active remediation dredge areas later in the day. Following the NBHSS safety meeting the WHG Team held a drilling team safety and kick-off meeting. The team included WHG, BLY, NEHS, and JE personnel.

The WHG Team loaded equipment onto barge, barge departed Area C dock, and transited to Aerovox Site drilling location. Barge arrived at boring station ASB-1, and was secured with spuds.

Received word from USACE-NAE to stand-down until Accident Prevention Plan (APP) was approved. Various activities transpired related to barge inspection by a marine surveyor and naval architect from New England Harbor Services, securing an additional Level B qualified Site Safety Officer, and laboratory hood reconfiguration.

7/12/2012 – Thursday (PM)

WHG Team received a conditional approval of the APP and notice to proceed from USACE-NAE. Drilling work commenced at ASB-1. Boring collection at ASB-1 was completed and barge was positioned over station ASB-2.

7/13/2012 – Friday

Boring collection at ASB-2 was completed and barge was positioned over station ASB-3. Before commencing boring collection at ASB-3 a marine safety inspector from Marine Safety Consultants inspected the barge for condition and stability according to USACE EM-385-1-1 requirements. Boring ASB-3 collection was completed later.

7/14/2012 – Saturday

Boring collections at ASB-4, ASB-5, and ASB-7 were completed. At 11:30, following collection of ASB-4, drilling operations were suspended to allow a marine surveyor from New England Harbor Services to make specific measurements for CAD drawings required for a naval architect's barge stability calculations.

Phone call held with Peter Hugh (USACE-NAE Engineering Technical Lead) to decide that any samples submitted after Saturday were to be reduced from a 24-hour turnaround time (TAT) to standard TAT. Samples submitted on Saturday remained 24-HR TAT.

7/15/2012 – Sunday

No operations.

7/16/2012 – Monday

Boring collection at ASB-6 was completed; at this point the initially proposed seven (7) boring locations had been collected and the WHG team was awaiting further instruction of where to drill remaining five (5) borings.

Following collection of ASB-6, the drillers inspected the sonic drill rig head for a hydraulic leak and determined the head required repair of a hydraulic seal. The leak was not a reportable amount and was contained by oil booms surrounding the drill barge. Repairs were completed after a 6-hour delay.

During the repair to the drill rig, WHG participated in a conference call discussion with USACE-NAE, EPA, and JE to select three (3) additional boring locations. The three selected boring locations were based on previous VOC sediment concentration data collected by JE; these stations were identified as boring stations ASB-8, ASB-9, ASB-10, respectively.

Following the drill rig repairs, the barge was positioned at new boring station ASB-9, and boring collection was completed.

7/17/2012 – Tuesday

Boring collection at stations ASB-8 and ASB-10 was completed. At this point the WHG team awaited further instruction of where to drill remaining two (2) borings.

During collection of ASB-10, WHG participated in a conference call discussion with USACE-NAE, EPA, and JE to select the two final boring locations. The two final boring locations were selected after review of the preliminary 24-hr TAT VOC and PCB data from borings ASB-1, ASB-2, ASB-3, ASB-4, and the top sections of ASB-5. The new boring stations were identified as ASB-11 and ASB-12.

Following collection of ASB-10, the barge was positioned at new station ASB-11, and boring collection was completed.

7/18/2012 – Wednesday

The barge was relocated from ASB-11 to ASB-12 and boring collection at ASB-12 was completed. At this point drilling operations were completed and demobilization activities started.

The barge transited to the NBHSS Area C dock for demobilization and to unload equipment. Personnel from JE and SES supervised and assisted with the safe demobilization of the barge. Personnel from BLY decontaminated the drill rig, tooling, and other equipment on the Area C decontamination pad. At 16:30, severe weather suspended demobilization operations for the remainder of the day.

7/19/2012 – Thursday

Personnel from BLY completed demobilization activities and departed the NBHSS by mid-morning. WHG and JE personnel continued boring sample processing in lab trailer.

7/20/2012 – Friday

WHG and JE personnel complete boring sample processing in lab trailer. All analytical samples submitted to laboratory. All field activities were completed.

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4.0 RESULTS

Results of the collection and analysis of sediment borings off the former Aerovox Site facility shoreline are presented in this section. Complete field data collection notes are presented in Appendix A. Boring logs prepared by JE are provided in Appendix B. The list of all compounds analyzed for is provided in Appendix C. Analytical reports from Alpha Analytical Laboratory are provided in Appendix D. Data Validation Reports from New Environmental Horizons are provided in Appendix E.

4.1 BORING COLLECTION

Twelve (12) borings were collected; positions are plotted on the map in Figure 2. After the initial seven (7) borings were completed, five (5) additional boring locations were selected by the USACE-NAE and EPA. The five new sites were selected after: 1) consideration of field observations; 2) review of previously collected VOC surface sediment sample results; and 3) review of preliminary VOC and PCB Aroclor results from borings ASB-1, ASB-2, ASB-3, ASB-4, and ASB-5. The as-built locations and ancillary metadata for the twelve borings are presented in Table 1. The top and bottom elevations for each boring, relative to the datum NGVD29, are presented in Table 1 to assist with inter-comparison of borings depths and recovered sediment. Boring collection ceased at bedrock, whether verified with the recovery of a plug of stone, or through drill rig characteristics and feedback provided by the driller. As required by the scope of work, the boring drilling operation was conscientious about minimally penetrating bedrock. Borings were filled with bentonite chips after completion.

Field notes are presented in Appendix A.

4.2 PHYSICAL CHARACTERISTICS

Boring sections were visually characterized and logged by soil scientist Mike Morris of JE. The logs documented the sediment physical characteristics (including a USCS descriptor; e.g., “SP” for sand), depth of transition between sediment types, depth of analytical sample collection, and other information. The logs also provide interpretation of sediment stratigraphic unit type. The final logs are provided in Appendix B.

In general, the borings contained a top-to-bottom stratigraphic sequence of: 1) marine deposits; 2) glacial outwash deposits; 3) glacial till deposits; and 4) bedrock plug. The marine deposit thickness varied by boring location since many of these locations had been previously dredged or excavated for remedial purposes. Marine deposits consisted of organic silts, silts, sands, and gravel with sand, with varying color from black to grey. In two borings, ASB-7 and ASB-12, marine deposits were underlain by peat deposits. The contact between these stratigraphic layers was distinct. Peat was brown in color and high in water content. The transition between marine or peat deposits and the underlying glacial outwash deposits occurred between an elevation of -5.6 and -20.3 feet NGVD29, with an average elevation of -12.0 feet NGVD29. Glacial outwash deposits were coarse in texture, consisting of mixtures of sand and gravel. Glacial outwash deposit colors varied between yellow, brown, and grey, but it is clear that the sediment had been exposed to a turbulent, subaerial environment. Glacial till deposits were comprised of a

fine grained matrix, but texturally variable (containing clay, silt, sand, and gravel) and poorly sorted within the stratigraphic unit. This characteristic was consistent between borings. Glacial till deposits were colored olive, greenish grey, and grey. Bedrock or weathered bedrock was observed between an elevation of -26.3 and -37.4 feet NGVD29, with an average elevation of -30.8 feet, NGVD29.

