APPENDIX A
Cultural Resources Report

CULTURAL RESOURCES REPORT COVER SHEET

DAHP Project Number: _2019-03-01989 (Please contact the lead agency for the project number. If associated to SEPA, please contact SEPA@dahp.wa.gov to obtain the project number before creating a new project.)

Author: Matthew Sterner, M.A., RPA.

Title of Report:

Date of Report: August 2024

County(ies): Kitsap Township: 24 North Range: 02 E Section: 02

Quad: Bremerton East Acres: 40

PDF of report submitted (REQUIRED) ☒ Yes

Historic Property Inventory Forms to be Approved Online? ☐ Yes ☒ No

Archaeological Site(s)/Isolate(s) Found or Amended? ☐ Yes ☒ No

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

Satisfy a DAHP Archaeological Excavation Permit requirement? ☒ Yes # ☐ No

Were Human Remains Found? ☐ Yes DAHP Case # ☒ No

DAHP Archaeological Site #:
45KP00110

- Submission of PDFs is required.
- Please be sure that any PDF submitted to DAHP has its cover sheet, figures, graphics, appendices, attachments, correspondence, etc., compiled into one single PDF file.
- Please check that the PDF displays correctly when opened.

Jacobs

Archaeological Monitoring at Blakely Harbor Park Site
Bainbridge Island
Kitsap County, Washington

Prepared for:

Geosyntec Consultants

August 2024

Archaeological Monitoring at Blakely Harbor Park Site
Bainbridge Island
Kitsap County, Washington

Project No.:	W3X98400
Date:	August 2024
Client Name:	Geosyntec Consultants
Author:	Matthew Sterner, MA, RPA

Jacobs
1100 112th Avenue NE, Suite 500
Bellevue, Washington 98004
425.453.5000
www.jacobs.com

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1 INTRODUCTION

Geosyntec Consultants (Geosyntec), at the direction of the Washington State Department of Ecology (Ecology), conducted a Remedial Investigation (RI) on behalf of Port Blakely Tree Farms (PBTF) at the Blakely Harbor Park Site (BHPS or Site), located on Bainbridge Island, Kitsap County, Washington. The BHPS sits atop a historic lumber mill (Mill) and the historic town of Port Blakely. The lumber mill was in generally steady operation from 1869 through the early 1920s and was recorded as an archaeological site by the State of Washington (45KP110).

The upland and nearshore portions of the Site were acquired by the Bainbridge Island Metro Park & Recreation District (BI Parks) in 1999 and again in 2010. The Site includes an upland park area and a marine embayment located in the westernmost portion of Blakely Harbor, which includes approximately 26 acres of vacant and forested upland area, a 7.5-acre former Mill Pond, 7,500 linear feet (ft) of shoreline, and approximately 74 acres of intertidal/subtidal marine harbor. The total site area is about 100 acres. Ecology conducted preliminary investigations in 2019 and determined the area exceeded acceptable levels of several chemical compounds. The current project conducted soil, groundwater, and sediment sampling and analyses across the historic mill site and adjacent areas.

In 2019, the Ecology compiled an overview of previous sediment testing at the BHPS, conducted their own testing at the Site and presented the results in a report. The goal of the Ecology study was to "characterize the intertidal and subtidal sediment contamination throughout the western portion of Blakely Harbor resulting from historical mill operations and to delineate the eastern extent of sediment chemical concentrations that exceed the Washington State Sediment Management Standards (SMS)." The report ultimately recommended additional testing (both in water as well as terrestrial) in many areas around the BHPS to better determine the presence of subsurface contaminants. Geosyntec retained Jacobs Engineering (Jacobs) to monitor the RI of the Blakley Harbor Lumber Mill and Town site (45KP110) to ensure minimal impacts to the archaeological site.

The historic lumber mill and townsite was acknowledged as an archaeological resource by the State of Washington in 1995, being first recorded by Mr. Dennis Lewarch. At that time, however, the Site's eligibility for listing in the National Register of Historic Places (NRHP) was not determined. The site is currently listed in the Washington Information System for Architectural and Archaeological Records Database (WISAARD) as "potentially eligible." Because Washington State law prohibits disturbance of archaeological sites that are eligible (or presumed eligible) for listing in the NRHP, a determination of eligibility for the site must be made or presumed.

Discussions with the Department of Archaeology and Historic Preservation (DAHP) in 2021 resulted in a determination that the resource should be treated as eligible and that an archaeological excavation permit was required by that agency. Washington State law requires that any ground disturbing work within the boundaries of an eligible or potentially eligible archaeological site must be permitted through the DAHP. Because the current project location

falls within the boundaries of archaeological site 45KP110, an archaeological permit was obtained from the DAHP in April 2021. A copy of the archaeological permit is included in **Appendix A**.

This report presents the results and recommendations of three years of archaeological monitoring of the RI efforts undertaken at the BHPS. The RI efforts presented no impacts to the archaeological site, consisting primarily of soil sampling from hand auguring and small diameter cores, and sediment sampling. While historical-period artifacts were observed during the archaeological monitoring effort, the overall integrity of any subsurface remains is unclear and public use of the property has certainly impacted shallow site components. Pending further archaeological evaluation to determine the integrity of potential subsurface archaeological deposits, the site should be treated as eligible for listing in the National Register of Historic Places per the 2021 evaluation and any impacts to the site should be avoided.

1.1 Project Description

The RI project area was basically divided into two main survey areas: in-water and near-shore survey and upland survey.

1.1.1 In-Water and Near-Shore Survey

The physical survey to identify issues associated with the underwater and near-shore locations at the Site consisted of three components. First, a bathymetry survey was performed in October 2020 to map substrate elevations and water depths. These data were used to confirm boat access, determine core tube lengths, and develop remedial alternatives. Second, a sediment profile imaging (SPI) survey was completed in October 2020. SPI is a tool that provides photographic evidence of sediment conditions in the upper 20 centimeter (cm) with minimal disturbance to bedded sediments.

A shoreline inspection survey was undertaken. A shoreline visual inspection was performed at low tide to identify structures, physical features, outfalls, slopes, and substrate types. The objective of the shoreline survey was to provide general information on physical conditions and characteristics at or near the shoreline. The shoreline survey characterized and inventoried the type, distribution, and substrate along the shoreline and littoral areas.

1.1.2 Sediment Sampling

The sediment investigation included the collection of surface sediment grabs in the nearshore, Mill Pond, and Inner Harbor areas and sediment cores in the Inner and Outer Harbor and Mill Pond areas. Samples were generally collected from research vessels although a few nearshore locations were collected by accessing the areas on foot. Archaeological monitoring was not completed for all sediment sample locations, but the archaeologist was available (“on-call”) to review materials found in sediment samples.

1.1.3 Upland Survey

The upland field investigation involved the collection of surface and subsurface soil samples and a phased approach to groundwater sampling in the near shore. Much akin to the approach for the shoreline and underwater survey, the upland portion of the project consisted of 3 sampling types.

First, hand-auger soil sampling collected discrete soil samples from the upper 2 feet of soil below the vegetative layer to delineate the extent of previously identified soil contamination at the Site. Additional hand augering was also conducted at locations not previously investigated.

Second, surface and subsurface soil samples were collected using a drilling rig mobilized to the Site. The drill rig was used to collect soil data at locations along the shoreline (at low tide) as well as locations further upland to estimate the vertical extent of soil contamination. The direct push method collected soil samples up to 25.5 feet below ground surface (bgs) and shallow groundwater samples using temporary well points installed in the borings. Groundwater samples were collected during low tide using low flow sampling methods.

Finally, a groundwater investigation evaluated groundwater conditions along the shoreline to assess the potential for contaminant migration to Blakely Harbor surface water and sediment. Following the initial phase of temporary groundwater sampling, four permanent monitoring wells were installed and monitored over four quarters (one year).

1.1.4 Awareness Training

The Geosyntec team conducting the RI also participated in trainings conducted by Jacobs archaeologists to provide rudimentary recognition of potential archaeological sensitive situations. These trainings provided basic protocols for unanticipated discoveries of both precontact and historical-period artifacts as well as precontact features and geomorphological anomalies that could identify sensitive remnant archaeological or cultural components or soil horizons. While this training was not intended to qualify Geosyntec staff to identify culturally sensitive materials independently, it was successful in sensitizing staff to contact the lead archaeologist if an archaeological monitor was not onsite.

1.2 Project Location

The BHPS is located at the east end of a protected harbor along the southeastern coast of Bainbridge Island, situated in Township 24 North, Range 02 East, Section 02 (Willamette Meridian) (**Figure 1**). The BHPS is bounded by NE Country Club Road to the west and the south, Northeast Blakely Avenue and 3-T Road to the north, and private residences and Blakely Harbor itself to the east (**Figure 2**).

The RI of the BHPS was completed in the north and south upland areas of the BHPS. As depicted in **Figure 2**, the entirety of the project will occur within the boundaries of archaeological site 45KP110.

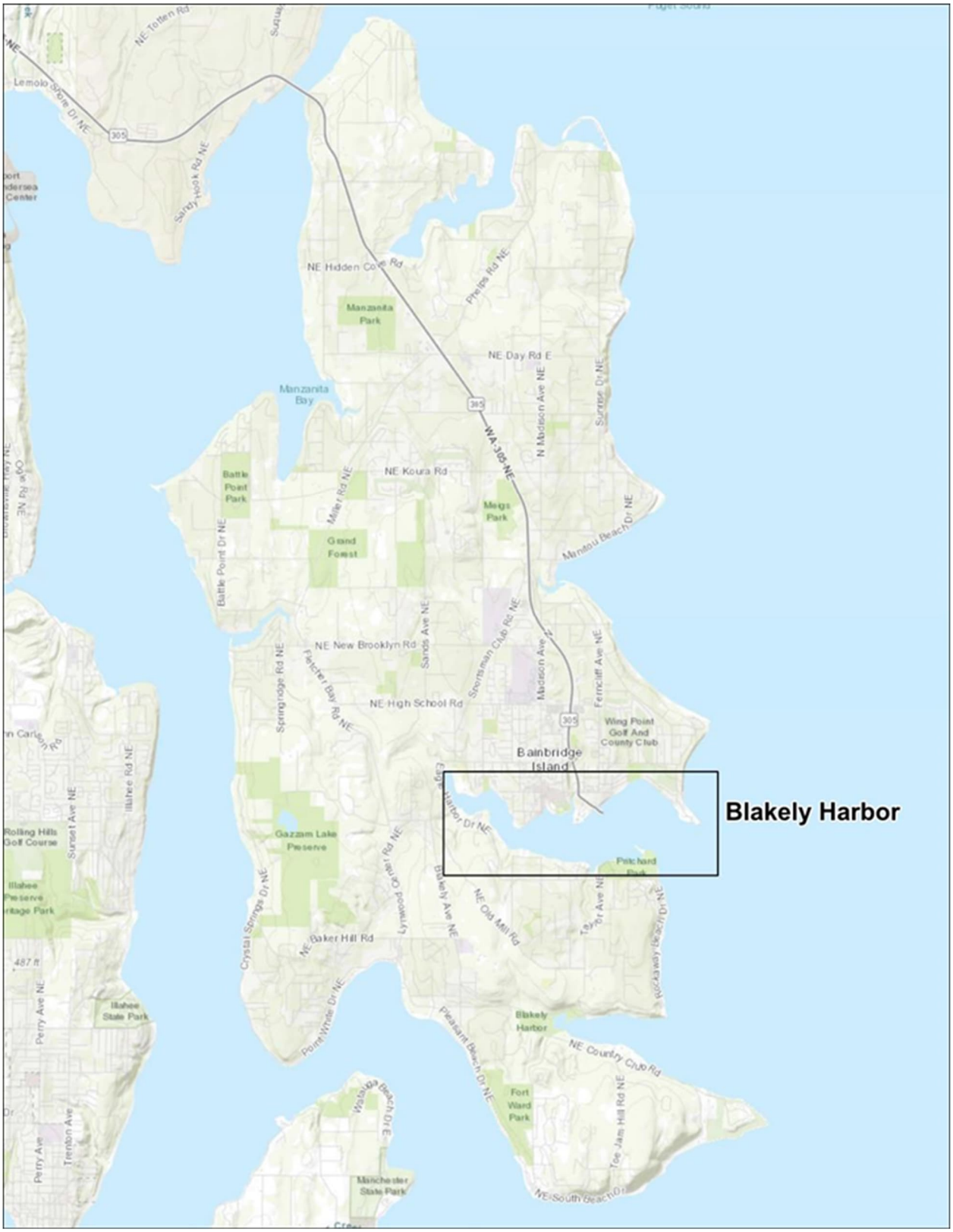

Figure 1. Project location, Bainbridge Island, Washington.

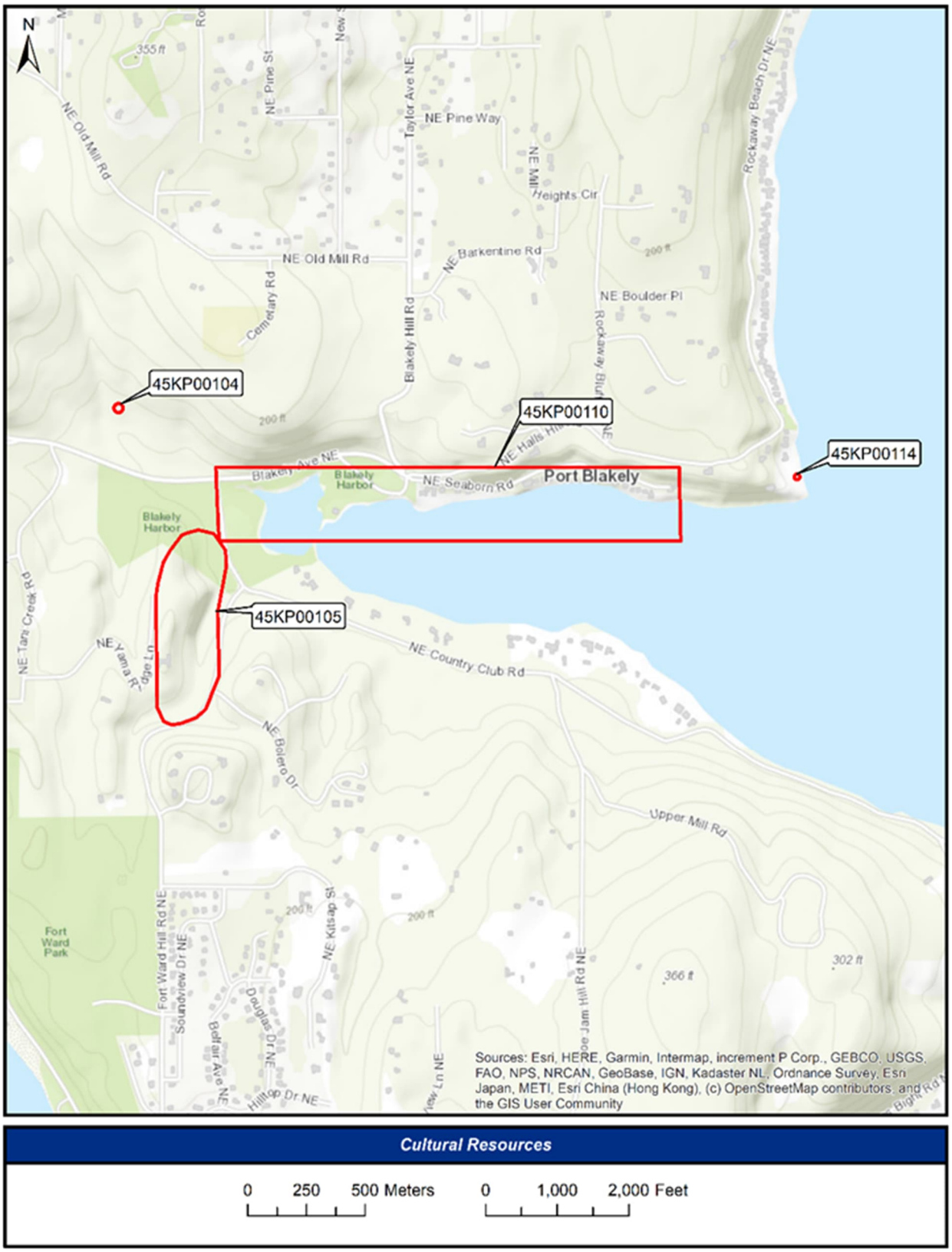

Figure 2. Aerial imagery of the Project location with known archaeological sites.

1.3 Key Personnel

Numerous Jacobs archaeologists have been involved in this project and have contributed to the effort since 2020. Matthew Sterner, MA, RPA, has served as the principal investigator throughout the project and has been involved in all aspects of the completion. Michael Chidley, MA, RPA, and Connie Gray, MS, have both served in the role of project manager over the course of the project. Archaeologists Patrick Elliott, MS, RPA, Jane Wiegand, MA, Michael Sean Shropshire, and Jessica Jones, MA, all contributed to various project responsibilities over the duration of the project. Every Jacobs employee involved in the project meets the Secretary of the Interior's Standards for a professional in the fields of archaeology or architectural history.

1.4 Regulatory Context

The project is being conducted for Ecology in compliance with the Washington State Environmental Policy Act (SEPA). The section below briefly outlines the regulatory context for that context.

State laws and policies that govern the protection of archaeological resources include the following:

- Revised Code of Washington (RCW) 27.44, Indian Graves and Records, provides for the protection of Native American graves and burial grounds, encourages voluntary reporting of said sites when they are discovered, and mandates a penalty for disturbance or desecration of such sites.
- RCW 27.53, Archaeological Sites and Resources, governs the protection and preservation of archaeological sites and resources and establishes DAHP as the administering agency for these regulations. This RCW also requires an excavation permit issued by DAHP prior to excavation, altering, or otherwise disturbing a known archaeological site.
- RCW 36.70A.020, Planning goals, includes a goal to "Identify and encourage the preservation of lands, sites, and structures that have historical, cultural, and archaeological significance." Cities planning under the Washington State Growth Management Act must consider and incorporate this historic preservation goal.
- RCW 68.60, Abandoned and Historic Cemeteries and Historic Graves, provides for the protection and preservation of abandoned and historic cemeteries and historic graves.

2 CULTURAL SETTING

This section describes the cultural setting of the Project and was used to inform the methods and expectations for monitoring for precontact and historical archaeological resources. A review of the physical environments that affect human behavior and the cultural setting helped generate expectations about how archaeological sites could be distributed across the landscape, the kinds of activities that occurred there, and the types of archaeological sites that may be present, which directly influenced the project parameters.

2.1 Precontact Period

Evidence of early human occupation within the Pacific Northwest is sparse up until the Middle Holocene (10,000 to 5000 years before present [BP]). However, the earliest evidence of human occupation within Western Washington begins near the end of the Pleistocene (ca.12,000 BP). Artifacts commonly ascribed to early Pleistocene sites include large projectile points, the Clovis point being the most widely recognized (Dixon 2001; Hutchings 1997). These large projectile points are the first widely accepted evidence of occupation within the Puget Sound area and greater Americas. Clovis sites have been found in Washington State on Whidbey Island, in south King County, Pierce County, and Thurston County (Avey 1990; Meltzer and Dunnell 1987; White and Heideman 2008).

The lack of archaeological evidence prior to the middle Holocene may be in part due to geological events that submerged or buried any sites that would have otherwise been present. During the Middle Holocene larger sites are observable in greater frequencies within the Pacific Northwest (Ames and Maschner 1999). The earliest dated evidence of Middle Holocene occupation in the Puget Sound region is a site off Little Bear Creek in Redmond, Washington. This site is typified by fragmented large projectile points within a peat deposit dating to roughly 8500 BP (Kopperl et al. 2009).

A common site type observed in the Puget Sound during the Middle Holocene is an "Olcott" site. Olcott sites consist of utilitarian cobble tools and Cascade-style leaf-shaped projectile points located near small streams on upland terraces and are dated between 8000 and 5000 BP (Kidd 1964; Matson 1976). While Olcott-like sites have been observed in geological contexts that appear to postdate 5000 BP, they have not been firmly dated later than the Middle Holocene.

The trend of increased observable archaeological site size and frequency between the Pleistocene and Holocene continues through the late Holocene with greater expressions of ethnographic lifeways. Late Holocene Puget Sound sites demonstrate a greater reliance on marine and littoral resources based on the presence of shell middens. Shell middens have not been observed to date prior to 5000 BP.

Postdating 2000 BP, large village sites—more greatly representing expressions of early ethnographic lifeways—are present in riverine and littoral settings, with specialized seasonal

camps as an appendage of the overall village body. The villages are interpreted as indicators of aggregating winter populations with a heavy reliance on salmon. These sites are associated with the quintessential Northwest cultural traits and account for the highest frequency of precontact site types within the vicinity of the BHPS (Ames and Maschner 1999). An example would be an occupation site located at West Point, roughly 5.5 miles northeast of Blakely Harbor which includes a shell midden (Larson and Lewarch 1995).

2.2 Historic Period

First recoded Euroamerican exploration of the Puget Sound was conducted by George Vancouver and crew in 1792 who recorded topographic and ethnographic data for the region (Suttles and Lane 1990). Shortly thereafter, in 1833, fur traders with the Hudson's Bay Company established a trading post at Fort Nisqually (White and Heideman 2008). Though it was not until 1854 that Bainbridge Island and the BHPS saw its first Euroamerican development. The first claim placed to what we know today as Blakely Harbor was made by Reuben Bean for 148.5 wooded acres (White 2008). However, Bean died in 1859 before his property was patented and was later in portion claimed by William Renton in the 1860s (Price Jr. 1989).

Renton made his claim for modern day Blakely Harbor under the Homestead Act of 1862 and was patented in 1869 (GLO Records 2007). It was here that Renton constructed the first timber processing facility on Bainbridge Island. Throughout the 1860s Renton bought additional neighboring property to increase his access to timber and freshwater necessary to run the Mill (Price Jr. 1989). The Mill was constructed on fir pilings, with pile-supported wharves to store green lumber and load ships nearby. Over time, additional piles were placed to increase the holding area for lumber, with the mill producing 20,000 to 30,000 board foot per day using machinery imported from San Francisco, ran by a 20-man crew (Price Jr. 1989). The Mill was quite successful and later expanded to include a town called Port Blakely to accommodate the staff working the mill (Berner 1966; Price Jr. 1989). The Mill continued to increase in capacity through the 1870s producing up to 90,000 board feet per day (Berner 1966; Price Jr. 1989).

In the mid-1870s Renton formed a partnership changing the name of the company briefly to Renton, Holmes and Company but was later incorporated as Port Blakely Mill Company by 1876 (Price Jr. 1989). The original mill in Blakely Harbor lasted until 1888 when it was destroyed in a massive fire, only to be rebuilt two years later and be considered the largest mill of its time. With the rebuild came additional out-buildings including a cookhouse, two hog houses and a masonic lodge, as well as a comprehensive fire suppression system linked to the stream fed ponds (Price Jr. 1989).

Immigrants formed a large part of the work force for the Mill since its establishment, most of whom were Scandinavian up until the 1870s and 1880s when Chinese and Japanese immigrants moved to the island. However, prejudice forced most of the Chinese workers out of the Mill though small groups stayed working in the town. Populations associated with Blakely Harbor

continued to boom into the 1880s and eventually led to ethnically-based suburbs to be established in the 1890s including two Japanese villages, Yama and Nagaya Village listed on the NRHP, and West Blakely also known as New Sweden (Price Jr. 1989).

The peak of the Mill production was in the 1890s with over 191 vessels servicing the Mill and 120 million board feet being produced a year at the turn of the century. In 1903 the Mill was again sold, this time to David Edward Skinner and John W. Eddy. Unfortunately, the Mill shortly after burnt down again in 1907 to be rebuilt in 1909 as a much smaller operation with a concrete room to house the Mill's steam engine and electricity generator (Price Jr. 1989).

More difficulties befell the Mill following the construction of the transcontinental railroad in 1893 as it opened vast new sources of timber and with it the number of sawmills processing 20 million board feet of lumber a year substantially increased between 1900 and 1905. By 1914, the mill in Blakely Harbor stopped production due to competition, resurrected briefly in 1916, and fully dismantled by 1924 (Price Jr. 1989). The town that was built up around the Mill slowly began to close with buildings gradually being destroyed between 1909 and 1925 and fully dismantled and abandoned by 1930 (Price Jr. 1989).

3 RECORDS AND LITERATURE REVIEW

A records search of the BHPS was first conducted in October 2020, by Jacobs Archaeologist Jane Wiegand, MA. The records search was completed utilizing WISAARD. The records search included the immediate BHPS, the boundary of 45KP110, and a surrounding 1-mile buffer. Within the BHPS, one archaeological site, 45KP110, has been previously recorded and is considered potentially eligible for listing on the NRHP. Also within the BHPS is one maritime resource known as the Hall Brothers Shipyard, which has not been surveyed, evaluated, or recorded as a cultural resource.

Seven additional cultural resources are recorded outside of the BHPS but within the 1-mile search buffer (**Table 1**). Two of these resources, 45KP105 and 45DT8, are listed on the NRHP, and one is a cemetery that has not been evaluated for listing on the NRHP. **Table 2** lists four previous cultural resources studies that have been conducted within the BHPS. **Table 3** lists five previous cultural resources studies that have been completed outside the BHPS but within a 1-mile buffer of the project location.

Table 1. Cultural Resources Within 1 Mile of the BHPS

Resource No.	Distance from BHPS	Description	NRHP Eligibility
45KP26	0.77 miles	Golf Club of Seattle	Unevaluated
45KP104	0.21 miles	Prehistoric Shell Midden	Unevaluated
45KP105	90 feet	Yama and Nagaya Village	Listed
45KP114	0.21 miles	Prehistoric Midden and Historic Debris	Unevaluated
45KP124	0.30 miles	Port Blakely to Port Madison County Road	Potentially Eligible
45KP164	0.20 miles	Port of Blakely Cemetery/ Evergreen Fraternal Cemetery	Unevaluated
45DT8	0.45 miles	Fort Ward Historic District Expansion	Listed

3.1 45KP110

45KP110 as originally recorded in 1995 by Dennis E. Lewarch as the lumber mill and mill-town or Port Blakely. The site is described as 1,400 meters in length west to east and 210 meters in width north to south (Lewarch 1995). Features of 45KP110 at included two of the mill-town's buildings, multiple foundations of other structures, ornamental trees, ornamental shrubs, and historic archaeological deposits (Lewarch 1995). Lewarch recorded the sites age as being between 1863 and the 1920s (1995). Site 45KP110 was evaluated by Barbara Bundy (2017) and recommended eligible for listing on the NRHP.

Table 2. Cultural Resources Studies Conducted within the BHPS

Report No.	Date	Author	Title	Description
1689675	2017	Berger, Margaret	Cultural Resources Assessment of the Blakely Harbor Park Improvements, Bainbridge Island	Evaluation of Site 45KP110 and associated features
1353708	2009	Rinck, Brandy	Cultural Resources Survey of the Stern Property on Blakely Harbor, Bainbridge Island	Literature Review, Records Search, Pedestrian Survey
1351413	2008	White, William Anderson	Cultural Resources Assessment for the Blakely Harbor Park Improvements	Literature Review, Records Search, Pedestrian Survey
1342981	1995	Lewarch, Dennis E.	Cultural Resources Assessment and Construction Monitoring of the US West Cross Sound Fiber Optic Cable Project	Literature Review, Records Search, Pedestrian Survey

Table 3. Cultural Resources Studies Conducted within 1 Mile of the BHPS

Report No.	Date	Author	Title	Description
1342947	1998	Forsman, Leonard A.	Letter to Carol Back Regarding Jasmine Point	Literature Review, Records Search, Pedestrian Survey
1342961	1999	Forsman, Leonard A.	Puget Sound Environmental Learning Center City of Bainbridge Island Kitsap County Cultural Resource Assessment Phase I	Literature Review, Records Search, Pedestrian Survey
1342966	2000	Murphy, Laura R.	Puget Sound Environmental Learning Center City of Bainbridge Island, Kitsap County Cultural Resource Assessment Phases 2 and 3 Technical Report Addendum	Literature Review, Records Search, Pedestrian Survey
1346076	2005	Chambers, Jennifer	Cultural Resources Assessment for the Bulkhead Repair Project at 2080 Bean's Bight Road NE, Bainbridge Island	Literature Review, Records Search, Pedestrian Survey
1682911	2012	Montgomery, Marcia	Cultural Resources Assessment for the Fort Hill Road Phase 2 Project, Bainbridge Island	Literature Review, Records Search, Pedestrian Survey

4 ARCHAEOLOGICAL MONITORING METHODS

Archaeological monitoring was conducted for ground disturbing activities associated with the soil, groundwater, and sediment sampling investigation, including both upland and nearshore sampling. Monitoring occurred over the course of numerous visits from 2020 through 2023. Based on stipulations mandated by an archaeological monitoring permit issued by the DAHP (see Appendix A), all RI activities associated with the Project that occurred within the exterior boundaries of archaeological site 45KP110 were conducted under the observation of an archaeological monitor. Any sampling that extended beyond 50 meters of the archaeological site boundary was also monitored, to ensure that vagaries of the archaeological site boundary were captured. A map of the project area depicting all of the remedial testing is presented in **Figure 3**.

The archaeological monitor documented any archaeological features or cultural materials encountered, including historical-period features and archaeological materials associated with site 45KP110, as well as any precontact features or cultural materials. Any artifacts recovered from hand tests, augur tests, or drill tests were noted and returned to their original location prior to unit backfilling.

The following methods were proposed for archaeological monitoring and were followed in the field:

- Prior to project excavation, Geosyntec coordinated with the Jacobs team to ensure an archaeological monitor was available for the anticipated actions and schedule.
- Ground-disturbing work during the Project was monitored by a qualified archaeologist. Jacobs was provided at least 72 hours advance notice of the need for anticipated archaeological monitoring.
- Project ground-disturbing testing was conducted under the observation of the archaeological monitor. Soil, sediments, and fill with potential archaeological deposits or material was carefully excavated and made available to the archaeological monitor for inspection. Archaeological screening of sampled sediments through ¼-inch hardware cloth was available if deemed appropriate by the monitoring archaeologist.

The archaeological monitor documented any archaeological features or cultural materials encountered, including historical-period features and archaeological materials associated with site 45KP110, as well as any precontact features or cultural materials. Any artifacts recovered from hand tests, augur tests, or drill tests were noted and returned to their original location prior to unit backfilling.

The archaeological monitor recorded the monitoring work as follows:

a. Daily activities were recorded on standard monitoring forms and in a field notebook for each day of monitoring.

b. Photographs recorded a general overview of monitoring areas, detail photographs of locations were taken as appropriate, and work in progress was photographed when appropriate.

c. Various other recording methods were available to record daily activities, including written descriptions, sketches, mapping, and Global Positioning System (GPS) units and logs.

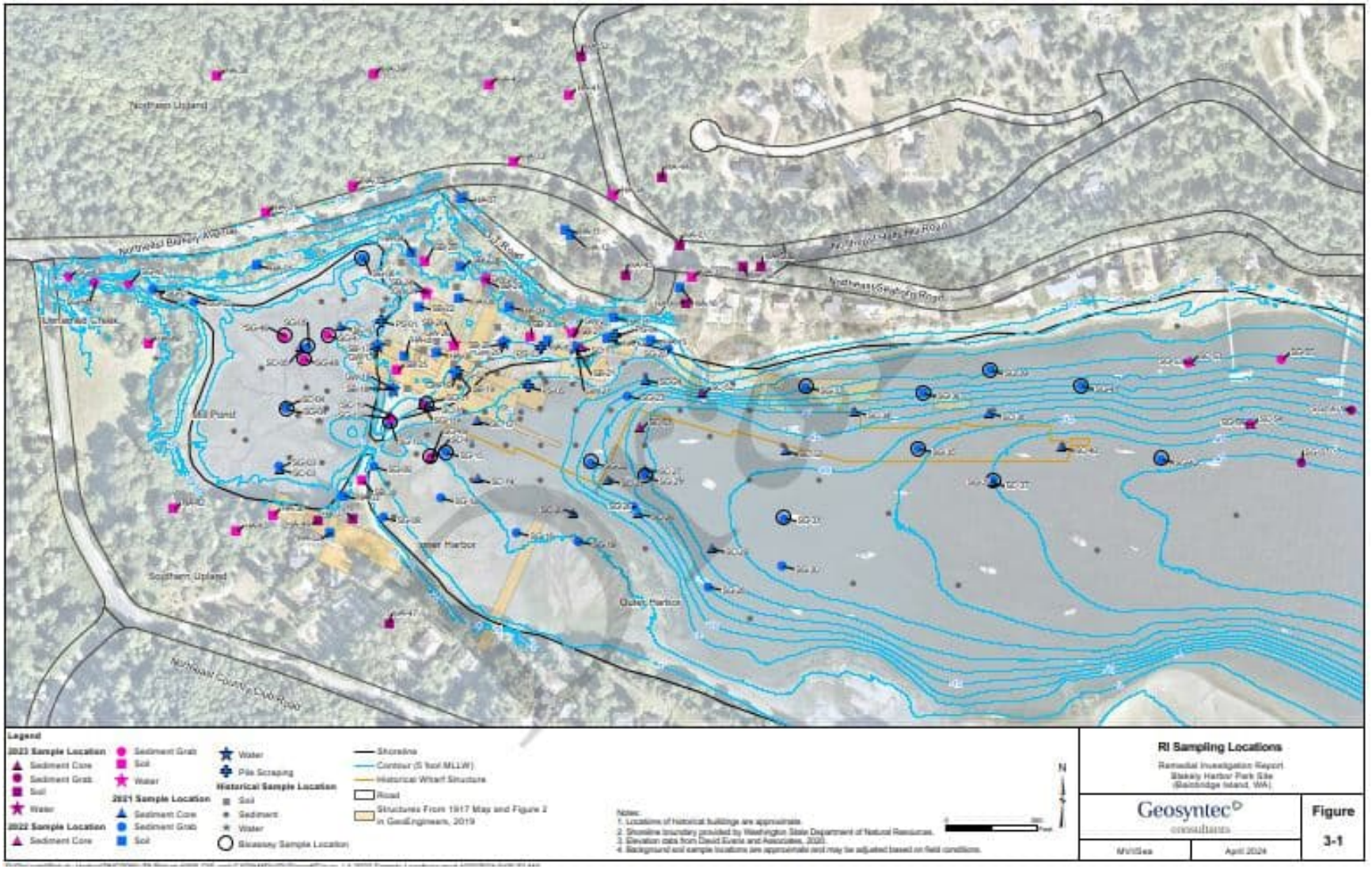

Figure 3. Geosyntec remedial investigation locations

5 RESULTS

Archaeological investigation and/or monitoring of the remediation investigation was completed over the course of numerous visits from 2020 through 2023. Data regarding the archaeological monitoring is included in **Table 4**.

Table 4. Dates of Archaeological Monitoring.

Date	Archaeologist	Task	No. of Test Areas	Results
09.10.2020	Sterner	Site evaluation	0	No work conducted.
08.19.2021	Elliott	Monitoring	3	Modern artifacts observed. Shell concentration noted in field but clearly disturbed context. No *in situ* artifacts or features encountered.
08.20.2021	Elliott	Monitoring	3	Modern artifacts observed. No *in situ* artifacts or features encountered.
08.23.2021	Sterner	Monitoring	6	No *in situ* artifacts or features encountered.
08.24.2021	Sterner	Monitoring	6	Modern waste only.
09.13.2021	Shropshire	Monitoring	2	Possible recent surface burn. No archaeological materials.
09.14.2021	Shropshire	Monitoring	2	No archaeological materials observed.
09.15.2021	Shropshire	Monitoring	2	No archaeological materials observed.
09.30.2022	Jones	Monitoring	2	Sawdust horizon potentially associated with Mill activities in SB 27 and SB 30. Inconclusive.
11.15.2023	Shropshire	Monitoring	-	No archaeological materials observed.
12.14.2023	Shropshire	Monitoring	6	Modern waste only.

Soils identified for the upland portions of the Site were generally defined as loams and sandy loams with varying degrees of gravels. Both modern and historical-period materials were observed at many of the testing locations, although were generally indistinguishable based on the lack of archaeological context. No features were identified in any of the upland testing.

Soils identified for the near-shore portions of the project exhibited predominantly tidal sands, occasionally punctuated with clay horizons. Artifacts were generally fewer in these tests and no features were identified.

Layers of sawdust were identified in two of the monitored units (SB27 and SB30), in the vicinity of the possible refuse burner and foundry of the Mill site. While these horizons may be intact and could represent direct activities associated with the Mill, additional archaeological testing would be required to develop a context for the deposits. No other intact or potentially intact features or soil horizons associated with Mill activities were observed during the monitoring effort.

6 CONCLUSIONS

Archaeological monitoring of RI performed in association with the BHPS RI conducted by Geosyntec for Ecology was an effort that extended from 2020 through 2023. The BHPS falls almost entirely with the Port Blakely Mill Company archaeological site, identified as 45KP110. Jacobs provided archaeological monitoring of the effort to identify potential site elements that might have been exposed during the effort as well as to ensure that integral elements of the archaeological site were not adversely impacted by project efforts or activities.

Over the course of four years, Jacobs provided archaeological monitoring support for the RI effort at BHPS. Monitoring was provided for terrestrial testing efforts only. In-water work was not monitored. Terrestrial investigation efforts were differentiated between upland and near-shore contexts. Much of the archaeological monitoring was associated with hand auger sampling locations, drilling locations, and archaeological monitors were on call had unanticipated discoveries or questions regarding archaeological artifacts or deposits arisen during other investigation performed at the site (e.g., sediment sampling).

Overall, the monitoring identified that much of the Site has been highly affected by public use of the area. While artifacts almost certainly associated with the operation of the Mill remain across the Site, a substantial amount of modern trash and debris has been introduced into the area. These materials seem to be generally intermixed throughout the upper zones (near surface) of the entire park area. Deeper contexts, especially across the upland portions of the Site, retain materials that may be associated with the Mill operation, but artifacts are highly fragmentary, non-diagnostic, and provide no information to augment our understanding of the Mill operation beyond the written record. Buried layers of sawdust observed in the middle portion of the Site (SB27 and SB30) may also be associated with the Mill operation but provide no substantive data to enhance our understanding of the resource. All artifacts and potential landforms identified during the monitoring effort were related to the period associated with Mill operation. No precontact materials were observed or identified during the monitoring effort.

In conclusion, there are clearly both above-ground and buried archaeological materials dating to the Mill period remaining at the BHPS location. Pending further archaeological evaluation to determine the integrity of subsurface deposits, the site should be treated as eligible for listing in the National Register of Historic Places per the 2021 evaluation and any impacts to the site should be avoided. Additional archaeological testing is recommended if significant ground-disturbing activities associated with future remediation efforts are undertaken.