4.3 ANALYTICAL RESULTS

Alpha Analytical Laboratory data reports containing results from the boring sediment and quality control samples are provided in Appendix D. Results from the group of seven (7) site specific contaminants-of-concern selected by the team are presented; these seven analytes include: PCB Aroclor 1242; PCB Aroclor 1254; Tetrachloroethene (PCE); Trichloroethene (TCE); cis-1,2-Dichloroethene; Vinyl Chloride; and 1,2,4-Trichlorobenzene. Other target analytes were detected in the sediment/boring samples. However, due to large amount of analytical data reported, it was decided that only the site-specific contaminants-of-concern would be presented and discussed in this report. Tabulated results for these seven contaminants of concern are provided in Tables 3 through 14. In general, the highest concentrations of these seven contaminants were present in the borings collected from the northern half of the study area, in particular borings: ASB-1, ASB-2, ASB-3, ASB-4, ASB-8, ASB-9, ASB-10, and ASB-12.

Occasionally samples with high contaminant concentrations required dilutions in order to bring concentrations within the operable range of the instrument. In doing so, low-level concentrations were diluted below the range of the instrument. Therefore, some of the analytes that were assigned a DU qualifier may exist in detectable concentrations if they were run at lower or no dilution. The primary purpose of this project is to provide validated data for subsequent analysis. Please refer to Appendix C for a complete list of the compounds that were analyzed for these samples and to Appendix D for the complete set of validated analytical results.

4.3.1 Polychlorinated Biphenyls as Aroclors

The Total PCB concentration in each sample was calculated as the sum of Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268 concentrations; a value of zero (0) was used in summation for non-detects (U, UJ, DUJ). Only four Aroclor compounds were detected in the boring samples. The detected Aroclors, listed in order of prominence, include 1242, 1254, 1260, and 1262. Aroclors 1242 and 1254 were detected in 96 and 62 of the 136 samples (123 field samples and 13 replicates) analyzed, respectively. Aroclor 1260 was detected in 17 samples, and Aroclor 1262 was detected in 9 samples. Although Aroclors 1242 and 1254 were often detected in the same sample, when present, Aroclor 1260 and 1262 were not detected in the same sample. There were no detections of Aroclors 1016, 1221, 1232, 1248, and 1268. Please refer to Tables 3 through 14 for the Total PCB, Aroclor 1242, and Aroclor 1254 concentration for each sediment sample.

Aroclor 1242 was detected in all borings except ASB-6. However, the three uppermost samples from ASB-6 likely contained Aroclor 1242 but it was not detected because the sample was run after dilution. Aroclor 1254 is present in all borings except ASB-9.

Concentrations vary considerably between boring sites, but there is an area of higher concentrations at the northern part of the study area around stations ASB-1, ASB-3, and ASB-8. Samples from borings ASB-2 and ASB-12 did not contain the high concentrations of Aroclors 1242 and 1254 despite being collected from the same area. Seven of the twelve borings did not contain a sample with Aroclor concentrations greater than 10 ppm (10,000 µg/ kg), the 1998 ROD cleanup criteria for river sediment. These borings include ASB-2, ASB-4, ASB-6, ASB-7, ASB-9, ASB-11, and ASB-12.

Generally, PCB concentrations are highest in the surface sediment and decrease with depth in the boring. However, lower concentrations of PCB Aroclors were detected in the glacial till sediment of all borings except for ASB-6.

Although there are some deviations, the highest concentrations of PCBs were detected in samples collected from an elevation of approximately -9.5 to -10.0 feet NGVD29. The highest concentration of Aroclor 1242 was 4,800,000 µg/kg at -5.2 to -5.7 feet NGVD29 in ASB-8, and the highest concentration of Aroclor 1254 was 8,350,000 µg/ kg at -9.5 to -10.0 feet NGVD29 in ASB-1.

Boring ASB-8 contained a sample with a concentration of Aroclor 1242 at 190,000 µg/ kg (190 ppm) at an elevation of -21.45 feet NGVD29. This sample (S-12L-B008-16.5-17.0) contained the highest concentration of an Aroclor at the lowest elevation and consisted of sand with silt collected from the glacial outwash deposits.

4.3.2 Volatile Organic Compounds

There were five VOC analytes included as part of the site specific contaminants of concern; these analytes include Tetrachloroethene (PCE), Trichloroethene (TCE), cis-1,2-Dichloroethene, Vinyl Chloride, and 1,2,4-Trichlorobenzene. Tabulated results for these five contaminants of concern are provided in Tables 3 through 14. Concentrations of VOCs were highest in the borings located in the northern part of the study area. Boring ASB-7, the southernmost location, contained the lowest detectable concentrations for any of the five site specific VOCs of concern.

Tetrachloroethene was not prevalent in the boring samples. The compound was not detected in eight of the borings (ASB-2, ASB-4, ASB-5, ASB-6, ASB-7, ASB-8, ASB-9 and ASB-12), and was detected only once in boring ASB-11. The highest detected concentration of PCE was 230,000 µg/kg in the top sample from boring ASB-3.

The compound Trichloroethene was observed throughout the sediment column, and down to the basal glacial till of every boring. Trichloroethene concentrations were highest in borings ASB-2, ASB-3, ASB-4, ASB-8, and ASB-9, which were located in the northern half of the study area. The maximum concentration detected in the sediment samples was 24,000,000 µg/kg (or 2.4 percent) in sample S-12L-B003-0.6-1.1, which is the upper most sample from ASB-3 (-7.4 to -7.9 feet NGVD29) (Table 5). The underlying sample in ASB-3, collected at -8.8 to -9.3 feet NGVD29, resulted in a detection of 13,000,000 µg/kg. These high concentrations of TCE are not present in the other borings, but concentrations of ≥ 81,000 µg/kg were detected in borings ASB-2, ASB-4, ASB-8 and

ASB-9. The other seven borings (ASB-1, ASB-5, ASB-6, ASB-7, ASB-10, ASB-11, and ASB-12) contained lower concentrations of TCE, with a range from 12 to 14,000 µg/kg.

The compound cis-1,2-Dichloroethene, a degradation product of Trichloroethene, was detected in all borings, and was present in the glacial till of nine of the twelve borings. The maximum concentration of cis-1,2-Dichloroethene was 2,200,000 µg/kg, detected in sample S-12L-B002-1.0-1.5 (-5.9 to -6.4 feet NGVD29) from ASB-2. Similar to the occurrence of TCE, the highest concentrations of cis-1,2-Dichloroethene were detected in borings from the northern half of the study area, specifically ASB-2, ASB-3, ASB-8, ASB-9, ASB-10, and ASB-12. The detected concentrations in these borings ranged from 3.8 to 2,200,000 µg/kg.

Vinyl Chloride, another degradation product of Trichloroethene, was observed in ten of the twelve borings. In general Vinyl Chloride was confined to the marine stratigraphy and other sediment in the upper sections of the sediment column. The analyte was detected in the glacial till of only two borings, and at concentrations ≤ 20 µg/kg. The highest concentrations, with detections ≥1,500 µg/kg, were observed in borings ASB-2, ASB-3, ASB-6, ASB-8, ASB-9, ASB-10, and ASB-12. Apart from borings ASB-6 and ASB-10, these boring are located in the northern part of the study area. Samples from ASB-2, ASB-3, and ASB-12 are closely located just off the drainage swales of the former Aerovox Site facility and the uppermost samples from those borings contained detections of Vinyl Chloride at 160,000 µg/kg, 180,000 µg/kg, and 110,000 µg/kg, respectively. However, the highest observed concentration of Vinyl Chloride was detected in the marine strata of boring ASB-8 at 240,000 µg/kg at elevation -5.2 to -5.7 feet.

The VOC compound 1,2,4-Trichlorobenzene was detected in nine of the twelve borings, with the highest concentrations in borings from the northern part of the study area, such as boring ASB-1, ASB-2, ASB-3, ASB-8, and ASB-10. Boring ASB-3 contained the highest concentration of 1,2,4-Trichlorobenzene at 460,000 µg/kg in the marine strata (upper most sample) at -7.4 to -7.9 feet NGVD29. The highest concentrations (>12,000 µg/kg) of 1,2,4-Trichlorobenzene were limited to the marine strata and one sample from the glacial outwash sediment. Detections in glacial outwash sediment were generally low and decreased with boring depth. The analyte was detected in the glacial till of one sample from ASB-8 at a concentration of 9.9 µg/kg.

4.3.3 Semi-volatile Organic Compounds

None of the semi-volatile compounds were included in the list of site specific contaminants of concern. Therefore, these data are not included in the primary Tables in this section, but the data are reported in Appendix D.

In general, SVOCs detections were limited to the upper samples (e.g., 1.0-1.5 or 3.5-4.0 feet depth) in borings ASB-1, ASB-3, ASB-4, ASB-5, ASB-6, ASB7, and ASB-12. Twenty of the sixty-seven compounds were identified in the boring samples; these compounds include: 1,2,4,5-Tetrachlorobenzene, Acenaphthene, Acenaphthylene, Anthracene, Benzaldehyde, Benz(a)Anthracene, Benzo(a)Pyrene, Benzo(b)Fluoranthene, Benzo(g,h,i)Perylene, Benzo(k)Fluoranthene, Bis(2-Ethylhexyl)Phthalate, Carbazole, Chrysene, Dibenz(a,h)Anthracene, Dibenzofuran, Fluoranthene, Fluorene, Indeno(1,2,3-

cd)Pyrene, Phenanthrene, and Pyrene. The majority of these polycyclic aromatic hydrocarbons (PAHs) are formed by the combustion of fuels and are considered pyrogenic compounds. Some of the PAHs are also found in diesel fuels and other petroleum waste oil products.

Table 15 lists the twelve compounds most frequently detected in these samples, along with the maximum concentration observed for the specific compound. Five of the seven PAHs in Table 15 are listed on the USEPA's Priority Chemical List for the National Waste Minimization Program (USEPA, 2008). The maximum concentration observed for these twelve compounds was observed from boring ASB-5, sample S-12L-B005-4.0-4.5: 69,000 µg/kg for phenanthrene.

4.4 FIELD BASED QUALITY CONTROL SAMPLES

Quality control samples were collected to ensure that sampling, decontamination and transport methods did not affect data quality. Quality control samples included field replicates, equipment blanks, and trip blanks. The field replicate sample was analyzed to evaluate the sampling procedure and analytical precision. The equipment blanks were collected to verify that decontamination procedures were adequate and that cross-contamination did not occur. The trip blanks for VOCs were analyzed to ensure the samples were not exposed to a source of contamination while in transit to the lab for analysis.

Table 16 provides an index correlating the equipment blank sample results with associated borings or decontamination procedure. The table also provides results for detectable analytes in the equipment blank samples. Three of the equipment blank samples resulted in low level detections of analytes. The equipment blanks for boring ASB-3 and ASB-4 contained detections of PCB Aroclor 1254 at 0.418 and 0.325 µg/l, respectively. These concentrations were detected just above each sample's reporting limit. The equipment blank sample collected to evaluate the decontamination water used from the tank on the drilling barge resulted in detections of Chloroform at 7.0 µg/l (RL = 0.75 µg/l) and Bromodichloromethane at 1.4 µg/l (RL = 0.5 µg/l). All other equipment blank samples resulted in non-detects for the complete suite of analytes.

Table 17 provides an index correlating trip blank samples with associated sediment or equipment blank samples. All samples resulted in non-detects for VOCs except for trip blank sample TB-071912-02, associated with samples from boring ASB-11. Sample TB-071912-02 had a detection of Trichloroethene at 2.6 µg/l (RL = 2.0 µg/l).

4.5 DATA VALIDATION

Data validation reports and worksheets prepared by New Environmental Horizons are provided in Appendix E. The information below summarizes the thirteen (13) reports and associated worksheets contained in Appendix E. An EPA Region I Tier I+ validation for VOCs, SVOCs, and PCB Aroclors was performed with the following intentions:

1) Determine if the data were generated and reported in accordance with the *Quality Assurance Project Plan for Shoreline Drilling and Sampling at the Former*

Aerovox Property, New Bedford Harbor Superfund Site, prepared by Woods Hole Group, Inc. and New Environmental Horizons, Inc., July 2012 (Woods Hole Group, 2012b); and the Region I, *EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses,* December 1996, including *Part II – Volatile/Semivolatile Data Validation Functional Guidelines*, and *Part III – Pesticide/PCB Data Validation Functional Guidelines*;

2) Determine if the data met project data quality objectives for acceptable accuracy, precision, sensitivity; and technical usability;

3) Generate an electronic deliverable of validated results with project-specific data validation qualifiers added

A Data Validation (DV) Report was developed for each sample delivery group (SDG), consisting of three parts: a report letter summarizing the actions taken; a database file of validated sample results with validation qualifiers, bias, and comments added based on actions taken; and Data Review Checklists completed during validation to document the Tier I+ reviews. The Checklists are an integral part of the DV Report as they contain comprehensive details of all quality control (QC) data reviewed, the acceptance criteria used, and the professional judgment and actions taken.

The laboratory reported results for all 53 project-specific target VOCs, 67 project-specific SVOCs, and 9 PCB Aroclors required in the QAPP (Woods Hole Group, 2012b). As there were no Project Action Limits (PALs) for the analytes reported, all data met sensitivity requirements. Sample-specific reporting limits (RLs) were reported for all samples. Based on the Tier I+ validation of VOCs, SVOCs, and PCB Aroclors, the analytical data were considered usable based on a comparison to the QAPP requirements, with the understanding of the potential uncertainty (bias) in the qualified results (Woods Hole Group, 2012b).

Results were qualified with the following abbreviations:

- U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
- UJ = Non-detect is estimated at the RL;
- J = Result is estimated;
- EB = analyte detected in associated equipment blank;
- D = result reported from a dilution analysis (added by laboratory);

Validation actions were taken on this data set for the following reasons:

- MS/MSD imprecision
- Low MS/MSD recoveries
- Low MS recovery
- REP/Field Duplicate (FD) imprecision
- Low Surrogate recovery
- Low % Solids
- High LCS recovery

- Low LCS recovery
- Dual Column Imprecision

Other validation actions included flagging results if compounds were detected in an associated equipment blank for field blank. The equipment blank qualifier, EB, was added to the samples in ASB-3 and ASB-4 that contained PCB Aroclor 1254 within 5 times the concentration detected in the equipment blank samples. There is negligible impact to the data since the highest concentration in the borings are orders of magnitude higher than the equipment blank results. The detections of Chloroform and Bromodichloromethane in the barge decontamination water source equipment blank sample are inconsequential to the dataset since these compounds were not detected in the field samples. The detection of Trichloroethene in trip blank sample TB-071912-02 resulted in the analytical data from three ASB-11 field samples being negated; these samples include: S-12L-B011-3.5-4.0, S-12L-B011-8.5-9.0, and S-12L-B011-13.5-14.0.