7 REFERENCES

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APPENDIX A

ARCHAEOLOGICAL MONITORING PERMIT FOR 45KP110

ARCHAEOLOGICAL SITE ALTERATION, EXCAVATION, AND MONITORING PERMIT APPLICATION COVERSHEET

Please note: either the Applicant or the Co-applicant must be a professional archaeologist as defined in WAC 25-48-020 (4).	Date: March 31, 2021
Name of Applicant & Affiliation: Matthew Sterner, MA, RPA Jacobs Engineering	Name of Co-applicant & Affiliation:
Applicant's Address: 3022 Wilderness Ct SE Olympia, WA 98501	Co-applicant's Address:
Telephone and Email Address: 360.480.8822 Matthew.Sterner@Jacobs.com	Telephone and Email address:
Smithsonian numbers(s) for which permit is requested: 45KP110	Parcel Number(s)
Proposed Fieldwork Start Date:05.30.2021	Proposed Fieldwork End Date:05.30.2023
DAHP Project Log Number: 2019-03-01989	Proposed dates for analysis and reporting: Upon completion of the remediation effort.
Type of Alteration or Excavation Proposed (e.g. Survey, Testing, Data Recovery, Monitoring): Archaeological Monitoring of Geotechnical boring.	
Location of Collection for Analysis: Both underwater and upland location within boundaries of Blakely Harbor Park.	
Institution in which the applicant proposes to curate collections, records, photographs, and data: No collections will be performed.	
Agency which has jurisdiction over land in which site is located and name of agency contact (e.g. County, City, Port Authority, state, etc.): Bainbridge Island Metro Park and Recreation District	
Applicable state permits and/or environmental review regulations: ☐ Growth Management Act (GMA) ☒ Shoreline Management Act (SMA), ☐ Forest Practices Act (FPA) ☒ State Environmental Policy Act (SEPA) ☐ Governor's Executive Order 05-05 ☐ Other _____	
If you did not check the SEPA box above, is the project exempt from State Environmental Policy Act review per RCW 43.21C and WAC 197-11-800? ☐ Yes ☒ No	
Will human remains be removed? ☐ Yes ☒ No If Yes, DAHP Case #(s): _____	

Signed this 31 day of March, 2021.
Applicant Signature:

_____ _____

Signed this _____day of _____, 20___.
Co-Applicant's Signature:

_____

ARCHAEOLOGICAL MONITORING PERMIT APPLICATION

for

Archaeological Site 45-KP-110

Blakely Harbor Park Site Remedial Investigation/Feasibility Study

Bainbridge Island, Kitsap County, Washington

1 APRIL 2021

PURPOSE OF APPLICATION AND INTRODUCTION

The purpose of this application is to obtain a permit to conduct archaeological monitoring during construction of the Blakely Harbor Park Site Remedial Investigation/Feasibility Study (Project), which occurs in association with archaeological site 45KP110. The Project is located in Blakely Harbor, Bainbridge Island, Kitsap County, Washington (Legal Description: portions of Section 02 of Township 24 North and Range 02 East).

The proposed work occurs entirely on non-federal land and does not have a federal nexus for funding, permits or approvals, and is therefore not subject to the National Historic Preservation Act of 1966. Under Washington state law (RCW 27.53), activities that alter, dig into, or otherwise disturb an archaeological site require an archaeological excavation permit issued by the Department of Archaeology and Historic Preservation (DAHP).

The Project will conduct soil, groundwater, and sediment sampling and analysis across 45KP110, an historic mill site.

PERMIT APPLICATION INFORMATION

The following sections address the specific information required by WAC 25-48-060, *Summary of information required of an applicant*, for an archaeological monitoring permit.

a) An archaeological monitoring permit application cover sheet;

Attached as cover.

b) Sufficient background information and summary of previous field investigation and research about the site(s) proposed for monitoring, such that the reviewers have a comprehensive understanding of the site(s) to be able to review the proposal as a complete document;

Geosyntec Consultants (Geosyntec), at the direction of the Washington State Department of Ecology (Ecology), will be conducting a remedial investigation and feasibility study (RI/FS) on behalf of Port Blakely Tree Farms and preparing a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (Site), located on Bainbridge Island, Kitsap County, Washington. The Site sits atop a historic lumber mill and the historic town of Port Blakely. The lumber mill was in generally steady operation from 1869 through the mid-1920s and is recorded as an archaeological site by the State of Washington (45KP110). The upland and nearshore portions of the Site were acquired by the Bainbridge Island Metro Park & Recreation District (BI Parks) in 1999 and again in 2010, from corporate holdings representing the mill owners (Port Blakely Tree Farms). The Site currently encompasses an area of approximately 40 acres. Ecology conducted preliminary soil investigations in 2019 and determined the area exceeded acceptable levels of several hazardous chemical compounds. The current project will conduct soil, groundwater, and sediment sampling and analysis across the historic mill site.

Historical studies indicate contaminants of potential concern (COPCs) are present in sediments and soils at concentrations exceeding applicable Washington state screening levels. The Site boundary will be refined during the RI/FS. Port Blakely will evaluate and assess the nature and extent of COPC impacts at the Site, evaluate remedial alternatives and prepare a draft plan for cleanup. The long-term objective will be to remediate the Site consistent with the Model Toxics Control Act (MTCA) and the Washington State Sediment Management Standards (SMS).

Site History

Captain William Renton made his claim for modern day Blakely Harbor under the Homestead Act of 1862 and received his patent for the land in 1869 (GLO Records 2007). It was here that Renton constructed the first timber processing facility on Bainbridge Island. Throughout the 1860s, Renton bought additional neighboring properties to increase his access to timber and freshwater, resources vital to the operation of the mill (Price Jr. 1989). The mill was constructed on fir pilings, with pile-supported wharves to store green lumber and load ships. Over time, additional piles were placed to increase the dock area and the holding area for lumber. In its early years, the mill was producing 20,000 to 30,000 board foot per day using machinery imported from San Francisco and operated by a 20-man crew (Price Jr. 1989). The sawmill proved quite successful and eventually expanded to include the town of Port Blakely to accommodate the staff working the mill (Berner 1966; Price Jr. 1989). The mill continued to increase in capacity through the 1870s, producing up to 90,000 board feet per day (Berner 1966; Price Jr. 1989). In the mid-1870s, Renton formed a partnership and changed the name of the company briefly to Renton, Holmes and Company, although it was later

incorporated as Port Blakely Mill Company in 1876 (Price Jr. 1989). The original mill in Blakely Harbor lasted until 1888 when it was destroyed in a massive fire. It was rebuilt two years later and the second mill was considered the largest mill of its time. With the rebuild came additional outbuildings including a cookhouse, two hog houses, a masonic lodge, and a comprehensive fire suppression system linked to the stream fed ponds (Price Jr. 1989).

Immigrants formed a large part of the work force for the mill since its establishment, most of whom were of Scandinavian origin. By the 1870s and 1880s, Chinese and Japanese immigrants moved to the island and were employed at the mill. However, prejudice forced most of the Chinese workers out of the mill, though small groups remained in the area and continued working in the town. Populations associated with Blakely Harbor continued to boom into the 1880s and eventually led to ethnically-based suburbs established in the 1890s including two Japanese villages, Yama and Nagaya Village (45KP105), listed on the National Register of Historic Places (NRHP), and West Blakely, also known as New Sweden (Price Jr. 1989).

The peak of the mill production was in the late 1890s, with over 191 vessels servicing the mill and 120 million board feet being produced a year at the turn of the century. The mill changed ownership again in 1903, this time to David Edward Skinner and John W. Eddy. Unfortunately, the mill succumbed to fire again in 1907 and was rebuilt in 1909 as a much smaller operation with a concrete room to house the mill's steam engine and electricity generator (Price Jr. 1989). More difficulties befell the mill following the construction of the transcontinental railroad in 1893, as the introduction of rail opened vast new sources of timber throughout the west. Due in large part to the dramatic increase in resources, the number of sawmills processing 20 million board feet of lumber a year substantially increased between 1900 and 1905. By 1914, the mill in Blakely Harbor stopped production due to competition. Although the mill was briefly resurrected in 1916, it could not effectively compete and was finally fully dismantled by 1924 (Price Jr. 1989). The town that had built up around the mill slowly began to close, with buildings gradually being destroyed, between 1909 and 1925, and was fully dismantled and abandoned by 1930 (Price Jr. 1989).

The historic lumber mill and townsite was acknowledged as an archaeological resource by the State of Washington in 1995, first recorded by Mr. Dennis Lewarch and assigned the designation 45KP110 (Figure 1). At that time, however, the site's eligibility for listing in the NRHP was not determined. The site is currently listed in the DAHP's Washington Information System for Architectural and Archaeological Records Database (WISAARD) as "potentially eligible."

The site is described as 1,400 meters in length (west to east) and 210 meters in width (north to south) (Lewarch 1995). Features of 45KP110 included two of the mill-town's buildings, multiple foundations from other structures, ornamental trees, ornamental shrubs, and historic archaeological deposits. Lewarch (1995) recorded the site's period of

significance as falling between 1863 and the 1920s. A map of the site with the locations of the 1917 mill structures and historical features is presented in Figure 2. The site was subsequently evaluated by Barbara Bundy (2017) and recommended eligible for listing on the NRHP, although this determination has never been concurred with by the DAHP.

c) The nature and extent of the work proposed, including how and why it is proposed to be conducted and the methods proposed for monitoring, proposed time of performance, locational maps showing archaeological and project construction elements and monitoring areas;

The project will be divided into two main survey areas: in-water survey and upland survey.

In-Water Survey

The physical survey to identify issues associated with the underwater and near-shore locations at the site will consist of three components. First, a bathymetry survey was performed (October 2020) to map substrate elevations and water depths. These data help confirm boat access, determine core tube lengths, and develop remedial alternatives. Second, a sediment profile imaging (SPI) survey was also completed in October 2020. SPI is a tool that provides photographic evidence of sediment conditions in the upper 20 centimeter (cm) with minimal disturbance to bedded sediments. Finally, a shoreline inspection survey will be undertaken. A shoreline visual inspection will be performed at low tide to identify structures, physical features, outfalls, slopes, and substrate types. The objective of the shoreline survey is to provide general information on physical conditions and characteristics at or near the shoreline. The shoreline survey will characterize and inventory the type, distribution, and substrate along the shoreline and littoral areas. Elements associated with the in-water survey work are presented in Figure 3.

Upland Survey

The upland field investigation will include collection of surface and subsurface soil samples and utilize a phased approach to groundwater sampling in the near shore. Much akin to the approach for the shoreline and underwater survey, the upland portion of the project will consist of 3 sampling types. First, hand-auger soil sampling will be used to collect 16 discrete soil samples from the upper 2 feet of soil below the vegetative layer to delineate the extent of previously identified soil contamination at the site. Additional hand augering will also be conducted at 3 locations not previously investigated. Second, soil data will be collected using a dedicated drilling rig. The drill rig will be mobilized to collect subsurface soil data at 5 locations along the shoreline (at low tide) and 1 location further upland to estimate the vertical extent of soil contamination. The intention is to use a direct push method to collect samples, but if direct push methods are unsuccessful (because of woody debris or other obstructions), a hollow-stem auger drill rig or a backhoe excavator will be mobilized to complete the sample collection. All mechanical boring, despite the method, should not exceed 12 feet. Finally, a groundwater

investigation will evaluate groundwater conditions along the shoreline to assess the potential for contaminant migration to Blakely Harbor surface water and sediment. Groundwater sampling will be performed in a phased approach that allows the data from the initial phase to inform the scope of data collection in subsequent phases, if required. The groundwater sampling will consist of 2 phases. Initially, and following the upland drilling of the mechanical boring trucks, temporary well points will be installed during low tide. Groundwater samples will be collected at each temporary well location using low flow sampling methods. If additional groundwater testing is required, up to 4 shallow groundwater wells will be installed along the shoreline. Elements associated with the upland survey work are presented in Figure 4.

Archaeological Monitoring

Archaeological monitoring will be conducted for ground disturbing activities associated with the proposed soil contaminant sampling investigation, including upland and nearshore sampling.

The archaeological monitor will document any archaeological features or cultural materials encountered, including historical-period features and archaeological materials associated with site 45KP110, as well as any precontact features and cultural materials. The archaeologist will record the monitoring work as follows:

• Daily activities will be recorded on standard monitoring forms and in a field notebook for each day of monitoring.

• Photographs will record general overview of monitoring areas, detail photographs of particular locations as appropriate, and work in progress.

• Various other recording methods may also be used to record daily activities, including written descriptions, sketches, mapping, and GPS units and field logs.

Following the conclusion of the remediation sampling effort, results of the archaeological monitoring will be documented and included in the RI/FS report. Based on the results of the archaeological monitoring, the team will coordinate with Ecology and DAHP to determine the monitoring requirements for the remedial action.

d) A protocol for immediate steps to be taken on-site by the archaeological monitor should they find archaeological resources or human skeletal remains and stating the authority of the archaeologists to halt excavations or other activities that may endanger archaeological resources or human skeletal remains. The protocol must state that if archaeological resources are identified during archaeological monitoring, measures to avoid, minimize, and mitigate impacts, collect and curate artifacts and records must be addressed through a permit amendment after additional consultation with the DAHP and interested/affected tribes;

If potential or evident archaeological/cultural resources are discovered, Geosyntec will cease all work within 15 meters (approximately 50 feet) of the find until the find is assessed by the Project Archaeologist. The Project Archaeologist will determine if the resource is modern, associated with 45KP110, or represents a new, intact archaeological deposit.

In the event that archaeological materials of precontact (or other significant) origin are identified during the monitoring effort that are not related to the Blakely Harbor Mill site (45KP110), the Project Archaeologist will halt work at the location of the discovery and Geosyntec and the Project Archaeologist will immediately contact DAHP to inform them of the discovery. If, in consultation with DAHP, it is determined that a discovery of archaeological significance is made that does not relate to the Blakely Harbor Mill and Town site (45KP110), an amendment to the present monitoring permit must be completed and submitted to DAHP for review. The amendment must address measures to avoid, minimize, and mitigate impacts to the newly identified resource.

The Project Archaeologist will ensure proper documentation and assessment of any newly identified cultural resources. All archaeological materials discovered during the monitoring will be recorded by the Project Archaeologist using standard techniques and in a format compatible with DAHP standards, as identified above.

Where cultural resources associated with known elements of 45KP110 are encountered during sampling or staging, but additional project effects to the resources are not anticipated, project sampling may be allowed to continue while assessment and documentation of the cultural resources proceed as determined and directed by the Project Archaeologist.

If continued sampling or staging is likely to cause additional impacts to the identified resources, project activities within 15 meters (approximately) of the discovery site will cease until the Project Archaeologist has documented the discovery, evaluated its significance, and assessed potential effects. The Project Archaeologist, in consultation with DAHP if necessary, will decide when activities may resume at the sampling location. Any archaeological artifacts, complete or fragmentary, that are identified as a result of the geotechnical sampling will remain on site. Any archaeological artifacts unearthed as a result of the geotechnical sampling will be analyzed and recorded on site and reburied, either in the sample hole or immediately adjacent to the sample location.

If ground-disturbing activities encounter human skeletal remains during the course of the project, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The finding of human skeletal remains will be reported by the Project Archaeologist or the Geosyntec on-site staff/responsible person (if the Project Archaeologist or their representative is not on site) to the county medical

examiner/coroner and/or local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed.

The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic. If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to the DAHP who will then take jurisdiction over the remains. DAHP will notify any appropriate cemeteries and all affected Native American Tribes (Tribes) of the find.

The State Physical Anthropologist at DAHP will make a determination of whether the remains are Indian or non-Indian and report that finding to any appropriate cemeteries and the affected Tribes. DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

e) The name and address of the professional archaeologist(s) who will conduct the monitoring work;

All monitoring will be performed or supervised by Ms. Stacy Bumback or Mr. Matthew Sterner. Addresses and contact information are presented below.

Project Archaeologists:

Name: Stacy Bumback
Address: 2454 Occidental Ave S
Suite 3D
Seattle, WA 98134
Phone Number: 206-910-9845
Email: Stacy.Bumback@jacobs.com

Name: Matthew Sterner, MA
Address: 3022 Wilderness Ct SE
Olympia, WA, 98501
Phone Number: 360-480-8822
Email: Matthew.Sterner@jacobs.com

f) The name and address of the individual(s) proposed to be responsible for carrying out the terms and conditions of the permit, if different from the individual(s) enumerated under e) of this subsection; and

Name: Matthew Sterner, MA
Address: 3022 Wilderness Ct SE
Olympia, WA, 98501
Phone Number: 360-480-8822
Email: Matthew.Sterner@jacobs.com

g) A completed site inventory form.

WASHINGTON ARCHAEOLOGICAL SITE INVENTORY FORM

County: Kitsap
Site Number: 45KP110
Date: March 27, 1995 **Compiler:** Dennis E. Lewarch
Location Information Restrictions: Yes__No___Unknown___

SITE DESIGNATION

Site Name: Port Blakely, Washington
Field or other Designation: **Computer Number:**

SITE LOCATION

UTM: Zone: 10	**Easting:**	**Northing:**
	A 536,140	5,271,510
	B 536,140	5,271,300
	C 537,500	5,271,510
	D 537,500	5,271,300

Legal Description: **T** 24N **R** 2E **Section** 2 S1/2
Latitude: **Longitude:** **Elevation (ft/m):** 0-80 feet/0-25 meters
USGS Map: Quad Name: Bremerton East, Washington
Series: 7.5' Quadrangle **Date:** 1981
Drainage: Major: Not applicable **Minor:** Not applicable **River Mile:** Not Applicable
Aspect: Varies **Slope:** Varies
Location Description (General to Specific): The site is on the east side of Bainbridge Island, south of the City of Bainbridge Island, along the north shore and west end of Blakely Harbor. The site includes the old mill pond at the west end of the harbor, the northern portion of the harbor, the beach, and the bluff top above the beach.
Approach (To Relocate): From the City of Bainbridge Island take the Port Blakely Road south to Port Blakely. The site is on the north shore of Blakely Harbor.

WASHINGTON ARCHAEOLOGICAL SITE INVENTORY FORM

Page 2 **Site Number:** 45KP110

SITE DESCRIPTION

Narrative Description: The site is the former lumber mill and milltown of Port Blakely, situated along the north shore of Blakely Harbor. All but two of the town's buildings burned or were torn down and all that remains are foundations, ornamental trees and shrubs, and historic archaeological deposits.
Site Type: Historic lumber milltown
Dimensions: Method of Horizontal Measurement: USGS map
Length: At least 1400 meters **Direction:** West-east **Width:** At least 210 meters **Direction:** North-south
Depth: Varies **Method of Vertical Measurement:**
Vegetation: On-Site: Varies; ornamental plants occur throughout the area
Local: *Tsuga heterophylla* Zone **Regional:** *Tsuga heterophylla* Zone
Landform:On-Site: Marine terrace and beach **Local:** Marine terrace
Water Resource:Type: Stream **Distance:** 20 meters
Permanence: Intermittent

CULTURAL MATERIALS AND FEATURES

Narrative Description: Old house foundations, ornamental plants, abandoned road beds, and pilings from old wharves occur throughout the former location of the historic milltown of Port Blakely. Historic artifacts are scattered across the beach on the north side of Blakely Harbor. Western Heritage archaeologists identified historic refuse concentrations throughout the former town site area.
Components: Historic
Dates: 1863 to 1920s

WASHINGTON ARCHAEOLOGICAL SITE INVENTORY FORM
Page 3 **Site Number:** 45KP110

SITE RECORDERS

Observed By: Dennis E. Lewarch
Address: Larson Anthropological/Archaeological Services
P.O. Box 70106
Seattle, WA 98107
Recorded By: Dennis E. Lewarch
Affiliation: Larson Anthropological/Archaeological Services
Date Recorded:
Revisited By: **Affiliation:**
Date Revisited:

SITE HISTORY

The history of Port Blakely is reviewed in the following publications:

Carlsson, L. E.
1992 *Port Blakely Mills and Milltown: Historic Buildings/ Cultural Resources Survey for Port Blakely Mill Company.* L. E. "Lars"Carlsson, Olympia, Washington for the Port Blakely Mill Company, Seattle, Washington.

Daugherty, Richard D.
1993 *A Cultural Resource Survey of the Proposed Port Blakely Development Part II Testing and Evaluation.* Western Heritage, Lacey, Washington for the Port Blakely Mill Company, Seattle.

Price, Andrew, Jr.
1989 *Port Blakely: The Community Captain Renton Built.* Port Blakely Books, Seattle.

Welch, Jeanne M. and Richard D. Daugherty
1991 *A Cultural Resource Survey of the Proposed Port Blakely Mill Company Development.* Western Heritage, Inc., Olympia, Washington for the Port Blakely Mill Company, Seattle, Washington.

WASHINGTON ARCHAEOLOGICAL SITE INVENTORY FORM
Page 4 **Site Number:** 45KP110

SITE OWNERSHIP

Owner: Port Blakely Mill Company
Address: 500 Union Street, Suite 830
Seattle, Washington 98101

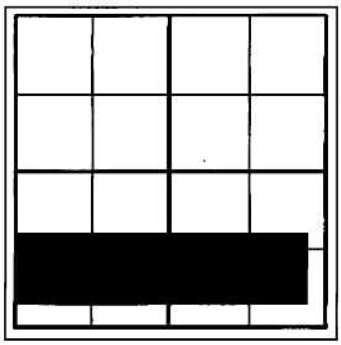
Tenant:

FORM RECORDS

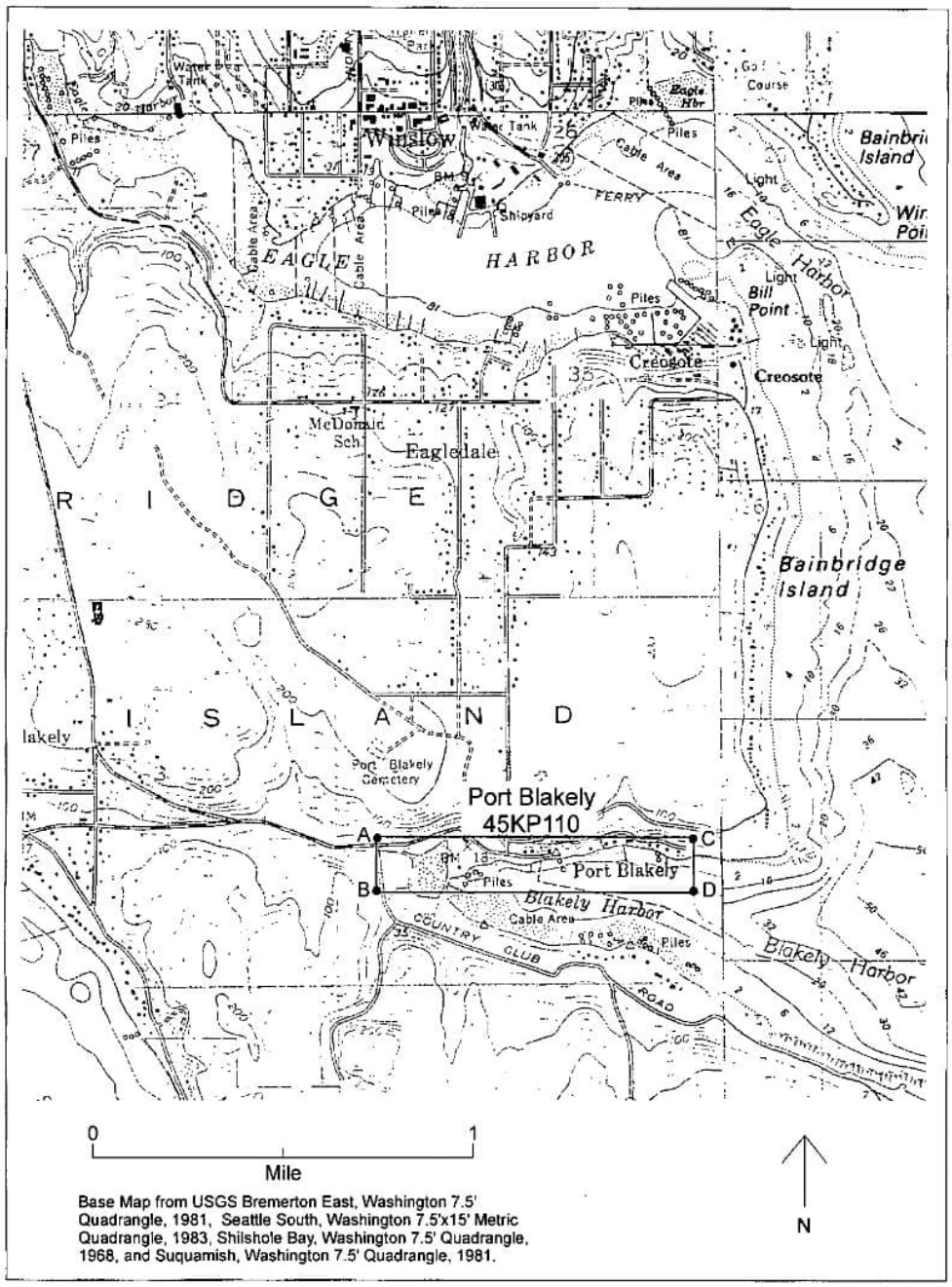
Other Forms:

USGS MAP

Quad Name: Bremerton East, Washington
Series: 7.5'
Date: 1981
Section 2



SKETCH MAP



Location of Port Blakely (45KP110)

Figure 1. Location Map of 45KP110 and Additional Archaeological Resources in the Vicinity.

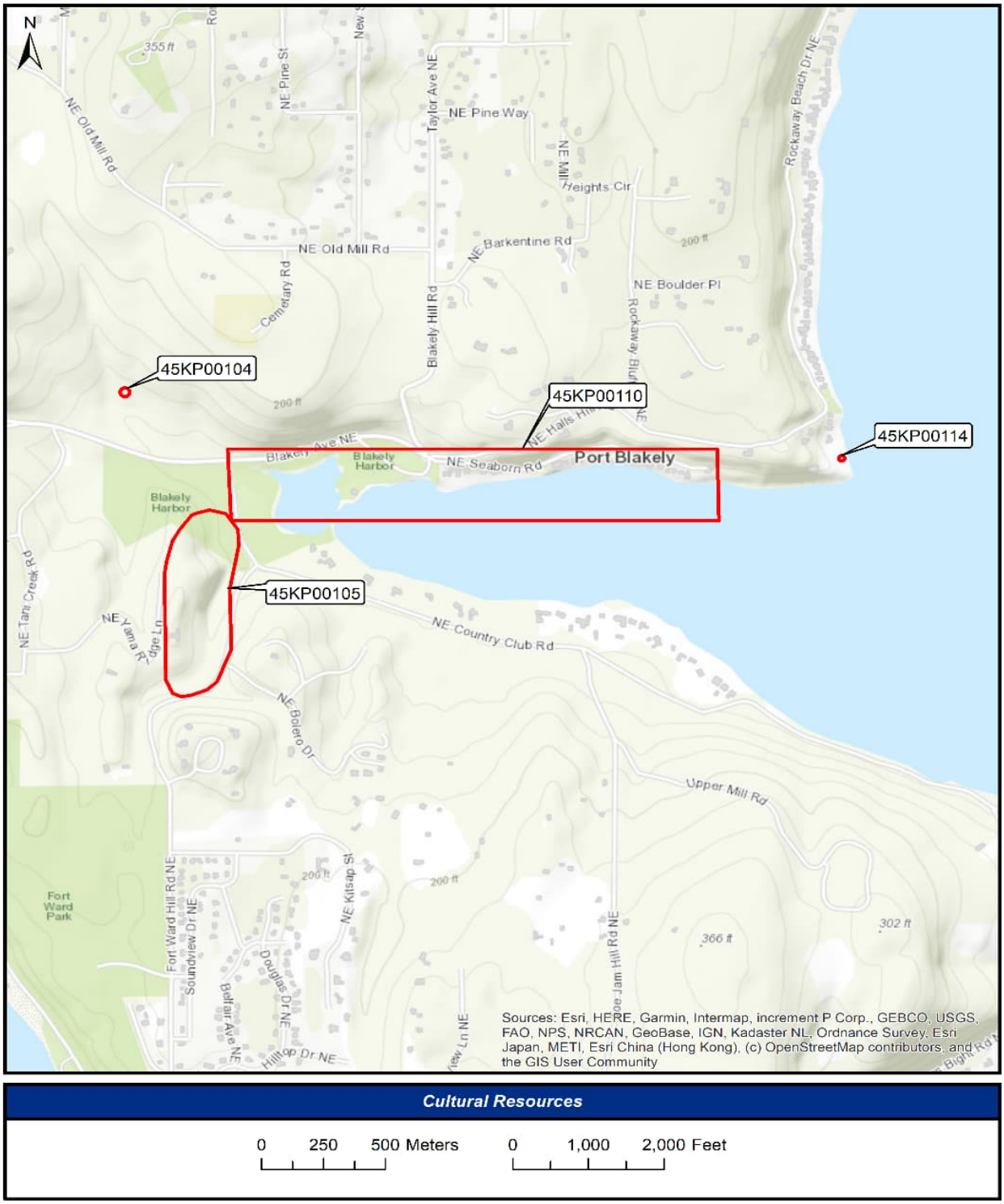


Figure 2. Blakely Harbor Park Project Site Showing 1917 Mill Structures and Historical Features.

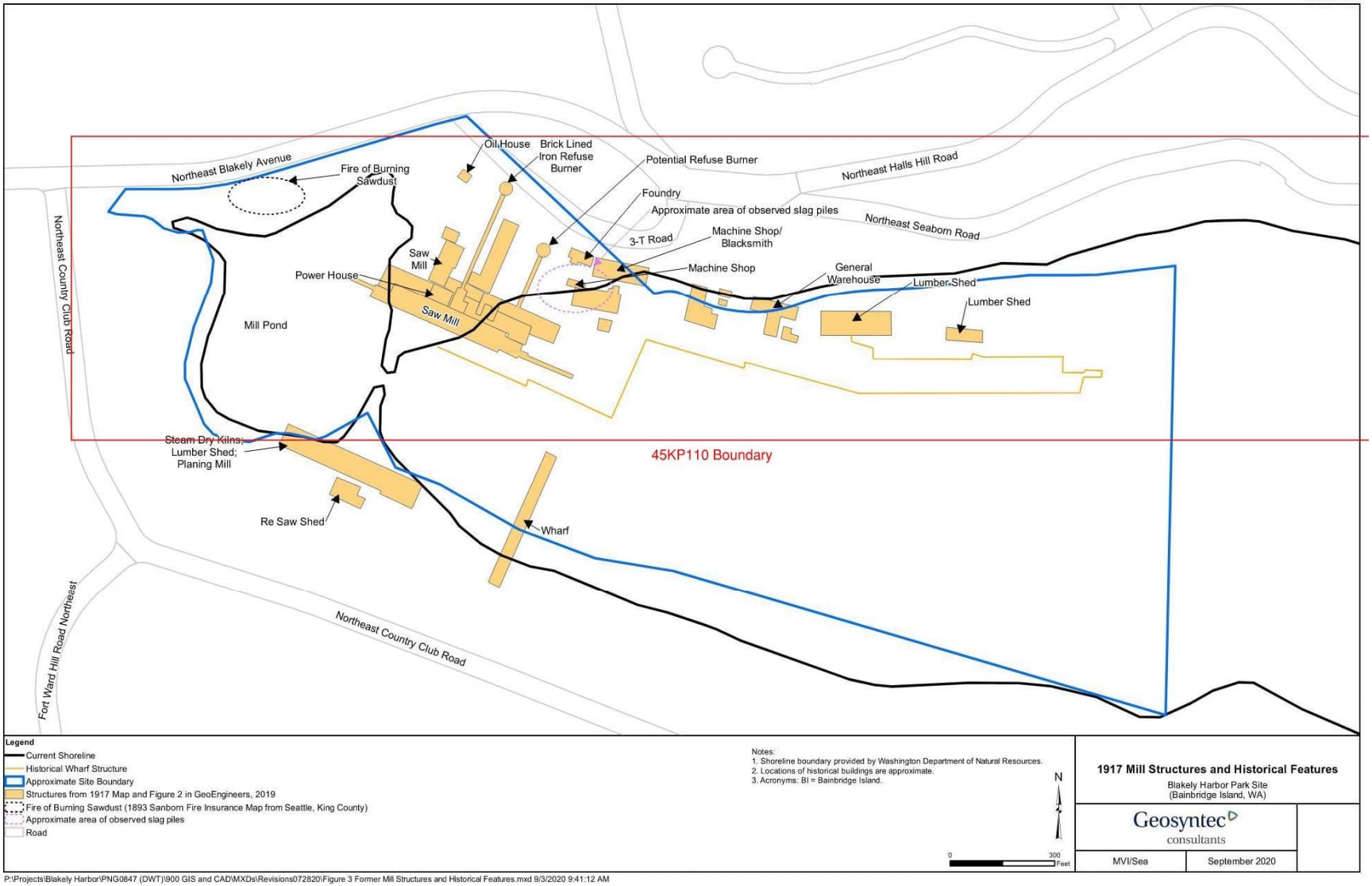


Figure 3. Blakely Harbor Park Project Site Showing Proposed In-water Sediment Sampling Locations.

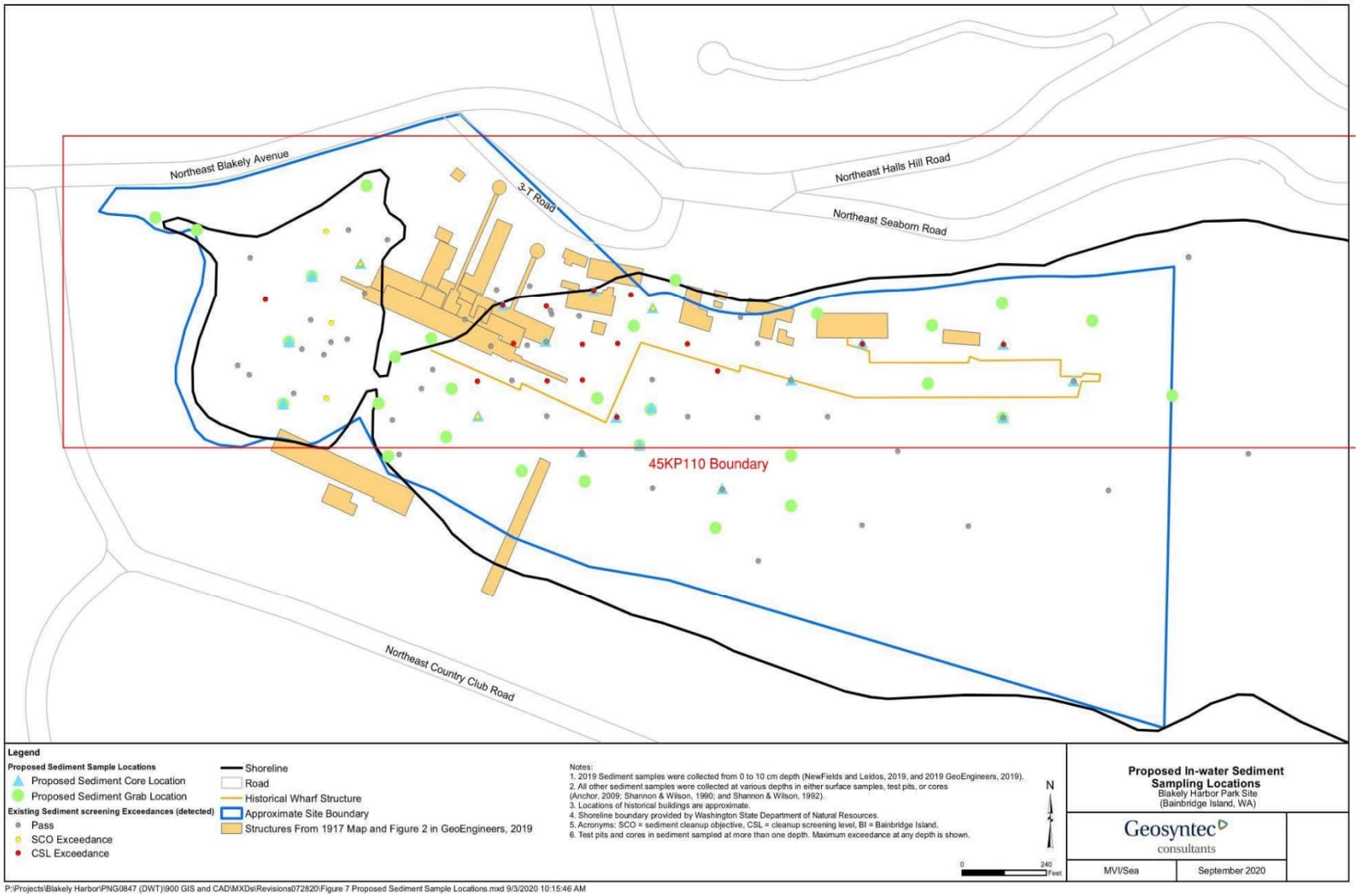
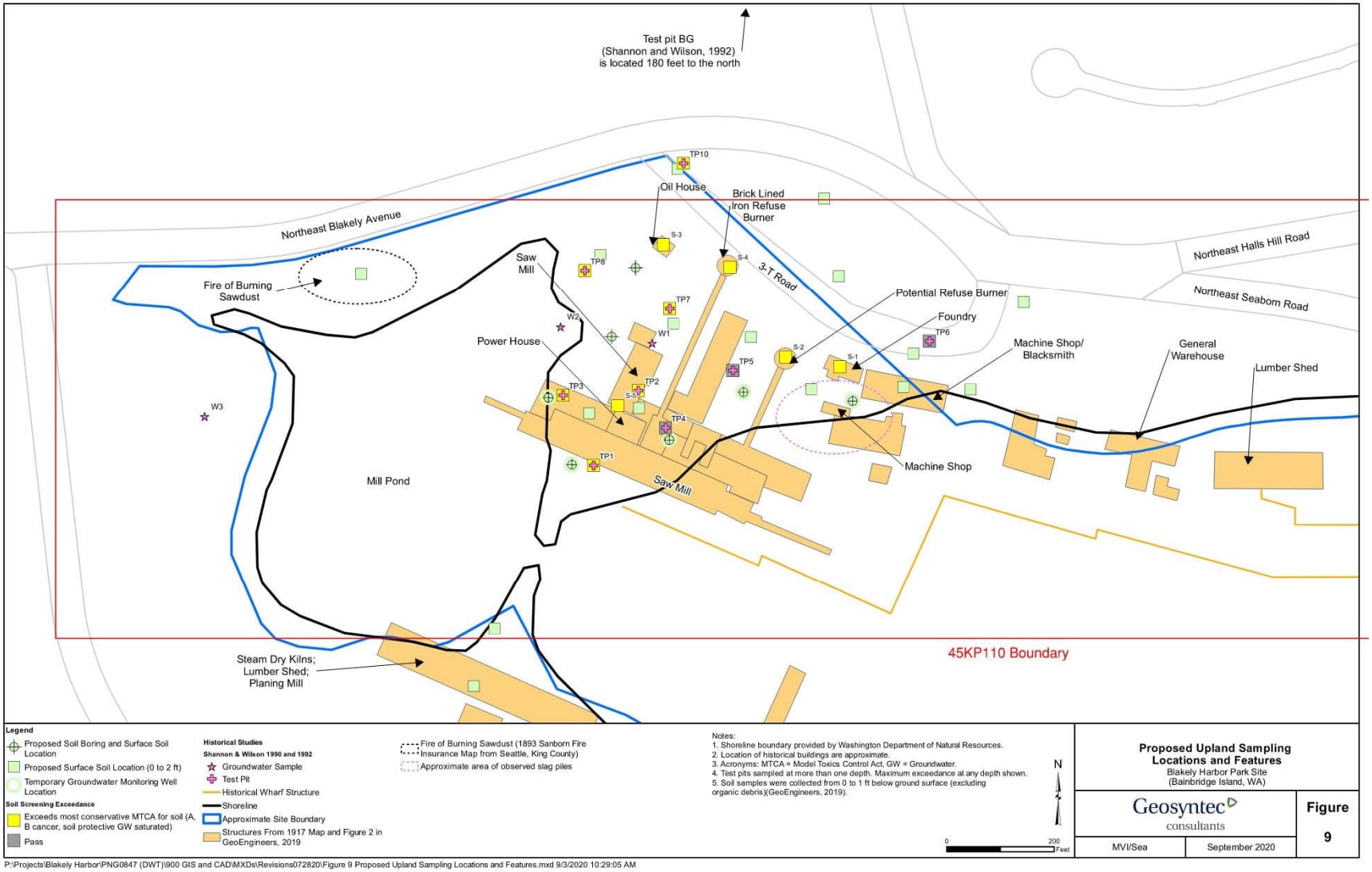


Figure 4. Blakely Harbor Park Project Site Showing Proposed Upland Sampling Locations.