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Table 3. Summary of analytical results for specific contaminants of concern in boring ASB-1

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-1	S-12L-B001-1.0-1.5	-6.5 to -7	OL	Marine	**28100**	5730	5730	DU	**28100**	5730	D	800	800	U	800	800	U	800	800	U	800	800	U	2000	2000	U
	S-12L-B001-4.0-4.5	-9.5 to -10	SP	Glacial Outwash	**8350000**	554000	554000	DU	**8350000**	554000	D	230	230		3500	230		1000	230		230	230	U	**13000**	580	
	S-12L-B001-6.0-6.5	-11.5 to -12	SW		**167300**	**73200**	4270	D	**94100**	4270	D	100	100	U	350	100		160	100		100	100	U	860	260	
	S-12L-B001-16.7-17.2	-22.2 to -22.7	SW		4853	1530	116	D	2600	116	D	230	230	U	560	230		230	230	U	230	230	U	580	580	U
	S-12L-B001-18.6-19.1	-24.1 to -24.6	SP	Glacial Till	774	292	21.2		482	21.2		4.8	4.8	U	77	4.8	J	4.8	4.8	U	4.8	4.8	U	12	12	U
	S-12L-B001-18.6-19.1 REP	-24.1 to -24.6	SP		643	226	21.3		417	21.3		4.1	4.1	U	140	4.1	J	8.1	4.1		4.1	4.1	U	10	10	U
	S-12L-B001-21.5-22.0	-27 to -27.5	CL		47.8	22.3	22.3	U	47.8	22.3		130	130	U	770	130		150	130		130	130	U	320	320	U
	S-12L-B001-23.5-24.0	-29 to -29.5	CL		28.7	20.7	20.7	U	28.7	20.7		210	210	U	850	210		210	210	U	210	210	U	530	530	U
	S-12L-B001-25.3-25.8	-30.8 to -31.3	GW-GC		106.3†	21.4	21.4	U	48.5	21.4		210	210	U	1000	210		210	210	U	210	210	U	520	520	U
	S-12L-B001-27.2-27.7	-32.7 to -33.2	ML		0	20.1	20.1	U	20.1	20.1	U	4.4	4.4	U	12	4.4		4.4	4.4	U	4.4	4.4	U	11	11	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
† Total PCB concentration includes Aroclor 1262, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 4. Summary of analytical results for specific contaminants of concern in boring ASB-2

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-2	S-12L-B002-1.0-1.5	-5.9 to -6.4	OL	Marine	2740	136	136	UJ	2740	136	J	44000	44000	DUJ	86000	44000	DJ	2200000	44000	DJ	160000	44000	DJ	110000	110000	DUJ
	S-12L-B002-3.0-3.5	-7.9 to -8.4	OL		52.2	25.1	25.1	U	52.2	25.1		2500	2500	DU	180000	2500	D	110000	2500	D	2500	2500	DU	6300	6300	DU
	S-12L-B002-5.5-6.0	-10.4 to -10.9	SW	Glacial Outwash	571	365	30.1	J	206	30.1	J	3600	3600	DU	280000	3600	D	160000	3600	D	3600	3600	DU	8900	8900	DU
	S-12L-B002-5.5-6.0 REP	-10.4 to -10.9	SW		9420	6420	571	JD	3000	571	JD	6000	6000	DU	300000	6000	D	160000	6000	D	6000	6000	DU	15000	15000	DU
	S-12L-B002-8.0-8.5	-12.9 to -13.4	SW		461.4*	231	22.3		210	22.3		140	140	U	340	140		220	140		140	140	U	360	360	U
	S-12L-B002-12-12.5	-16.9 to -17.4	SW-SM		0	21.1	21.1	U	21.1	21.1	U	130	130	U	420	130		130	130	U	130	130	U	340	340	U
	S-12L-B002-14-14.5	-18.9 to -19.4	SP-SM	Glacial Till	118.1	57.3	22.4		60.8	22.4		140	140	U	1100	140		140	140	U	140	140	U	350	350	U
	S-12L-B002-17.5-18	-22.4 to -22.9	SW		196.1†	21.2	21.2	U	26.1	21.2		3.7	3.7	U	98	3.7	J	6.9	3.7	J	3.7	3.7	U	9.4	9.4	U
	S-12L-B002-19.5-20	-24.4 to -24.9	ML		0	22.7	22.7	U	22.7	22.7	U	3.8	3.8	U	18	3.8		3.8	3.8	U	3.8	3.8	U	9.6	9.6	U
	S-12L-B002-24-24.5	-28.9 to -29.4	GW-GC		51.4†	22.3	22.3	U	33.1	22.3		3.2	3.2	U	24	3.2		3.8	3.2		3.2	3.2	U	8	8	U
	S-12L-B002-24.5-25	-29.4 to -29.9	GW-GC		47.5†	22.2	22.2	U	29.5	22.2		9.8	9.8	U	57	9.8		9.8	9.8	U	9.8	9.8	U	24	24	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
† Total PCB concentration includes Aroclor 1262, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 5. Summary of analytical results for specific contaminants of concern in boring ASB-3

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-3	S-12L-B003-0.6-1.1	-7.4 to -7.9	OL	Marine	**2027000**	**957000**	114000	DJ	**1070000**	114000	DJ	230000	180000	DJ	24000000	740000	DJ	1500000	180000	DJ	180000	180000	DUJ	460000	460000	DUJ
	S-12L-B003-2.0-2.5	-8.8 to -9.3	OL		**3580000**	**1660000**	131000	D	**1920000**	131000	D	52000	31000	D	13000000	310000	DJ	450000	31000	DJ	31000	31000	DU	77000	77000	DUJ
	S-12L-B003-2.0-2.5 REP	-8.8 to -9.3	OL		**2530000**	**1280000**	113000	D	**1250000**	113000	D	18000	18000	DU	1800000	18000	DJ	150000	18000	DJ	18000	18000	DU	210000	44000	DJ
	S-12L-B003-3.5-4.0	-10.3 to -10.8	SW		**258000**	**123000**	20700	D	**135000**	20700	D	220	130		20000	650	D	410	130		130	130	U	2200	320	
	S-12L-B003-4.5-5.0	-11.3 to -11.8	SW		**1074000**	**524000**	21300	D	**550000**	21300	D	760	760	DU	760	760	DU	1900	760	D	760	760	DU	58000	1900	D
	S-12L-B003-9.0-9.5	-15.8 to -16.3	SW	Glacial Outwash	**789000**	**337000**	21900	D	**452000**	21900	D	520	140		780	140		140	140	U	140	140	U	7400	340	
	S-12L-B003-14.5-15.0	-21.3 to -21.8	SW		428	149	20.9		279	20.9	EB	1.7	1.7	U	15	1.7		3.9	1.7		1.7	1.7	U	9.1	4.2	
	S-12L-B003-19.5-20.0	-26.3 to -26.8	ML	Glacial Till	185.6	82.6	21.3		103	21.3	EB	150	150	U	1200	150		150	150	U	150	150	U	380	380	U
	S-12L-B003-21.5-22.0	-28.3 to -28.8	CL-ML		84.2	32.2	21.1		52	21.1	EB	140	140	U	1600	140		140	140	U	140	140	U	350	350	U
	S-12L-B003-22.5-23.0	-29.3 to -29.8	CL-ML		260.9*	87.6	24.1		145	24.1	EB	190	190	U	800	190		190	190	U	190	190	U	470	470	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 6. Summary of analytical results for specific contaminants of concern in boring ASB-4

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-4	S-12L-B004-0.5-1.0	-6.1 to -6.6	OL	Marine	8300	4900	503	D	3400	503	D	1900	1900	DU	81000	1900	D	17000	1900	D	1900	1900	DU	4800	4800	DU
	S-12L-B004-3.5-4.0	-9.1 to -9.6	ML		171.8	86	23.7	J	85.8	23.7	JEB	200	200	U	2000	200		3700	200		510	200		500	500	U
	S-12L-B004-3.5-4.0 REP	-9.1 to -9.6	ML		85.9	40.2	23.9	J	45.7	23.9	JEB	190	190	U	1800	190		4600	190		620	190		480	480	U
	S-12L-B004-6.5-7.0	-12.1 to -12.6	SP-SM	Glacial Outwash	138.8	80.8	23.5	J	58	23.5	EB	160	160	U	1100	160		330	160		160	160	U	410	410	U
	S-12L-B004-7.5-8.0	-13.1 to -13.6	GW		196.1	107	21.2		89.1	21.2	EB	130	130	U	600	130		130	130	U	130	130	U	330	330	U
	S-12L-B004-11.0-11.5	-16.6 to -17.1	SW-SM		261.7	92.7	20.1		169	20.1	EB	2.8	2.8	U	19	2.8		2.8	2.8	U	2.8	2.8	U	7.1	7.1	U
	S-12L-B004-15.5-16.0	-21.1 to -21.6	SW-SM		104	38.3	21.2		65.7	21.2	EB	140	140	U	190	140		140	140	U	140	140	U	350	350	U
	S-12L-B004-17.5-18.0	-23.1 to -23.6	ML	Glacial Till?	421	183	23.8		238	23.8	EB	160	160	U	1000	160		160	160	U	160	160	U	410	410	U
	S-12L-B004-20.0-20.5	-25.6 to -26.1	GW-GM	Glacial Outwash	132.3	64.3	21.8	J	68	21.8	EB	3.7	3.7	U	55	3.7		4.6	3.7		3.7	3.7	U	9.2	9.2	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 7. Summary of analytical results for specific contaminants of concern in boring ASB-5

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-5	S-12L-B005-0.5-1.0	-6.2 to -6.7	OL	Marine	**163200**	**112000**	28100	D	**51200**	28100	D	7.5	7.5	U	7.5	7.5	U	7.5	7.5	U	7.5	7.5	U	19	19	U
	S-12L-B005-0.5-1.0 REP	-6.2 to -6.7	OL		**153800**	**111000**	25100	D	**42800**	25100	D	8.2	8.2	U	8.2	8.2	U	8.2	8.2	U	8.2	8.2	U	20	20	U
	S-12L-B005-4.0-4.5	-9.7 to -10.2	ML		252	23	23	U	252	23		3	3	U	3	3	U	3	3	U	3	3	U	7.5	7.5	UJ
	S-12L-B005-6.0-6.5	-11.7 to -12.2	SW-SM	Glacial Outwash	70.1	70.1	24.3		24.3	24.3	U	210	210	U	210	210	U	950	210		210	210	U	520	520	U
	S-12L-B005-7.5-8.0	-13.2 to -13.7	SW-SM		72.8	40.3	21.2		32.5	21.2		2.6	2.6	U	190	140		190	140		3.2	2.6		6.6	6.6	U
	S-12L-B005-10.5-11.0	-16.2 to -16.7	SP		67.8	19.8	19.8	U	67.8	19.8		2	2	U	13	2		2	2	U	2	2	U	5	5	U
	S-12L-B005-15.2-15.7	-21.2 to -21.7	SW-SM		84*	37.6	21.6		27.3	21.6		4.6	4.6	U	170	4.6		19	4.6		4.6	4.6	U	11	11	U
	S-12L-B005-16.5-17.0	-22.2 to -22.7	ML	Glacial Till	48.4*	31.6	24.3		24.3	24.3	U	3.8	3.8	U	250	3.8		39	3.8		3.8	3.8	U	9.6	9.6	U
	S-12L-B005-18.0-18.5	-23.7 to -24.2	ML		115.6*	46	22.7		50.7	22.7		2.7	2.7	U	120	2.7		19	2.7		2.7	2.7	U	6.8	6.8	U
	S-12L-B005-19.0-19.5	-24.7 to -25.2	SW		33.6	33.6	20.4		20.4	20.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	3.6	3.6	U
	S-12L-B005-21.0-21.5	-26.7 to -27.2	CL-ML		126.2*	22.6	22.5		78.2	22.5		2.8	2.8	U	17	2.8		5	2.8		2.8	2.8	U	7.1	7.1	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 8. Summary of analytical results for specific contaminants of concern in boring ASB-6

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-6	S-12L-B006-0.0-0.5	-4.4 to -4.9	OL	Marine	8320	4520	4520	DU	8320	4520	D	600	600	U	600	600	U	**16000**	600		3200	600		1500	1500	U
	S-12L-B006-1.0-1.5	-5.4 to -5.9	ML		4060	2660	2660	DU	4060	2660	D	280	280	U	280	280	U	1000	280		630	280	J	710	710	U
	S-12L-B006-1.0-1.5 REP	-5.4 to -5.9	ML		0	2640	2640	DU	2640	2640	DU	280	280	U	280	280	U	1500	280		1500	280	J	710	710	U
	S-12L-B006-3.0-3.5	-7.4 to -7.9	SP		29.2	23	23	U	29.2	23		230	230	U	230	230	U	720	230		230	230	U	570	570	U
	S-12L-B006-6.5-7.0	-10.9 to -11.4	SP		0	23.6	23.6	U	23.6	23.6	U	220	220	U	220	220	U	860	220		220	220	U	550	550	U
	S-12L-B006-8.0-8.5	-12.4 to -12.9	SP		0	22.4	22.4	U	22.4	22.4	U	210	210	U	210	210	U	900	210		210	210	U	520	520	U
	S-12L-B006-10.5-11.0	-14.9 to -15.4	SP		0	23.4	23.4	U	23.4	23.4	U	180	180	U	180	180	U	1000	180		180	180	U	440	440	U
	S-12L-B006-13.0-13.5	-17.4 to -17.9	SP		0	21.2	21.2	U	21.2	21.2	U	160	160	U	360	160		660	160		160	160	U	410	410	U
	S-12L-B006-16.5-17.0	-20.9 to -21.4	SW-SM	Glacial Outwash	0	21.5	21.5	U	21.5	21.5	U	3.9	3.9	U	270	3.9		110	3.9		3.9	3.9	U	9.8	9.8	U
	S-12L-B006-21.0-21.5	-25.4 to -25.9	SW		248.2†	20.9	20.9	U	39.2	20.9		160	160	U	160	160		160	160	U	160	160	U	410	410	U
	S-12L-B006-23.0-23.5	-27.4 to -27.9	ML		633†	43.2	43.2	DU	105	43.2	D	130	130	U	350	130		130	130	U	130	130	U	330	330	U
	S-12L-B006-26.0-26.5	-30.4 to -30.9	SW		17.6†	21.7	21.7	U	21.7	21.7	U	4	4	U	88	4		40	4		4	4	U	10	10	U
	S-12L-B006-27.0-27.5	-31.4 to -31.9	SW-SM		38.9†	21.1	21.1	U	21.1	21.1	U	190	190	U	260	190		190	190	U	190	190	U	480	480	U
	S-12L-B006-28.5-29.0	-32.9 to -33.4	CL-ML	Glacial Till	0	22.4	22.4	U	22.4	22.4	U	2.2	2.2	U	42	2.2		27	2.2		2.2	2.2	U	5.5	5.5	U
	S-12L-B006-31.0-31.5	-35.4 to -35.9	CL-ML		8.68†	22.8	22.8	U	22.8	22.8	U	3.8	3.8	U	73	3.8		18	3.8		3.8	3.8	U	9.6	9.6	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
† Total PCB concentration includes Aroclor 1262, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 9. Summary of analytical results for specific contaminants of concern in boring ASB-7