REFERENCES

Berner, Richard C.

1966 The Port Blakely Mill Company, 1876-89. *Pacific Northwest Quarterly* 57(4):158-171.

Bundy, Barbara

2017 Blakely Harbor Park Pedestrian Improvement Project, Port Blakely Jetties National Register of Historic Places Evaluation. Technical Memorandum to Bainbridge Island Metro Parks and Recreation District. Anchor, QEA, Seattle, Washington.

Lewarch, Dennis E.

1995 Washington Archaeological Site Inventory Form for site 45KP110, Kitsap County. On File with the Washington Department of Archaeology and Historic Preservation.

Price, Jr., Andrew

1989 Port Blakely: The Community Captain Renton Built. Port Blakely Books, Seattle, Washington.

APPENDIX B

ARCHAEOLOGICAL MONITORING DAILY FIELD SUMMARY FORMS

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 09.10.2020

Monitor Name: M. Sterner

Start Time: 9 am **End Time:** 2 pm .

Crew: None

Work Areas: None
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): n/a
Artifacts Observed (Yes/No): n/a
Features Observed (Yes/No): n/a
Notes: No monitoring was scheduled. Site visit was for purposes of understanding the extent and integrity of the archaeological site prior to the commencement of fieldwork. Site exhibits remains of intact structures and likely presence of surface artifacts dating to the operation of the mill.

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 08.19.2021

Monitor Name: Patrick Elliott

Start Time:____/_____ **End Time:**_____/_____.

Crew:

Work Areas: Test designated HA-01
Sediments Observed: Dark brown-gray gravelly loam, subangular to subrounded
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Yes
Features Observed (Yes/No): No
Notes: Scattered shell fragments (fill) and one pieces of aqua glass, most likely a piece of an insulator

Work Areas: Test designated HA-06
Sediments Observed: Very dark brown loam
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Yes
Features Observed (Yes/No): No
Notes: Brick fragments, glass fragments, wooden pieces, and a single piece of wire

Work Areas: Test designated HA-05
Sediments Observed: Dark brown sandy loam
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): yes
Features Observed (Yes/No): No
Notes: Scattered brick fragments and slag, brick fragments increase near the bottom of the unit.

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 08.20.2021

Monitor Name: Patrick Elliott

Start Time:____/_____ **End Time:**_____/_____.

Crew:

Work Areas: Test designated HA-03
Sediments Observed: Brown fine-medium sand, traces of sub-rounded gravels
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Yes
Features Observed (Yes/No): No
Notes: Brick and wood fragments with potential basalt core, located 12-18 inches below surface

Work Areas: Test designated HA-02
Sediments Observed: Very dark brown loam, occasional gravels
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Flat glass fragment and other miscellaneous glass fragments, concrete fragments/

Work Areas: Test designated HA-04
Sediments Observed: Very dark brown-gray loam, small to medium subangular to subrounded gravels
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Large brick fragment with smaller brick fragments, melted glass fragments, nail fragments, wooden pieces (Lumber).

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 08.23.2021

Monitor Name: M. Sterner

Start Time: 5 am **End Time:** 7 pm .

Crew: Self

Work Areas: Test designated HA-16
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in two levels: 0-12″ and 12-24″. No archaeological materials or soils. Hole begun at ~7:15, finished at 8:45.

Work Areas: Test designated HA-12
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated upland area, approx. 20 m west of parking area. Excavated in in two levels: 0-12″ and 12-24″. No archaeological materials or soils. Hole begun at 9:00, finished at 10:20.

Work Areas: Test designated HA-11
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated upland area, approx. 10-15 m north of parking area. Hole excavated in two levels: 0-12″ and 12-24″. One very small fragment of WBE identified between 0-6 inches bs (fragment of plate with partial foot ring-no fragment of mm). Encountered some sort of caliche horizon at approx.. 12″ bs. Hole was offset approx. 5 m to the east and 12-24″ sample was recovered from that location. Hole begun at 10:55, finished at 12:45.

Work Areas: Test designated HA-15
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in beach location, near eastern edge of park/private property. Hole excavated in two levels: 0-12" and 12-24". First 12" seems to encounter some wood waste, with one small glass frag. Second foot is "mostly wood waste" of recent deposit (some still exhibits bark). Water at base of hole. Hole begun at 1:45, finished at 2:30.

Work Areas: Test designated HA-13
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in beach location, near eastern edge of park/private property (west of HA-15 and close to shoreline). Hole excavated in two levels: 0-12" and 12-24". Near-surface wood waste (0-4 inches bs). Hole begun at 2:45, finished at 3:30.

Work Areas: Test designated HA-14
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in beach location, just above the tidal zone/beach (approx. 10-15 m east of HA-13). Hole excavated in two levels: 0-12" and 12-24". Heavy clay in upper section, changing to clays as depth increases. Hole begun at 4:00, finished at 5:15.

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 08.24.2021

Monitor Name: M. Sterner

Start Time: 5 am **End Time:** 7 pm .

Crew: Self

Work Areas: Test designated HA-10
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): yes
Features Observed (Yes/No): No
Notes: Beach Location, approx. 80m east of powerhouse. Small fragment of WBE in upper foot. Few small glass fragments (nothing diagnostic) in second foot. Very sandy matrix. Hole excavated in two levels: 0-12" and 12-24". Hole begun at 8:10, finished at 9:15.

Work Areas: Test designated HA-9
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): yes
Features Observed (Yes/No): No
Notes: Hole excavated on first terrace above the beach, approx. 10m east of access path with trailhead marker and trash can. Excavated in in two levels: 0-12" and 12-24". Metal spike (19cm x 1 cm diameter) recovered from uppermost 6 inches. Hole begun at 9:50, finished at 11:00.

Work Areas: Test designated HA-8
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): yes
Features Observed (Yes/No): No
Notes: Hole excavated across the street from one of the main entrances to the park (entrance near pit toilet), underneath a plum tree. Hole excavated in two levels: 0-12" and 12-24". Started poorly as rubble construction debris encountered immediately. Location adjacent to two roads and culvert location. Some brick and mortar fragments in first level. Also a small caliber pistol cartridge (.25 or 32 caliber?) Team attempted three offsets but was unable to excavate 12-24" level. Hole begun at 12:35, finished at 1:30.

Work Areas: Test designated HA-7
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in beach location, near eastern edge of park/private property. Hole excavated in two levels: 0-12" and 12-24". First 12" seems to encounter some wood waste, with one small glass frag. Second foot is "mostly wood waste" of recent deposit (some still exhibits bark). Water at base of hole. Hole begun at 1:45, finished at 2:30.

Work Areas: Test designated HA-13
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in beach location, near eastern edge of park/private property (west of HA-15 and close to shoreline). Hole excavated in two levels: 0-12" and 12-24". Near-surface wood waste (0-4 inches bs). Hole begun at 2:45, finished at 3:30.

Work Areas: Test designated HA-14
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated in beach location, just above the tidal zone/beach (approx. 10-15 m east of HA-13). Hole excavated in two levels: 0-12" and 12-24". Heavy clay in upper section, changing to clays as depth increases. Hole begun at 4:00, finished at 5:15.

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 09.13.2021

Monitor Name: Michael Sean Shropshire

Start Time: 7 am **End Time:** 3:30 pm .

Crew: Geo Techs: Rose and Lucas, Drill operator: Tim

Work Areas: Blakley Harbor, shafts BH-SB-21 and BH-SB-20
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Brick fragments were observed throughout the BH-SB-21 core. Unidentified wood fragments were observed possibly from pilings.

Work Areas: Test designated BH-SB-21
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Brick fragments throughout core.
Features Observed (Yes/No): No
Notes: Hole excavated to 12'. No archaeological materials or soils. Hole begun at ~10:54, finished at ~13:00.

Work Areas: Test designated BH-SB-20
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated to 12'. No archaeological materials or soils. Hole begun at 15:17, finished at 16:00. Possible burn area observed on surface from 25m east to 25m west of BH-SB-20, fine shell observed at 12' with some larger pieces, shell is clean and within the intertidal zone, shell is crushed to small bits as if subjected to tidal action, due to shell size and location this is unlikely to be midden material.

- 0700 Met in parking lot
- 830 meeting, tour of survey area
- 0915 drill mobilized

- 1018 drill in position for first core, BH-SB-21
- 1054 first core, 0-5' brick fragment, 5-10' pieces of wood, 10-15' brick fragment
- 1517 start drill BH-SB-20, burn area observed on surface from 25m east to 25m west of BH-SB-20, fine shell observed at 12' with some larger pieces, shell is clean and within the intertidal zone, shell is crushed to small bits as if subjected to tidal action, due to shell size and location this is unlikely to be midden material
- 1600 done drilling for the day

Photograph Log

Photo No.	Description - Location	Direction	Cultural Materials Y/N
3015	Drilling first core	W	No
3017	Overview of work area	E	No
3018	Overview of work area	E	No
3019	Shell at 12', fine fragments	-	No

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 09.14.2021

Monitor Name: Michael Sean Shropshire

Start Time: 7 am **End Time:** 3:30 pm .

Crew: Geo Techs: Rose and Lucas, Drill operator: Tim

Work Areas: Test designated BH-SB-19
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated to 12'. No archaeological materials or soils. Hole begun at ~09:00, finished at ~11:00.

Work Areas: Test designated BH-SB-18
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Brick fragments throughout core.
Features Observed (Yes/No): No
Notes: Hole excavated to 12'. No archaeological materials or soils. Hole begun at ~12:15, finished at ~15:00.
Notes:

- 0730 Tailgate meeting
- 0900 Start drilling core BH-SB-19
- 1130 drill moved to new location
- 1215 begin drilling second core, BH-SB-18
- 1530 done drilling for the day

Photograph Log

Photo No.	Description - Location	Direction	Cultural Materials Y/N
3022	Core from BH-SB-19	-	No
3023	Core from BH-SB-18 showing possible charcoal or creosote layer	-	No

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 09.15.2021

Monitor Name: Michael Sean Shropshire

Start Time: 7 am **End Time:** 3:30 pm .

Crew: Geo Techs: Rose and Lucas, Drill operator: Tim

Work Areas: Test designated BH-SB-22
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole excavated to 12'. No archaeological materials or soils. Hole begun at ~08:15, finished at ~09:00.

Work Areas: Test designated BH-SB-22
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Brick fragments throughout core.
Features Observed (Yes/No): No
Notes: Hole excavated to 12'. No archaeological materials or soils. Hole begun at ~09:21, finished at ~11:00.

- 0700 met up and moved gear to drilling area
- 0800 safety meeting
- 0815 start drilling BH-SB-22
- 0921 start drilling BH-SB-17
- 1200 lunch
- 1400 done digging for the day
- Bricks with "Clayburn" lettering on them around the holes.

Photograph Log

Photo No.	Description - Location	Direction	Cultural Materials Y/N
3026	Clayburn bricks found near core location	-	No
3027	Overview of work area	-	No
3028	Overview of work area	-	No

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 09.30.2022

Monitor Name: Jessica Jones

Start Time: 7:30 am **End Time:** 5 pm .

Crew: Joey Traywick and Cindy Bartlett from Geosyntec
Anthony Kiss from Cascade on a Genuine Geoprobe 7822 DT direct push using 3 3/4 inch plastic sleeves.

Work Areas: Test designated BH SB 27
Sediments Observed: Mixed sediments with rounded gravels
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): Yes
Features Observed (Yes/No): No
Notes: Burned fine materials at around 1 foot, ending with what looks like desecrated kiln brick (tan). Mixed soils for 1 foot, gravel rounded, then layer of wood mulch from floating logs, followed by two distinct layers of sawdust from the mill. More mixed soils/sawdust, then possibly a cedar wood chunk, possibly for surface stabilization. Under wood plank, directly into native soils (saturated wet clay with 80% rounded pebbles and coarse sand).

Work Areas: Test designated BH SB 30
Sediments Topsoil, followed by fine dark ashy layer
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Unit located on the northeastern side of the harbor, 200 feet from SB27, in slightly raised landform just up from the beach area where pilings and structure debris is visible. 7 inches of topsoil followed by a fine black ashy deposit, similar to the previous unit (27) yet more fine. Immediately below is fragmented red building brick, below which is a small layer of gravel, then layers of sawdust. Base of which is more wood and gravel. Directly below which is native gravels. Native gravels continue 10-15 ft, with shell layer just starting to appear at the bottom of the 15-foot marker.

Jacobs Engineering

Archaeological Monitoring: Daily Field Summary Form

Date: 12.14.2023

Monitor Name: Michael Sean Shropshire

Start Time: 7:30 am **End Time:** 5 pm .

Crew:

Work Areas: Test designated BH-HA-45, hole 1
Sediments Observed: Dark brown to brown-red loam with occasional cobbles
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes:

Work Areas: Test designated BH-HA-45, hole 2
Sediments Observed: very dark brown silty sand, large pebbles and gravels.
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Small, scattered brick fragments

Work Areas: Test designated BH-HA-45, hole 3
Sediments Observed: n/a
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Hole on steep slope, hole aborted due to a thick root and slope.

Work Areas: Test designated BH-HA-45, hole 4
Sediments Observed: Very dark brown to gray-brown sand with 30% gravels and pebbles
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes:

Work Areas: Test designated BH-HA-45, hole 5
Sediments Observed: Very dark brown sandy silt with pebbles and cobbles.
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes: Two flat colorless glass fragments.

Work Areas: Test designated BH-HA-45, hole 6
Sediments Observed: Very dark brown clay loam
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): No
Features Observed (Yes/No): No
Notes:

Work Areas: Test designated BH-HA-45, hole 7
Sediments Observed: Very dark silty loam
Evidence of Disturbance (Yes/No): No
Artifacts Observed (Yes/No): yes
Features Observed (Yes/No): No
Notes: Half brick fragment, clear glass fragment, and piece of grout near the surface.

APPENDIX B
Bathymetry and Lidar Survey Report

Geosyntec consultants

engineers | scientists | innovators

APPENDIX B
BATHYMETRIC AND LIDAR SURVEY REPORT

DRAFT REMEDIAL INVESTIGATION REPORT

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
DCAP	draft cleanup action plan
DEA	David Evans and Associates, Inc.
Ecology	Washington State Department of Ecology
FS	Feasibility Study
Lidar	Light Detection and Ranging
Port Blakely	Port Blakely Tree Farms
RI	Remedial Investigation
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix summarizes the bathymetric and Lidar surveys conducted at Blakely Harbor during Phase 1 of the RI. A detailed description of the results of the investigation is reported in the attached Survey Report (Attachment B-1). Except where noted, field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, the Sampling and Analysis Plan, and the Quality Assurance Project Plan (Geosyntec, 2022). The only deviation from the RI/FS Work Plan was the use of a different vessel than expected; this is summarized in Section 4.4 of the RI Report.

2. SUMMARY OF FIELD INVESTIGATIONS

From October 19 to October 22, 2020, Marine Services Division of David Evans and Associates, Inc. (DEA) conducted a multibeam bathymetric survey. A high-resolution airborne Lidar was conducted by GeoTerra, Inc., as a subcontractor to DEA on September 28, 2020.

A geodetic control survey established control points for the aerial survey and quality control.

The Lidar survey was conducted at low spring tide to optimize aerial coverage over the shallow mudflats and allow data collection of shoreline structures. The bathymetric survey was conducted during a high spring tide to maximize area available for surveying.

The bathymetry and Lidar surveys were both performed under the direction of a Washington Professional Land Surveyor. Oversight for the bathymetric survey was provided by a National Society of Professional Surveyors – The Hydrographic Society of America Certified Hydrographer. Oversight for the Lidar survey was provided by a Certified Photogrammetrist.

The bathymetry and Lidar surveys were integrated into a half-meter spaced composite surface model with vertical datum referenced to the mean low lower water, Epoch 1983-2001, and horizontal datum referenced to the North American Datum of 1983, 2011 realization, Epoch 2010.0, projected to the Washington State Plane Coordinate System, North Zone, with units in US Survey Feet.

Comprehensive report of the surveys is provided in Attachment B-1.

3. REFERENCES

Geosyntec Consultants, Inc. 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site.* Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 31 January.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

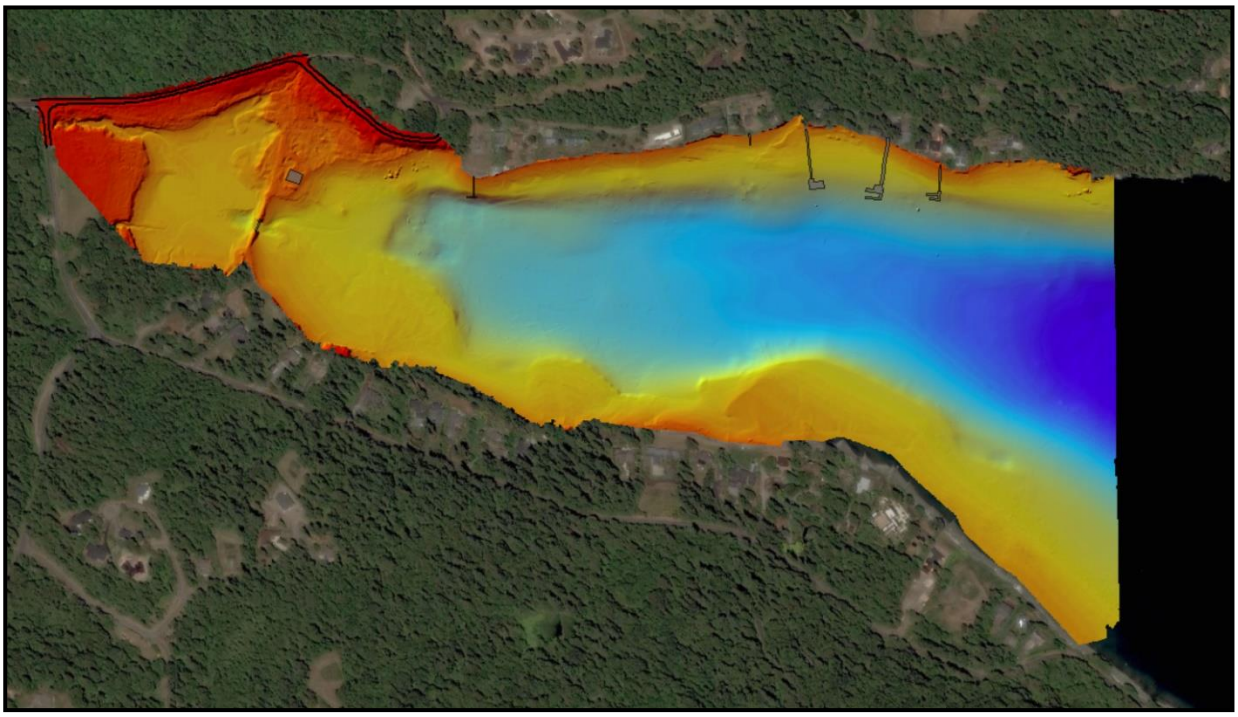
ATTACHMENT B-1

Blakely Harbor Park Site Lidar and Bathymetric Survey Report

BLAKELY HARBOR PARK SITE
LIDAR AND BATHYMETRIC SURVEY REPORT

OCTOBER 2020

Port Blakely, Bainbridge Island, Washington



Prepared by:

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way, Suite 130
Vancouver, Washington 98661
(360) 314-3200

Prepared for:

Geosyntec Consultants, Inc.
520 Pike Street, Suite 1375
Seattle, Washington 98101

BLAKELY HARBOR PARK SITE
LIDAR AND BATHYMETRIC SURVEY REPORT

OCTOBER 2020

Port Blakely, Bainbridge Island, Washington

Prepared by:

Jonathan L. Dasler, PE, PLS, CH
NSPS-THSOA Certified Hydrographer, #107
David Evans and Associates, Inc.
Senior Vice President/Director of Marine Services

Reviewed by:

Gregory P. Baird, PLS, CH
NSPS-THSOA Certified Hydrographer, #201
David Evans and Associates, Inc.

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ACRONYMS AND ABBREVIATIONS

ASCII	American Standard Code for Information Interchange
CH	Certified Hydrographer
DEA	David Evans and Associates, Inc.
GMT	Greenwich Mean Time
GNSS	Global Navigation Satellite System
HIPS	Hydrographic Information Processing System
HVF	HIPS Vessel File
Hz	Hertz
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
kHz	kilohertz
LAS	LASer file format
NAD83(2011)	North American Datum of 1983, 2011 realization
NAVD88/12b	North American Vertical Datum of 1988, Geoid 12b
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NTRIP	Networked Transport of RTCM via Internet Protocol
PDT	Pacific Daylight Time
PLS	Professional Land Surveyor
POS/MV	Position and Orientation System for Marine Vessels
PPS	Pulse Per Second
PPSM	Points Per Square Meter
RMS	Root Mean Square
RMSEv	Root Mean Square for Elevation
RTCM	Radio Technical Commission for Maritime
RTK	Real-Time Kinematic
SBET	Smooth Best Estimate Trajectory
SPCS	State Plane Coordinate System
S/V	Survey Vessel
TIN	Triangulated Irregular Network
TVU	Total Vertical Uncertainty
USACE	United States Army Corps of Engineers
UTC	Coordinated Universal Time
ZDA	Global Positioning System Timing Message

1.0 INTRODUCTION

The Marine Services Division of David Evans and Associates, Inc. (DEA) conducted a comprehensive high-resolution airborne Lidar and bathymetric survey of the Blakely Harbor Park Site located on Bainbridge Island near Blakely, WA. The purpose of the survey was to collect detailed elevation data in support of ongoing remediation in the area. Field efforts consisted of:

- a geodetic control survey for establishing control points for the aerial survey and quality control points for the aerial Lidar and bathymetric survey;

- an aerial topographic Lidar survey performed during a low spring tide to optimize aerial coverage over the shallow mudflats and acquire outlines of docks, structures and pavement to the extent detectable by airborne Lidar; and

- a bathymetric survey during a high spring tide that consisted of a high-resolution multibeam bathymetric survey and supplemented with single beam bathymetric data to infill areas inshore of the footbridge with a small remote-controlled vessel that were inundated during the airborne Lidar survey.

The data were integrated into a half-meter spaced composite surface model and provided as an Esri geodatabase and ArcMap products to be used as base data for ongoing remediation.

Surveys were performed under the direction of a Washington Professional Land Surveyor (PLS), a National Society of Professional Surveyors - The Hydrographic Society of America (NSPS-THSOA) Certified Hydrographer (CH) for oversite of bathymetric surveys, and a Certified Photogrammetrist (CP) for oversite of airborne Lidar acquisition and processing.

This report describes the datums, control established, data acquisition, methodology and data processing procedures. In addition to this report, additional deliverables are included and are listed in Section 6.0 Deliverables of this report.

2.0 DATUMS, CONTOL AND COVERAGE

2.1 Datums

Horizontal datum for this survey is the North American Datum of 1983, 2011 realization, Epoch 2010.0 (NAD83(2011)), projected to the Washington State Plane Coordinate System (SPCS), North Zone, with units in U.S. Survey Feet.

Elevation data are referenced to Mean Lower Low Water, Epoch 1983-2001 (MLLW), the current National Tidal Datum Epoch (NTDE) as determined through the National Oceanic and Atmospheric Administration VDatum model for the area. Elevation data was originally acquired relative to the North American Vertical Datum of 1988, Geoid 18 (NAVD88/18) and a site wide conversion of +2.43 feet was applied to convert NAVD88/18 elevations to MLLW. This conversion factor was obtained from the NOAA VDatum model and is consistent over the entire survey area.

2.2 Control Survey

Horizontal and vertical control for this survey used the Washington State Reference Network (WSRN) for Global Navigation Satellite System (GNSS) corrections for establishing the control network by a DEA land survey crew and used in real-time for bathymetric data acquisition. The DEA land survey crew conducted a geodetic control survey to provide ground control for the airborne Lidar survey and

a checkpoint for the bathymetric survey. The survey consisted of establishing seven control points used to control the Lidar survey and six ground shots to be used for independent checks. Results of these checks can be found in Appendix A, Table 7. Field notes that document the control survey can be found in Appendix B.

Table 1 includes final coordinates and elevations for survey control used to control the Lidar survey with control point 3001 used as a position check for the bathymetric survey.

Table 1. Control Table

Point ID	Northing (US Feet)	Easting (US Feet)	Elevation (MLLW)	Description
3000	225072.36	1216565.48	13.80	WSDOT 3.5" MON 2000 Rich
3001	222539.61	1225907.07	34.34	Mag Nail & Washer, Vessel Check In
3002	221721.08	1225161.41	11.22	Mag Nail
3101	222489.43	1224206.62	26.38	Mag Nail
3102	222486.84	1226009.89	36.69	Mag Nail
3103	222578.59	1228503.57	102.89	Mag Nail
3104	222088.62	1225219.32	14.62	Hub & Tack
3105	221468.14	1224449.21	41.40	Mag Nail
3106	220534.69	1227348.49	48.00	Mag Nail
3107	219669.40	1229337.13	23.24	Mag Nail

Figure 1 shows the location of the control and ground shot checkpoints used for the survey.

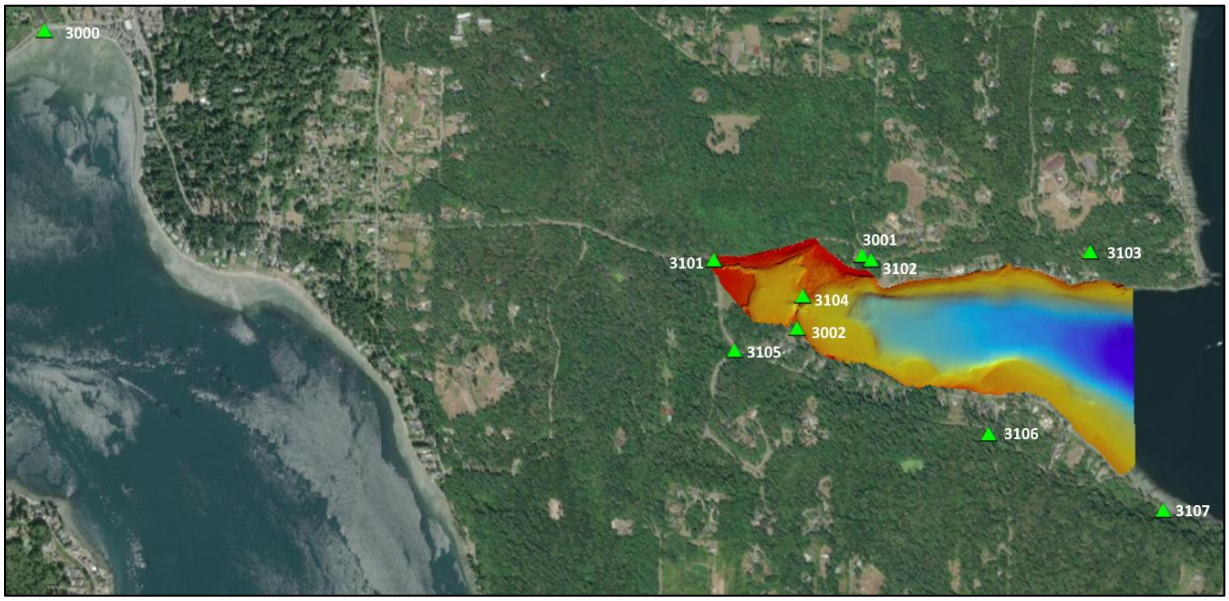


Figure 1. Control points.

2.3 Survey Area and Coverage

The survey area is located in Blakely Harbor on Bainbridge Island. Multibeam coverage was obtained using a swath angle of 45 degrees per side in deep water, 50 degrees in depths less than 30 feet, and

60 degrees in depths less than 8 feet with shoreline data collected during a high tide. Figure 2 depicts a hillshade image of the multibeam bathymetric coverage.

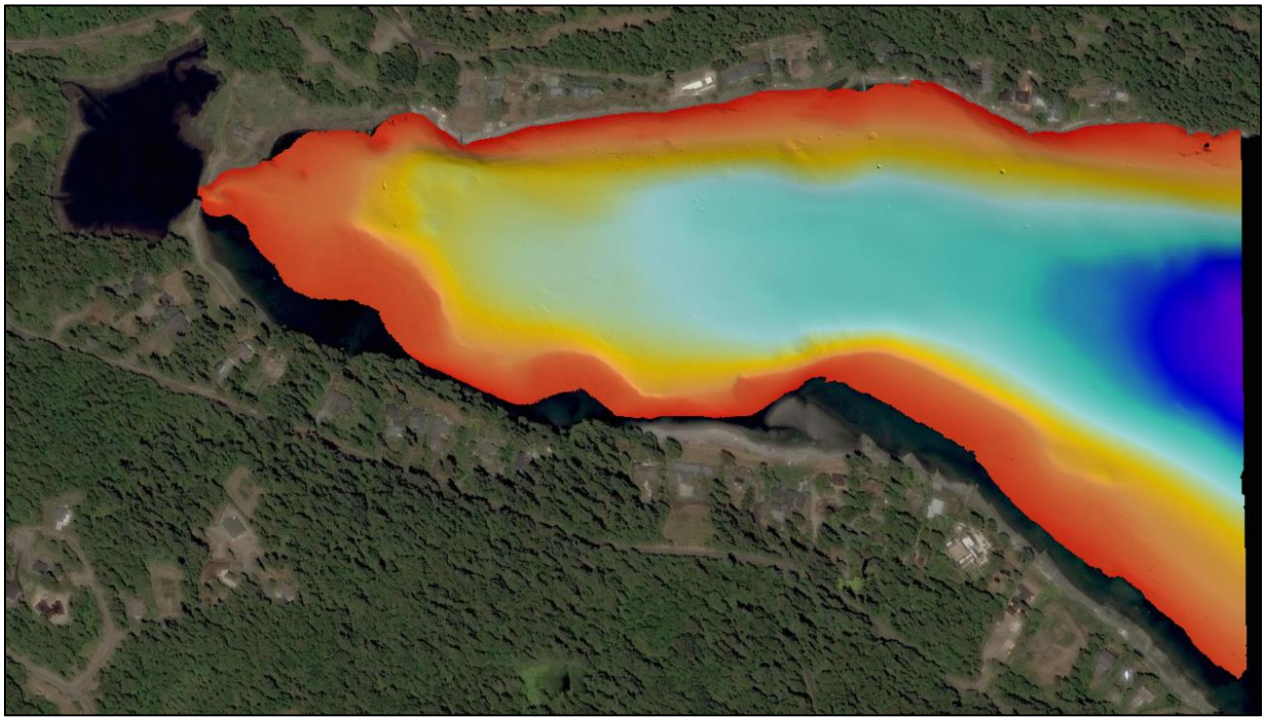


Figure 2. Hillshade imagery of multibeam bathymetric coverage.

Figure 3 depicts airborne topographic Lidar coverage that was acquired during a low tide.

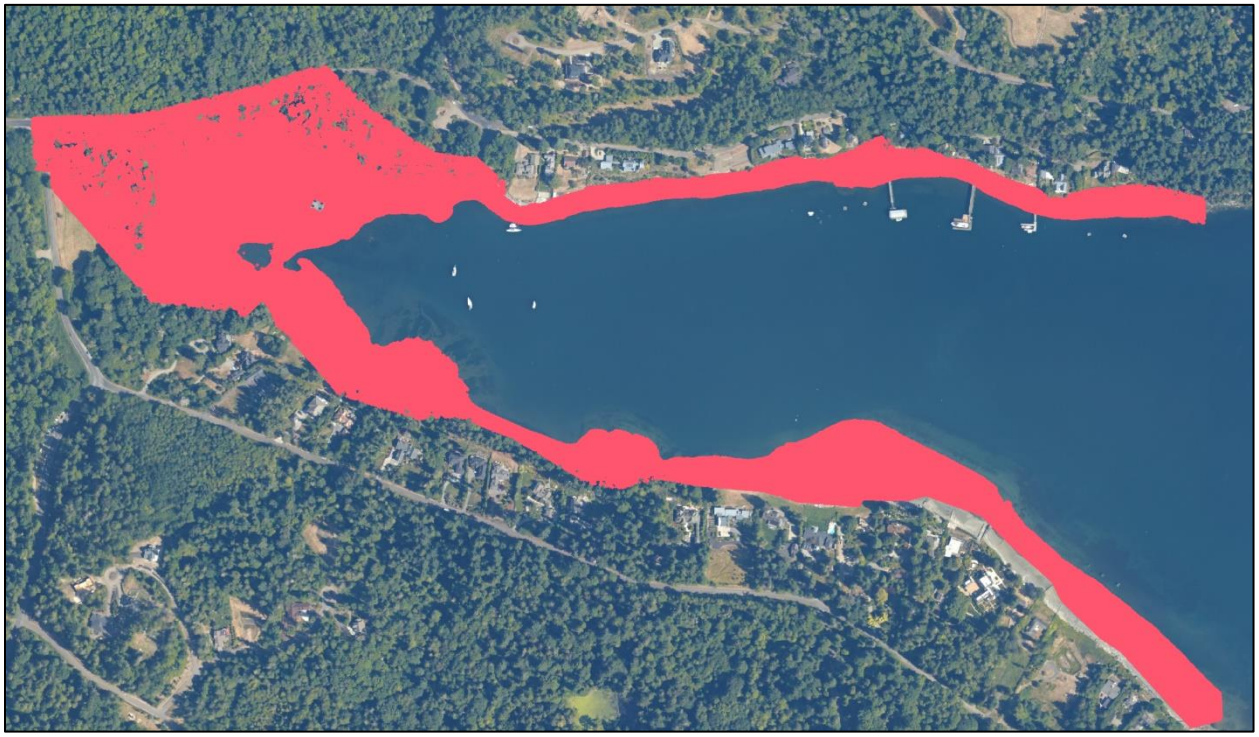


Figure 3. Airborne topographic Lidar coverage shown in red.

Figure 4 depicts single beam bathymetric coverage in the Blakely Park cove, inshore of the footbridge, acquired with a small remote-controlled boat to fill the Lidar coverage gap that was inundated during the Lidar survey that was acquired during a low tide. The multibeam survey vessel could not enter this area at a high tide due to the low clearance of the footbridge.



Figure 4. Single beam bathymetric coverage shown in purple.

The combined coverage from the composite surface is shown in Figure 5.

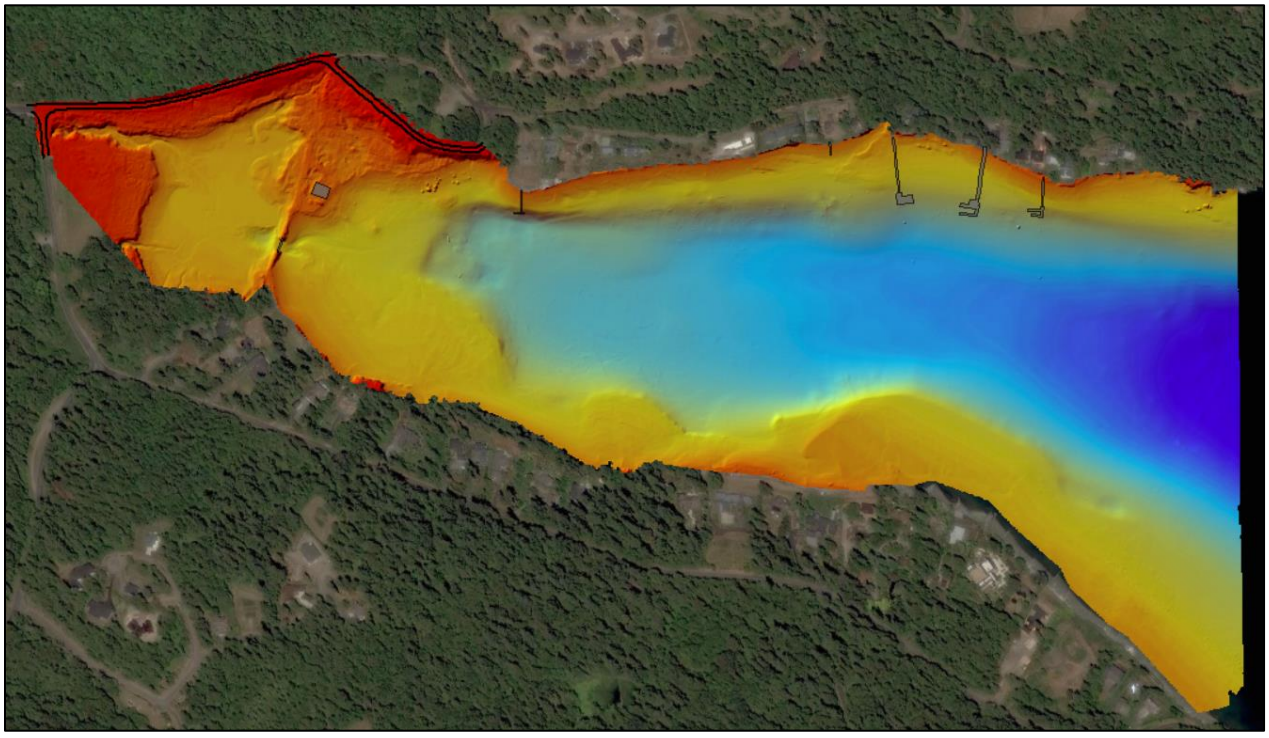


Figure 5. Hillshade image of combined coverage.

3.0 BATHYMETRIC SURVEYS

The primary method for collecting high-resolution bathymetric data was through use of a multibeam bathymetric sonar. Supplemental data was acquired using a survey-grade bathymetric sonar. Field notes of the bathymetric survey are included in Appendix B with the single beam survey notes in a yellow field book and multibeam survey notes captured in DEA's digital log. Appendix C includes safety documentation, including DEA's COVID plan for the project.

3.1 Equipment

3.1.1 Survey Platforms

The primary survey vessel was the *Perseverance* (Figure 6), a 25-foot aluminum monohull with twin 150 HP outboard motors. The Perseverance is equipped with an over-the-side sonar mount, and survey acquisition station.



Figure 6. Survey Vessel *Perseverance.*

For single beam surveys, a small remote-controlled survey platform (Q-Boat) was used (Figure 7).