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-7	S-12L-B007-0.5-1.0	-2.5 to -3	ML	Marine	3360	2260	184	D	1100	184	D	6.5	6.5	U	6.5	6.5	U	6.5	6.5	U	6.5	6.5	U	16	16	U
	S-12L-B007-1.5-2.0	-3.5 to -4	Pt	Peat	7850	5220	328	DJ	2630	328	DJ	27	27	UJ	27	27	UJ	27	27	UJ	27	27	UJ	67	67	UJ
	S-12L-B007-2.5-3.0	-4.5 to -5	Pt		0	164	164	UJ	164	164	UJ	33	33	UJ	33	33	UJ	33	33	UJ	33	33	UJ	83	83	UJ
	S-12L-B007-2.5-3.0REP	-4.5 to -5	Pt		810	688	113	J	122	113	J	29	29	UJ	29	29	UJ	29	29	UJ	29	29	UJ	74	74	UJ
	S-12L-B007-5.0-5.5	-7 to -7.5	SW	Glacial Outwash	0	20.6	20.6	U	20.6	20.6	U	3.1	3.1	U	3.1	3.1	U	3.1	3.1	U	3.1	3.1	U	8.4	7.7	
	S-12L-B007-10.0-10.5	-12 to -12.5	SW-SM		110.1	77.7	21.7	J	32.4	21.7		3.4	3.4	U	3.4	3.4	U	520	200		94	3.4		8.5	8.5	U
	S-12L-B007-14.5-15.0	-16.5 to -17	SW		25.3	25.3	20.8		20.8	20.8	U	3	3	U	3	3	U	3	3	U	3	3	U	7.4	7.4	U
	S-12L-B007-15.5-16.0	-17.5 to -18	SW		178.7*	25.7	21.4		21.4	21.4	U	2.1	2.1	U	26	2.1		23	2.1		2.1	2.1	U	5.3	5.3	U
	S-12L-B007-19.5-20.0	-21.5 to -22	SW		0	22.3	22.3	U	22.3	22.3	U	2.1	2.1	U	21	2.1		2.2	2.1		2.1	2.1	U	5.3	5.3	U
	S-12L-B007-20.5-21.0	-22.5 to -23	SP-SM	Glacial Till	41.7	41.7	20.9		20.9	20.9	U	2.2	2.2	U	120	2.2		19	2.2		2.2	2.2		5.4	5.4	U
	S-12L-B007-30.0-30.5	-32 to -32.5	SW-SM		0	20	20	U	20	20	U	1.8	1.8	U	30	1.8		47	1.8		20	1.8		4.6	4.6	U
	S-12L-B007-32.5-33.0	-34.5 to -35	SW		22.2	22.2	20.4		20.4	20.4	U	1.8	1.8	U	35	1.8		59	1.8		11	1.8		4.6	4.6	U
	S-12L-B007-34.5-35.0	-36.5 to -37	SW		37	21	21	U	37	21		2.3	2.3	U	8.1	2.3		4	2.3		2.3	2.3	U	5.8	5.8	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details. µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 10. Summary of analytical results for specific contaminants of concern in boring ASB-8

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-8	S-12L-B008-0.5-1.0	-5.2 to -5.7	ML	Marine	**3280000**	**3280000**	150000	D	150000	150000	DU	2300	2300	DU	2300	2300	DU	1000000	23000	D	170000	2300	D	120000	5700	DJ
	S-12L-B008-0.5-1.0REP	-5.2 to -5.7	ML		**4800000**	**4800000**	373000	D	373000	373000	DU	4100	4100	DU	4100	4100	DU	1600000	41000	D	240000	4100	D	320000	10000	DJ
	S-12L-B008-1.5-2.0	-6.2 to -6.7	ML		**2570000**	**2570000**	147000	D	147000	147000	DU	20000	20000	DU	20000	20000	DU	1100000	20000	D	120000	20000	D	49000	49000	DU
	S-12L-B008-3.0-3.5	-7.7 to -8.2	ML		**124800**	**107000**	3640	D	**17800**	3640	D	13000	13000	DU	340000	13000	D	960000	13000	D	43000	13000	D	32000	32000	DU
	S-12L-B008-6.0-6.5	-10.7 to -11.2	ML		**3790000**	**3790000**	158000	D	158000	158000	DU	480	480	U	25000	480		17000	480		480	480	U	3500	1200	
	S-12L-B008-7.5-8.0	-12.2 to -12.7	ML		**188000**	**188000**	8280	D	8280	8280	DU	27000	27000	DU	620000	27000	D	930000	27000	D	27000	27000	DU	69000	69000	DU
	S-12L-B008-11.0-11.5	-15.7 to -16.2	SW-SM	Glacial Outwash	**276000**	**276000**	21200	D	21200	21200	DU	250	250	U	250	250	U	250	250	U	250	250	U	3800	620	
	S-12L-B008-16.5-17.0	-21.2 to -21.7	SW-SM		**190000**	**190000**	10300	D	10300	10300	DU	150	150	U	150	150	U	150	150	U	150	150	U	760	370	
	S-12L-B008-21.0-21.5	-25.7 to -26.2	SP-SM		274.9*	192	21		59	21		4.2	4.2	U	220	4.2		91	4.2		4.2	4.2	U	13	10	
	S-12L-B008-22.2-22.7	-26.9 to -27.4	ML	Glacial Till	202.4*	140	21.4		34.2	21.4		2.6	2.6	U	140	2.6		65	2.6		2.6	2.6	U	9.9	6.6	

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 11. Summary of analytical results for specific contaminants of concern in boring ASB-9

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-9	S-12L-B009-0.5-1.0	-7.5 to -8	OL	Marine	1050	1050	62.9	J	62.9	62.9	UJ	880	880	UJ	100000	8800	DJ	400000	8800	DJ	18000	880	J	2200	2200	UJ
	S-12L-B009-1.5-2.0	-8.5 to -9	OL		0	25.1	25.1	U	25.1	25.1	U	270	270	U	8800	270		10000	270		270	270	U	680	680	U
	S-12L-B009-1.5-2.0REP	-8.5 to -9	OL		0	23.9	23.9	U	23.9	23.9	U	250	250	U	14000	250		12000	250		250	250	U	630	630	U
	S-12L-B009-5.5-6.0	-12.5 to -13	SW-SM		0	21.8	21.8	U	21.8	21.8	U	150	150	U	160	150		760	150		150	150	U	380	380	U
	S-12L-B009-9.2-9.7	-16.2 to -16.7	SW		48.6	48.6	21.5		21.5	21.5	U	3.8	3.8	U	34	3.8		15	3.8		3.8	3.8	U	14	9.6	
	S-12L-B009-10.3-10.8	-17.3 to -17.8	SW-SM	Glacial Outwash	0	21.8	21.8	U	21.8	21.8	U	3	3	U	340	170		410	170		9	3		45	7.4	
	S-12L-B009-15.0-15.5	-22 to -22.5	SW-SM		28.6	28.6	21.3		21.3	21.3	U	150	150	U	700	150		150	150	U	150	150	U	370	370	U
	S-12L-B009-19.0-19.5	-26 to -26.5	SW		57.2*	31.5	20.5		20.5	20.5	U	4	4	U	120	4		17	4		4	4	U	10	10	U
	S-12L-B009-21.5-22.0	-28.5 to -29	CL	Glacial Till	73.5*	28.9	21.5		21.5	21.5	U	3.5	3.5	U	290	3.5		45	3.5		3.5	3.5	U	8.8	8.8	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 12. Summary of analytical results for specific contaminants of concern in boring ASB-10