Figure 7. DEA's custom remote-controlled "Q-Boat" for single beam surveys with limited access.

3.1.2 Multibeam Echosounder System

The *Perseverance* was equipped with a Reson SeaBat 7101 multibeam echosounder and an integrated AML Micro SV Xchange sound speed sensor. The multibeam was deployed from a custom side mount strut on the *Perseverance*. The sonar was operated at 240 kHz and configured to acquire a 150-degree swath of 511 beams.

All multibeam data were acquired with the 240 kHz selected in the hardware configuration. Range adjustments were made during acquisition as dictated by changes in water depth. HYPACK HYSWEEP was used to acquire multibeam bathymetry data in HYSWEEP HSX file format.

All time tagging of bathymetric data in HYPACK software and in the hydrographic survey logs are Coordinated Universal Time (UTC), which is a time standard equivalent to Greenwich Mean Time (GMT), which is seven hours ahead of Pacific Daylight Time (PDT).

3.1.3 Single Beam Echosounder System

Single beam surveys were acquired with a Teledyne ODOM CV-100 survey-grade echosounder using a 4-degree shallow-water transducer operating at 200 kHz.

3.1.4 Position, Heading and Motion Reference Systems

The *Perseverance* was outfitted with a position and orientation system for marine vessels (POS/MV) with GNSS and inertial reference system, which was used to measure attitude, heading, heave, and position. The system was comprised of an Inertial Motion Unit (IMU), dual frequency (L1/L2) GNSS antennas, and a data processor. A secondary GNSS receiver consisted of a Trimble R10-2 receiver that was positioned over the vessel reference point to be used for vertical control of the survey. The POS/MV primary GNSS receiver and the Trimble R10-2 receiver were provided real-time kinematic (RTK) GNSS correctors received from the Washington State Reference Network (WSRN) using an Intuicom cellular modem with data received via Networked Transport of RTCM via Internet Protocol (NTRIP).

The Reson processors and HYPACK acquisition computers were provided a Pulse Per Second (PPS) and National Marine Electronics Association (NMEA) Global Positioning System Timing Message (ZDA) to achieve precise synchronization of sonar measurements with position and attitude data from the POS/MV.

The POS/MV integrated dual frequency RTK GNSS and inertial reference system was used for the motion sensor for this survey. The POS/MV is a 6-degree of freedom motion unit, with a stated accuracy of 0.05 meters or 5 percent for heave, 0.02 degrees for roll and pitch and heading. Real-time displays of the vessel motion accuracy were monitored throughout the survey with the MV-POSView controller program. If any of the vessel motion accuracy degraded to greater than 0.05 degrees root mean square (RMS), survey operations would be suspended until the inertial unit was able to regain the higher degree of accuracy.

For positioning of single beam data aboard the Q-Boat, a Trimble SPS-855 was used for both position and vertical measurements. The Trimble system received RTK GNSS corrections from the WSRN via a broadcast from the Intuicom radio via NTRIP, similar to the *Perseverance*.

3.1.5 Sound Speed Measurements

An AML Micro SV sound speed sensor mounted on the Reson 7101 sonar head was input into the Reson processor, and sound speeds from the sensor were used in real-time during acquisition. AML Oceanographic Micro SVP&T sensors were used as the primary sound speed profiler.

3.1.6 Vertical Measurements

All bathymetric data is time-tagged and recorded relative to the vessel reference point. Using a fixed vertical reference for both the sonar and GNSS systems, as opposed to using the water surface and making water surface observations, provides improved vertical accuracy as it considers dynamic changes in draft and local water surface variations in the vicinity of the survey. The sonar fixed draft was used to reference the soundings to the project vertical datum. Vertical reference point measurements, which approximately represent the water surface elevation, were obtained using each navigation system: the Applanix POS/MV, and the Trimble R10-2 RTK-GNSS receiver for multibeam surveys and the Trimble SPS-885 for single beam surveys. RTK correctors were applied to the shipboard GNSS for logging of approximate water surface elevations at a rate of five hertz (Hz). RTK-GNSS approximate water surface observations at the vessel reference point were graphically viewed and edited for outliers, artifacts from multipath, or loss of satellites.

3.2 Equipment Calibration

3.2.1 Patch Test

Multibeam patch tests were conducted to measure alignment offsets between the IMU sensor and the Reson 7101 sonar transducer, and to determine time delays between the time-tagged sensor data. Patch tests consisted of a series of lines run in a specific pattern. A precise timing latency test was performed by running multiple lines in the same direction at differing speeds over a known feature on the seafloor. Roll alignment was determined by evaluating reciprocal lines run over a flat bottom. The pitch tests consisted of a set of reciprocal lines located on a steep slope. The yaw error was determined by running parallel lines in the same direction over the same area as the pitch tests. All lines were run at approximately 3 knots to 6 knots. Patch tests were run in the vicinity of the survey site. Patch test average values applied in CARIS software are listed in Table 2. All values were input and applied to all bathymetric data in the HIPS Vessel File (HVF).

Table 2. *Perseverance* Reson 7101 Patch Test Values

Date	Latency (seconds)	Pitch (Degrees)	Roll (Degrees)	Yaw (Degrees)
10/20/2020	0.000	-0.80	0.72	-0.55
10/21/2020	0.000	-0.65	0.48	-0.50

3.2.2 Bar Check

A bar check was performed prior to the onset of survey operations to validate sonar draft. For the *Perseverance*, the bar check was accomplished by lowering a bar on a marked chain below the sonar head to a known distance from the water surface, reading port and starboard draft for an average draft, acquiring a sound speed cast, and logging multibeam data on the bar. The average difference between the bar depth and the processed sonar return on the bar was 0.08 feet over the line logged with a standard deviation of 0.02 feet.

For the Q-Boat, a depth was measured from the water surface to the seafloor with a survey tape, given the shallow water. The Q-Boat was positioned over the location and a line was logged of single beam data. The average difference between the measured depth and the processed depth was 0.00 feet over the line logged with a standard deviation of 0.00 feet.

During survey operations, dynamic draft and any changes in static draft due to vessel loading are accounted for using RTK GNSS heights and a fixed distance from the GNSS antenna phase center to the acoustic reference point of the sonar.

3.2.3 Position Check

A position check was performed prior to the onset of survey operations on control point 3001, set during the control survey. The positioning system GNSS antenna for each survey platform was placed over the control point at a set height and a HYPACK line was recorded to document positional accuracy. Table 3 presents the results of these position checks for each vessel.

Table 3. Position Check Results

Vessel/Date	Delta Northing (US FT)	Delta Easting (US FT)	Delta MLLW (US FT)
Perseverance 10/19/2020	0.04	0.05	-0.06
Q-Boat 10/22/2020	0.00	-0.05	-0.03

3.2.4 Sound Speed Sensor Calibration

DEA submits sound speed sensors for factory calibration annually per NOAA specifications. Appendix D contains factory documentation of recent calibrations for the sensors used for this survey. In addition, a comparison is made to other sensors periodically during the survey to validate that the sensors are operating within design parameters.

3.3 Bathymetric Data Processing and Analysis

3.3.1 Bathymetric Data Processing

Post-processing of multibeam data was conducted utilizing CARIS Hydrographic Information Processing System (HIPS) version 11.3.8. Patch test data were analyzed, and alignment corrections were applied during processing. Survey data used Real-Time Kinematic GNSS heights from the secondary Trimble R10-2 receiver, converted to MLLW elevations using Geoid 18 and adjusted to MLLW using a fixed value of +2.43 feet added to NADV88/18 elevations. These data were logged as a tide record in HYPACK. The RTK GNSS height data was reviewed in HYPACK for any data fliers and a 30-second smoothing algorithm was applied to remove wave-induced motion, which is corrected in the heave records applied in CARIS. After editing and smoothing in HYPACK, tide values were exported and applied to the multibeam data using the CARIS apply tide file tool. Sound velocity profiles were used to correct slant range measurements and to compensate for any ray path bending.

Upon import, filters were applied for quality, rejecting beams assigned quality flags of ‘0’ or ‘1’, and swath width was limited to 45 degrees port and starboard in deep water, 50 degrees per side in depths 30 feet to eight feet, and 60 degrees per side in depths less than eight feet. These data were flagged as rejected and were reaccepted during follow-on evaluation if necessary. Processing began by verifying attitude (heave, pitch, roll and heading) and navigation data, which were reviewed and accepted. Using

the CARIS subset editor, sounding data were reviewed for quality and data flyers. Sounding data, including sonar beams reflecting from sediment in the water column, returns from aquatic life, or noise due to aeration in the water column were carefully reviewed before being flagged as rejected.

To take advantage of the high-resolution multibeam bathymetric survey and adhere to survey specifications, a half-meter (1.64 feet) grid of the survey area was created using CARIS HIPS processing software. This process created a uniform sounding distribution over the survey area from the underlying denser dataset with assigned values to each grid node using a swath-angle weighted algorithm to populate grid nodes. The American Standard Code for Information Interchange (ASCII) XYZ point file, was exported relative to NAD83(2011), SPCS Washington North Zone for horizontal and MLLW elevations (positive up) for vertical with all units in U.S. Survey Feet. Features standing proud of the seafloor (piles, dolphins, docks, and debris) were flagged and used in the generation of a multibeam hillshade image to highlight these features that were not included in the seafloor dataset merged into the final surface model.

Single beam data was processed in HYPACK software. Full-resolution RTK GNSS height data was applied to bathymetric data and a sound speed profile was applied. Data was thinned to a depth measurement every one-foot down individual survey lines and exported as an ASCII XYZ point file relative to NAD83(2011), SPCS Washington North Zone for horizontal and MLLW elevations (positive up) for vertical with all units in U.S. Survey Feet.

3.3.2 Crossline Sonar Beam Analysis

The multibeam sonar recorded 511 beams for each sonar ping covering a swath 75 degrees to either side of nadir (vertical below the sonar). The swath width was filtered to 45 degrees to each side of nadir and a crossline analysis was conducted to prove each of the sonar beams within the 110-degree swath met accuracy requirements for the survey. The analysis involved running survey lines that cross orthogonal to the primary survey line pattern and comparing the soundings from individual sonar beams in the crossline data to a finalized 3-foot grid from the main scheme lines. Requirements called for surveys to meet USACE Hydrographic Survey Manual (EM111-2-1003). The USACE requirement for maintenance dredging in water depths 15 feet to 75 feet, the depth range for this survey, is +/- 0.8 feet at a 95% confidence level. The analysis was also conducted using the International Hydrographic Organization (IHO) Special Order depth accuracy standards, which was modified from a 0.25-meter minimum accuracy to a 0.0762-meter (0.25-foot) minimum accuracy. This standard also uses a factor to increase the allowable inaccuracy based on depth. The IHO modified Special Order allowable total vertical uncertainty (TVU) formula is listed below:

$$+/-\sqrt{a^2 + (b * d)^2}$$

Where:

a = 0.25 feet (IHO Special Order calls for a=0.25 meters)
b = 0.0075 (IHO Special Order depth factor)
d = water depth in feet

Figure 8 depicts the results of this crossline beam analysis to document that all beams used in the 90-degree swath (45 degrees per side) meet both USACE requirements and IHO Special Order modified requirements. All beams exceeded 95% of soundings passing.

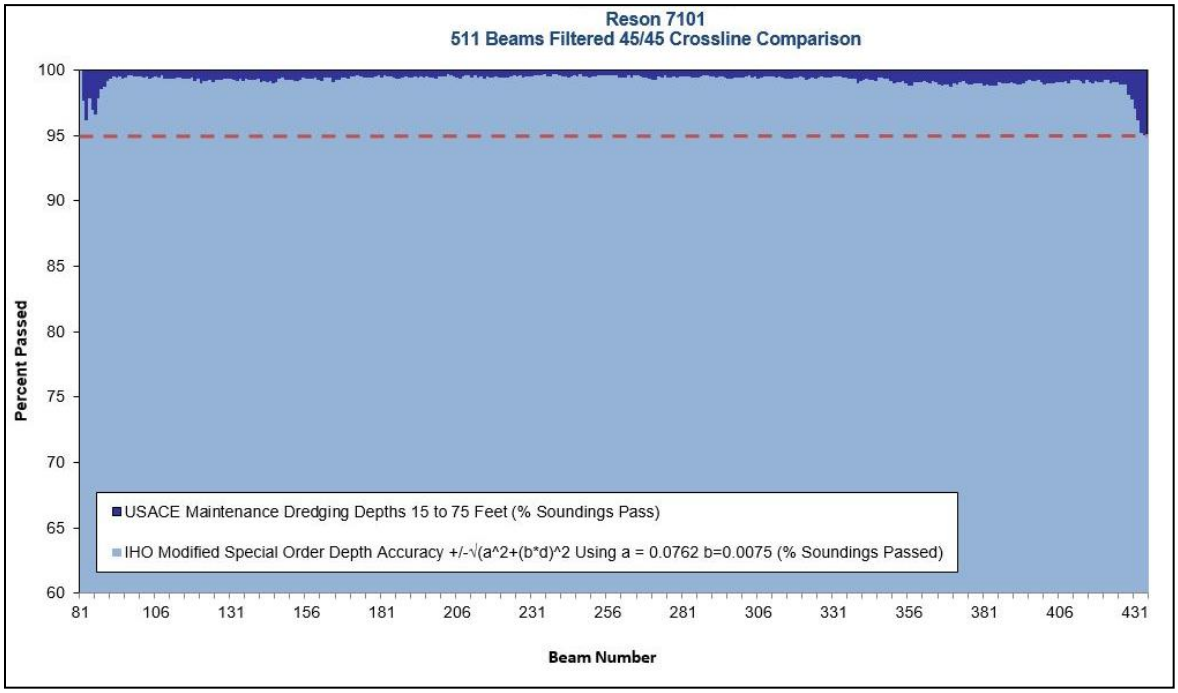


Figure 8. Histogram of Crossline Beam Analysis.

3.3.3 Crossline Difference Analysis

To assess the precision of the survey, crossline data was gridded at a half-meter (1.64-foot) resolution, consistent with the resolution grid from the main survey lines. A difference analysis was conducted between the surfaces to evaluate if the precision of the survey met project requirements. The USACE typical repeatability (precision) requirement for maintenance dredging in water depths 15-75 feet, the depth range for this survey, is 0.3 feet. Figure 9 presents the full results of the analysis and documents that the survey meets USACE requirements for repeatability, or mean difference, of -0.006 m (0.02 feet vs. required 0.3 feet) and standard deviation at a 95% confidence level at 0.027 m (+/- 0.09 feet vs. required +/- 0.8 feet). The larger minimum and maximum values are on logs and other debris in the survey area and a result of comparing grid nodes at a 1.64-foot resolution on an abrupt change in seafloor elevation.

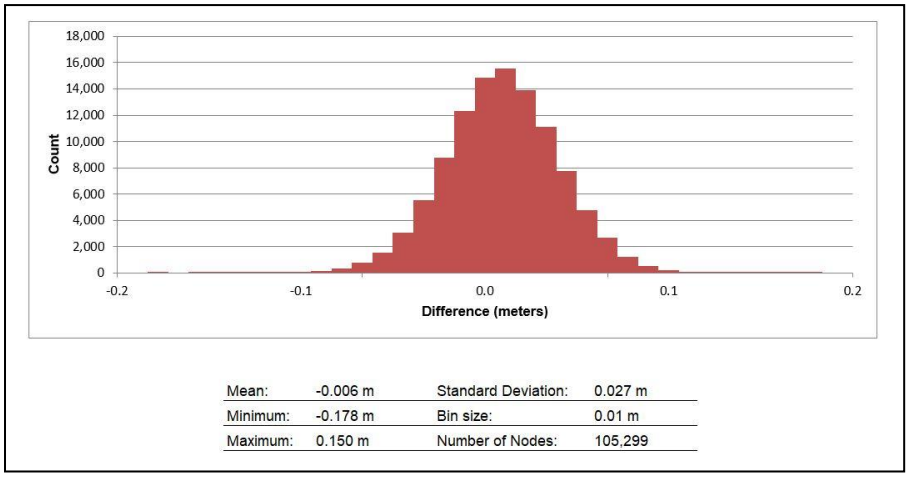


Figure 9. Histogram of Crossline versus Main Line gridded data difference.

3.3.4 Wrecks Located in Multibeam Data

During data processing and analysis, two wrecks were identified in the multibeam data. The location of the two wrecks is at the western end of Blakely Harbor in 15 to 25 feet MLLW. Figure 10 shows the location of the two wrecks, which are incorporated into the Esri geodatabase with images and dimensions for each wreck.

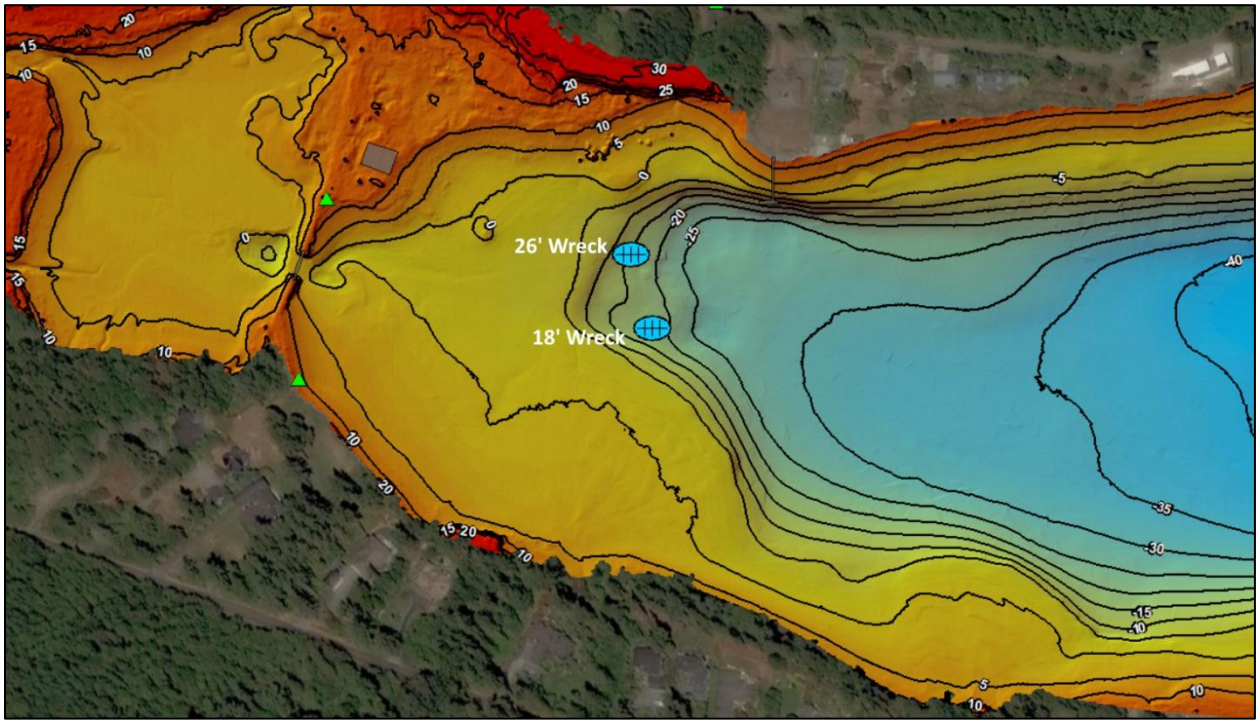


Figure 10. Location of wrecks identified in the multibeam data.

The first is a 26-foot long by 8-foot wide wreck located in the west end of the bay in 16 feet of water and projecting 5.6 feet above the seafloor with a minimum clearance depth of 10.5 feet MLLW (Figure 11).

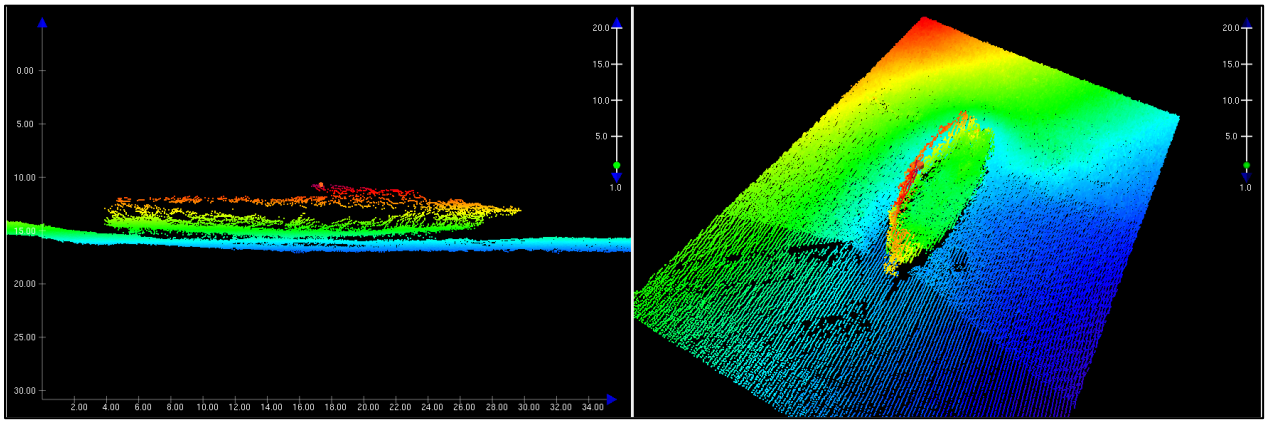


Figure 11. 26-foot wreck.

The second is an 18-foot long by 8-foot wide wreck located south of the first wreck in 18 feet of water and projecting 2.7 feet above the seafloor with a minimum clearance depth of 15.4 feet MLLW (Figure 12).

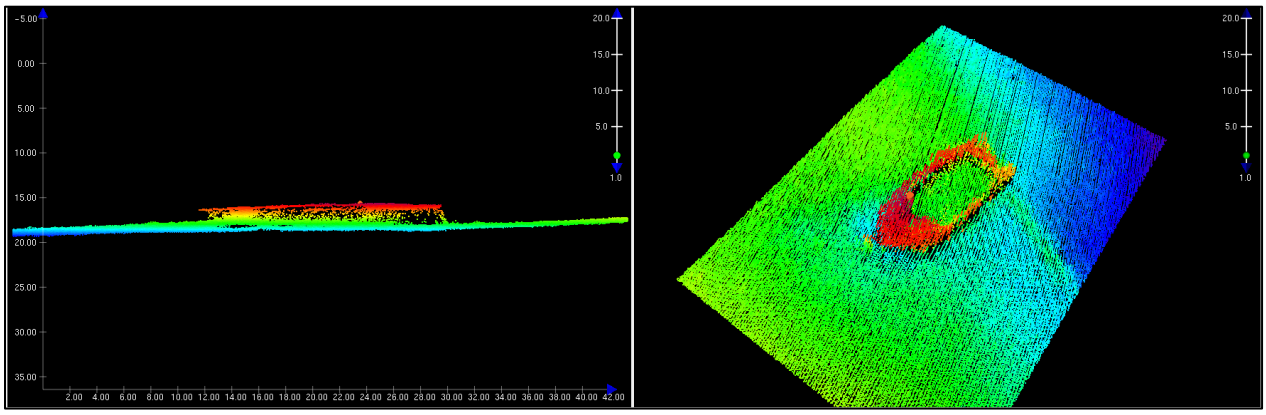


Figure 12. 18-foot wreck.

4.0 AIRBORNE LIDAR

Airborne Lidar was acquired by GeoTerra, Inc., as a subcontractor to DEA. Acquisition was targeted for low water conditions on September 28, 2020, during a low tide of 0.5 feet MLLW. Data was acquired from four primary flight lines run in reciprocal directions and one cross-tie flight line at an approximate altitude of 5,800 feet above ground level. The base project Lidar was acquired to obtain a data density of 16 points per square meter (ppsm) based upon a multi-swath, minimum 50% overlap approach with actual overlap achieved at 55%. Ground control was provided by a DEA control survey to provide an absolute adjustment of the Lidar point cloud to the surveyed ground coordinates. With adjustment to survey control, the absolute target accuracy was ±0.3 feet Root Mean Square for Elevation (RMSEv) for areas of slope less than 20 degrees. The actual mean vertical error was 0.00 feet with minimum at -0.08 feet and maximum of 0.13 feet and vertical RMSEv of 0.07 feet.

The base project dataset was classified to standard LAS format with classification of ground, non-ground, water, and dock structures. The Lidar data was processed and adjusted using DEA control relative to NAVD88/18 and was adjusted to MLLW based on the NOAA conversion model VDatum. Using Lidar data and intensity, polylines outlining planimetric features (pavement edge, docks, and structures) were delineated from the Lidar data and provided as AutoCAD drawing files. A full report on data acquisition, processing and analysis was provided by GeoTerra and is included in Appendix A of this report.

5.0 COMPOSITE MODEL GENERATION

5.1 Integration of Data

Multibeam data was exported from CARIS as a half-meter grid and imported into Trimble TerraModel software for compilation of a composite surface model. Import of classified LASer (LAS) file format from the airborne Lidar data was imported onto a different layer in TerraModel using only the ground classification (Classification 2), or bare earth. As the LAS data was relative to NAVD88, an elevation shift of 2.43 feet was added to the data to adjust elevations relative to MLLW. The same shift had already been applied to all bathymetric data. To remove water surface returns in the LAS data, data was clipped below an elevation of 0.5-feet MLLW, slightly above the water surface returns. Multibeam

data was clipped above 0.5-feet MLLW and merged with the Lidar into a composite dataset. To fill gaps in the shallow bay inshore of the footbridge, single beam data was imported and clipped at the extents of Lidar and multibeam coverage. The resultant composite dataset was modeled with a triangulated irregular network (TIN) using a restricted edge distance of 12 feet. From the TIN model, a half-meter (1.64-foot) grid was developed to be used as the final surface model. The data was exported as an ASCII XYZ point file relative to NAD83(2011), SPCS Washington North Zone for horizontal and MLLW elevations for vertical with all units in U.S. Survey Feet.

5.2 ArcMap Product Generation

The ASCII file from the composite model was loaded into Esri ArcGIS software for generation of the final surface model. Using ArcGIS Spatial Analyst, 1-foot minor contours with 5-foot major contours were generated from the surface model. Labeling was applied to major 5-foot contours. Vector linework of dock outlines, the footbridge, the remnant structure and pavement edges derived from airborne Lidar were imported in ArcMap. Control points used for the survey were also imported for reference. These data were compiled into an Esri geodatabase and loaded into an Esri ArcMap document for delivery. Positions and measurements of the two wrecks identified during the survey were added to Esri geodatabase and ArcMap document with hyperlinks to images of the wrecks.

6.0 DELIVERABLES

Deliverables were posted to a secure site for access and include a project report, an Esri ArcMap project file and ASCII data of the final surface data with associated metadata.

Digital products consist of the following and are in accordance with the Scope of Work specifications and work requirements:

1. PDF of project report and appendices.
2. Esri ArcMap project file containing:
    - Control Point Locations;
    - Wrecks;
    - Road Pavement Limits;
    - 5-Foot Labeled Contours;
    - 1-Foot Contours;
    - Floating Point file of Final Surface Model;
    - Colored Hillshade Image of Multibeam Surface with features proud of the seafloor;
    - Colored Hillshade Image of Final Surface; and
    - Grey Scale Hillshade Image of Final Surface.
3. ASCII point file of Final Surface.
4. Associated Metadata file for ASCII Point data.

APPENDIX A
LIDAR TECHNICAL REPORT



Blakely Harbor Lidar

Presented to:
David Evans and Associates, Inc.
2801 SE Columbia Way, Suite 130
Vancouver, WA 98661

Submitted by:
GeoTerra, Inc.
860 McKinley St
Eugene, OR 97402

November 25, 2020

Project Overview (Metadata)

GeoTerra, Inc. was selected by David Evans and Associates, Inc. to provide Lidar acquisition, Lidar calibration and classification for an area per the boundary provided. GeoTerra utilized an Optech Galaxy Prime Lidar sensor in a Cessna 310C Riley for this project. Below is a brief synopsis of the processing and analysis of this data set.



Table 1: Acquisition Specifications

Specification	**Description**
Acquisition dates	28-September-2020
Pulse Repetition Frequency (PRF)	500 kHz
Scan Rate	74 (Hz)
Target Collection Density	16 ppsm
Field of View (FOV)	33 deg
Minimum Laser Side lap	55%
Altitude	5879 ft AGL
Ground Speed	129 Kts

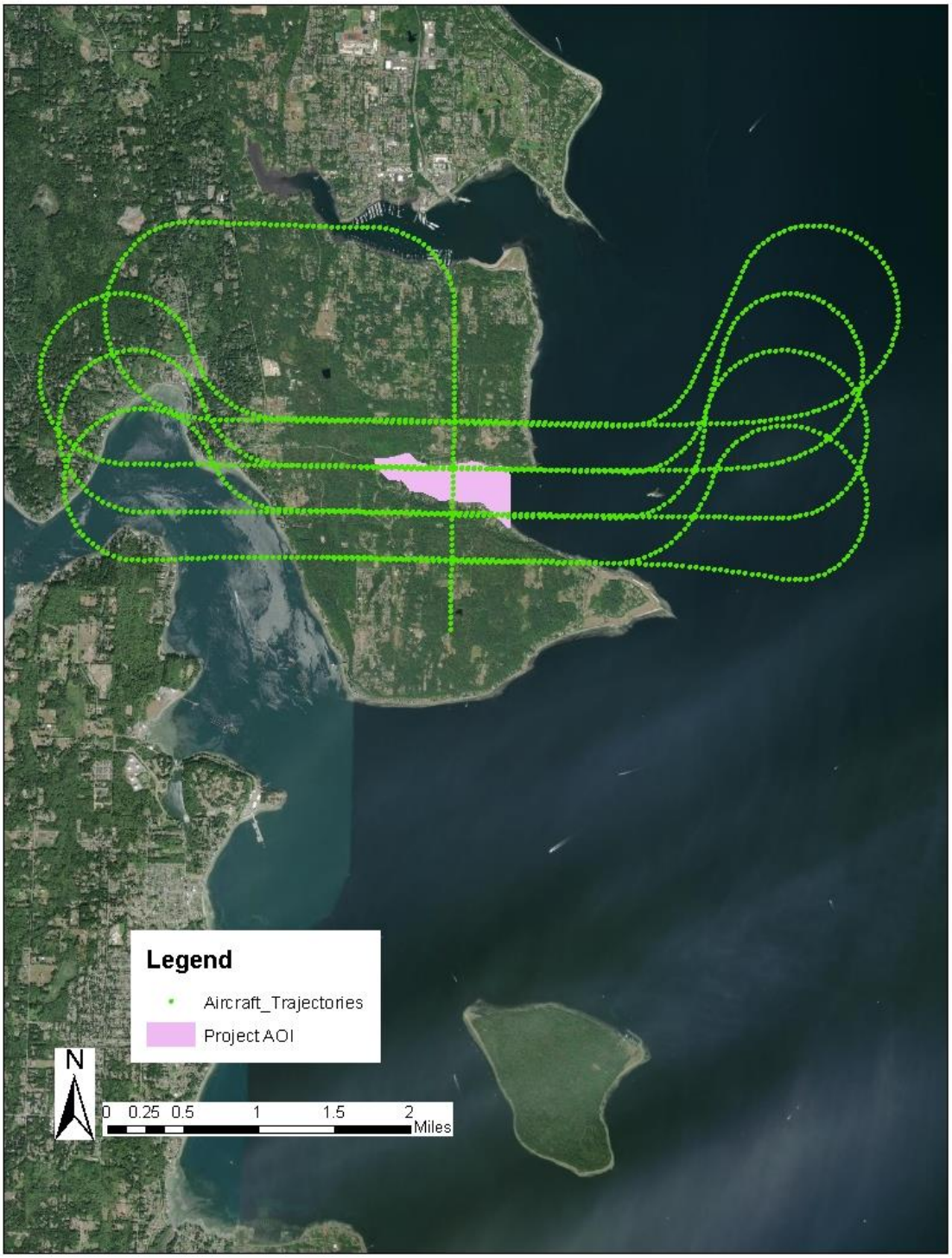


Figure 1. Aircraft trajectory map

Table 2. Overview of methodology

Process	Software	Description
Flight Planning	Teledyne Optech Airborne Mission Manager	Data acquisition was planned in consideration to terrain, environmental factors and target objects.
Flight execution	Optech Galaxy Prime	Sensor equipped with POS AV™ AP50 (OEM); 220-channel dual frequency GNSS receiver; GNSS airborne antenna with Iridium filters; high-accuracy IMU (IMU-8)
Post processing of ABGPS data	Novatel Inertial Explorer Version 8.60.6323	The data collected during the flight is post-processed into Smoothed Best Estimate of Trajectory (SBET) binary file of the IMU trajectory which is combined processed data from both GNSS satellite data and IMU data and is used to geo-reference the laser point cloud.
Post Processing of raw files to LAS format	Optech LMS (Lidar Management Suite)	Data was processed from range format to LAS format and preliminary adjustment was made using tie plane methodology.
Relative adjustment of Lidar strips	TerraMatch	Additional relative adjustment was performed using tie line methodology to further improve fit especially in areas where tie planes were not found.
Absolute adjustment of Lidar strips	LP360	Ground dataset was compared to known survey locations. Any systematic variation between the two datasets was removed.
QC	LP360; TerraScan	Data was automatically classified using rigorous algorithms of TerraScan. Manual quality control was performed in LP360 using variety of interpretation keys to correct any avoidable misclassifications. Special focus was on area delineated by the client

Table 3: Project coordinate system and datum

Specification	Description
Coordinate System	Washington State Plane, North Zone
Horizontal Datum	NAD83 (2011)
Vertical Datum	NAVD88
Geoid	18
Units	US Survey Feet

Table 4. Relative accuracy assessment based on 13,430 section lines

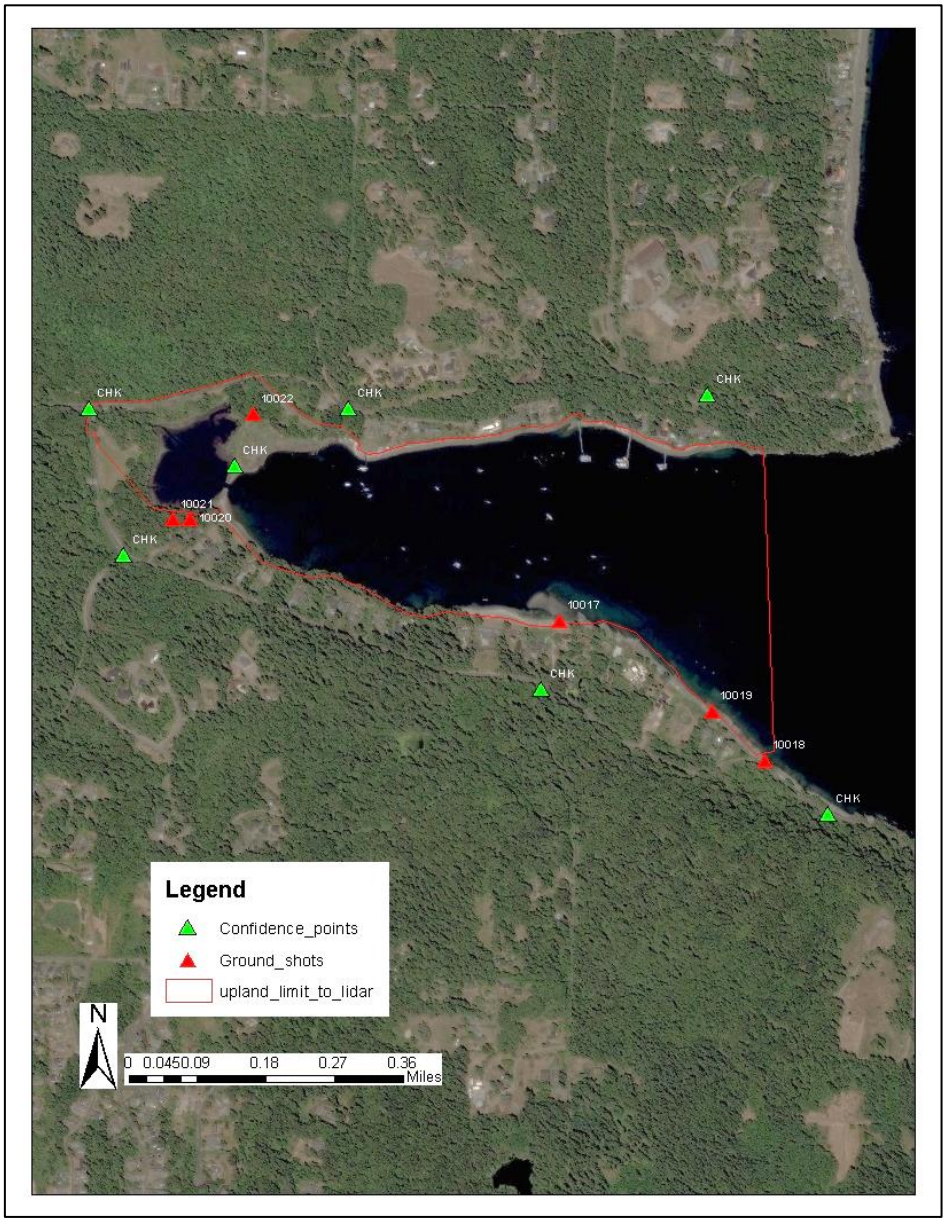
Error type	Z [ft]
Average magnitude	0.028
RMS Value	0.039
Maximum value	0.263

Table 5. Absolute accuracy assessment based on 7 surveyed control points. Data was determined to be shifted by an absolute value of -1.118ft to match the relative plane to the ground plane.

Type	Value [ft]
Vertical Error Mean	0.000
Vertical Error Min, Max	[-0.083, 0.133]
Vertical Error Range	0.216
Vertical Skew	0.715
Vertical RMSE	**0.067**
Vertical NMAS/VMAS Accuracy (90% CI)	± 0.111
Vertical NSSDA Accuracy (95% CI)	± 0.132
ASPRS Vertical Accuracy Class	0.068

Table 6. Statistics on control points

ID	X	Y	Z	Surface Z	DZ
3101	1224206.622	222489.4	23.95	23.985	-0.035
3102	1226009.891	222486.8	34.256	34.265	-0.008
3103	1228503.567	222578.6	100.457	100.516	-0.058
3104	1225219.323	222088.6	12.193	12.276	-0.083
3105	1224449.214	221468.1	38.966	38.916	0.050
3106	1227348.495	220534.7	45.569	45.436	0.133
3107	1229337.133	219669.4	20.808	20.806	0.002



The dataset was compared to independent check survey shots. Below are statistics with calculated residuals and RMS value.

Table 7. Statistics on independent check survey comparison

ID	X	Y	Z	Surface Z	DZ	Errors
10017	1227472.407	221013.511	6.267	6.285	-0.018	Vertical Error Mean: 0.032
10018	1228898.744	220044.292	5.815	5.755	0.060	Vertical Error Min, Max: [-0.018,0.080]
10019	1228535.470	220384.563	5.559	5.479	0.080	Vertical Error Range: 0.097
10020	1224913.937	221718.820	15.409	15.397	-0.922	Vertical Skew: -0.011
10021	1224788.699	221718.616	20.993	20.384	0.609	Vertical RMSE: 0.051
10022	1225347.865	222452.824	15.272	15.268	0.004	Vertical NMAS/VMAS Accuracy (90% CI): ±0.083
						Vertical NSSDA Accuracy (95% CI): ±0.099
						ASPRS Vertical Accuracy Class: 0.051
						Vertical Min Contour Interval: 0.153

Points 1020 and 10021 are within deep vegetation cover where accuracy of both survey control and ground classified returns have a decreased level of confidence. Both points were excluded from the final adjustment analysis.

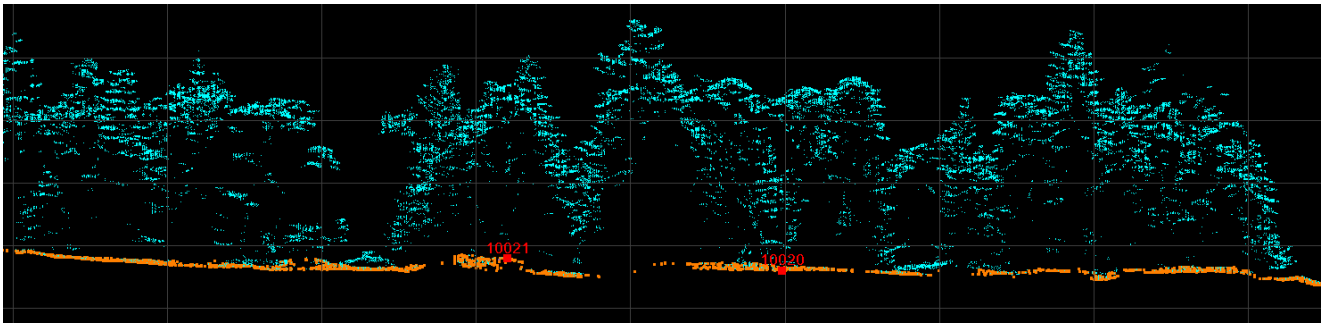


Figure 2. Profile of dense vegetation

Table 8. Classification scheme

Classification	**Definition**
00_cross strip	Points from cross flight lines used in calibration
01_Unclassified	Other classes not fitting into other categories
02_Ground	Pre-classified ground returns
07_Low Noise	Pre-classified noise below ground surface
12_Overlap	Points determined to be withheld from the edge of the strip
17_Bridge	Points determined to be on the bridge or boat dock
18_High Noise	Pre-classified high noise points/bird strikes



Figure 3. Shaded relief representation of Bare Earth model

APPENDIX B
FIELD LOGS

DEFYING
MOTHER NATURE®
SINCE 1916

RECYCLABLE

All components of this product are recyclable

Rite in the Rain

A patented, environmentally responsible, all-weather writing paper that sheds water and enables you to write anywhere, in any weather.

Using a pencil or all-weather pen, *Rite in the Rain* ensures that your notes survive the rigors of the field, regardless of the conditions.

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Tacoma, WA 98424-1017 USA
www.RiteintheRain.com

Item No. 311FX
ISBN: 978-1-60134-183-9

Made in the USA
US Pat No. 6,863,940

GEOS0000-0003

Rite in the Rain®
ALL-WEATHER
LEVEL
№ 311FX

BLAKELY HARBOR

BOOK 1

Land Survey

GEOS00000-0003 GEOS10192020DG

COORD SYSTEM WAN NAD83
GEOID MODEL WA G18 GRS80

STORE	ROD	LINE	CODE	DESC
3000	6 562		MON	WSDOT RICH
3001	6 562		CB	MAG NAIL WASHER
3102	6 562		CAK	MAG NAIL
3103	6 562		CAK	MAG NAIL
3104	6 562		CHC	SETHUB & TK

JDAL CS15 BLUE
JSGO CS14 BLUE 10/19/20

#3000
FOUND WSDOT MON 3" BRASSY FLUSH IN CONC MARKED 2000 RICH MON IS 0.8 FT SOUTH OF E.P. & 2.80 FT NORTH OF 10" CONC WALL

#3001 SET MAGNAIL WASHER IN EP ON SOUTH SIDE BLAKELY HILL RD 25FT ~~NORTH~~ BLAKELY HARBOR PARK SIGN ~~N222489.426 E1224206.622 EL=23.950~~

#3102 SET MAG NAIL IN CENTER OF 5 WAY NE 3-TRD NE BLAKELY AVE NE HALLS HILL RD & BLAKELY HILL RD.

#3103 SET MAG NAIL SOUTH PRICE LANE ON NE HALL HILLS ROAD. 15FT NORTH OF 4FT DIA BIG ROCK.

#3104 SET HUB & TK IN CENTER LINE OF 6FT WIDE PATH +/- 40FT NORTH OF BRIDGE SOUTH SIDE OF PARK BENCH

Rite in the Rain.

GEOS 0000 - 0003 GEOS 10192035D4

STORE	ROD	LINE	CODE	DESC
3101	6 562		CHK	SET MAG NAIL
3105	6 562		CHK	SET MAG NAIL
3106	6 562		CHK	SET MAG NAIL
3107	6 562		CHK	SET MAG NAIL
10,000	6 562		GND	@ 1:58 PM
10,001	6 562		GND	@ 2:01 PM
3000	6 562		MON	V SHOT

JDD4 C&S 15 BLUE
JSGO C&S 14 BLUE 10/19/20

#3101 SET MAG NAIL IN NW COR STOP BAR @ NE BLAKELY AVE & NE COUNTRY CLUB RD.

#3105 SET MAG NAIL CENTER OF 3WAY NE COUNTRY RD & FORT WARD HILL NE RD.

#3106 SET MAG NAIL CENTER OF TOE JAM RD @ NE COUNTRY CLUB RD IN DOUBLE YELLOW & STRIPE.

#3107 SET MAG NAIL IN & DOUBLE YELLOW STRIPE 20FT +/- FROM 2 WAY SW STOP BAR.

#10,000 H20 SHOT
#10,001 H20 SHOT

Rite in the Rain

GEOS0000-0003 GEOS10Z0Z0JOG

COORD SYSTEM WA N NAD83
GEOID MODEL WA G18 GRS80

STORE	ROD	LINE	CODE	DESC
10,010	6 562		GND	
10,011	6 562		GND	
10,012	6 562		GND	
10,013	6 562		GND	
10,014	6 562		GND	
10,015	6 562		GND	
3002	6 562		CP	SET TEMP MARK
10,016	6 562		GND	
10,017	6 562		GND	
10,018	6 562		GND	
10,019	6 562		GND	
3000	"		MON	✓ SHOT

JOB4 CS15 BLUB
JSGO CS14 BLUB 10-20-20

Rite in the Rain.

GEOS0000-00003 GEOS101020 JOT

TQ 3104 Mm = 5 49

B/S @ 3002 Mm = 4 80 (360)

STORE	ROD	LINE	CODE	DESC
10,020	6 00		GND	IN WOODS
10,022	13 20		"	"
3002	4 80		CHKCP	BS ✓ Δ=-00-00-14"

JOPM CS15 OCV8

JSGO TS15 POX 10/20/20

HA = 188-57-16 ΔH +0.006

HD = 372.078 ΔV -0.012

PRISM

CIR

"

PRISM

Rite in the Rain

GEOS00000003



Rite in the Rain®
ALL-WEATHER
LEVEL
№ 311FX

BLAKELY HARBOR

Marine Survey

Project Info

Blakely Harbor, WA

Horiz. CRS:
NAD83 (2011), Wash. State Plane
North Zone

Units: US Survey Feet

Vertical Datum: NAVD88, Geoid 2018

Shifted to MLLW

Survey Crew:
Sam Werner
Dan Prince

Vessel:
S/V Perseverance

Rite in the Rain.

ARRIVED TO BAINBRIDGE ISLAND, WA AND DEA CONTROL Pt. 3001.

S. WERNER
D. PRINCE

MON. 10/19/20

CHECKING PERSEVERANCE INTO POINT 3001 USING WSRN CORRECTIONS.

KNOWN COORDS:
N: 222539.612 ft
E: 1225907.075 ft
Z: 31.910 ft (NAVD88)
34.341 ft (MLLW)

R10 rover on 2m fixed height rod = 6.562 ft
+ 0.6532 ft (bottom of quick release to APC)

TOTAL OFFSET = 7.215 ft

Hypack line 0048

Measured coords:
N: 222539.573 ft
E: 1225907.028 ft
Z: 31.969 ft (NAVD88)
34.400 (mllw)

Not the best check but lost fix frequently due to overlead trees.

Rite in the Rain

10/22/20 ~45°F

S. WERNER COLD/CLEAR

D. PRINCE

Single Beam Survey with Q-Boat

POSITION CHECK FOR Q-BOAT

@ Pt. 3001

KNOWN COORDS:

N: 222539.612 ft

E: 1225907.075 ft

Z: 31.910 ft (NAVD88)

34.341 ft (MLLW)

RECEIVING CORRECTIONS FROM WRSN USING INTVICOM

MV 2m = 6.56 ft

+ 0.2024 ft (ARC → APC)

6.762 ft

AUB MEASURED COORDS:

N: 222539.616 ft

E: 1225907.121 ft

Z: 31.945 ft (NAVD88)

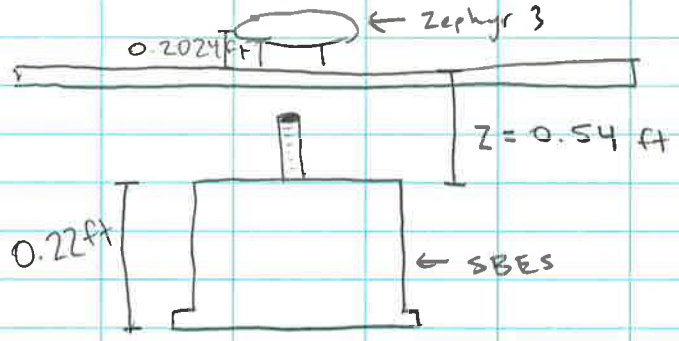
34.376 ft (MLLW)

HYDACK FILE 1214

GOOD CHECK. MOVING TO SURVEY

NEW Z MEASUREMENT FOR Zephyr 3 ROVER ANTENNA

FROM TOP OF LEVELING ROD TO TOP OF TRANSDUCER IN Q BOAT



Rite in the Rain

TOTAL Z of new set-up:

0.22ft
+ 0.54 ft
+ 0.2024 ft
0.9624 ft

RUNNING BAR CHECK

BAR DEPTH = 2.4 ft

1426 TEST LINE
↳ Logged data

BAR CHECK Line 1450
TIDE = -11.04

BEGINNING MS LINES

LINE	TIDE	
1504	10.94	
1506	10.98	
1508	10.94	
1510	10.85	
1516	10.92	
1518	10.87	- REJECT
1526	10.67	
1530	10.71	- REJECT
1532	10.57	
1535	10.61	
1538	10.45	
1542	10.54	
1544	10.45	
1547	10.41	
1552	10.43	
1555	10.36	
1559	10.33	
1601	10.25	
1603	10.20	
1604	10.17	

BATTERY IN LAPTOP DIED, BREAKING TO CHARGE

Rite in the Rain.

LINE	TIDE
1849	7.35
1850	7.25
1851	7.33
1852	7.32
1854	7.36
1854_0001	7.33
1855	7.30
1857	7.26
1859	7.23 - 1st line re-run
1900	7.23 - 2nd line
1904	7.24 - 3rd line
1907	Reject
1908	7.21 - 4th line
1910	7.16 - 5th line

↳ up against rocks @ SOL

Rite in the Rain.

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Survey Information

Horizontal Control	**Information**
RTK GNSS Base Station	Washington State Reference Network (WSRN)
- Station ID	
RTK GNSS Check In Point	DEA Control Point
- Station ID	3001
Horizontal Datum	NAD83(2011) Epoch 2010.0
Units	U.S Survey Feet
Coordinate System	Wahington State Plane North Zone
Vertical Control	**Information**
Vertical Datum	MLLW Epoch 1983-2011
Units	U.S. Survey Feet
Gauge or Base Location	
Additional Information	
Project Information	**Information**
Contract Number	
Task Order	
Contractor	David Evans and Associates, Inc.
Locality	Blakely, WA
Sub Locality	Bainbridge Island
Operations	Bathymetric Sonar
Comments	

Vessel Information

Sonar Equipment	**System**	**Serial Number or Version**
Bathymetric Sonar		
- Topside	Reson 7101	5110128
- Transmit		
- Receive		
Full Column SVP	Smart X	Housing: 200790
Surface SVP	Micro Base X	Housing: 206588
Secondary SVP		
Other		
Navigation	**System**	**Serial Number or Version**
Primary System	Applanix POS MV	
- IMU	LN200	750
- PCS	POS MV V5	7113
- Antenna 1		
- Antenna 2		
- Firmware Version		
Secondary System	Trimble R10 0075	
- IMU		
- PCS		
- Antenna 1		
- Antenna 2		
- Firmware Version		
Software	**System**	**Serial Number or Version**
Line Planning	HYPACK	2020
Primary Navigation	HYPACK SURVEY	
Multibeam Acquisition	HYSWEEP SURVEY	
Multibeam Processing	CARIS	11.3.8
POSMV Controller		
MVP Acquisition		
SVP Acquisition		
SVP Processing		
SVP Conversion		
Other		

Day Information

Date	**Information**
Local Date	10/21/21
Calendar Day	DN294
Weather	**Information**
Seas	
Wind Speed	
Comments	
Survey	**Information**
Hydrographer	
Registry Number Sheet	
Survey Vessel	
Survey Crew	
Vessel Crew	
Towing Point	

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/20/20 00:21:56	SOL	Start of Line 2020PE2940021
10/20/20 00:22:06	EOL	End of Line 2020PE2940021
10/20/20 00:48:32	SOL	Start of Line 2020PE2940048
10/20/20 00:49:10	EOL	End of Line 2020PE2940048
10/20/20 14:58:32	SYS	System Status Modified
10/20/20 14:58:34	CUS	Systems running on vessel
10/20/20 14:58:44	CUS	Receiving corrections from PRSN; fixed RTK
10/20/20 14:58:59	CUS	Plan of the day is to survey Blakely Harbor with 7101 MBES
10/20/20 15:22:34	CUS	(47:37:19.132 N, 122:31:13.350 W) Logging POSPAC and Vessel Rover files
10/20/20 15:22:44	CUS	(47:37:18.838 N, 122:31:13.208 W) Under way for survey area
10/20/20 16:06:14	SYS	System Status Modified
10/20/20 16:17:16	CUS	R10 dropping in and out - attempting to fix
10/20/20 16:39:15	CUS	(47:35:37.302 N, 122:29:46.832 W) Fixed issue by increasing baud rate coming from Intuicom and matching it on R10 @ 9600]
10/20/20 16:43:01	TGT	(47:35:42.014 N, 122:30:06.239 W) Adjusted Target: AML001_20201020 1228836.04 221493.13 83.73
10/20/20 16:50:21	SOL	(47:35:42.020 N, 122:30:03.499 W) Start of Line 2020PE2941650
10/20/20 16:50:45	SOL	(47:35:42.129 N, 122:30:04.775 W) SOL file= 20202941650.HSX
10/20/20 16:54:41	CUS	(47:35:43.678 N, 122:30:25.345 W) Total swath in reson UI is 140 deg
10/20/20 16:54:56	CUS	(47:35:43.795 N, 122:30:26.621 W) Total swath in reson UI is 140 deg - will increase to 150 when running shore passes in order to steer to 90 on either side
10/20/20 16:59:44	EOL	(47:35:45.616 N, 122:30:51.367 W) End of Line 2020PE2941650
10/20/20 17:00:50	TGT	(47:35:45.845 N, 122:30:51.768 W) Adjusted Target: AML002_20201020 1225673.63 221957.33 12.47
10/20/20 17:03:48	SOL	(47:35:45.460 N, 122:30:51.433 W) Start of Line 2020PE2941703
10/20/20 17:04:09	SVP	(47:35:45.446 N, 122:30:50.258 W) AML001 - before start of 1st line
10/20/20 17:04:22	SVP	(47:35:45.315 N, 122:30:49.119 W) AML002
10/20/20 17:04:30	SOL	(47:35:45.222 N, 122:30:48.407 W) SOL file= 20202941703.HSX
10/20/20 17:07:30	SYS	(47:35:43.791 N, 122:30:31.989 W) System Status Modified
10/20/20 17:12:51	EOL	(47:35:41.243 N, 122:30:03.052 W) End of Line 2020PE2941703
10/20/20 17:13:46	SOL	(47:35:40.221 N, 122:30:02.672 W) Start of Line 2020PE2941713
10/20/20 17:13:53	SOL	(47:35:40.269 N, 122:30:03.170 W) SOL file= 20202941713.HSX
10/20/20 17:23:26	EOL	(47:35:45.281 N, 122:30:51.383 W) End of Line 2020PE2941713
10/20/20 17:24:22	SOL	(47:35:45.213 N, 122:30:51.511 W) Start of Line 2020PE2941724
10/20/20 17:24:27	SOL	(47:35:45.197 N, 122:30:51.263 W) SOL file= 20202941724.HSX
10/20/20 17:29:26	TGT	(47:35:42.351 N, 122:30:27.208 W) Adjusted Target: AML003_20201020 1227281.07 221571.45 51.12
10/20/20 17:30:54	SVP	(47:35:41.890 N, 122:30:22.063 W) AML003
10/20/20 17:34:34	EOL	(47:35:39.430 N, 122:30:02.841 W) End of Line 2020PE2941724
10/20/20 17:35:11	SOL	(47:35:38.533 N, 122:30:02.953 W) Start of Line 2020PE2941735
10/20/20 17:35:18	SOL	(47:35:38.618 N, 122:30:03.596 W) SOL file= 20202941735.HSX
10/20/20 17:38:32	TGT	(47:35:41.260 N, 122:30:21.006 W) Adjusted Target: boat at anchor 1227808.66 221417.32 0.00
10/20/20 17:44:10	EOL	(47:35:45.089 N, 122:30:51.567 W) End of Line 2020PE2941735
10/20/20 17:45:00	SOL	(47:35:45.080 N, 122:30:51.639 W) Start of Line 2020PE2941745
10/20/20 17:45:08	SOL	(47:35:44.940 N, 122:30:51.046 W) SOL file= 20202941745.HSX
10/20/20 17:50:11	TGT	(47:35:41.274 N, 122:30:25.613 W) Adjusted Target: buoy 1227430.10 221449.74 0.00
10/20/20 17:54:38	EOL	(47:35:37.770 N, 122:30:02.792 W) End of Line 2020PE2941745
10/20/20 17:55:35	TGT	(47:35:37.067 N, 122:30:01.355 W) Adjusted Target: AML004_20201020 1229104.56 221004.07 75.26
10/20/20 18:00:09	SOL	(47:35:36.927 N, 122:30:02.853 W) Start of Line 2020PE2941800
10/20/20 18:00:17	SVP	(47:35:37.118 N, 122:30:03.410 W) AML005
10/20/20 18:00:25	SVP	(47:35:37.274 N, 122:30:04.049 W) AML004
10/20/20 18:00:29	SOL	(47:35:37.362 N, 122:30:04.371 W) SOL file= 20202941800.HSX
10/20/20 18:09:15	TGT	(47:35:44.020 N, 122:30:49.758 W) Adjusted Target: boat at anchor 1225885.09 221761.10 0.00
10/20/20 18:09:42	EOL	(47:35:44.871 N, 122:30:51.676 W) End of Line 2020PE2941800
10/20/20 18:10:33	SOL	(47:35:44.816 N, 122:30:51.884 W) Start of Line 2020PE2941810
10/20/20 18:10:39	SOL	(47:35:44.778 N, 122:30:51.532 W) SOL file= 20202941810.HSX
10/20/20 18:12:38	TGT	(47:35:42.402 N, 122:30:43.702 W) Adjusted Target: holiday 1225857.48 221772.27 0.00
10/20/20 18:17:13	TGT	(47:35:39.987 N, 122:30:18.552 W) Adjusted Target: AML005_20201020 1227899.28 221320.73 29.99
10/20/20 18:19:26	SVP	(47:35:38.427 N, 122:30:11.030 W) AML005
10/20/20 18:21:08	EOL	(47:35:36.499 N, 122:30:03.009 W) End of Line 2020PE2941810
10/20/20 18:22:00	SOL	(47:35:35.926 N, 122:30:03.365 W) Start of Line 2020PE2941822
10/20/20 18:22:05	SOL	(47:35:36.053 N, 122:30:03.708 W) SOL file= 20202941822.HSX
10/20/20 18:27:19	TGT	(47:35:40.245 N, 122:30:29.050 W) Adjusted Target: buoy 1227241.92 221333.86 0.00
10/20/20 18:32:04	EOL	(47:35:44.682 N, 122:30:51.991 W) End of Line 2020PE2941822
10/20/20 18:32:57	SOL	(47:35:44.608 N, 122:30:52.086 W) Start of Line 2020PE2941832
10/20/20 18:33:05	SOL	(47:35:44.605 N, 122:30:51.653 W) SOL file= 20202941833.HSX
10/20/20 18:33:08	SOL	(47:35:44.573 N, 122:30:51.495 W) SOL file= 20202941832.HSX
10/20/20 18:35:21	TGT	(47:35:41.660 N, 122:30:44.089 W) Adjusted Target: buoy 1226172.96 221535.60 0.00
10/20/20 18:35:44	TGT	(47:35:41.541 N, 122:30:42.609 W) Adjusted Target: AML006_20201020 1226235.28 221513.19 31.43
10/20/20 18:37:19	SVP	(47:35:40.827 N, 122:30:35.994 W) AML006
10/20/20 18:43:11	EOL	(47:35:35.471 N, 122:30:02.974 W) End of Line 2020PE2941832
10/20/20 18:43:44	SOL	(47:35:34.905 N, 122:30:02.990 W) Start of Line 2020PE2941843
10/20/20 18:43:52	SOL	(47:35:35.051 N, 122:30:03.495 W) SOL file= 20202941843.HSX
10/20/20 18:51:39	TGT	(47:35:40.973 N, 122:30:41.016 W) Adjusted Target: buoy 1226441.58 221446.39 0.00
10/20/20 18:51:56	TGT	(47:35:41.128 N, 122:30:42.457 W) Adjusted Target: buoy 1226332.63 221447.83 0.00
10/20/20 18:53:33	EOL	(47:35:43.592 N, 122:30:49.378 W) End of Line 2020PE2941843
10/20/20 18:54:08	SOL	(47:35:43.770 N, 122:30:50.168 W) Start of Line 2020PE2941854
10/20/20 18:54:14	SOL	(47:35:43.599 N, 122:30:49.774 W) SOL file= 20202941854.HSX
10/20/20 19:00:44	TGT	(47:35:39.912 N, 122:30:21.513 W) Adjusted Target: holiday? 1227498.83 221326.37 0.00
10/20/20 19:03:01	TGT	(47:35:36.989 N, 122:30:11.373 W) Adjusted Target: AML007_20201020 1228386.03 221009.13 22.64
10/20/20 19:04:15	SVP	(47:35:35.868 N, 122:30:07.103 W) AML_007
10/20/20 19:05:01	EOL	(47:35:34.462 N, 122:30:02.719 W) End of Line 2020PE2941854
10/20/20 19:05:43	SOL	(47:35:34.097 N, 122:30:02.800 W) Start of Line 2020PE2941905
10/20/20 19:05:51	SOL	(47:35:34.272 N, 122:30:03.420 W) SOL file= 20202941905.HSX
10/20/20 19:06:50	TGT	(47:35:35.596 N, 122:30:08.146 W) Adjusted Target: buoy 1228681.62 220859.26 0.00
10/20/20 19:14:43	EOL	(47:35:42.766 N, 122:30:47.264 W) End of Line 2020PE2941905
10/20/20 19:15:15	SOL	(47:35:43.000 N, 122:30:47.857 W) Start of Line 2020PE2941915
10/20/20 19:15:33	SOL	(47:35:42.356 N, 122:30:47.117 W) SOL file= 20202941915.HSX
10/20/20 19:19:14	EOL	(47:35:39.506 N, 122:30:28.747 W) End of Line 2020PE2941915
10/20/20 19:19:45	SOL	(47:35:39.461 N, 122:30:27.945 W) Start of Line 2020PE2941919
10/20/20 19:19:53	SOL	(47:35:39.366 N, 122:30:28.406 W) SOL file= 20202941919.HSX
10/20/20 19:23:06	CUS	(47:35:40.503 N, 122:30:44.854 W) Lost RTK fix briefly
10/20/20 19:23:42	EOL	(47:35:42.080 N, 122:30:46.517 W) End of Line 2020PE2941919
10/20/20 19:24:07	SOL	(47:35:42.220 N, 122:30:46.978 W) Start of Line 2020PE2941924
10/20/20 19:24:11	SOL	(47:35:42.037 N, 122:30:46.845 W) SOL file= 20202941924.HSX
10/20/20 19:27:38	EOL	(47:35:39.388 N, 122:30:29.186 W) End of Line 2020PE2941924
10/20/20 19:28:06	TGT	(47:35:40.585 N, 122:30:29.441 W) Adjusted Target: AML008_20201020 1227208.76 221365.28 37.47

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/20/20 19:31:45	SVP	(47:35:41.378 N, 122:30:30.751 W) AML008
10/20/20 19:33:09	SOL	(47:35:39.410 N, 122:30:29.230 W) Start of Line 2020PE2941933
10/20/20 19:33:14	SOL	(47:35:39.214 N, 122:30:29.373 W) SOL file= 20202941933.HSX
10/20/20 19:34:00	TGT	(47:35:38.543 N, 122:30:32.238 W) Adjusted Target: blowout holiday 1227109.88 221197.10 0.00
10/20/20 19:34:15	TGT	(47:35:38.564 N, 122:30:33.310 W) Adjusted Target: dock 1226954.41 221186.02 0.00
10/20/20 19:37:36	EOL	(47:35:41.796 N, 122:30:46.652 W) End of Line 2020PE2941933
10/20/20 19:38:04	SOL	(47:35:42.026 N, 122:30:46.881 W) Start of Line 2020PE2941938
10/20/20 19:38:13	SOL	(47:35:41.585 N, 122:30:46.691 W) SOL file= 20202941938.HSX
10/20/20 19:38:21	CUS	(47:35:41.159 N, 122:30:46.514 W) Lost RTK fix right at SOL
10/20/20 19:39:40	CUS	(47:35:39.731 N, 122:30:40.729 W) Losing fix frequently on this line
10/20/20 19:42:14	TGT	(47:35:39.295 N, 122:30:28.385 W) Adjusted Target: possible - holiday 1227175.67 221220.59 0.00
10/20/20 19:42:48	EOL	(47:35:40.006 N, 122:30:25.884 W) End of Line 2020PE2941938
10/20/20 19:43:09	TGT	(47:35:40.660 N, 122:30:24.890 W) Adjusted Target: holiday 1227341.93 221271.85 0.00
10/20/20 19:43:56	SOL	(47:35:40.014 N, 122:30:26.043 W) Start of Line 2020PE2941943
10/20/20 19:44:01	SOL	(47:35:40.001 N, 122:30:25.678 W) SOL file= 20202941943.HSX
10/20/20 19:48:15	EOL	(47:35:33.782 N, 122:30:02.489 W) End of Line 2020PE2941943
10/20/20 19:48:44	SOL	(47:35:33.231 N, 122:30:02.192 W) Start of Line 2020PE2941948
10/20/20 19:48:51	SOL	(47:35:33.376 N, 122:30:02.652 W) SOL file= 20202941948.HSX
10/20/20 19:49:07	TGT	(47:35:33.736 N, 122:30:03.758 W) Adjusted Target: AML009_20201020 1228792.58 220741.47 0.00
10/20/20 19:50:15	SVP	(47:35:34.936 N, 122:30:07.366 W) AML009
10/20/20 19:54:11	EOL	(47:35:39.983 N, 122:30:25.511 W) End of Line 2020PE2941948
10/20/20 19:54:54	SOL	(47:35:39.887 N, 122:30:26.269 W) Start of Line 2020PE2941954
10/20/20 19:55:18	SOL	(47:35:39.923 N, 122:30:24.705 W) SOL file= 20202941954.HSX
10/20/20 20:00:01	EOL	(47:35:32.988 N, 122:30:02.163 W) End of Line 2020PE2941954
10/20/20 20:08:46	SOL	(47:35:32.724 N, 122:30:02.610 W) Start of Line 2020PE2942008
10/20/20 20:08:58	SOL	(47:35:33.130 N, 122:30:03.706 W) SOL file= 20202942008.HSX
10/20/20 20:11:19	EOL	(47:35:38.042 N, 122:30:16.071 W) End of Line 2020PE2942008
10/20/20 20:11:55	SOL	(47:35:37.644 N, 122:30:15.257 W) Start of Line 2020PE2942011
10/20/20 20:11:59	SOL	(47:35:37.450 N, 122:30:15.045 W) SOL file= 20202942011.HSX
10/20/20 20:14:32	EOL	(47:35:32.555 N, 122:30:02.356 W) End of Line 2020PE2942011
10/20/20 20:15:02	SOL	(47:35:32.143 N, 122:30:02.328 W) Start of Line 2020PE2942015
10/20/20 20:15:20	TGT	(47:35:32.483 N, 122:30:03.215 W) Adjusted Target: AML010_20201020 1228842.92 220596.05 0.00
10/20/20 20:17:27	SVP	(47:35:35.278 N, 122:30:10.532 W) AML010
10/20/20 20:17:37	SOL	(47:35:35.425 N, 122:30:11.251 W) SOL file= 20202942015.HSX
10/20/20 20:18:23	EOL	(47:35:36.650 N, 122:30:13.999 W) End of Line 2020PE2942015
10/20/20 20:18:56	SOL	(47:35:36.331 N, 122:30:13.497 W) Start of Line 2020PE2942018
10/20/20 20:19:00	SOL	(47:35:36.146 N, 122:30:13.431 W) SOL file= 20202942018.HSX
10/20/20 20:21:26	EOL	(47:35:32.076 N, 122:30:02.465 W) End of Line 2020PE2942018
10/20/20 20:22:25	SOL	(47:35:31.805 N, 122:30:02.397 W) Start of Line 2020PE2942022
10/20/20 20:22:29	SOL	(47:35:31.856 N, 122:30:02.726 W) SOL file= 20202942022.HSX
10/20/20 20:23:15	TGT	(47:35:33.144 N, 122:30:05.984 W) Adjusted Target: possible obstruction 1228883.95 220511.83 0.00
10/20/20 20:24:28	EOL	(47:35:35.408 N, 122:30:11.435 W) End of Line 2020PE2942022
10/20/20 20:24:53	SOL	(47:35:35.481 N, 122:30:10.961 W) Start of Line 2020PE2942024
10/20/20 20:24:57	SOL	(47:35:35.253 N, 122:30:10.744 W) SOL file= 20202942024.HSX
10/20/20 20:26:36	EOL	(47:35:31.696 N, 122:30:02.352 W) End of Line 2020PE2942024
10/20/20 20:28:59	TGT	(47:35:41.611 N, 122:30:01.533 W) Adjusted Target: AML011_20201020 1229122.30 221429.21 90.55
10/20/20 20:30:32	SVP	(47:35:42.094 N, 122:30:02.453 W) AML_011
10/20/20 20:30:38	SVP	(47:35:42.105 N, 122:30:02.496 W) AML011
10/20/20 20:32:13	SOL	(47:35:42.887 N, 122:30:02.830 W) Start of Line 2020PE2942032
10/20/20 20:32:22	SOL	(47:35:42.945 N, 122:30:03.628 W) SOL file= 20202942032.HSX
10/20/20 20:40:46	TGT	(47:35:45.873 N, 122:30:49.649 W) Adjusted Target: buoy 1225864.50 221954.86 0.00
10/20/20 20:41:02	EOL	(47:35:45.746 N, 122:30:51.138 W) End of Line 2020PE2942032
10/20/20 20:41:45	SOL	(47:35:45.943 N, 122:30:51.262 W) Start of Line 2020PE2942041
10/20/20 20:42:01	SOL	(47:35:46.098 N, 122:30:50.031 W) SOL file= 20202942041.HSX
10/20/20 20:42:51	TGT	(47:35:45.619 N, 122:30:45.978 W) Adjusted Target: sailboat 1226043.86 221946.16 0.00
10/20/20 20:45:00	TGT	(47:35:45.356 N, 122:30:34.140 W) Adjusted Target: AML012_20201020 1227036.19 221866.47 0.00
10/20/20 20:47:34	SVP	(47:35:44.609 N, 122:30:22.266 W) AML012
10/20/20 20:51:11	EOL	(47:35:43.772 N, 122:30:02.570 W) End of Line 2020PE2942041
10/20/20 20:52:00	SOL	(47:35:44.328 N, 122:30:02.704 W) Start of Line 2020PE2942052
10/20/20 20:52:05	SOL	(47:35:44.329 N, 122:30:03.141 W) SOL file= 20202942052.HSX
10/20/20 21:01:02	EOL	(47:35:45.868 N, 122:30:51.250 W) End of Line 2020PE2942052
10/20/20 21:01:49	SOL	(47:35:46.073 N, 122:30:51.241 W) Start of Line 2020PE2942101
10/20/20 21:01:59	SOL	(47:35:46.221 N, 122:30:50.593 W) SOL file= 20202942101.HSX
10/20/20 21:02:37	TGT	(47:35:46.534 N, 122:30:47.921 W) Adjusted Target: buoy 1225896.44 222027.12 0.00
10/20/20 21:10:31	EOL	(47:35:44.976 N, 122:30:02.508 W) End of Line 2020PE2942101
10/20/20 21:11:02	SOL	(47:35:45.396 N, 122:30:02.121 W) Start of Line 2020PE2942111
10/20/20 21:11:25	TGT	(47:35:45.416 N, 122:30:03.793 W) Adjusted Target: AML013_20201020 1228823.01 221854.34 0.00
10/20/20 21:12:36	SVP	(47:35:45.347 N, 122:30:08.312 W) AML_013
10/20/20 21:12:40	SVP	(47:35:45.352 N, 122:30:08.650 W) AML013
10/20/20 21:13:53	SOL	(47:35:45.597 N, 122:30:15.362 W) SOL file= 20202942111.HSX
10/20/20 21:20:02	EOL	(47:35:45.991 N, 122:30:51.313 W) End of Line 2020PE2942111
10/20/20 21:20:49	SOL	(47:35:46.169 N, 122:30:51.510 W) Start of Line 2020PE2942120
10/20/20 21:21:00	SOL	(47:35:46.374 N, 122:30:50.792 W) SOL file= 20202942120.HSX
10/20/20 21:22:21	TGT	(47:35:46.804 N, 122:30:45.175 W) Adjusted Target: boat at dock 1226115.18 222058.74 0.00
10/20/20 21:29:45	EOL	(47:35:45.877 N, 122:30:03.221 W) End of Line 2020PE2942120
10/20/20 21:30:34	SOL	(47:35:46.109 N, 122:30:03.314 W) Start of Line 2020PE2942130
10/20/20 21:30:41	SOL	(47:35:46.121 N, 122:30:04.043 W) SOL file= 20202942130.HSX
10/20/20 21:34:34	TGT	(47:35:47.057 N, 122:30:27.625 W) Adjusted Target: AML014_20201020 1227382.05 222035.35 30.45
10/20/20 21:35:50	SVP	(47:35:47.234 N, 122:30:32.740 W) AML014
10/20/20 21:36:21	TGT	(47:35:47.033 N, 122:30:35.552 W) Adjusted Target: boat at anchor 1226824.17 222063.99 0.00
10/20/20 21:39:05	TGT	(47:35:47.059 N, 122:30:49.322 W) Adjusted Target: partially submerged rocks 1225883.55 222153.14 0.00
10/20/20 21:39:36	EOL	(47:35:46.214 N, 122:30:51.402 W) End of Line 2020PE2942130
10/20/20 21:40:25	SOL	(47:35:46.355 N, 122:30:51.742 W) Start of Line 2020PE2942140
10/20/20 21:40:31	SOL	(47:35:46.402 N, 122:30:51.466 W) SOL file= 20202942140.HSX
10/20/20 21:47:08	TGT	(47:35:47.304 N, 122:30:26.917 W) Adjusted Target: cluster of baring piles 1227320.46 222089.65 0.00
10/20/20 21:49:47	TGT	(47:35:46.734 N, 122:30:15.636 W) Adjusted Target: buoy 1228075.80 222006.51 0.00
10/20/20 21:52:08	EOL	(47:35:46.418 N, 122:30:03.335 W) End of Line 2020PE2942140
10/20/20 21:52:54	SOL	(47:35:46.584 N, 122:30:03.417 W) Start of Line 2020PE2942152
10/20/20 21:52:59	SOL	(47:35:46.530 N, 122:30:03.878 W) SOL file= 20202942152.HSX
10/20/20 21:54:13	TGT	(47:35:46.773 N, 122:30:10.722 W) Adjusted Target: buoy 1228567.70 221984.71 0.00
10/20/20 22:00:23	EOL	(47:35:46.785 N, 122:30:45.012 W) End of Line 2020PE2942152
10/20/20 22:00:57	TGT	(47:35:46.538 N, 122:30:45.669 W) Adjusted Target: AML015_20201020 1226100.45 222022.58 30.58
10/20/20 22:02:27	SVP	(47:35:46.118 N, 122:30:46.221 W) AML015
10/20/20 22:03:40	SOL	(47:35:46.998 N, 122:30:44.084 W) Start of Line 2020PE2942203
10/20/20 22:05:00	SOL	(47:35:47.539 N, 122:30:38.836 W) SOL file= 20202942203.HSX
10/20/20 22:14:00	EOL	(47:35:46.822 N, 122:30:03.262 W) End of Line 2020PE2942203