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-10	S-12L-B010-0.2-0.7	-7.4 to -7.9	OL	Marine	**59000**	**59000**	2840	D	2840	2840	DU	890	890	U	890	890	U	5100	890		4500	890		2200	2200	U
	S-12L-B010-1.0-1.5	-8.2 to -8.7	ML		2246	1670	161	J	576	161	J	8600	8600	DUJ	8600	8600	DUJ	420000	8600	DJ	49000	8600	DJ	140000	22000	DJ
	S-12L-B010-2.5-3.0	-9.7 to -10.2	ML		538	437	36.5	J	101	36.5	J	1900	1900	DU	1900	1900	DU	70000	1900	D	4400	1900	DJ	7300	4800	D
	S-12L-B010-2.5-3.0 REP	-9.7 to -10.2	ML		969	797	46.1	J	172	46.1	J	2500	2500	DU	2500	2500	DU	110000	2500	D	9100	2500	DJ	12000	6300	D
	S-12L-B010-4.0-4.5	-11.2 to -11.7	SW-SM	Glacial Outwash	149	117	20.1		32	20.1		2.6	2.3		28	2.3		52	2.3		2.3	2.3	U	25	5.6	
	S-12L-B010-6.5-7.0	-13.7 to -14.2	SW-SM		56.6	56.6	21.7		21.7	21.7	U	4.4	2.1		140	2.1		340	150		14	2.1		26	5.3	
	S-12L-B010-9.0-9.5	-16.2 to -16.7	SW		366.7	294	20.6		72.7	20.6		3.4	3.4	U	9.2	3.4		11	3.4		3.4	3.4	U	8.4	8.4	U
	S-12L-B010-11.0-11.5	-18.2 to -18.7	SW-SM		128	128	21.6		21.6	21.6	U	2.5	2.5	U	11	2.5		19	2.5		2.5	2.5	U	6.2	6.2	U
	S-12L-B010-14.0-14.5	-21.2 to -21.7	SW-SM		197*	125	20.6		31.3	20.6		2.8	2.8	U	15	2.8		7	2.8		2.8	2.8	U	7.1	7.1	U
	S-12L-B010-15.8-16.3	-23 to -23.5	SW-SM		115	115	21.8		21.8	21.8	U	4	2.2		160	150		170	2.2		16	5.5		5.5	5.5	U
	S-12L-B010-20.0-20.5	-27.2 to -27.7	CL-ML	Glacial Till	123.4*	83	23		24.7	23		4.6	4.6	U	150	4.6		56	4.6		5	4.6		12	12	U
	S-12L-B010-21.5-22.0	-28.7 to -29.2	ML		155.2*	108	22.2		30.8	22.2		3	3		240	160		96	3		5.6	3		7.5	7.5	U
	S-12L-B010-22.7-23.2	-29.9 to -30.4	ML		25	25	20.8		20.8	20.8	U	2.8	2.8	U	57	2.8		7.2	2.8		2.8	2.8	U	7.1	7.1	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 13. Summary of analytical results for specific contaminants of concern in boring ASB-11

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-11	S-12L-B011-0.2-0.7	-7.1 to -7.6	OL	Marine	978	943	943	DU	978	943	D	6.8	6.8	U	6.8	6.8	U	6.8	6.8	U	6.8	6.8	U	17	17	U
	S-12L-B011-2.0-2.5	-8.9 to -9.4	SM		22.7	22.7	21.6	J	21.6	21.6	U	150	150	U	1300	150		320	150		150	150	U	520	370	
	S-12L-B011-2.0-2.5 REP	-8.9 to -9.4	SM		88.9	88.9	22.8	J	22.8	22.8	U	160	160	U	1300	160		330	160		160	160	U	510	400	
	S-12L-B011-3.5-4.0	-10.4 to -10.9	SW-SM		104	104	21.7		21.7	21.7	U	2.5	2.5	U	7.8	2.5	U	2.5	2.5	U	2.5	2.5	U	6.2	6.2	U
	S-12L-B011-8.5-9.0	-15.4 to -15.9	SW-SM	Glacial Outwash	70.1	70.1	20.9		20.9	20.9	U	2.1	2.1	U	12	2.1	U	2.1	2.1	U	2.1	2.1	U	5.3	5.3	U
	S-12L-B011-13.5-14.0	-20.4 to -20.9	SP		103.4*	58	20.5		22	20.5		2.7	2.7	U	6.4	2.7	U	2.7	2.7	U	2.7	2.7	U	6.8	6.8	U
	S-12L-B011-16.0-16.5	-22.9 to -23.4	SW-SM		413.2*	40.8	20.2		51.4	20.2		3.3	3.3	U	33	3.3		7.7	3.3		3.3	3.3	U	8.2	8.2	U
	S-12L-B011-18.5-19.0	-25.4 to -25.9	SM	Glacial Till	120*	62.4	21.2		29.6	21.2	J	2.1	1.9		190	1.9		180	1.9		1.9	1.9	U	4.9	4.9	U
	S-12L-B011-20.0-20.5	-26.9 to -27.4	SM		35.3	35.3	21		21	21	U	3	3	U	92	3		61	3		3	3	U	7.5	7.5	U
	S-12L-B011-21.5-22.0	-28.4 to -28.9	CL		53.6	53.6	21.3		21.3	21.3	U	1.9	1.9	U	63	1.9		45	1.9		1.9	1.9	U	4.8	4.8	U
	S-12L-B011-22.0-22.5	-28.9 to -29.4	CL		23.9	23.9	21.9		21.9	21.9	U	2	2	U	28	2		18	2		2	2	U	4.9	4.9	U
	S-12L-B011-25.5-26.0	-32.4 to -32.9	ML		29.2	29.2	21.7		21.7	21.7	U	2.6	2.6	U	23	2.6		12	2.6		2.6	2.6	U	6.6	6.6	U

Notes:

(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
* Total PCB concentration includes Aroclor 1260, which is not presented in this Table; see section 4.3.1 for additional details.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 14. Summary of analytical results for specific contaminants of concern in boring ASB-12