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/20/20 22:16:09	CUS	(47:35:45.668 N, 122:30:00.143 W) Time to run a patch
10/20/20 22:19:24	SOL	(47:35:41.066 N, 122:30:18.877 W) Start of Line 2020PE2942219
10/20/20 22:19:28	PAT	(47:35:40.967 N, 122:30:18.961 W) SOL file= 20202942219.HSX
10/20/20 22:19:57	EOL	(47:35:39.637 N, 122:30:19.990 W) End of Line 2020PE2942219
10/20/20 22:20:41	SOL	(47:35:39.375 N, 122:30:20.223 W) Start of Line 2020PE2942220
10/20/20 22:20:46	PAT	(47:35:39.466 N, 122:30:20.195 W) SOL file= 20202942220.HSX
10/20/20 22:21:31	EOL	(47:35:41.209 N, 122:30:18.957 W) End of Line 2020PE2942220
10/20/20 22:24:31	SOL	(47:35:40.735 N, 122:30:17.645 W) Start of Line 2020PE2942224
10/20/20 22:24:39	PAT	(47:35:40.355 N, 122:30:17.950 W) SOL file= 20202942224.HSX
10/20/20 22:25:04	EOL	(47:35:39.146 N, 122:30:18.889 W) End of Line 2020PE2942224
10/20/20 22:25:51	SOL	(47:35:39.068 N, 122:30:19.011 W) Start of Line 2020PE2942225
10/20/20 22:25:58	PAT	(47:35:39.272 N, 122:30:18.928 W) SOL file= 20202942225.HSX
10/20/20 22:26:31	EOL	(47:35:40.933 N, 122:30:17.698 W) End of Line 2020PE2942225
10/20/20 22:27:11	SOL	(47:35:40.283 N, 122:30:16.453 W) Start of Line 2020PE2942227
10/20/20 22:27:15	PAT	(47:35:40.065 N, 122:30:16.671 W) SOL file= 20202942227.HSX
10/20/20 22:27:39	EOL	(47:35:38.786 N, 122:30:17.697 W) End of Line 2020PE2942227
10/20/20 22:28:32	SOL	(47:35:38.750 N, 122:30:17.836 W) Start of Line 2020PE2942228
10/20/20 22:28:34	PAT	(47:35:38.833 N, 122:30:17.787 W) SOL file= 20202942228.HSX
10/20/20 22:29:11	EOL	(47:35:40.538 N, 122:30:16.520 W) End of Line 2020PE2942228
10/20/20 22:31:44	CUS	(47:35:42.877 N, 122:30:16.476 W) Good patch; running XL
10/20/20 22:33:30	SOL	(47:35:47.132 N, 122:30:11.130 W) Start of Line 2020PE2942233
10/20/20 22:33:37	XLN	(47:35:46.843 N, 122:30:11.275 W) SOL file= 20202942233.HSX
10/20/20 22:36:00	EOL	(47:35:37.756 N, 122:30:14.796 W) End of Line 2020PE2942233
10/20/20 22:37:50	SOL	(47:35:39.890 N, 122:30:22.103 W) Start of Line 2020PE2942237
10/20/20 22:37:54	XLN	(47:35:40.070 N, 122:30:22.126 W) SOL file= 20202942237.HSX
10/20/20 22:40:03	EOL	(47:35:47.909 N, 122:30:21.473 W) End of Line 2020PE2942237
10/20/20 22:43:05	SOL	(47:35:47.611 N, 122:30:33.473 W) Start of Line 2020PE2942243
10/20/20 22:43:07	XLN	(47:35:47.541 N, 122:30:33.531 W) SOL file= 20202942243.HSX
10/20/20 22:45:39	EOL	(47:35:38.664 N, 122:30:34.629 W) End of Line 2020PE2942243
10/20/20 22:47:51	SOL	(47:35:40.245 N, 122:30:43.948 W) Start of Line 2020PE2942247
10/20/20 22:48:01	XLN	(47:35:40.812 N, 122:30:43.788 W) SOL file= 20202942247.HSX
10/20/20 22:49:34	EOL	(47:35:47.098 N, 122:30:42.218 W) End of Line 2020PE2942247
10/20/20 22:50:18	CUS	(47:35:46.802 N, 122:30:41.886 W) Good XL; collecting bar check now
10/20/20 22:52:56	CUS	(47:35:44.585 N, 122:30:43.097 W) Draft of 0.1 ft
10/20/20 22:53:54	CUS	(47:35:44.583 N, 122:30:43.552 W) Raw sonar depth to bar of approx 1.22m
10/20/20 22:55:11	CUS	(47:35:44.618 N, 122:30:44.173 W) Raw sonar depth to bar of approx 1.22m; bar held at 2m below WL
10/20/20 22:55:19	SOL	(47:35:44.623 N, 122:30:44.235 W) Start of Line 2020PE2942255
10/20/20 22:55:23	CUS	(47:35:44.626 N, 122:30:44.265 W) Bar check line 2255
10/20/20 22:56:00	EOL	(47:35:44.631 N, 122:30:44.532 W) End of Line 2020PE2942255
10/20/20 22:57:15	TGT	(47:35:44.580 N, 122:30:45.366 W) Adjusted Target: bar check 1226179.82 221831.78 0.00
10/20/20 22:58:24	SOL	(47:35:47.154 N, 122:30:43.866 W) Start of Line 2020PE2942258
10/20/20 22:58:29	SOL	(47:35:47.246 N, 122:30:43.637 W) SOL file= 20202942258.HSX
10/20/20 23:02:21	TGT	(47:35:47.977 N, 122:30:28.622 W) Adjusted Target: buoy 1227224.54 222155.16 0.00
10/20/20 23:04:21	EOL	(47:35:47.571 N, 122:30:23.579 W) End of Line 2020PE2942258
10/20/20 23:05:14	SOL	(47:35:47.639 N, 122:30:23.517 W) Start of Line 2020PE2942305
10/20/20 23:05:18	SOL	(47:35:47.799 N, 122:30:23.628 W) SOL file= 20202942305.HSX
10/20/20 23:05:59	TGT	(47:35:48.447 N, 122:30:25.650 W) Adjusted Target: swim platform 1227506.76 222170.60 0.00
10/20/20 23:06:19	TGT	(47:35:48.309 N, 122:30:26.566 W) Adjusted Target: swim platform 1227434.91 222167.11 0.00
10/20/20 23:07:12	EOL	(47:35:47.930 N, 122:30:29.202 W) End of Line 2020PE2942305
10/20/20 23:07:54	TGT	(47:35:45.660 N, 122:30:30.230 W) Adjusted Target: AML016_20201020 1227133.29 221940.75 46.69
10/20/20 23:09:16	SVP	(47:35:44.883 N, 122:30:29.560 W) AML016
10/20/20 23:11:07	CUS	(47:35:45.134 N, 122:30:29.865 W) Steering sonar 15 degrees to Stbd to spray inside piles
10/20/20 23:12:47	SOL	(47:35:48.069 N, 122:30:24.564 W) Start of Line 2020PE2942312
10/20/20 23:13:02	SOL	(47:35:48.085 N, 122:30:25.312 W) SOL file= 20202942312.HSX
10/20/20 23:13:15	SOL	(47:35:48.006 N, 122:30:26.039 W) SOL file= 20202942312.HSX
10/20/20 23:14:17	EOL	(47:35:47.908 N, 122:30:28.847 W) End of Line 2020PE2942312
10/20/20 23:14:29	CUS	(47:35:47.810 N, 122:30:29.483 W) Now 15 degrees to port
10/20/20 23:16:01	SOL	(47:35:47.753 N, 122:30:28.885 W) Start of Line 2020PE2942316
10/20/20 23:16:13	SOL	(47:35:47.772 N, 122:30:28.287 W) SOL file= 20202942316.HSX
10/20/20 23:17:58	EOL	(47:35:47.718 N, 122:30:24.001 W) End of Line 2020PE2942316
10/20/20 23:19:12	SOL	(47:35:48.080 N, 122:30:23.989 W) Start of Line 2020PE2942319
10/20/20 23:19:24	SOL	(47:35:48.496 N, 122:30:24.358 W) SOL file= 20202942319.HSX
10/20/20 23:23:59	EOL	(47:35:46.785 N, 122:30:44.722 W) End of Line 2020PE2942319
10/20/20 23:24:49	SOL	(47:35:47.305 N, 122:30:43.301 W) Start of Line 2020PE2942324
10/20/20 23:24:51	SOL	(47:35:47.367 N, 122:30:43.172 W) SOL file= 20202942324.HSX
10/20/20 23:29:10	EOL	(47:35:47.909 N, 122:30:23.827 W) End of Line 2020PE2942324
10/20/20 23:29:31	SOL	(47:35:47.628 N, 122:30:22.749 W) Start of Line 2020PE2942329
10/20/20 23:29:49	SOL	(47:35:47.919 N, 122:30:22.011 W) SOL file= 20202942329.HSX
10/20/20 23:34:54	EOL	(47:35:47.024 N, 122:30:03.012 W) End of Line 2020PE2942329
10/20/20 23:35:33	TGT	(47:35:45.413 N, 122:30:01.851 W) Adjusted Target: AML017_20201020 1229095.13 221855.09 38.52
10/20/20 23:35:48	SVP	(47:35:45.295 N, 122:30:01.881 W) AML017
10/20/20 23:38:16	CUS	(47:35:44.902 N, 122:30:02.030 W) Done with acquisition for the day; pulling gear and beginning transit back to marina

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Survey Information

Horizontal Control	**Information**
RTK GNSS Base Station	Washington State Reference Network (WSRN)
- Station ID	
RTK GNSS Check In Point	DEA Control Point
- Station ID	3001
Horizontal Datum	NAD83(2011) Epoch 2010.0
Units	U.S Survey Feet
Coordinate System	Wahington State Plane North Zone
Vertical Control	**Information**
Vertical Datum	MLLW Epoch 1983-2011
Units	U.S. Survey Feet
Gauge or Base Location	
Additional Information	
Project Information	**Information**
Contract Number	
Task Order	
Contractor	David Evans and Associates, Inc.
Locality	Blakely, WA
Sub Locality	Bainbridge Island
Operations	Bathymetric Sonar
Comments	

Vessel Information

Sonar Equipment	**System**	**Serial Number or Version**
Bathymetric Sonar		
- Topside	Reson 7101	5110128
- Transmit		
- Receive		
Full Column SVP	Smart X	Housing: 200790
Surface SVP	Micro Base X	Housing: 206588
Secondary SVP		
Other		
Navigation	**System**	**Serial Number or Version**
Primary System	Applanix POS MV	
- IMU	LN200	750
- PCS	POS MV V5	7113
- Antenna 1		
- Antenna 2		
- Firmware Version		
Secondary System	Trimble R10 0075	
- IMU		
- PCS		
- Antenna 1		
- Antenna 2		
- Firmware Version		
Software	**System**	**Serial Number or Version**
Line Planning	HYPACK	2020
Primary Navigation	HYPACK SURVEY	
Multibeam Acquisition	HYSWEEP SURVEY	
Multibeam Processing	CARIS	11.3.8
POSMV Controller		
MVP Acquisition		
SVP Acquisition		
SVP Processing		
SVP Conversion		
Other		

Day Information

Date	**Information**
Local Date	10/22/21
Calendar Day	DN295
Weather	**Information**
Seas	
Wind Speed	
Comments	
Survey	**Information**
Hydrographer	
Registry Number Sheet	
Survey Vessel	
Survey Crew	
Vessel Crew	
Towing Point	

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/21/20 15:01:21	SYS	(47:37:16.184 N, 122:31:12.053 W) System Status Modified
10/21/20 15:01:31	CUS	(47:37:15.756 N, 122:31:11.811 W) Under way for survey area
10/21/20 15:01:38	CUS	(47:37:15.467 N, 122:31:11.604 W) Logging POSPAC and Vessel Rover files
10/21/20 15:24:22	TGT	(47:35:45.073 N, 122:29:51.581 W) Adjusted Target: AML001_20201021 1229787.63 221769.58 86.94
10/21/20 15:25:58	CUS	(47:35:45.357 N, 122:29:50.990 W) On site; gear deployed
10/21/20 15:26:05	SVP	(47:35:45.382 N, 122:29:50.940 W) AML001
10/21/20 15:29:36	SOL	(47:35:47.175 N, 122:30:02.889 W) Start of Line 2020PE2951529
10/21/20 15:29:40	SOL	(47:35:47.198 N, 122:30:03.285 W) SOL file= 20202951529.HSX
10/21/20 15:30:50	TGT	(47:35:47.320 N, 122:30:09.821 W) Adjusted Target: swim platform 1228588.50 222052.33 0.00
10/21/20 15:31:21	TGT	(47:35:47.628 N, 122:30:12.037 W) Adjusted Target: swim platform 1228434.37 222069.33 0.00
10/21/20 15:32:15	EOL	(47:35:47.353 N, 122:30:15.453 W) End of Line 2020PE2951529
10/21/20 15:33:26	SOL	(47:35:47.316 N, 122:30:14.772 W) Start of Line 2020PE2951533
10/21/20 15:33:29	SOL	(47:35:47.353 N, 122:30:14.603 W) SOL file= 20202951533.HSX
10/21/20 15:35:21	EOL	(47:35:47.508 N, 122:30:08.200 W) End of Line 2020PE2951533
10/21/20 15:36:46	SOL	(47:35:47.427 N, 122:30:02.760 W) Start of Line 2020PE2951536
10/21/20 15:36:51	SOL	(47:35:47.419 N, 122:30:03.174 W) SOL file= 20202951536.HSX
10/21/20 15:39:31	EOL	(47:35:47.225 N, 122:30:14.282 W) End of Line 2020PE2951536
10/21/20 15:40:35	SOL	(47:35:47.963 N, 122:30:12.993 W) Start of Line 2020PE2951540
10/21/20 15:40:49	SOL	(47:35:48.044 N, 122:30:12.082 W) SOL file= 20202951540.HSX
10/21/20 15:42:32	CUS	(47:35:47.689 N, 122:30:04.107 W) Bumping total swath to 150 degrees starting next line
10/21/20 15:42:57	EOL	(47:35:47.624 N, 122:30:01.878 W) End of Line 2020PE2951540
10/21/20 15:44:26	SOL	(47:35:47.798 N, 122:30:03.424 W) Start of Line 2020PE2951544
10/21/20 15:44:29	SOL	(47:35:47.781 N, 122:30:03.626 W) SOL file= 20202951544.HSX
10/21/20 15:47:54	EOL	(47:35:47.332 N, 122:30:14.098 W) End of Line 2020PE2951544
10/21/20 15:50:15	SOL	(47:35:47.516 N, 122:30:14.016 W) Start of Line 2020PE2951550
10/21/20 15:51:16	SOL	(47:35:48.078 N, 122:30:10.714 W) SOL file= 20202951551.HSX
10/21/20 15:52:47	EOL	(47:35:47.810 N, 122:30:03.281 W) End of Line 2020PE2951550
10/21/20 15:54:10	SOL	(47:35:47.793 N, 122:30:03.859 W) Start of Line 2020PE2951554
10/21/20 15:54:14	SOL	(47:35:47.782 N, 122:30:04.156 W) SOL file= 20202951554.HSX
10/21/20 15:57:45	EOL	(47:35:47.390 N, 122:30:15.565 W) End of Line 2020PE2951554
10/21/20 15:58:37	TGT	(47:35:45.816 N, 122:30:17.712 W) Adjusted Target: AML002_20201021 1227997.17 221934.40 45.44
10/21/20 15:59:05	SVP	(47:35:45.370 N, 122:30:17.350 W) AML002
10/21/20 16:01:27	SOL	(47:35:46.931 N, 122:30:15.620 W) Start of Line 2020PE2951601
10/21/20 16:01:36	SOL	(47:35:47.315 N, 122:30:15.818 W) SOL file= 20202951601.HSX
10/21/20 16:03:15	EOL	(47:35:47.424 N, 122:30:20.201 W) End of Line 2020PE2951601
10/21/20 16:04:20	SOL	(47:35:47.493 N, 122:30:18.450 W) Start of Line 2020PE2951604
10/21/20 16:04:25	SOL	(47:35:47.692 N, 122:30:18.394 W) SOL file= 20202951604.HSX
10/21/20 16:05:51	EOL	(47:35:47.312 N, 122:30:16.109 W) End of Line 2020PE2951604
10/21/20 16:06:47	SOL	(47:35:47.326 N, 122:30:15.971 W) Start of Line 2020PE2951606
10/21/20 16:06:51	SOL	(47:35:47.448 N, 122:30:16.054 W) SOL file= 20202951606.HSX
10/21/20 16:08:39	EOL	(47:35:47.451 N, 122:30:18.495 W) End of Line 2020PE2951606
10/21/20 16:10:12	SOL	(47:35:47.681 N, 122:30:18.428 W) Start of Line 2020PE2951610
10/21/20 16:10:15	SOL	(47:35:47.790 N, 122:30:18.397 W) SOL file= 20202951610.HSX
10/21/20 16:11:57	EOL	(47:35:47.794 N, 122:30:16.325 W) End of Line 2020PE2951610
10/21/20 16:12:40	SOL	(47:35:47.358 N, 122:30:18.807 W) Start of Line 2020PE2951612
10/21/20 16:12:56	SOL	(47:35:47.395 N, 122:30:19.753 W) SOL file= 20202951612.HSX
10/21/20 16:14:16	EOL	(47:35:47.621 N, 122:30:22.300 W) End of Line 2020PE2951612
10/21/20 16:15:01	SOL	(47:35:47.718 N, 122:30:22.165 W) Start of Line 2020PE2951615
10/21/20 16:15:06	SOL	(47:35:47.948 N, 122:30:22.224 W) SOL file= 20202951615.HSX
10/21/20 16:16:17	EOL	(47:35:48.238 N, 122:30:19.701 W) End of Line 2020PE2951615
10/21/20 16:16:55	SOL	(47:35:48.491 N, 122:30:19.580 W) Start of Line 2020PE2951616
10/21/20 16:17:02	SOL	(47:35:48.610 N, 122:30:20.015 W) SOL file= 20202951616.HSX
10/21/20 16:17:55	EOL	(47:35:47.940 N, 122:30:22.265 W) End of Line 2020PE2951616
10/21/20 16:18:42	SOL	(47:35:48.216 N, 122:30:19.687 W) Start of Line 2020PE2951618
10/21/20 16:18:47	SOL	(47:35:48.312 N, 122:30:19.490 W) SOL file= 20202951618.HSX
10/21/20 16:20:10	EOL	(47:35:48.209 N, 122:30:22.069 W) End of Line 2020PE2951618
10/21/20 16:21:15	SOL	(47:35:48.478 N, 122:30:22.512 W) Start of Line 2020PE2951621
10/21/20 16:21:19	SOL	(47:35:48.535 N, 122:30:22.663 W) SOL file= 20202951621.HSX
10/21/20 16:23:25	EOL	(47:35:47.934 N, 122:30:20.687 W) End of Line 2020PE2951621
10/21/20 16:23:28	CUS	(47:35:47.909 N, 122:30:20.792 W) Lost fix briefly on last line
10/21/20 16:23:59	TGT	(47:35:47.604 N, 122:30:21.536 W) Adjusted Target: AML003_20201021 1227762.93 222106.10 27.95
10/21/20 16:26:09	SOL	(47:35:48.498 N, 122:30:19.157 W) Start of Line 2020PE2951626
10/21/20 16:26:17	SOL	(47:35:48.767 N, 122:30:19.113 W) SOL file= 20202951626.HSX
10/21/20 16:28:04	EOL	(47:35:48.410 N, 122:30:22.546 W) End of Line 2020PE2951626
10/21/20 16:29:04	SOL	(47:35:48.444 N, 122:30:22.581 W) Start of Line 2020PE2951629
10/21/20 16:29:23	SOL	(47:35:48.871 N, 122:30:23.005 W) SOL file= 20202951629.HSX
10/21/20 16:30:45	EOL	(47:35:48.972 N, 122:30:19.010 W) End of Line 2020PE2951629
10/21/20 16:33:19	SOL	(47:35:47.760 N, 122:30:23.675 W) Start of Line 2020PE2951633
10/21/20 16:33:23	SOL	(47:35:47.871 N, 122:30:23.766 W) SOL file= 20202951633.HSX
10/21/20 16:38:18	EOL	(47:35:46.855 N, 122:30:44.855 W) End of Line 2020PE2951633
10/21/20 16:39:07	SOL	(47:35:47.159 N, 122:30:44.594 W) Start of Line 2020PE2951639
10/21/20 16:39:12	SOL	(47:35:47.329 N, 122:30:44.513 W) SOL file= 20202951639.HSX
10/21/20 16:41:22	SVP	(47:35:48.540 N, 122:30:34.649 W) AML003 - 10 mins ago
10/21/20 16:44:24	EOL	(47:35:47.873 N, 122:30:24.229 W) End of Line 2020PE2951639
10/21/20 16:44:57	SOL	(47:35:48.121 N, 122:30:23.792 W) Start of Line 2020PE2951644
10/21/20 16:45:18	SOL	(47:35:49.069 N, 122:30:23.945 W) SOL file= 20202951644.HSX
10/21/20 16:49:41	EOL	(47:35:46.936 N, 122:30:44.758 W) End of Line 2020PE2951644
10/21/20 16:50:27	SOL	(47:35:47.098 N, 122:30:44.621 W) Start of Line 2020PE2951650
10/21/20 16:50:47	SOL	(47:35:47.569 N, 122:30:43.904 W) SOL file= 20202951650.HSX
10/21/20 16:55:17	EOL	(47:35:47.553 N, 122:30:23.573 W) End of Line 2020PE2951650
10/21/20 16:55:38	TGT	(47:35:46.973 N, 122:30:23.170 W) Adjusted Target: AML004_20201021 1227621.79 222053.09 36.88
10/21/20 16:55:48	SVP	(47:35:46.880 N, 122:30:23.037 W) AML004
10/21/20 17:00:18	SOL	(47:35:46.639 N, 122:30:44.879 W) Start of Line 2020PE2951700
10/21/20 17:00:26	SOL	(47:35:46.694 N, 122:30:45.407 W) SOL file= 20202951700.HSX
10/21/20 17:02:25	EOL	(47:35:46.191 N, 122:30:51.726 W) End of Line 2020PE2951700
10/21/20 17:02:54	SOL	(47:35:46.205 N, 122:30:52.346 W) Start of Line 2020PE2951702
10/21/20 17:03:05	SOL	(47:35:46.506 N, 122:30:51.939 W) SOL file= 20202951702.HSX
10/21/20 17:04:55	EOL	(47:35:47.010 N, 122:30:46.080 W) End of Line 2020PE2951702
10/21/20 17:05:41	SOL	(47:35:47.183 N, 122:30:46.165 W) Start of Line 2020PE2951705
10/21/20 17:05:45	SOL	(47:35:47.295 N, 122:30:46.051 W) SOL file= 20202951705.HSX
10/21/20 17:08:07	EOL	(47:35:46.250 N, 122:30:52.596 W) End of Line 2020PE2951705
10/21/20 17:09:15	TGT	(47:35:46.255 N, 122:30:48.000 W) Adjusted Target: holiday 1226027.75 221972.05 0.00
10/21/20 17:09:51	SOL	(47:35:47.225 N, 122:30:46.145 W) Start of Line 2020PE2951709

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/21/20 17:09:57	SOL	(47:35:47.408 N, 122:30:46.059 W) SOL file= 20202951709.HSX
10/21/20 17:11:29	EOL	(47:35:46.924 N, 122:30:49.796 W) End of Line 2020PE2951709
10/21/20 17:11:37	CUS	(47:35:46.616 N, 122:30:49.901 W) Lost RTK right at EOL
10/21/20 17:12:37	SOL	(47:35:47.312 N, 122:30:46.129 W) Start of Line 2020PE2951712
10/21/20 17:12:41	SOL	(47:35:47.430 N, 122:30:46.082 W) SOL file= 20202951712.HSX
10/21/20 17:14:08	EOL	(47:35:46.955 N, 122:30:49.787 W) End of Line 2020PE2951712
10/21/20 17:14:36	TGT	(47:35:46.189 N, 122:30:50.420 W) Adjusted Target: AML005_20201021 1225791.34 222031.82 16.24
10/21/20 17:14:49	SVP	(47:35:46.055 N, 122:30:50.622 W) AML005
10/21/20 17:17:18	SOL	(47:35:44.566 N, 122:30:52.061 W) Start of Line 2020PE2951717
10/21/20 17:17:30	SOL	(47:35:44.434 N, 122:30:51.504 W) SOL file= 20202951717.HSX
10/21/20 17:17:38	CUS	(47:35:44.219 N, 122:30:50.959 W) Lost RTK at SOL
10/21/20 17:17:47	CUS	(47:35:43.885 N, 122:30:50.387 W) Lost RTK at SOL and a few time along line; shadowed by trees
10/21/20 17:29:14	EOL	(47:35:31.495 N, 122:30:02.329 W) End of Line 2020PE2951717
10/21/20 17:30:12	TGT	(47:35:31.630 N, 122:30:00.897 W) Adjusted Target: 1229127.41 220434.30 20.67
10/21/20 17:30:29	TGT	(47:35:31.706 N, 122:30:00.821 W) Adjusted Target: AML006_20201021 1229127.41 220434.30 20.67
10/21/20 17:31:22	SVP	(47:35:32.145 N, 122:30:01.264 W) AML006
10/21/20 17:31:59	SOL	(47:35:31.092 N, 122:30:02.443 W) Start of Line 2020PE2951731
10/21/20 17:32:02	SOL	(47:35:31.153 N, 122:30:02.641 W) SOL file= 20202951731.HSX
10/21/20 17:36:19	EOL	(47:35:39.813 N, 122:30:23.589 W) End of Line 2020PE2951731
10/21/20 17:36:51	SOL	(47:35:39.871 N, 122:30:24.314 W) Start of Line 2020PE2951736
10/21/20 17:36:55	SOL	(47:35:39.817 N, 122:30:23.981 W) SOL file= 20202951736.HSX
10/21/20 17:41:09	EOL	(47:35:30.870 N, 122:30:02.191 W) End of Line 2020PE2951736
10/21/20 17:41:47	SOL	(47:35:30.630 N, 122:30:02.558 W) Start of Line 2020PE2951741
10/21/20 17:41:53	SOL	(47:35:30.780 N, 122:30:03.129 W) SOL file= 20202951741.HSX
10/21/20 17:43:18	TGT	(47:35:34.172 N, 122:30:10.358 W) Adjusted Target: dolphin 1228537.98 220651.50 0.00
10/21/20 17:45:08	EOL	(47:35:38.482 N, 122:30:19.178 W) End of Line 2020PE2951741
10/21/20 17:45:35	SOL	(47:35:38.696 N, 122:30:20.340 W) Start of Line 2020PE2951745
10/21/20 17:45:43	SOL	(47:35:38.450 N, 122:30:19.881 W) SOL file= 20202951745.HSX
10/21/20 17:50:06	EOL	(47:35:30.392 N, 122:30:02.322 W) End of Line 2020PE2951745
10/21/20 17:50:49	SOL	(47:35:30.266 N, 122:30:02.939 W) Start of Line 2020PE2951750
10/21/20 17:51:02	SOL	(47:35:30.554 N, 122:30:04.000 W) SOL file= 20202951750.HSX
10/21/20 17:53:11	EOL	(47:35:35.468 N, 122:30:14.091 W) End of Line 2020PE2951750
10/21/20 17:54:07	TGT	(47:35:38.007 N, 122:30:14.578 W) Adjusted Target: AML007_20201021 1228211.10 221028.05 12.53
10/21/20 17:54:11	SVP	(47:35:38.089 N, 122:30:14.630 W) AML007
10/21/20 17:55:17	SOL	(47:35:37.399 N, 122:30:16.685 W) Start of Line 2020PE2951755
10/21/20 17:55:25	SOL	(47:35:37.041 N, 122:30:16.267 W) SOL file= 20202951755.HSX
10/21/20 17:56:41	CUS	(47:35:33.700 N, 122:30:11.308 W) Losing fix a lot at the south-eastern end of area
10/21/20 17:58:25	EOL	(47:35:29.985 N, 122:30:02.588 W) End of Line 2020PE2951755
10/21/20 18:00:09	SOL	(47:35:33.154 N, 122:30:08.952 W) Start of Line 2020PE2951800
10/21/20 18:00:15	SOL	(47:35:33.278 N, 122:30:09.355 W) SOL file= 20202951800.HSX
10/21/20 18:01:07	EOL	(47:35:34.770 N, 122:30:12.509 W) End of Line 2020PE2951800
10/21/20 18:01:55	SOL	(47:35:34.762 N, 122:30:12.352 W) Start of Line 2020PE2951801
10/21/20 18:01:59	SOL	(47:35:34.655 N, 122:30:12.037 W) SOL file= 20202951801.HSX
10/21/20 18:02:46	EOL	(47:35:33.281 N, 122:30:08.834 W) End of Line 2020PE2951801
10/21/20 18:03:34	SOL	(47:35:31.022 N, 122:30:05.557 W) Start of Line 2020PE2951803
10/21/20 18:03:40	SOL	(47:35:30.811 N, 122:30:05.279 W) SOL file= 20202951803.HSX
10/21/20 18:04:17	EOL	(47:35:29.674 N, 122:30:02.494 W) End of Line 2020PE2951803
10/21/20 18:04:55	SOL	(47:35:29.392 N, 122:30:02.668 W) Start of Line 2020PE2951804
10/21/20 18:05:43	SOL	(47:35:30.789 N, 122:30:05.483 W) SOL file= 20202951804.HSX
10/21/20 18:14:53	EOL	(47:35:40.020 N, 122:30:45.965 W) End of Line 2020PE2951804
10/21/20 18:15:36	SOL	(47:35:39.780 N, 122:30:45.952 W) Start of Line 2020PE2951815
10/21/20 18:15:45	SOL	(47:35:39.551 N, 122:30:45.106 W) SOL file= 20202951815.HSX
10/21/20 18:16:15	TGT	(47:35:39.277 N, 122:30:42.513 W) Adjusted Target: AML008_20201021 1226416.75 221289.39 0.00
10/21/20 18:17:29	SVP	(47:35:39.340 N, 122:30:38.195 W) AML008
10/21/20 18:24:59	EOL	(47:35:29.172 N, 122:30:02.440 W) End of Line 2020PE2951815
10/21/20 18:25:26	TGT	(47:35:28.914 N, 122:30:00.111 W) Adjusted Target: AML009_20201021 1229129.79 220152.16 9.78
10/21/20 18:26:51	SVP	(47:35:29.215 N, 122:29:58.367 W) AML009
10/21/20 18:39:00	SOL	(47:35:39.178 N, 122:30:40.504 W) Start of Line 2020PE2951839
10/21/20 18:39:09	SOL	(47:35:39.097 N, 122:30:41.378 W) SOL file= 20202951839.HSX
10/21/20 18:42:39	EOL	(47:35:45.751 N, 122:30:57.450 W) End of Line 2020PE2951839
10/21/20 18:43:27	SOL	(47:35:45.681 N, 122:30:57.377 W) Start of Line 2020PE2951843
10/21/20 18:43:33	SOL	(47:35:45.645 N, 122:30:57.135 W) SOL file= 20202951843.HSX
10/21/20 18:47:18	EOL	(47:35:39.275 N, 122:30:40.285 W) End of Line 2020PE2951843
10/21/20 18:47:59	SOL	(47:35:38.949 N, 122:30:40.845 W) Start of Line 2020PE2951847
10/21/20 18:48:04	SOL	(47:35:38.884 N, 122:30:41.212 W) SOL file= 20202951847.HSX
10/21/20 18:52:19	EOL	(47:35:45.558 N, 122:30:57.264 W) End of Line 2020PE2951847
10/21/20 18:52:51	SOL	(47:35:45.406 N, 122:30:57.321 W) Start of Line 2020PE2951852
10/21/20 18:52:56	SOL	(47:35:45.376 N, 122:30:57.154 W) SOL file= 20202951852.HSX
10/21/20 18:55:46	EOL	(47:35:39.667 N, 122:30:46.067 W) End of Line 2020PE2951852
10/21/20 18:56:19	TGT	(47:35:40.683 N, 122:30:43.687 W) Adjusted Target: AML010_20201021 1226203.68 221424.35 0.00
10/21/20 18:56:32	TGT	(47:35:40.855 N, 122:30:43.357 W) Adjusted Target: AML010_20201021 1226203.68 221424.35 0.00
10/21/20 18:56:34	SVP	(47:35:40.874 N, 122:30:43.319 W) AML010
10/21/20 18:58:46	SOL	(47:35:39.865 N, 122:30:47.002 W) Start of Line 2020PE2951858
10/21/20 18:58:54	SOL	(47:35:40.204 N, 122:30:47.466 W) SOL file= 20202951858.HSX
10/21/20 19:01:13	EOL	(47:35:45.288 N, 122:30:56.538 W) End of Line 2020PE2951858
10/21/20 19:01:19	CUS	(47:35:45.508 N, 122:30:56.827 W) Lost fix right at EOL
10/21/20 19:01:56	SOL	(47:35:44.905 N, 122:30:56.027 W) Start of Line 2020PE2951901
10/21/20 19:02:00	SOL	(47:35:44.752 N, 122:30:55.720 W) SOL file= 20202951901.HSX
10/21/20 19:03:48	EOL	(47:35:40.698 N, 122:30:47.330 W) End of Line 2020PE2951901
10/21/20 19:04:27	SOL	(47:35:40.871 N, 122:30:47.787 W) Start of Line 2020PE2951904
10/21/20 19:04:32	SOL	(47:35:41.001 N, 122:30:48.005 W) SOL file= 20202951904.HSX
10/21/20 19:06:41	EOL	(47:35:44.813 N, 122:30:55.812 W) End of Line 2020PE2951904
10/21/20 19:07:07	SOL	(47:35:44.957 N, 122:30:56.179 W) Start of Line 2020PE2951907
10/21/20 19:07:10	SOL	(47:35:44.883 N, 122:30:56.063 W) SOL file= 20202951907.HSX
10/21/20 19:08:37	EOL	(47:35:42.573 N, 122:30:49.771 W) End of Line 2020PE2951907
10/21/20 19:09:28	SOL	(47:35:42.564 N, 122:30:51.491 W) Start of Line 2020PE2951909
10/21/20 19:09:33	SOL	(47:35:42.715 N, 122:30:51.677 W) SOL file= 20202951909.HSX
10/21/20 19:10:38	EOL	(47:35:44.171 N, 122:30:55.013 W) End of Line 2020PE2951909
10/21/20 19:11:07	SOL	(47:35:44.265 N, 122:30:55.457 W) Start of Line 2020PE2951911
10/21/20 19:11:12	SOL	(47:35:44.117 N, 122:30:55.261 W) SOL file= 20202951911.HSX
10/21/20 19:12:03	EOL	(47:35:42.786 N, 122:30:51.392 W) End of Line 2020PE2951911
10/21/20 19:12:40	SOL	(47:35:42.667 N, 122:30:52.056 W) Start of Line 2020PE2951912
10/21/20 19:12:43	SOL	(47:35:42.659 N, 122:30:52.308 W) SOL file= 20202951912.HSX
10/21/20 19:13:17	EOL	(47:35:43.719 N, 122:30:54.547 W) End of Line 2020PE2951912
10/21/20 19:14:15	SOL	(47:35:45.671 N, 122:30:57.395 W) Start of Line 2020PE2951914
10/21/20 19:14:29	SOL	(47:35:45.232 N, 122:30:56.890 W) SOL file= 20202951914.HSX

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/21/20 19:18:52	EOL	(47:35:39.347 N, 122:30:39.044 W) End of Line 2020PE2951914
10/21/20 19:19:42	SOL	(47:35:38.831 N, 122:30:40.697 W) Start of Line 2020PE2951919
10/21/20 19:19:45	SOL	(47:35:38.795 N, 122:30:40.923 W) SOL file= 20202951919.HSX
10/21/20 19:23:53	EOL	(47:35:45.529 N, 122:30:57.870 W) End of Line 2020PE2951919
10/21/20 19:25:54	TGT	(47:35:44.461 N, 122:30:51.027 W) Adjusted Target: AML011_20201021 1225760.25 221819.11 0.00
10/21/20 19:26:00	SVP	(47:35:44.480 N, 122:30:50.837 W) AML011
10/21/20 19:29:14	SOL	(47:35:44.209 N, 122:30:51.273 W) Start of Line 2020PE2951929
10/21/20 19:29:19	SOL	(47:35:44.368 N, 122:30:51.583 W) SOL file= 20202951929.HSX
10/21/20 19:30:51	EOL	(47:35:46.008 N, 122:30:58.103 W) End of Line 2020PE2951929
10/21/20 19:31:31	SOL	(47:35:46.089 N, 122:30:57.850 W) Start of Line 2020PE2951931
10/21/20 19:31:36	SOL	(47:35:46.141 N, 122:30:57.600 W) SOL file= 20202951931.HSX
10/21/20 19:33:02	EOL	(47:35:44.510 N, 122:30:51.002 W) End of Line 2020PE2951931
10/21/20 19:34:36	SOL	(47:35:44.706 N, 122:30:51.006 W) Start of Line 2020PE2951934
10/21/20 19:34:47	SOL	(47:35:44.885 N, 122:30:51.634 W) SOL file= 20202951934.HSX
10/21/20 19:37:04	EOL	(47:35:45.283 N, 122:30:58.472 W) End of Line 2020PE2951934
10/21/20 19:37:04	SOL	(47:35:45.283 N, 122:30:58.472 W) Start of Line 2020PE2951937
10/21/20 19:37:11	SOL	(47:35:45.371 N, 122:30:58.160 W) SOL file= 20202951937.HSX
10/21/20 19:39:56	EOL	(47:35:44.014 N, 122:30:48.001 W) End of Line 2020PE2951937
10/21/20 19:40:50	SOL	(47:35:45.084 N, 122:30:50.673 W) Start of Line 2020PE2951940
10/21/20 19:40:55	SOL	(47:35:45.209 N, 122:30:51.170 W) SOL file= 20202951940.HSX
10/21/20 19:42:37	EOL	(47:35:45.169 N, 122:30:58.924 W) End of Line 2020PE2951940
10/21/20 19:43:13	SOL	(47:35:45.326 N, 122:30:58.577 W) Start of Line 2020PE2951943
10/21/20 19:43:17	SOL	(47:35:45.407 N, 122:30:58.490 W) SOL file= 20202951943.HSX
10/21/20 19:45:12	EOL	(47:35:45.292 N, 122:30:50.443 W) End of Line 2020PE2951943
10/21/20 19:45:49	SOL	(47:35:45.507 N, 122:30:50.520 W) Start of Line 2020PE2951945
10/21/20 19:45:57	SOL	(47:35:45.651 N, 122:30:51.072 W) SOL file= 20202951945.HSX
10/21/20 19:47:27	EOL	(47:35:45.336 N, 122:30:58.338 W) End of Line 2020PE2951945
10/21/20 19:49:00	SOL	(47:35:46.486 N, 122:30:55.534 W) Start of Line 2020PE2951949
10/21/20 19:49:02	SOL	(47:35:46.526 N, 122:30:55.372 W) SOL file= 20202951949.HSX
10/21/20 19:50:05	EOL	(47:35:45.897 N, 122:30:50.789 W) End of Line 2020PE2951949
10/21/20 19:50:22	TGT	(47:35:45.512 N, 122:30:50.037 W) Adjusted Target: AML012_20201021 1225764.09 221946.66 14.53
10/21/20 19:50:26	SVP	(47:35:45.434 N, 122:30:49.992 W) AML012
10/21/20 19:53:29	SOL	(47:35:47.314 N, 122:30:50.076 W) Start of Line 2020PE2951953
10/21/20 19:53:44	SOL	(47:35:47.480 N, 122:30:50.777 W) SOL file= 20202951953.HSX
10/21/20 19:54:30	EOL	(47:35:46.211 N, 122:30:53.160 W) End of Line 2020PE2951953
10/21/20 19:55:02	SOL	(47:35:46.256 N, 122:30:53.838 W) Start of Line 2020PE2951955
10/21/20 19:55:05	SOL	(47:35:46.331 N, 122:30:53.699 W) SOL file= 20202951955.HSX
10/21/20 19:55:58	EOL	(47:35:47.530 N, 122:30:50.853 W) End of Line 2020PE2951955
10/21/20 19:56:45	SOL	(47:35:47.474 N, 122:30:50.718 W) Start of Line 2020PE2951956
10/21/20 19:56:47	SOL	(47:35:47.503 N, 122:30:50.829 W) SOL file= 20202951956.HSX
10/21/20 19:57:47	EOL	(47:35:45.987 N, 122:30:54.184 W) End of Line 2020PE2951956
10/21/20 19:58:29	SOL	(47:35:46.341 N, 122:30:54.323 W) Start of Line 2020PE2951958
10/21/20 19:58:32	SOL	(47:35:46.428 N, 122:30:54.161 W) SOL file= 20202951958.HSX
10/21/20 19:59:21	EOL	(47:35:47.450 N, 122:30:51.586 W) End of Line 2020PE2951958
10/21/20 20:00:05	SOL	(47:35:47.501 N, 122:30:51.530 W) Start of Line 2020PE2952000
10/21/20 20:00:09	SOL	(47:35:47.524 N, 122:30:51.779 W) SOL file= 20202952000.HSX
10/21/20 20:01:12	EOL	(47:35:46.047 N, 122:30:54.496 W) End of Line 2020PE2952000
10/21/20 20:02:16	SOL	(47:35:47.540 N, 122:30:52.112 W) Start of Line 2020PE2952002
10/21/20 20:02:22	SOL	(47:35:47.550 N, 122:30:52.527 W) SOL file= 20202952002.HSX
10/21/20 20:03:01	EOL	(47:35:46.379 N, 122:30:54.563 W) End of Line 2020PE2952002
10/21/20 20:04:59	SOL	(47:35:47.209 N, 122:30:49.231 W) Start of Line 2020PE2952004
10/21/20 20:05:03	SOL	(47:35:47.278 N, 122:30:49.565 W) SOL file= 20202952004.HSX
10/21/20 20:08:08	EOL	(47:35:45.310 N, 122:30:57.643 W) End of Line 2020PE2952004
10/21/20 20:08:35	SOL	(47:35:45.513 N, 122:30:55.339 W) Start of Line 2020PE2952008
10/21/20 20:08:39	SOL	(47:35:45.543 N, 122:30:55.001 W) SOL file= 20202952008.HSX
10/21/20 20:08:51	EOL	(47:35:45.638 N, 122:30:53.996 W) End of Line 2020PE2952008
10/21/20 20:10:25	SOL	(47:35:47.294 N, 122:30:49.538 W) Start of Line 2020PE2952010
10/21/20 20:10:29	SOL	(47:35:47.357 N, 122:30:49.860 W) SOL file= 20202952010.HSX
10/21/20 20:13:15	EOL	(47:35:45.248 N, 122:30:58.745 W) End of Line 2020PE2952010
10/21/20 20:14:21	SOL	(47:35:44.304 N, 122:30:55.587 W) Start of Line 2020PE2952014
10/21/20 20:14:27	XLN	(47:35:44.442 N, 122:30:55.232 W) SOL file= 20202952014.HSX
10/21/20 20:15:28	EOL	(47:35:47.150 N, 122:30:50.546 W) End of Line 2020PE2952014
10/21/20 20:15:36	CUS	(47:35:47.263 N, 122:30:50.189 W) Might have ended out of fix
10/21/20 20:16:32	SOL	(47:35:46.137 N, 122:30:47.104 W) Start of Line 2020PE2952016
10/21/20 20:16:48	SOL	(47:35:46.097 N, 122:30:46.213 W) SOL file= 20202952016.HSX
10/21/20 20:17:00	EOL	(47:35:46.096 N, 122:30:45.497 W) End of Line 2020PE2952016
10/21/20 20:17:15	TGT	(47:35:46.097 N, 122:30:44.863 W) Adjusted Target: AML013_20201021 1226128.41 221968.31 33.92
10/21/20 20:17:19	SVP	(47:35:46.094 N, 122:30:44.760 W) AML013
10/21/20 20:22:45	CUS	(47:35:41.726 N, 122:30:18.552 W) Running patch
10/21/20 20:22:58	SOL	(47:35:41.117 N, 122:30:18.900 W) Start of Line 2020PE2952022
10/21/20 20:23:02	PAT	(47:35:40.912 N, 122:30:19.042 W) SOL file= 20202952022.HSX
10/21/20 20:23:33	EOL	(47:35:39.319 N, 122:30:20.233 W) End of Line 2020PE2952022
10/21/20 20:24:21	SOL	(47:35:39.471 N, 122:30:20.285 W) Start of Line 2020PE2952024
10/21/20 20:24:24	PAT	(47:35:39.631 N, 122:30:20.166 W) SOL file= 20202952024.HSX
10/21/20 20:24:52	EOL	(47:35:41.278 N, 122:30:18.867 W) End of Line 2020PE2952024
10/21/20 20:25:35	SOL	(47:35:40.811 N, 122:30:17.652 W) Start of Line 2020PE2952025
10/21/20 20:25:38	PAT	(47:35:40.652 N, 122:30:17.773 W) SOL file= 20202952025.HSX
10/21/20 20:26:09	EOL	(47:35:38.997 N, 122:30:19.045 W) End of Line 2020PE2952025
10/21/20 20:26:48	SOL	(47:35:39.060 N, 122:30:19.144 W) Start of Line 2020PE2952026
10/21/20 20:26:51	PAT	(47:35:39.186 N, 122:30:19.075 W) SOL file= 20202952026.HSX
10/21/20 20:27:26	EOL	(47:35:40.980 N, 122:30:17.613 W) End of Line 2020PE2952026
10/21/20 20:28:04	SOL	(47:35:40.382 N, 122:30:16.485 W) Start of Line 2020PE2952028
10/21/20 20:28:07	PAT	(47:35:40.223 N, 122:30:16.593 W) SOL file= 20202952028.HSX
10/21/20 20:28:38	EOL	(47:35:38.585 N, 122:30:17.867 W) End of Line 2020PE2952028
10/21/20 20:29:22	SOL	(47:35:38.590 N, 122:30:18.035 W) Start of Line 2020PE2952029
10/21/20 20:29:25	PAT	(47:35:38.725 N, 122:30:17.917 W) SOL file= 20202952029.HSX
10/21/20 20:30:01	EOL	(47:35:40.737 N, 122:30:16.371 W) End of Line 2020PE2952029
10/21/20 20:30:28	CUS	(47:35:41.425 N, 122:30:14.726 W) Good patch
10/21/20 20:30:37	CUS	(47:35:41.379 N, 122:30:13.923 W) Running extra lines in deep areas in case density required - can reject if original data looks good
10/21/20 20:33:04	SOL	(47:35:41.235 N, 122:30:02.939 W) Start of Line 2020PE2952033
10/21/20 20:33:07	SOL	(47:35:41.258 N, 122:30:03.198 W) SOL file= 20202952033.HSX
10/21/20 20:33:49	TGT	(47:35:41.608 N, 122:30:06.928 W) Adjusted Target: AML014_20201021 1228837.87 221444.91 75.20
10/21/20 20:33:51	SVP	(47:35:41.623 N, 122:30:07.096 W) AML14
10/21/20 20:33:56	SVP	(47:35:41.660 N, 122:30:07.516 W) AML014
10/21/20 20:38:17	EOL	(47:35:43.705 N, 122:30:28.847 W) End of Line 2020PE2952033
10/21/20 20:39:01	SOL	(47:35:43.294 N, 122:30:29.097 W) Start of Line 2020PE2952039

DAVID EVANS AND ASSOCIATES INC.
MARINE SERVICES

David Evans and Associates, Inc.
Marine Services Division
2801 SE Columbia Way
Vancouver, WA 98661
Phone: (360)314-3200
Fax : (360)314-3250

Event Log

Date/Time	Code	Comments
10/21/20 20:39:06	SOL	(47:35:43.271 N, 122:30:28.630 W) SOL file= 20202952039.HSX
10/21/20 20:43:57	EOL	(47:35:40.445 N, 122:30:02.713 W) End of Line 2020PE2952039
10/21/20 20:44:54	SOL	(47:35:39.554 N, 122:30:03.273 W) Start of Line 2020PE2952044
10/21/20 20:44:59	SOL	(47:35:39.630 N, 122:30:03.824 W) SOL file= 20202952044.HSX
10/21/20 20:47:27	EOL	(47:35:41.432 N, 122:30:16.104 W) End of Line 2020PE2952044
10/21/20 20:48:27	SOL	(47:35:40.756 N, 122:30:14.812 W) Start of Line 2020PE2952048
10/21/20 20:48:31	SOL	(47:35:40.701 N, 122:30:14.523 W) SOL file= 20202952048.HSX
10/21/20 20:51:12	EOL	(47:35:38.685 N, 122:30:02.847 W) End of Line 2020PE2952048
10/21/20 20:51:52	SOL	(47:35:37.833 N, 122:30:03.338 W) Start of Line 2020PE2952051
10/21/20 20:53:50	EOL	(47:35:39.856 N, 122:30:13.192 W) End of Line 2020PE2952051
10/21/20 20:55:11	SOL	(47:35:43.304 N, 122:30:19.288 W) Start of Line 2020PE2952055
10/21/20 20:55:14	SOL	(47:35:43.358 N, 122:30:19.020 W) SOL file= 20202952055.HSX
10/21/20 20:55:34	TGT	(47:35:43.308 N, 122:30:17.773 W) Adjusted Target: AML015_20201021 1227944.59 221654.44 54.49
10/21/20 20:55:36	SVP	(47:35:43.293 N, 122:30:17.666 W) AML015
10/21/20 20:59:28	EOL	(47:35:42.271 N, 122:30:02.667 W) End of Line 2020PE2952055
10/21/20 20:59:57	SOL	(47:35:42.906 N, 122:30:02.413 W) Start of Line 2020PE2952059
10/21/20 21:00:00	SOL	(47:35:42.964 N, 122:30:02.654 W) SOL file= 20202952059.HSX
10/21/20 21:02:47	EOL	(47:35:43.744 N, 122:30:16.952 W) End of Line 2020PE2952059
10/21/20 21:03:17	SOL	(47:35:44.347 N, 122:30:16.760 W) Start of Line 2020PE2952103
10/21/20 21:06:23	EOL	(47:35:43.782 N, 122:30:01.960 W) End of Line 2020PE2952103
10/21/20 21:13:12	TGT	(47:35:42.780 N, 122:30:01.677 W) Adjusted Target: AML016_20201021 1229100.56 221573.29 85.24
10/21/20 21:13:32	SVP	(47:35:42.746 N, 122:30:01.786 W) AML016
10/21/20 21:13:37	CUS	(47:35:42.739 N, 122:30:01.812 W) Acquired everything we can with MBES; pulling gear and transitting back to marina. EOD

APPENDIX C
SAFETY
DOCUMENTS

Safety and Environmental Meeting Report

(Meeting to be held first workday of each week)

Date: 10/19/20

Project Title: BLAKELY HARBOR SURVEY Contract No. _____

DEA Project No: GEOS00000003 Task Order No. _____

Strength of Organization: _____ Number of attendants: 2 Mtg. Duration: 30 min

Names of Attendees:

SAM WERNER
DAN PRINCE

Safety Subjects Discussed
TRAILER / TOWING LIFE JACKETS BOAT SAFETY INCLIMATE WEATHER Q-BOAT OPS

Environmental Subjects discussed
OIL / GAS SPILL MARINE LIFE

Signatures of Attendees:

Leader Signature			
HYDROGRAPHER Title			

HYDROGRAPHIC SURVEY
SAFETY MEETING KEY POINTS

"LIFEJACKETS SAVE LIVES ONLY WHEN WORN"

BOAT TRAILER:

- Insure that the hitch is secured to the truck.
- Check safety chains.
- Secure ball hitch latch and lock.
- Check fluid level in trailer brake reservoir.
- Check trailer and truck lights.
- Check tires for correct air pressure and visible defects or unusual wear.
- Check tie downs, winch connections and safety chains from trailer to boat.
- Check nuts and bolts on trailer for looseness and fatigue.
- Grease wheel bearings.

PRE-LAUNCH CHECKS:

- Insure that there are serviceable lifejackets for every person.
- Insure there are hardhats for every person.
- Make sure there is enough fuel.
- Prior to fueling insure all electrical power is off and remove portable tanks from boat before fueling.
- Insure that the auxiliary kicker motor is operational and has enough fuel.
- Check engine oil and coolant fluid levels.
- Check for fuel leaks in the engine compartment.
- Insure that engine blower is on five minutes before starting engine.
- Check bilge pumps for operation and bilge area cleanliness.
- Inspect hoses for cuts and wear.
- Check engine belts for cuts, wear and tightness.
- Physically check that the hull plug is secured, insure that the hull plug lever is not in an exposed position to the river bottom, to prevent accidental removal from objects under water.
- Insure that throwable flotation device is installed.
- Perform radio checks for UHF and VHF radios.
- Check navigation lights and horn
- Remove boat tie downs from trailer.
- Insure that bow safety chain is secured prior to backing down the boat ramp.

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Rafts and small boats

- At least two oars and one spare oar on board
- Patch kit for raft
- Air pump for raft
- Zip lock bags or water proof containers for cell phones or other equipment that needs to stay dry
- Throw able line for water rescue of personnel
- Maps of project area and GPS
- Make a way point for your river entry and exits
- Hip or chest waders
- Insure that raft is not leaking air and all inflation plugs are tight or secured
- Secure all sharp objects on or in raft, to prevent accidental punctures (i.e. range poles tips and machetes)

POST ENGINE START UP CHECKS:

- Check engine gauges (volt meter, oil pressure, coolant temp, fuel gauge).
- Open engine compartment and check for leaks.
- Check propulsion controls.
- After previous checks are performed, launch vessel.

WHEN VESSEL IS AFLOAT:

- **Life jackets** shall be warn when outside of the cabin and **at all times on any small vessel or raft**.
- Keep a lookout for other vessels and floating debris.
- Give way to all vessels as most people don't know the "rules of the road".
- Keep in contact with commercial traffic, monitor channels 16 at all times; listen to all "Notice to Mariners" broadcasts. Monitor channel 13 for commercial traffic or ship to ship and bridges; channel 14 for dam and lock operations.
- Be cautious when approaching the shore and when pulling upstream of objects (i.e., pile dikes, navigation aids' anchored vessels).
- In a swift current be extremely cautious, if the vessel loses power or steering the vessel could flip or become flooded with water when it comes arrest on an object
- Watch out for ropes that could be attached to piling when on the downstream side, as rope could get caught in the jet pump intake or propellers.
- When on small rivers if possible be aware of your location, to avoid missing the main river channel.
- Always be aware of what is down or up stream, in small rivers there is potential for unseen hazards. In many cases it is necessary to stop the vessel and perform reconnaissance in uncharted waters, to avoid a potential disaster from logjams, rapids, waterfalls and other potential hazards. When in a rafting situation it may be prudent to traverse over land to avoid the hazard or shallow waters.
- Never put a persons safety in jeopardy by being upstream of a log jam or obstruction that the person could not escape from, in fast river currents. Water is very powerful and unforgiving and a lifejacket may not save the persons life.
- Respect other persons judgment and concerns when it comes to safety on any body of water.
- There are situations when the requested data collection can not be performed, due to unsafe conditions.
- .

ENVIRONMENTAL PROTECTION:

Report all spills (i.e. oils, fuels, antifreeze) to the U.S. Coast Guard. The only fluid or element that is not considered a hazard is water. Insure that the engine compartment is clean and free of oil, fuel, and antifreeze, because if the bilge discharges, contaminates could discharge along with the water. If there is a sheen on the water report it and secure the scene. Approach cautiously as it could be explosive or flammable. Attempt to identify the spill; if it is safe, respond with containment and oil soak up pads.

LAND BASED SURVEYING:

- Wear **life jackets when near or above water** (i.e. shore, docks, piers and jetties)
- Wear hard hats, safety glasses and hearing protection when necessary.
- Wear boots at all times.
- Be cautious when on jetties or near shore, as these areas are typically extremely slippery or can have undercut river banks.
- Beware of walking in tidal areas, as tidal areas are often mud, and a person could become stuck and not able to free themselves prior to high tide.
- When working near heavy equipment or vehicles always be aware of their location.
- When working near roads always have the proper signs and safety cones in place.

DAVID EVANS
AND ASSOCIATES INC.

David Evans and Associates, Inc. (DEA) Marine Services

COVID-19 EXPOSURE CONTROL, MITIGATION AND RECOVERY PLAN

Introduction

This plan contains information as well as descriptions of mandatory safety and health standards for DEA vessels, projects and staff. The content is intended to assist supervisors, employees, and subcontractors in providing a safe and healthful workplace. The sources of this information are from the Occupational Safety and Health Administration (OSHA) and the Centers for Disease Control and Prevention (CDC). The recommendations follow CDC and OSHA's guidance and will be updated if additional information becomes available.

COVID-19 Description

The Coronavirus Disease 2019 (COVID-19) is a respiratory disease caused by the SARS-CoV-2 virus. It has spread from China to many other countries around the world, including the United States. Symptoms of COVID-19 infection can cause illness ranging from mild to severe and, in some cases, can be fatal.

Symptoms typically include fever, cough, and shortness of breath. Some people infected with the virus have reported experiencing other non-respiratory symptoms. Other people, referred to as asymptomatic cases, have experienced no symptoms at all. According to the CDC, symptoms of COVID-19 may appear in as few as 2 days or as long as 14 days after exposure.

How COVID-19 Spreads

Although the first human cases of COVID-19 likely resulted from exposure to infected animals, infected people can spread COVID-19 to other people. The virus is thought to spread mainly from person toperson, including:

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs or sneezes. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

It may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the primary way the virus spreads. People are thought to be most contagious when they are most symptomatic (i.e., experiencing fever, cough, and/or shortness of breath). Some spread might be possible before people show symptoms; there have been reports of this type of asymptomatic transmission with this new coronavirus, but this is also not thought to be the main way the virus spreads.

Although the United States has implemented public health measures to limit the spread of the virus, it is likely that some person-to-person transmission will continue to occur.

General Workplace Controls
Due to the likely person-to-person transmission of COVID-19, anticipated ongoing future exposure, and the potentially long incubation period between exposure and onset of symptoms, it is not feasible to completely eliminate the potential for exposure during work on the vessels. The most effective protection measures, listed from most effective to least effective, are engineering controls, administrative controls, safe work practices, and PPE. Typical hazard control also includes elimination and/or substitution as the first way to control a hazard; however, in this case, complete elimination is not as practical of a consideration. The following practices are suitable for application on the vessels as well as office locations where work is being managed and coordinated.

Similar to DEA offices, all vessels and workplaces shall utilize signage to indicate that the work is being completed under a COVID-19 plan. Additional signage shall be used to designate means and methods used to address worker safety and vessel cleanliness.

Basic Infection Prevention and Vessel Cleaning/Disinfecting Measures
For most Marine Services work, protecting workers will depend on emphasizing basic infection prevention measures. As appropriate, all employees shall implement good hygiene and infection control practices, including:

- Handwashing – Promote frequent and thorough handwashing, including by providing workers with a place to wash their hands with soap and water. Soap and water shall be abundantly provided on all vessels for frequent handwashing. Workers should be encouraged to leave their workstations to wash their hands regularly, before and after going to the bathroom, before and after eating, and after coughing, sneezing or blowing their noses.
- Respiratory Hygiene – Workers should cover their mouth and nose when coughing or sneezing as well as other hygienic recommendations by the CDC.
- Hand Sanitizer – Due to the nature of the work, access to running water may not be practical. In these situations, provide alcohol-based hand rubs containing at least 60% ethanol or 70% isopropanol.
- Portable Toilets and Handwashing Stations – When permanent hand sinks and toilets are not available, in addition to portable toilets, provide portable handwashing stations. Signage shall be posted for personal hygiene, handwashing and disinfection at all portable toilets and handwashing locations.
- Disinfectants – Utilize EPA-registered disinfectants effective for use against the COVID-19 virus.
- Cloth Face Coverings – CDC recommends that everyone wear a cloth face covering over their noses and mouths when in the community setting, including during travel if they must travel. This is an additional public health measure staff should take to reduce the spread of COVID-19 in addition to (not instead of) social distancing.
- Housekeeping & Cleaning – Institute regular housekeeping practices, which include cleaning and disinfecting frequently used tools and equipment, and other elements of the work environment where possible. Employees should regularly do the same in their assigned work areas.
- High-Touch Surfaces – Clean and disinfect frequently touched objects and surfaces such as workstations, handrails, machines, shared tools, pens, tablets, and doorknobs at least 3 to 4

times per day. Employees performing cleaning should wear, at minimum, long sleeves and disposable single-use gloves.

- Common Spaces – Offices, sleeping quarters, break/lunchroom areas, and supplies storage containers have high-touch areas (doorknobs, switches, desks, keyboards, elevator control buttons, etc.), which should be cleaned and/or disinfected at least 3 to 4 times per day. Employees performing cleaning should wear, at minimum, long sleeves and disposable single-use gloves.
- Garbage – Trash receptacles should be placed conveniently throughout the vessels and lined with trash bags appropriate to the nature of likely debris. Trash from the work site should be collected frequently enough to ensure they do not become overfull. Nitrile, latex, or vinyl gloves should be worn during trash collection and disposed of upon completion.
- Portable Toilets – A handwashing station should be established outside each portable toilet. The wash station should either have running water and soap or sanitizers sufficient to meet hand-cleaning needs. A sign should be placed on the door to each toilet requiring hand cleaning before and after use and encouraging application of a spray disinfectant following each use. Spray disinfectant should be placed in each toilet unit. Toilets should be cleaned by site staff two to three times per day and should be serviced as needed.

Engineering Controls

Engineering controls involve isolating employees from work-related hazards. In work areas where appropriate, these types of controls reduce exposure to hazards without relying on worker behavior and can be the most effective solution to implement. Options for engineering controls to prevent transmission of COVID-19 can be very difficult while working on the vessels, but the following may be applicable:

- Physically separate work tasks/locations as practicable.
- Use physical barriers (such as plastic sheeting, plexiglass, or temporary walls) between work tasks that must be performed with less than 6-feet of separation, as practicable.
- Install higher-efficiency air filters on AC units, up to high-efficiency particulate air (HEPA)filters where possible.
- Increase ventilation rates in the work environment. Maximize airflow through use of air handling equipment, windows, etc.
- All exhaust fans in heads, galley, and other areas shall always be running to provide negative pressure ventilation.

Administrative Controls

Administrative controls require action by the worker or employer. Typically, administrative controls are changes in work policy or procedures to reduce or minimize exposure to a hazard. The following administrative controls are to reduce exposure and prevent COVID-19 infected workers:

 Post signage identifying hygienic practices, handwashing, disinfecting, and sanitizing practice and responsibilities for workers.

- Train all staff on current information about COVID-19 and ways to protect themselves and their family.

- Provide workers with up-to-date education and training on COVID-19 risk factors and protective behaviors.
- Review COVID-19 safe work practices each morning with all staff.
- Employees must stay home when feeling sick or when they have been in close contact with a confirmed positive case.
- If symptoms consistent with COVID-19 develop during a work shift, employee is responsible to notify their supervisor and self-quarantine immediately.
- Minimize contact among workers, and maintain 6-foot separation at all times.
- Avoid congregating in large groups as best possible. Hold group meetings in open air and in large spaces.
- Employees will be encouraged to stagger breaks and lunches, if practicable, to reduce the size of any group at any one time, and employees must remain at least 6-feet apart.
- Employees must inform their supervisors if they have a sick family member at home with COVID-19. If an employee has a family member sick with COVID-19, that employee must follow the isolation/quarantine requirements as established by the State Department of Health.
- Employees are encouraged to have remote communication and establish means to communicate with supervisors, such as text, email, phone calls, etc.
- Employees are discouraged from using other workers' phones, desks, offices, or other work tools and equipment, when possible. Do not share equipment without sanitizing – this includes pens, digital touchpads, keyboards, phones/radios, handrails, door handles, etc.
- Employees must be trained to use protective clothing and equipment – how to put it on, use/wear it, and take it off correctly, including in the context of their current and potential duties.
- Employees and PMs should be aware of local administrative policy and procedures that may impact DEA Marine Services operations. Consider federal, state, local, and maritime-specific sources (USCG, local port authority, etc.).

Travel To/From Project Location

- Prior to departing, obtain EPA registered cleaners and hand sanitizers. Bring EPA-registered disinfectant and other personal cleaning supplies, including cloths and disposable gloves.
- Encourage personnel to drive as opposed to taking a flight, if feasible.
- Plan to make as few stops as possible, but make sure to rest when feeling drowsy.
- Employees are encouraged to avoid ridesharing or carpooling.
- While social distancing guidelines are in place, employees must limit shared-use vehicles or equipment. If a situation requires shared vehicles, the Delivery Leader or Chief of Parties will obtain prior permission from the Corporate Safety Manager. Employees will be reimbursed for personal mileage per DEA expense reimbursement guidelines.
- If/when vehicle or equipment sharing is necessary, the following must apply:
    - Employees must deliberately increase the physical space between them as much as possible.
    - Shared space must have good, fresh airflow, such as by air conditioning or an opened window, weather permitting. Do not recirculate air.
    - Vehicle or equipment operator must clean and disinfect high-touch surfaces nightly and throughout the day as needed. Vehicle or equipment high-touch surfaces include: the

steering wheel, door handles, shift lever, any buttons or touch screens, wiper and turn signal stalks, passenger and driver door armrests, grab handles, and seat adjusters.

- If disinfection is possible, diluted household bleach solutions, alcohol solutions with at least 70% alcohol, and most common EPA-registered household disinfectants (i.e. Clorox Disinfecting Wipes) should be used. Follow manufacturer's instructions for application and proper ventilation.
- If disinfecting products are not available, surfaces should be cleansed using a detergent or soap and water.
- All DEA vehicles and equipment are required to carry potable water and soap for cleaning and hygiene. Disinfection products will also be required and provided when available.
- Prepare food and water for the road. Pack non-perishables in case restaurants and stores are closed.
- Bring any medications needed for the duration of the trip.
- Bring an EPA-registered disinfectant and other personal cleaning supplies.
- If flying is necessary, try to avoid contact with sick passengers, avoid touching your eyes, nose or mouth with unwashed hands, and wash your hands often with soap and water for at least 20 seconds, or use hand sanitizer that contains at least 60% alcohol.
- Book accommodations in advance if you must stay somewhere overnight.
- Avoid use of cabs, Uber, Lyft, or other forms of public transportation; vehicle rental is preferred over cabs and public transport.
- Source hotel accommodations that have in-room kitchens.
- While at hotels or housing, disinfect your rooms with an EPA COVID-19 registered cleaner.
- Clean and disinfect all high-touch surfaces. This includes tables, doorknobs, light switches, countertops, handles, desks, phones, remote controls, toilets, and sink faucets.
- Use the "No Housekeeping" sign to limit public access to your hotel room.
- Avoid hotel breakfast buffets; only consume unopened food items, such as yogurt, fresh fruit (wash the fresh fruit prior to eating), etc.
- Purchase groceries once a week and cook meals in the hotel room if kitchen or microwave facilities are available. If an in-room kitchen or cooking facilities are not available, consider a meal delivery service.
- If a refrigerator is not available in the hotel room, bring a cooler for food and meals or use the drive-thru/curbside pickup option to minimize public exposure at restaurants.
- Wash any plates, cups, or silverware (other than pre-wrapped plastic) before using. Use a dishwasher if available.
- Take the same steps you would in other public places — for example, avoid close contact with others, wash your hands often, and wear a cloth face covering.
- Every team member shall carry essential work authorization paperwork for travel and to present too anyone who may ask, including authorities, hotel staff, etc.

Employee Testing and Immunizations

- Since employees with the COVID-19 virus pose a direct threat to the health of others, employees will be required to participate in COVID-19 testing as a condition of allowing the employees to work on the vessel. Testing will be in accordance with guidance from the Food and Drug Administration and U.S. Centers for Disease Control and Prevention.

- Employees must be up-to-date with routine vaccinations, including measles-mumps-rubella (MMR) vaccine and the seasonal flu vaccine.
- Employees will measure their temperatures and assess symptoms prior to boarding the vessel and starting work each day. The goal of employee screening is two-fold: to help clear well people for work so they can continue to do their jobs, and keep employees with elevated exposure risk or COVID-19 symptoms isolated until they can safely return to work. The screening process requires that employees complete a brief online screening survey using their mobile phone or computer to be automatically cleared/not cleared for work.
- Employees who are identified as an elevated risk will receive a second, in-depth screening survey. Based on their answers, their risk level is determined to be low, moderate or high. Those with low risk (no apparent exposure, or symptoms that do not indicate COVID-19 infection, such as seasonal allergies) may be cleared for work. Employees with moderate-to-high risk will have WorkCare provide telehealth nurse triage.
- Employees must report to their supervisor if they develop symptoms of COVID-19 (e.g., fever, cough, chills, headache, repeated shaking, sore throat, shortness of breath, fatigue, muscle aches, or new loss of taste or smell). If symptoms develop during a shift, the employee will be isolated immediately and the vessel will return to port. The symptomatic employee will be evaluated by a healthcare provider and all other employees will receive COVID-19 testing as a condition of allowing the employees to return to work on the vessel. The vessel will be cleaned and disinfected immediately. (See DEA Office and Project Cleaning and Disinfection.)

Sanitation and Cleanliness

- Soap and water shall be abundantly provided on the vessel for frequent handwashing. Employees are encouraged to leave their workstations to wash their hands regularly, before and after going to the bathroom, before and after eating and after coughing, sneezing or blowing their noses.
- When running water is not available, portable washing stations, with soap, are required. Alcohol-based hand sanitizers with greater than 60% ethanol or 70% isopropanol can also be used, but are not a replacement for the water requirement.
- In areas visible to all workers, post required hygienic practices, including not to touch face with unwashed hands or with gloves; wash hands often with soap and water for at least 20 seconds; use hand sanitizer with at least 60% alcohol; clean and disinfect frequently touched objects and surfaces such as workstations, keyboards, telephones, handrails, machines, shared tools, elevator control buttons, and doorknobs; cover the mouth and nose when coughing or sneezing as well as other hygienic recommendations by the U.S. Centers for Disease Control and Prevention (CDC).
- Make disinfectants available to employees throughout the vessel and ensure cleaning supplies are frequently replenished.

Personal Protective Equipment (PPE)

- Personnel should have access to personal protection equipment (PPE) including nitrile gloves and face covering to be used at their discretion or at the direction of supervisors.
- If disposable PPE is used, it must be donned prior to boarding the ship and disposed of after debarking the ship. Non-disposable PPE must be sanitized prior to using again.

- In the context of the COVID-19 pandemic, CDC recommends that everyone wear a cloth face covering over their nose and mouth when in a community setting, including during travel if they must travel. This is an additional public health measure people should take to reduce the spread of COVID-19 in addition to (not instead of) social distancing, frequent hand cleaning and other everyday preventive actions. A cloth face covering is not intended to protect the wearer but may prevent the spread of virus from the wearer to others. This would be especially important if someone is infected but does not have symptoms.

Employee Health/Symptoms

- Employees must stay home when feeling sick or when they have been in close contact with a confirmed positive case. If they develop symptoms of acute respiratory illness, they must selfquarantine and inform their supervisor.
- Employees must inform their supervisors if they have a sick family member at home with COVID-19. If an employee has a family member sick with COVID-19, that employee must follow the isolation/quarantine requirements as established by the State Department of Health.
- All employees will be screened at the beginning of their shift by taking their temperature and being asked if they have a fever, cough, shortness of breath, fatigue, muscle aches, or new loss of taste or smell. Any worker with a temperature of 100.4°F or higher is considered to have a fever and must be sent home.
- Employees must report to their supervisor if they develop symptoms of COVID-19 (e.g., fever, cough, chills, headache, repeated shaking, sore throat, shortness of breath, fatigue, muscle aches, or new loss of taste or smell). If symptoms develop during a shift, the employee will isolate immediately. If symptoms develop while the employee is not working, the employee should not come to work until they have been evaluated by a healthcare provider.
- DEA employees are encouraged to make the choice that is right for themselves and their families. Employees who prefer not to work under these circumstances shall notify their supervisor and be allowed to remove themselves from the work. Supervisors shall reach out to their HR Business Partner for help with employee concerns.
- If an employee is confirmed to have COVID-19 infection, DEA will inform fellow employees of their possible exposure to COVID-19 in the workplace but maintain confidentiality as required by the Americans with Disabilities Act (ADA). DEA will instruct fellow employees about how to proceed based on the CDC Public Health Recommendations for Community-Related Exposure.

Return to Work Criteria

- If an employee tests positive for COVID-19 they will be restricted from the vessel and should isolate and comply with medical practitioner and/or governmental guidance regarding restrictions. The employee should not return to work until they receive a release from a medical practitioner allowing a return to work.
- If employees are experiencing cold, flu, or COVID-19 related symptoms, they must meet the following criteria before returning to work:
    - Employees must have a resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath), and a negative result on an FDA Emergency Use Authorized molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥ 24 hours apart (total of two negative specimens);

Or

- At least 3 days (72 hours) have passed since recovery, defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath); and at least 7 days have passed since symptoms first appeared.

- Employees who have had close contact with someone with (confirmed or suspected) COVID-19 but who have since completed 14 days self-quarantine without developing symptoms are cleared to return to work.

High-Risk Employees

Higher-risk individuals are advised to stay home and avoid crowds as much as possible, including public places with lots of people and large gatherings where there will be close contact with others. This includes travel, concert venues, conventions, sporting events, and crowded social gatherings. People at higher risk of severe illness include those:

- Over 60 years of age
- With underlying health conditions, including include heart disease, lung disease, or diabetes
- With weakened immune systems
- Who are pregnant

Key Links and References

https://www.cdc.gov/coronavirus/2019-ncov/travelers/faqs.html#General
https://www.cdc.gov/coronavirus/2019-ncov/community/critical-workers/implementing-safetypractices.
html
https://lonestarhsc.org/covid-19/
https://homeport.uscg.mil/port-directory/houston-galveston
http://www.imo.org/en/MediaCentre/HotTopics/Documents/Circular%20Letter%20No.4204-Add.4.pdf
https://www.osha.gov/SLTC/covid-19/

APPENDIX D
SOUND SPEED INSTRUMENT CALIBRATIONS

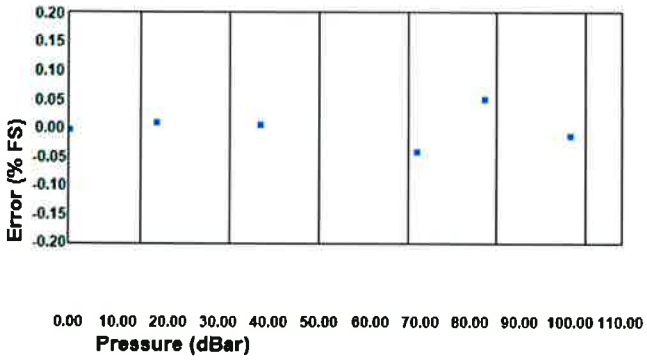
AML OCEANOGRAPHIC
Xchange your old ideas

Certificate of Calibration

Asset Serial Number:	305434
Calibration Type:	Pressure
Certification Date:	March 13,2020
Sensor SN:	305434
Calibration Range:	0.11 to 100.07 dBar
Sensor Range:	100 dBar
Error (% FS)	0.028
Standards:	Paroscientific 785/1567
Equation:	P=A + E*raw + I*raw^2 + M*raw^3

Coefficients

Coefficient A:	-1.251413E+1	Coefficient H:	0.000000E+0
Coefficient B:	0.000000E+0	Coefficient I:	6.501714E-11
Coefficient C:	0.000000E+0	Coefficient J:	0.000000E+0
Coefficient D:	0.000000E+0	Coefficient K:	0.000000E+0
Coefficient E:	1.901497E-3	Coefficient L:	0.000000E+0
Coefficient F:	0.000000E+0	Coefficient M:	4.791795E-17
Coefficient G:	0.000000E+0	Coefficient N:	0.000000E+0



Robert Haydock, President, AML Oceanographic

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. If this instrument or sensor has been re-calibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary.

AML Oceanographic Ltd. 2071 Malaview Avenue Sidney, B.C. V8L 5X6 CANADA Tel: +1 250-656-0771 Fax: +1 250-655-3655

AML OCEANOGRAPHIC
Xchange your old ideas

Certificate of Calibration

Asset Serial Number:	**206588**
Calibration Type:	**Sound Velocity**
Certification Date:	**March 13,2020**
Sensor SN:	**206588**
Calibration Range:	**1423.53 to 1509.08 m/s**
Sensor Range:	**1375 to 1625 m/s**
Residual (RMSE):	**0.010**
Standards:	**Hart 2563/4067**

Calibration Results (see note 2)

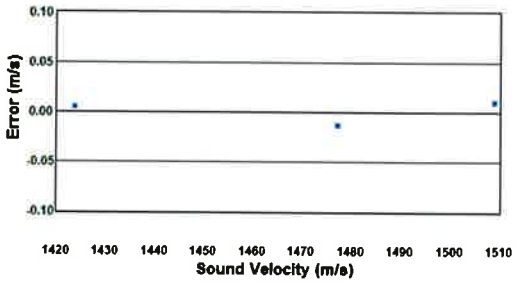
Calculated Coefficients

A1:	**-2.950550E-8**
B1:	**1.949788E-7**
A2:	**-1.917188E-5**
B2:	**1.957657E-7**
A3:	**4.430992E-8**
B3:	**1.949706E-7**

Water Temperature (°C)	*Reference SV (m/s)*	*Sensor Reading (m/s)*	*Error (Sensor – Ref) (m/s)*
29.969	*1509.072*	*1509.081*	*0.009*
18.362	*1477.216*	*1477.202*	*-0.014*
4.414	*1423.521*	*1423.526*	*0.005*

Transfer Function: SV = (Ai + Bi*t)^-1 (see note 1)

RMSE: 0.010 **Pass/Fail: PASS**



Robert Haydock, President, AML Oceanographic

Note 1: 't' represents raw time of flight in counts. Transfer function intelligently switches between coefficient pairs (A1,B1), (A2,B2), and (A3,B3) based on environmental conditions. Default coefficient pair is (A3,B3).
Note 2: Sensor calibrated in accordance with AML Calibration Procedure DOC-1891 traceable to National Standards; available upon request.

AML Oceanographic certifies that the asset described above has been calibrated or recalibrated with equipment referenced to traceable standards. If this instrument or sensor has been re-calibrated, please be sure to update your records. Please also ensure that you update the instrument's coefficient values in any post-processing software that you use, if necessary.

AML Oceanographic Ltd. 2071 Malaview Avenue Sidney, B.C. V8L 5X6 CANADA Tel: +1 250-656-0771 Fax: +1 250-655-3655

AML OCEANOGRAPHIC
Xchange your old ideas

Certificate of Calibration

Asset Serial Number:	200790
Calibration Type:	Sound Velocity
Certification Date:	June 11,2020
Sensor SN:	200790
Calibration Range:	1412.20 to 1509.03 m/s
Sensor Range:	1375 to 1625 m/s
Residual (RMSE):	0.003
Standards:	Hart 2563/4067

Calibration Results (see note 2)

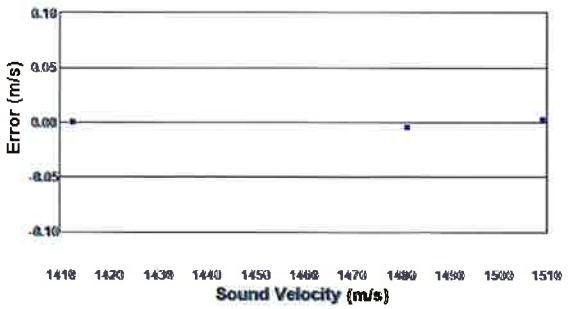
Calculated Coefficients

A1:	1.090841E-6
B1:	1.944929E-7
A2:	-1.819422E-5
B2:	1.953474E-7
A3:	1.307238E-6
B3:	1.944449E-7

Water Temperature (°C)	*Reference SV (m/s)*	*Sensor Reading (m/s)*	*Error (Sensor – Ref) (m/s)*
29.948	*1509.023*	*1509.026*	*0.003*
19.602	*1481.128*	*1481.125*	*-0.004*
1.993	*1412.203*	*1412.204*	*0.001*

Transfer Function: SV = (Ai + Bi*t)^-1 (see note 1)

RMSE: 0.003 Pass/Fail: PASS



Robert Haydock, President, AML Oceanographic

Note 1: 't' represents raw time of flight in counts. Transfer function intelligently switches between coefficient pairs (A1,B1), (A2,B2), and (A3,B3) based on environmental conditions. Default coefficient pair is (A3,B3).
Note 2: Sensor calibrated in accordance with AML Calibration Procedure DOC-1891 traceable to National Standards; available upon request.