Boring ID	Sample ID	Elevation (feet, NGVD29)	USCS Description	Strat. Unit	Total PCBs (µg/kg)	Aroclors (µg/kg)						VOCs (µg/kg)														
						# 1242			# 1254			Tetrachloroethene			Trichloroethene			cis-1,2-Dichloroethene			Vinyl Chloride			1,2,4-Trichlorobenzene		
						Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.	Value	RL	Qual.
ASB-12	S-12L-B012-1.0-1.5	-5.2 to -5.7	ML	Marine	2246	1840	209	DJ	406	209	DJ	6700	6700	DU	6700	6700	DU	380000	6700	DJ	110000	6700	D	17000	17000	DU
	S-12L-B012-1.0-1.5 REP	-5.2 to -5.7	ML		4028	438	121	DJ	3590	203	DJ	1100	1100	DU	1100	1100	DU	91000	1100	DJ	110000	1100	D	2800	2800	DU
	S-12L-B012-2.0-2.5	-6.2 to -6.7	Pt	Peat	129	129	45		45	45	U	6200	6200	DU	6200	6200	DU	360000	6200	D	22000	6200	D	16000	16000	DU
	S-12L-B012-2.5-3.0	-6.7 to -7.2	Pt		115	115	36.4		36.4	36.4	U	3600	3600	DU	3600	3600	DU	190000	3600	D	18000	3600	D	9000	9000	DU
	S-12L-B012-4.0-4.5	-8.2 to -8.7	SM	Glacial Outwash	77.3	77.3	24.4		24.4	24.4	U	440	440	DU	440	440	DU	29000	440	D	440	440	DU	1100	1100	DU
	S-12L-B012-6.0-6.5	-10.2 to -10.7	SM		474	356	24.4		118	24.4		210	210	U	2100	210		9800	210		520	210		540	540	U
	S-12L-B012-7.0-7.5	-11.2 to -11.7	SW-SM		60.3	60.3	21.2		21.2	21.2	U	430	430	U	520	430		2700	430		430	430	U	1100	1100	U
	S-12L-B012-10.5-11.0	-14.7 to -15.2	SW-SM		160.5	125	21.3		35.5	21.3		160	160	U	320	160		860	160		160	160	U	410	410	U
	S-12L-B012-13.5-14.0	-17.7 to -18.2	SW-SM		64	64	21.4		21.4	21.4	U	160	160	U	590	160		160	160	U	160	160	U	400	400	U
	S-12L-B012-17.0-17.5	-21.2 to -21.7	SW		36.3	36.3	20.8		20.8	20.8	U	150	150	U	1500	150		150	150	U	150	150	U	380	380	U
	S-12L-B012-17.0-17.5 REP	-21.2 to -21.7	SW		44.6	44.6	21.3		21.3	21.3	U	120	120	U	1600	120		120	120	U	120	120	U	290	290	U
	S-12L-B012-18.5-19.0	-22.7 to -23.2	CL	Glacial Till	31.5	31.5	21.5		21.5	21.5	U	200	200	U	1600	200		200	200	U	200	200	U	500	500	U
	S-12L-B012-21.0-21.5	-25.2 to -25.7	CL		28.1	28.1	23.6		23.6	23.6	U	180	180	U	970	180		180	180	U	180	180	U	460	460	U

Notes:
(a) – Total PCBs calculated as the sum of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.
(b) – A value of zero (0) was used in summation for non-detects (U, UJ, DUJ).
(c) – Cells shaded in grey are validated non-detects for the corresponding analyte at the sample specific reporting limit (RL).
(d) – PCB Aroclor results greater than 10 ppm are in bold.
µg/kg – micrograms per kilogram (ppb);
U = Analyte is non-detect at or above the sample-specific reporting limit (RL);
UJ = Non-detect is estimated at the RL;
J = Result is estimated;
EB = analyte detected in associated equipment blank;
D = result reported from a dilution analysis (added by laboratory);

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Table 15. Summary of the twelve most-frequently detected SVOCs

Analyte	Number of Detections	Minimum Concentration (µg/kg)	Maximum Concentration (µg/kg)
Fluoranthene	17	270 (RL = 240)	62,000 (RL = 1,200)
Phenanthrene	17	260 (RL = 240)	69,000 (RL = 1,200)
Pyrene	16	710 (RL = 580)	46,000 (RL = 1,200)
Benz(a)Anthracene	14	630 (RL = 270)	22,000 (RL = 1,200)
Benzo(a)Pyrene	14	560 (RL = 360)	19,000 (RL = 1,600)
Benzo(b)Fluoranthene	14	600 (RL = 230)	23,000 (RL = 1,200)
Benzo(k)Fluoranthene	14	280 (RL = 130)	9,500 (RL = 1,200)
Chrysene	14	750 (RL = 270)	22,000 (RL = 1,200)
Benzo(g,h,i)Perylene	13	330 (RL = 170)	10,000 (RL = 1,600)
Indeno(1,2,3-Cd)Pyrene	13	370 (RL = 170)	12,000 (RL = 1,600)
Anthracene	12	320 (RL = 290)	20,000 (RL = 1,200)
Fluorene	7	230 (RL = 210)	11,000 (RL = 2,000)

Note:
Please see Appendix D for laboratory data reports and Appendix E for data validation reports.

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Table 16. Summary of Equipment Blank Results

Sample Description	Sample ID	Detected Analytes
ASB-1	EB-071212-01	none
ASB-2	EB-071312-01	none
ASB-3	EB-071312-02	Aroclor 1254 @ 0.418 µg/l (RL = 0.25 µg/l)
ASB-4	EB-071412-01	Aroclor 1254 @ 0.325 µg/l, (RL = 0.25 µg/l)
ASB-5	EB-071412-03	none
ASB-6	EB-071612-01	none
ASB-7	EB-071412-04	none
ASB-8	EB-071712-01	none
ASB-9	EB-071612-02	none
ASB-10	EB-071712-02	none
ASB-11	EB-071712-03	none
ASB-12	EB-071812-01	none
Barge Decontamination Water Source	EB-071412-02	Chloroform @ 7.0 µg/l, (RL = 0.75 µg/l); Bromodichloromethane @ 1.4 µg/l, (RL = 0.5 µg/l)
Laboratory Equipment Decontamination	EB-071912-01	none

Table 17. Summary of Trip Blank Results

Sample Description	Sample ID	Detected Analytes
ASB-1	TB-071212-02 TB-071212-03	none
ASB-2	TB-071212-02 TB-071212-03 TB-071312-01 TB-071312-02	none
EB-071312-01	TB-071312-03	none
ASB-3	TB-071412-01 TB-071412-02	none
EB-071312-02	TB-071312-03	none
ASB-4	TB-071412-01 TB-071412-02	none
EB-071412-01	TB-071412-03	none
ASB-5	TB-071412-01 TB-071412-02 TB-071812-02 TB-071812-03	none
EB-071412-03	TB-071412-04	none
ASB-6	TB-071612-01 TB-071612-02	none
EB-071612-01	TB-071612-03	none
ASB-7	TB-071912-03 TB-071912-04	none
EB-071412-04	TB-071412-04	none
ASB-8	TB-071712-02 TB-071712-03	none

Sample Description	Sample ID	Detected Analytes
EB-071712-01	TB-071712-01	none
ASB-9	TB-071712-02 TB-071712-03	none
EB-071612-02	TB-071712-01	none
ASB-10	TB-071812-02 TB-071812-03	none
EB-071712-02	TB-071712-01	none
ASB-11	TB-071912-01 TB-071912-02 TB-071812-02 TB-071812-03	Trichloroethene @ 2.6 µg/l (RL = 2.0 µg/l) in sample TB-071912-02
EB-071712-03	TB-071812-01	none
ASB-12	TB-072012-01 TB-072012-02 TB-071912-03 TB-071912-04	none
EB-071812-01	TB-071812-01	none
EB-071412-02 (Barge Decontamination Water Source)	TB-071412-03	none
EB-071912-01 (Laboratory Equipment Decontamination)	TB-071912-05	none

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