APPENDIX C
Soil Boring Logs

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

PROJECT Blakely Harbor Park Site
PROJECT LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

KEY SHEET - CLASSIFICATIONS AND SYMBOLS

GS FORM: KEY 09/99

EMPIRICAL CORRELATIONS WITH STANDARD PENETRATION RESISTANCE N VALUES *

	N VALUE * (BLOWS/FT)	CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS/SQ FT)
FINE GRAINED SOILS	0 - 2	VERY SOFT	<0.25
	3 - 4	SOFT	0.25 - 0.50
	5 - 8	FIRM	0.50 - 1.00
	9 - 15	STIFF	1.00 - 2.00
	16 - 30	VERY STIFF	2.00 - 4.00
	31 - 50	HARD	>4.00
	>50	VERY HARD	

	N VALUE * (BLOWS/FT)	RELATIVE DENSITY
COARSE GRAINED SOILS	0 - 4	VERY LOOSE
	5 - 10	LOOSE
	11 - 30	MEDIUM DENSE
	31 - 50	DENSE
	>50	VERY DENSE

* ASTM D 1586; NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 IN. O.D., 1.4 IN. I.D. SAMPLER ONE FOOT.

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

MAJOR DIVISIONS			SYMBOLS	DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL COARSER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO.4 SIEVE	CLEAN GRAVELS — LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES — APPRECIABLE AMOUNT OF FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING NO.4 SIEVE	CLEAN SANDS — LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES — APPRECIABLE AMOUNT OF FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL FINER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

NOTE: DUAL SYMBOLS USED FOR BORDERLINE CLASSIFICATIONS

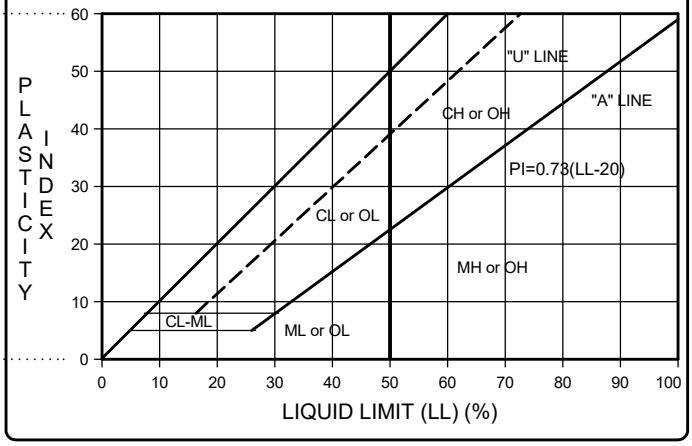
PARTICLE SIZE IDENTIFICATION

BOULDERS	>300 mm
COBBLES	75 - 300 mm
GRAVEL: COARSE	19.0 - 75 mm
GRAVEL: FINE	4.75 - 19 mm
SAND: COARSE	2.00 - 4.75 mm
SAND: MEDIUM	0.425 - 2.00 mm
SAND: FINE	0.075 - 0.425 mm
SILT	0.075 - 0.002 mm
CLAY	<0.002 mm

WELL GRADED - HAVING WIDE RANGE OF GRAIN SIZES AND APPRECIABLE AMOUNTS OF ALL INTERMEDIATE PARTICLE SIZES

POORLY GRADED - PREDOMINANTLY ONE GRAIN SIZE, OR HAVING A RANGE OF SIZES WITH SOME INTERMEDIATE SIZES MISSING

PLASTICITY CHART



OTHER MATERIAL SYMBOLS

- Siltstone
- Sandstone
- Siltstone/Claystone
- Claystone
- Shale
- Siltstone/Sandstone
- Conglomerate
- Granitic
- Sand
- Silt
- Silty Sand
- Alluvium
- Artificial Fill
- Debris Fill
- Asphalt
- Cement

WELL SYMBOLS

- Concrete
- Grout
- Hydrated Bentonite
- Filter Sand
- Well Screen
- Well Sump
- Native / Slough
- Centralizer

SAMPLER AND OTHER SYMBOLS

- Auger
- Core
- Drive Point
- Grab Sample
- Core Loss
- Rock Core

- Water Level at Time Drilling, or as Shown
- Static Water Level
- MSL: Mean Sea Level
- AGS: Above Ground Surface
- BGS: Below Ground Surface
- PID: Photoionization Detector
- ppm: Parts per Million

SEATTLE - KEY PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 1/18/22

Geosyntec consultants

520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-17 **SHEET** 1 OF 1
START DATE 9/15/2021 **Elevation** 12.95 FEET (See Note A)
FINISH DATE 9/15/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	CORE: TYPE	CORE: % RECOVERY	SAMPLES: SAMPLE NAME	SAMPLES: PID READING (ppm)	COMMENTS
	Moist, black, TOPSOIL; organic soil with roots and some brick fragments.		TOPSOIL		2.66' stick up. 0.5' bgs- Top of bentonite seal (<1 bag bentonite md. chips Cetco Puregold)			BH-SB-17-0to2	0.8	
	Moist, light brown (7.5YR 6/4), poorly-sorted SAND with silt; few gravels; brick fragments up to 2 inches.		SW-SM					BH-SB-17-0to2-D	0.8	
	Wet, black (7.5YR 2.5/1), cohesive, WOOD (fibers).		WOOD						0.8	
2	Dark reddish-brown and reddish-yellow WOOD (intact pieces of dimensional lumber).		WOOD				78	BH-SB-17-2to4	0.8	VWWA: 20% 2'-4' bgs, pale tan fibers < 2", one 3" wood piece.
4					1", temporary, pre-pack, PVC well.					VWWA: 100 % 2'-6' bgs, lumber < 4", sawdust. No odor.
	Wet, black (7.5YR 2.5/1), cohesive, WOOD (fibers). @ 5.5' bgs - Hard, reddish-yellow and reddish-brown, WOOD (dimensional lumber); minor sawdust.		WOOD		5' bgs- Top of sand filter pack.			BH-SB-17-4to6	0.8	
6									0.5	DTW=6.5 feet btoc.
	Wet WOOD (mix of dimensional lumber, wood pieces, and sawdust). Sulfur odor.		WOOD		7' bgs- Top of screen.		96		0.8	VWWA: 100% 6'-10' bgs, brown and dark brown, sawdust, wood chips, lumber 2"-3", sulfur odor.
8								BH-SB-17-6to10		
								BH-SB-17-6to10-D		
10									1	
							66	BH-SB-17-10to12		VWWA: 100% 10'-12' bgs, degraded, brown and dark brown, sawdust, wood chips, fibrous wood 1"-3".
12					Boring transitions from 4" to 2.5" at 12' bgs.				16.4	
14							35			
	Wet, greenish-black (gley 1 5GY 2.5/1), gravelly SILT with sand; white shell pieces.		ML		Bottom of screen at 17' bgs. 0.01" slot screen.				0.8	
16	End of boring at 17' bgs.									

CONTRACTOR Cascade Drilling **NORTHING** 222226.110
EQUIPMENT GeoProbe **EASTING** 1225172.882
DRILL MTHD Direct Push **ANGLE** Vertical
DIAMETER 4 to 2.5 inch @ 12 feet bgs. **BEARING** ------
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 1/18/22

Geosyntec consultants

520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-18 **SHEET** 1 OF 1
START DATE 9/14/2021 **Elevation** 15.17 FEET (See Note A)
FINISH DATE 9/14/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	USCS Classification	WELL: WELL CONSTRUCTION MATERIAL	CORE: % RECOVERY	SAMPLES: SAMPLE NAME	PID READING (ppm)	COMMENTS
	Dry, brown (10YR 4/3), loose, non-plastic, non-cohesive, organic TOPSOIL with sand and trace gravel, grass roots.	TOPSOIL	2.83' stick up. 0.5' bgs- Top of bentonite seal (<1 bag bentonite md. chips Cetco Puregold) 1' bgs- Top of sand filter pack. 2' bgs- Top of screen.				
	Dry, brown, degraded WOOD (chips and rotten woody debris).	WOOD					
	Dry, dark yellowish-brown (10YR 3/4), well-graded, subrounded fine SAND with silt and gravel.	SW-SM			BH-SB-18-0to2		VWWA: 34% 0'-2' bgs, brown, wood pieces 1"-2".
2	Dry, black, SILT with brick fragments, trace roots, no odor.	ML		63			
	Moist, dark yellowish-brown (10YR 3/4), non-cohesive, non-plastic, SILT; some subangular gravel, some sand.	ML			BH-SB-18-2to4		VWWA: <5% 2'-4' bgs, wood fibers, no odor.
4	Gravel content increases with depth.						
					BH-SB-18-4to6		VWWA: 0% 4'-6' bgs, no wood observed.
6	@ 6.75' bgs - Becomes wet.		1", temporary, pre-pack, PVC well.			N/A	
	Wet, dark brown (7.5YR 3/5), well graded GRAVEL with silt and sand.	GM		80	BH-SB-18-6to9		VWWA: 0% 6'-9' bgs, no wood observed.
8			Bottom of screen at 12' bgs. 0.01" slot screen.				VWWA: <5% 9'-11' bgs, trace wood observed after wetting.
	SILT with gravel, wood fragments, and dimensional lumber.	ML			BH-SB-18-9to11		
10	Wet, dark brown (7.5YR 3/2), well graded SAND with gravel; some wood pieces.	SW		99			
	@ 11-11.5' bgs - Fine to coarse gravel and brick pieces.				BH-SB-18-11to12		VWWA: <5% 11'-12' bgs, trace wood observed after wetting.
12	Wet, greenish black (gley 1 2.5/GY), medium dense, well-graded GRAVEL with silt and sand.	GM					
	End of boring at 12' bgs.						

CONTRACTOR Cascade Drilling **NORTHING** 222101.299
EQUIPMENT GeoProbe **EASTING** 1225216.647
DRILL MTHD Direct Push **ANGLE** Vertical
DIAMETER 2.5 inch **BEARING** ------
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 1/18/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-19 **SHEET** 1 OF 1
START DATE 9/14/2021 **Elevation** 8.41 FEET (See Note A)
FINISH DATE 9/14/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	CORE: TYPE	CORE: % RECOVERY	SAMPLES: SAMPLE NAME	SAMPLES: PID READING (ppm)	COMMENTS
	Moist, well graded, silty SAND; trace gray and white shells, trace fine gravel.		SW		2.23' stick up.					VWWA: 43% 0'-2' bgs, fibers and mostly intact wood pieces larger than 3-4".
	Wet, reddish-yellow (7.5YR 6/8), WOOD (decomposed dimensional lumber), brick pieces.		WOOD		0.5' bgs - Top of bentonite seal (<1 bag bentonite md. chips Cetco Puregold).			BH-SB-19-0to2		
2	Wet, dark brown (7.5YR 3/3), WOOD (sawdust).		WOOD		1' bgs - Top of sand filter pack.		68			
	@ 1.58-1.67' bgs - Black material (burned).				2' bgs - Top of screen.					VWWA: 100% 2'-6' bgs, fiberous wood with sawdust, wood chips <1", and wood pieces <2".
4								BH-SB-19-2to6		
								BH-SB-19-2to6-DUP		
	@ 5.75' bgs - Becomes mostly sawdust and less decomposed.									
6					1", temporary, pre-pack, PVC well.				N/A	
	@7-8' bgs - Grades to gravel.							BH-SB-19-6to8		VWWA: 100% 6'-8' bgs, dark tan, degraded, wood fibers (0.25"-0.5") and sawdust.
	Wet, greenish-black (gley 1 2.5/5GY), medium dense, well graded fine to medium GRAVEL with silt and well graded fine to coarse subangular sand; non-plastic and non-cohesive.		GM				99			
8					Bottom of screen at 12 feet bgs. 0.01" slot screen.			SB-19-8to10		VWWA: 0% 8'-10' bgs, no wood observed.
10	@ 10' bgs - Color changes to dark greenish-gray (10Y 4/1).									
							99	SB-19-10to12		VWWA: 0% 10'-12' bgs, no wood observed.
12	End of boring at 12' bgs.									

CONTRACTOR Cascade Drilling **NORTHING** 222147.198
EQUIPMENT GeoProbe **EASTING** 1225397.621
DRILL MTHD Direct Push **ANGLE** Vertical
DIAMETER 2.5 inch **BEARING** ------
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-20 **SHEET** 1 OF 1
START DATE 9/13/2021 **Elevation** 11.40 FEET (See Note A)
FINISH DATE 9/13/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL LOG	WELL CONSTRUCTION MATERIAL	CORE TYPE	CORE % RECOVERY	SAMPLES SAMPLE NAME	SAMPLES PID READING (ppm)	COMMENTS
0	Dry, very dark gray (10YR 3/1), loose, silty fine to medium SAND; trace subrounded fine white gravel,		SM		3.16' stick up. 0.167' bgs - Top of bentonite seal (<1 bag bentonite md. chips Cetco Puregold). 0.5' bgs - Top of sand filter pack. 1.5' bgs - Top of screen.					
	Dry, very dark gray (10YR 3/1), loose, silty fine SAND and SLAG; trace subrounded medium gravel.		FILL							
	Dry, yellow (10YR 8/8), WOOD (dimensional lumber).		WOOD					BH-SB-20-0to3		
2							56			
4	@ 4.5': 3" layer of brown (7.5 YR 4/4) PEAT.							BH-SB-20-3to5		
	Loose, well graded, medium to coarse, gravelly SAND; sand is rounded to sub-rounded.		SW							
6					1", temporary, pre-pack, PVC well.				N/A	
								BH-SB-20-5to9		
8					0.75" x 60" x 0.01" slot screen.		60			
	Wet, brown (10YR 5/4), poorly graded gravelly SAND; trace silt; trace shells.		SW							
10					11.5' bgs - Bottom of screen. 0.01" slot screen.			BH-SB-20-9to12		
	@ 11.5-12' bgs - Heaving and sloughing. Shell size increases.						99			
12	End of boring at 12' bgs.									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 2.5 inch
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

NORTHING 222235.930
EASTING 1225535.266
ANGLE Vertical
BEARING ------

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Seattle, Washington 98101
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GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-21 **SHEET** 1 OF 1
START DATE 9/13/2021 **Elevation** 9.74 FEET (See Note A)
FINISH DATE 9/13/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	CORE: TYPE	CORE: % RECOVERY	SAMPLES: SAMPLE NAME	SAMPLES: PID READING (ppm)	COMMENTS
0	Moist, black (10YR 2/1), soft, SILT; non-plastic, non-cohesive, trace sand.	ML		3.33' stick up. 0.5' bgs - Top of bentonite seal (<1 bag bentonite md. chips Cetco Puregold).					
	@ 0-0.6' bgs - Organic-rich fibrous material and slag.	SM					BH-SB-21-0to2		
2	Wet, dark brown, soft, medium grained, silty SAND; low plasticity, non-cohesive, trace brick fragments <0.75". Increasing brick fragment content with depth.					50	BH-SB-21-2to4		
4	Wet, yellowish-brown, soft, decomposed WOOD (sawdust and pulp fibers).	WOOD					BH-SB-21-4to6		
6	@ 6' bgs - WOOD (dimensional lumber) @ 6-9.67' bgs - Color becomes yellowish-brown with yellow streaks			5.47' bgs - Top of sand filter pack. 6.47' bgs - Top of screen.		50	BH-SB-21-6to10	N/A	
8				1", temporary, pre-pack, PVC well. Bottom of screen at 11.47' bgs. 0.01" slot screen.					
10	Wet, dark grayish-brown (10YR 4/2), loose, coarse, subrounded, gravelly SAND; non-plastic, non-cohesive, trace wood pulp, wood fibers, and brick fragments <1.5".	SM				50	BH-SB-21-10to12		
12	End of boring at 12' bgs.								

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 2.5 inch
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

NORTHING 222219.626
EASTING 1225738.582
ANGLE Vertical
BEARING ------

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

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Seattle, Washington 98101
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GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-22 **SHEET** 1 OF 1
START DATE 9/15/2021 **Elevation** 11.50 FEET (See Note A)
FINISH DATE 9/15/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	CORE: TYPE	CORE: % RECOVERY	SAMPLES: SAMPLE NAME	SAMPLES: PID READING (ppm)	COMMENTS
	Moist, black (10YR 2/1), sandy TOPSOIL; contains plant roots and fibers.		TOPSOIL						0.8	VWWA: 14% 0'-2' bgs, black to dark brown, wood pieces 1"-1.5", rootlets, and fibers.
	Increasing moisture and decreasing sand with depth.							BH-SB-22-0to2	0.8	
2	@ 2' bgs - Degraded brown WOOD.								0.8	
	Wet, dark brown (10YR 3/8), well graded SAND with gravel and brick fragments.		SW				65			
	Yellow (10YR 3/8), WOOD.		WOOD					BH-SB-22-2to4	0.8	VWWA: 12% 2'-4' bgs, wood pieces 0.25"-2".
4										
	@ 5.25' bgs - Red brick fragments and gravel.							BH-SB-22-4to6	3.1	
	@ 5.75' bgs - WOOD (Dimensional Lumber).									
6	@ 6-10' bgs - Black, reddish brown WOOD (sawdust) with silt.								0.8	
							75			
8					No Well.			BH-SB-22-6to10	0.8	VWWA: 100% 6'-10' bgs, black, degraded, sawdust <0.125".
								BH-SB-22-6to10-D		
10	WOOD (pieces and sawdust) with silt, sand, and small brick fragments.		WOOD						0.8	
	@11' bgs - Subrounded gravels.						80	BH-SB-22-10to12		VWWA: 90% 10'-12' bgs, black sawdust <0.125", black wood chips 1"-2", no odor.
12	Dark greenish-gray, SILT with trace gravel and white shell fragments.		ML						0.8	
	Grades to lighter greenish-gray SILT with trace gravel and white shell fragments.									
14							65			
									0.8	
16										
	End of boring at 17' bgs.									

CONTRACTOR Cascade Drilling **NORTHING** 222339.700
EQUIPMENT GeoProbe **EASTING** 1225290.160
DRILL MTHD Direct Push **ANGLE** Vertical
DIAMETER 4 to 2.5 inch @ 12 feet bgs. **BEARING** ------
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, (A) Elevation at ground surface

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-23 **SHEET** 1 OF 1
START DATE 9/15/2021 **Elevation** 9.74 FEET (See Note A)
FINISH DATE 9/15/2021
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	CORE: TYPE	CORE: % RECOVERY	SAMPLES: SAMPLE NAME	SAMPLES: PID READING (ppm)	COMMENTS
	Dry, light reddish-yellow, FILL (bricks, slag, glass, burned wood).		FILL					BH-SB-23-0to2	0.8	
2	@ 2-2.42' bgs - Black fine silt and ash.						72	BH-SB-23-2to4	0.8	
4										
	Pink (7.5 YR 7/4), fine to coarse SAND with silt.		SM					BH-SB-23-4to6		
6	Dry, black, SILT with fine sand and burned wood; brick fragments, trace slag.		ML					BH-SB-23-6to7	0.8	
	@ 7' bgs - Wet, black WOOD with light brown (7.5 YR 1/4), fine sand and silt.				No Well.		82		0.8	
8								BH-SB-23-7to10		
	Brown (7.5 YR 4/3), rounded, fine to medium SAND with burned wood.		FILL						0.8	
10	@ 9' bgs - Light colored brick and becomes wet.									
	Moist, black, SILT with brick fragments; non-cohesive; non-plastic.		ML						0.8	
	@10.25-11.25' bgs - Large brick fragments.						99	BH-SB-23-10to12		
12	WOOD (burned and partially decomposed sawdust); with brick fragments.		WOOD						0.8	
	Wet, greenish-black (1 gley 2.5/5GY), silty GRAVEL with sand.		GM						1.0	
							N/A		0.8	13.5-15' bgs - No wood observed.
14										
	End of boring at 15' bgs.									

CONTRACTOR Cascade Drilling **NORTHING** 222451.578
EQUIPMENT GeoProbe **EASTING** 1225409.956
DRILL MTHD Direct Push **ANGLE** Vertical
DIAMETER 4 to 2.5 inch @ 12 feet bgs. **BEARING** ------
LOGGER Rose Propst **REVIEWER** Cindy Bartlett **PRINTED** 01/18/22

REMARKS: bgs = Below Ground Surface, (A) Elevation at ground surface

COORDINATE SYSTEM: NAVD88, Washington State Plane North

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520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-24 **SHEET** 1 OF 1
START DATE 9/29/2022 **Elevation** 14.00
FINISH DATE 9/29/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	USCS Classification	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	% RECOVERY	SAMPLE ID	PID READING (ppm)	COMMENTS
	Dry, loose, black, WOOD debris; with slag (light colored) and brick fragments.	WOOD	3.6' stick up.			BH-SB-24-0to2	0.0	VWWA: 0-2' bgs, ~87.5%, sawdust, small fibers, wood chips (~1" cube); appears burnt.
	Moist, firm, black, WOOD.	WOOD					0.0	VSA: 0-2' bgs, <5%, 1 piece (2"x1"x1"), glassy/vitric, light colored. Compressed sample.
	Wet, firm, black, WOOD. @ 4.5' bgs - fresh wood, 1/2 size of sampler (~1.5 inches), not black when broken. @ 7.6' bgs - blocked sampler by large wood, fresh surfaces.	WOOD	2' bgs - Top of bentonite seal (< 1 bag md chips Cetgo Puregold). 3' bgs - Top of sand pack (2/12 sand from Cemex). 4' bgs - Top of screen (2" pre-pack sch 40 PVC well).		90	BH-SB-24-2to4	0.0	VWWA: 2-4' bgs, >90%, dk black, small fibers, wood chips (sm-lg). VSA: 2-4' bgs, no slag observed. DTW @ 1253 measured @ 4.35' bgs.
5							0.0	
						BH-SB-24-6to8		VWWA: 4-6' bgs, >50%. Observation consistent for remainder of soil boring.
	Very wet, loose, black, WOOD (large fragments of 3-4") with silt and sand.	WOOD			50		0.0	VSA: 4-6' bgs, no slag observed. Observation consistent for remainder of soil boring.
	Wet, loose, black, WOOD (sawdust) and wood debris up to 1" with silty sand.	WOOD				BH-SB-24-8to10		
10	Missing or compressed.						0.0	Drillers state material is very soft and wet.
	Wet, loose, black, WOOD (sawdust) and wood debris (up to 1") with silt and sand; trace fine gravel. @ 7.6' bgs - red brick fragment ~ 2" x 3/4".	WOOD	Bottom of screen at 14.0' bgs. 0.01" slot screen. Total well depth = 14.3' bgs.			BH-SB-24-10to12	0.0	
	Wet, loose, olive yellow (2.5Y 6/6), WOOD.	WOOD			80	BH-SB-24-12to14		
	Wet, soft, black (2.5Y 2.5/1), SILT with fine, rounded gravel (25%) and trace clay (5%). @ 14.7' bgs - wood chunk, reddish color, bark compared to earlier wood debris.	ML					0.0	
15						BH-SB-24-14to15	0.0	
	End of boring at 15' bgs.							

CONTRACTOR Cascade Drilling **LATITUDE**
EQUIPMENT GeoProbe **LONGITUDE**
DRILL MTHD Direct Push **ANGLE** Vertical
DIAMETER 3.75 inch **PRINTED** 11/21/22
LOGGER Dottie Metcalf-Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

REMARKS:

COORDINATE SYSTEM: NAVD88, Washington State Plane North
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-25 **SHEET** 1 OF 1
START DATE 9/29/2022 **Elevation** 10.80
FINISH DATE 9/29/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
	Grass, 50% roots, and soil.		TOPSOIL							
	Dry, loose-soft, black (5YR 2.5/1), SILT with pebbles, slag, and brick fragments.		ML					BH-SB-25-0to2	0.0	VWWA: 0-2' bgs, no wood waste observed. VSA: 0-2' bgs, 8.75%, light and multicolored, glassy-voids, pebble sized slag (1-2").
	Dry, loose-soft, dark reddish-brown (5YR 2.5/1), silty SAND with brick fragments and pebbles (<10%).		SM				80	BH-SB-25-2to4	0.0	VWWA: 2-4' bgs, no wood waste observed. VSA: 2-4' bgs, 6.25%, light, vesicular and glass, subangular fine gravel sized (<0.5") with voids.
	Dry, loose-soft, black, silty SAND with 10-15% wood debris (charcoal) and increased gravel; @ 3' bgs - encountered a red brick; @ 3.2' bgs - white shell fragments.		SM					BH-SB-25-4to6	0.0	Most of the BH-SB-25-4to6 sample was collected from the last foot of the first core tube.
5	Moist, loose, dark brown (7.5YR 3/2), silty, coarse SAND with fine gravel.		SM				<50			
	Moist, loose, brown (7.5YR 4/3), silty GRAVEL with coarse sand.		GM					BH-SB-25-8to10	0.0	VWWA: 8-10' bgs, no wood waste observed. Observation consistent for remainder of soil boring.
10	Wet, loose, brown (7.5YR 4/3), silty GRAVEL with coarse sand.		GM					BH-SB-25-10to12	0.0	VSA: 8-10' bgs, no slag observed. Observation consistent for remainder of soil boring.
	Very wet, loose, dark greenish gray (GLEY1 4/1), clayey GRAVEL with sand (>15%); shell fragments.		GC				100	BH-SB-25-12to14	0.0	Driller stated that last core run had more resistance.
15	End of boring @ 15' bgs.							BH-SB-25-14to15	0.0	

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 222155.4
LONGITUDE 1225227.3
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-26 **SHEET** 1 OF 1
START DATE 9/29/2022 **Elevation** 11.30
FINISH DATE 9/30/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	PID READING (ppm)	COMMENTS
	Moist, soft, black (7.5YR 2.5/1), SILT muttled with strong brown (7.5YR 4/6) silt, likely due to brick fragment breakdown.		ML		2.4' stick up.			BH-SB-26-0to2	0.0	Slight odor. VWWA: 0-2' bgs, >95%, sawdust, small fibers, wood chips (2"), slight odor - decomposition. VSA: 0-2' bgs, no slag observed. Core compressed in the wood section. DTW @ 0915 measured @ 3.0' bgs. VWWA: 2-4' bgs, >95%, sawdust, small fibers, wood chips (2"), slight odor - decomposition. VSA: 2-4' bgs, no slag observed. Sample collected using mostly soil from upper core. VWWA: 4-6' bgs, <5%, no visible wood debris. Observation consistent for remainder of soil boring. VSA: 4-6' bgs, no slag observed. Observation consistent for remainder of soil boring. Native Some slough in upper foot of lower core.
	Moist, loose, dark brown (7.5YR 3/4), WOOD with some bark and other fragments visible.		WOOD				100	BH-SB-26-2to4	0.0	
	Black sand with fine gravel.		GW-GM		2' bgs - Top of bentonite seal (~1/4 bag md chips Cetgo Puregold).				0.0	
	Wet, loose, dark reddish brown (5YR 3/4), well graded GRAVEL with coarse sand (>25%) and fines (silt ~15%).		GW-GM		3.5' bgs - Top of sand pack (1/2 bag of 2/12 sand from Cemex).			BH-SB-26-4to6	0.0	
5					5' bgs - Top of screen (2" pre-pack sch 40 PVC well).		60	BH-SB-26-7to9	0.0	
	Wet, medium firm, dark gray (GLEY1 4/N), well graded SAND with shells, fine gravel (angular-subangular ~15%), and clay.		SW-SC					BH-SB-26-9to10	0.0	
10									0.0	
							100		0.0	
					Bottom of screen at 15' bgs. 0.01" slot screen.				0.3	
									0.3	
15	End of boring @ 15' bgs.				Total well depth = 15.25' bgs				0.3	

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 222227.0
LONGITUDE 1225397.0
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-27 **SHEET** 1 OF 2
START DATE 9/30/2022 **Elevation** 9.80
FINISH DATE 9/30/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	PID READING (ppm)	COMMENTS
	Bark dust, loam topsoil.	TOPSOIL		2.95' stick up.					1.5' of 1st core - no recovery or compressed.
	Moist, medium dense, black, coarse sand sized burned wood debris (charcoal) with ~0.25" refractory bricks, degraded at 2.5-2.75' bgs.	WOOD				70		0.0	VWWA: 2-2.5' bgs, 17.5%, dk brown, fine dust, lg wood chips. VSA: 2-2.5' bgs, no slag observed.
	Moist, medium dense, gray brown, silty gravel.	FILL		3' bgs - Top of bentonite seal (~1/4 bag md chips Cetgo Puregold).			BH-SB-27-2.5to3.5	0.0	VWWA: 2.5-3.5' bgs, no wood observed.
	Moist, medium dense, gray brown, sawdust and wood pieces at upper 0.25' of core; fresh, moist wood @ 7.7-7.8' bgs.	FILL						0.0	VSA: 2-2.5' bgs, 10%, light and degraded, refractory bricks, sub-rounded/sub-angular, crushed, gravel sized.
5							BH-SB-27-4to6	0.0	
				7' bgs - Top of sand pack (~1/4 bag 2/12 sand Cemex).		70		0.0	1.5' of 2nd core - no recovery. VWWA: Combined 4-5 and 7-8' bgs, >95%, wood grain and fibrous, sawdust, wood chips (at upper interval), fresh wood at 8' bgs; no odor or degradation. VSA: Combined 4-5 and 7-8' bgs, no slag observed.
	Fines downward to: Wet, medium dense, gray-brown (5Y 5/2), silty fine subrounded GRAVEL (~70%) with some coarse sand (~25%) and trace medium sand (< 5%).	GM						0.0	
				9' bgs - Top of screen (2" pre-pack sch 40 PVC well).			BH-SB-27-8to10		VWWA: 8-10' bgs, no wood obsered. Observation consistent for remainder of soil boring.
10								0.0	SVA: 8-10' bgs, no wood observed. Observation consistent for remainder of soil boring.
						90		0.0	0.5' of 3rd core - no recovery.
							BH-SB-27-12to14		
15									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Cindy Bartlett
LATITUDE 222253.0
LONGITUDE 1225730.2
ANGLE Vertical
PRINTED 11/21/22
REVIEWER Dottie Metcalf -Lindenburger

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-27 **SHEET** 2 OF 2
START DATE 9/30/2022 **Elevation** 9.80
FINISH DATE 9/30/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL LOG	WELL CONSTRUCTION MATERIAL	SAMPLES TYPE	% RECOVERY	SAMPLE ID	PID READING (ppm)	COMMENTS
	Wet, medium dense, gray-brown (5Y 5/3), subrounded fine GRAVEL at >40% with > 50% coarse sand trace silt, multicolored.		SW-SM					BH-SB-27-14to16	0.0	
					Bottom of screen at 19' bgs. 0.01" slot screen.		100	BH-SB-27-16to18	0.0	Archived samples deeper than 16' bgs.
	Wet, medium dense, gray brown (5Y 5/3 - 5Y 5/4), coarse SAND with shell fragments up to 0.25".		SM							
	Wet, dense, dark brown, silt-sandy SILT muttled with thin shell fragments up to 0.5".		ML		Total well depth = 19.25' bgs			BH-SB-27-18to20	0.0	Silt is wet but perched water above.
	Wet, medium dense, gray brown (5Y 5/3), gravelly, coarse SAND; shell fragments up to 0.25".		SW							
20	End of boring @ 20' bgs.									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Cindy Bartlett

LATITUDE 222253.0
LONGITUDE 1225730.2
ANGLE Vertical
PRINTED 11/21/22
REVIEWER Dottie Metcalf -Lindenburger

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Geosyntec consultants

520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-28 **SHEET** 1 OF 2
START DATE 9/28/2022 **Elevation** 13.20
FINISH DATE 9/28/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
	Dry, loose, dark reddish brown (5YR 3/4), WOOD litter (mulch).		WOOD					BH-SB-28-0to2	0.0	VWWA: 0-2' bgs, 58.75%, bark, fibers, wood chisp (2-3"), appears to be fresh mulch. VSA: 0-2' bgs, no slag observed.
	Dry, loose, black (5YR 2.5/2), SILT.		MH							
	Dry, hard/compact, pinkish white (5YR 8/2), SLAG.		SLAG				95			
	Dry, loose, black, WOOD - charcoal, fine gravel.		SW					BH-SB-28-2to4	0.0	VWWA: 2-4' bgs, 6.25', burned, wood chips (<1"). VSA: 2-4' bgs, 18.75%, light color, not dense, vesicular, brittle, glass, bulky with voids (>2"), appears to be fine sand/brick with voids.
	Dry, loose, very dark gray (5YR 3/1), coarse SAND with small pebbles (<10%).		SW							
	Dry, loose, black, WOOD - charcoal, large pieces.		WOOD					BH-SB-28-4to6	0.0	
5	No recovery.									VWWA: 5-6' bgs, >95%, burned, powdered dust to 1" cube chunks, wood chips; charcoal. VSA: 5-6' bgs, no slag observed.
	Very moist, soft, black, SILT; becomes moist, loose, dark reddish brown (5YR 3/2), SAND with some fines (<15%).		MH SW-SM					BH-SB-28-6to8	0.0	VWWA: 6-8' bgs, some potential trace ash. VSA: 6-8' bgs, no slag observed. @7.5' bgs - resistance during drilling.
	Moist, firm/compact, reddish gray (5YR 5/2), fine to medium SAND.		SW-SM				60			
	Black wood fiber.		WOOD							
	Wet, loose, gray (GLEY1 5/N), coarse SAND with wood pieces (black 1-2") and fines (< 15%), some fused sand.		SM					BH-SB-28-8to10	0.0 0.0	@9' bgs - moderate resistance during drilling. VWWA: 8-10' bgs, 15.6%, burned, wood chips (1").
10										

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 222469.2
LONGITUDE 1225308.2
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-28 **SHEET** 2 OF 2
START DATE 9/28/2022 **Elevation** 13.20
FINISH DATE 9/28/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
	Wet, loose, very dark gray (GLEY1 3/N), coarse SAND with 15% rounded gravels.		SM						0.0	VSA: 8-10' bgs, no slag observed.
									0.0	
	Light gray (GLEY1 7/1) CLAY.		ML					BH-SB-28-10to12		VWWA: 10-12' bgs, 13.75%, burned, wood chips (1-2").
	Wet, very loose, dark black, WOOD - pieces.		WOOD						0.0	VSA: 10-12' bgs, no slag observed.
							100		0.0	
	Wet, soft, black, PEAT. @ 14.1' bgs wood fibers encountered are light-reddish (like natural bark).							BH-SB-28-12to14	0.0	Sulfur like odor - considered native peat. VWWA: 12-14' bgs, >90%, burned, small fibers, wood chips (1-2"), possible sawdust. VSA: 12-14' bgs, no slag observed.
	Moist, soft, black (GLEY1 2.5/N), CLAY.		CL						0.0	
15	End of boring at 15' bgs.									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 222469.2
LONGITUDE 1225308.2
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-29 **SHEET** 1 OF 2
START DATE 9/28/2022 **Elevation** 14.50
FINISH DATE 9/29/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
0	Dry, loose, dark reddish gray (5 YR 4/2), well graded SAND with subangular to rounded fine gravel (30-40%); shell fragments.		SW		2.65' stick up.		65	BH-SB-29-2to4	0.0	The first ~0.5' of material bgs was cleared by drillers. Subsequent cores were advanced from 0.5-5.5' bgs and so on. 0-2' bgs - no recovery. VWWA: 2-4' bgs, no wood waste observed. Observation consistent for remainder of soil boring. SVA: 2-4' bgs, no slag observed. Observation consistent for remainder of soil boring.
5	No recovery.				2.4' bgs - Top of bentonite seal (<1 bag md chips Cetgo Puregold).			BH-SB-29-4to6	0.0	
							50			5-8' bgs - no recovery.
	Moist, loose, dark reddish brown (5YR 3/3), well graded GRAVEL with silty sand; gradually grades from sand to gravel; pebbles are subrounded to rounded.		GW-GM					BH-SB-29-8to10	0.0	
10					11.9' bgs - Top of sand pack (<1 bag 2/12 sand Cemex).		60			10' bgs - Driller states material is soft. DTW @ 0915 measured @ 12' bgs; used driller's tape.
					12.9' bgs - Top of screen (2" pre-pack sch 40 PVC well).			BH-SB-29-13to15	0.0	
15							<50			Poor yield and slough at top of core.
	Becomes wet @ ~18' bgs.									
20										

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 222432.0
LONGITUDE 1225439.0
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

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Geosyntec consultants

520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB/GW-29 **SHEET** 2 OF 2
START DATE 9/28/2022 **Elevation** 14.50
FINISH DATE 9/29/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
					Bottom of screen at 22.9' bgs. 0.01" slot screen. Total well depth = 23.2' bgs.		100	19to21 BH-SB-29-	0.0	
								BH-SB-29-21to23	0.0	
	Moist, firm, very dark greenish gray (GLEY1 3/10Y), SAND with silt (>15%); shell fragments.		SM					BH-SB-29-23to24	0.0	Driller noted collapse as pulling sample up.
25	End of boring @ 25.5' bgs.									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 222432.0
LONGITUDE 1225439.0
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

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Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-30 **SHEET** 1 OF 1
START DATE 9/30/2022 **Elevation** 9.00
FINISH DATE 9/30/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
	Moist, soft, organic black, TOP SOIL with roots.		TOPSOIL						0.0	
									0.0	0-3' bgs - no recovery or compressed material.
							40		0.0	
								BH-SB-30-3to4	0.0	VWWA: 3-4' bgs, 5%, very dk gray/black, roots, very fine wood debris (potentially sawdust); no odor. VSA: 3-4' bgs, no slag observed.
	Moist, soft, black, WOOD (burned soot or degraded wood) with bricks and angular, coarse gravel.		WOOD FILL					BH-SB-30-4to5	0.0	
5	Moist, stiff, dark brown-black (5YR 3/3), FILL with very fine crushed and angular gravel, brick debris. @ 4.5' bgs - sawdust with 1 large wood piece.								0.0	VWWA: 4-5' bgs, >95%, dk brown - reddish brown, slightly degraded sawdust, wood chunks (2-3"). VSA: 4-5' bgs, no slag observed.
							100		0.0	5-7.5' bgs - no recovery or compressed material.
	Wet, medium dense, brown-gray (5Y 5/4), silty GRAVEL with coarse sand and fine, subrounded gravel of multiple lithologies (basalt, sandstones); trace fine sand.		GM					BH-SB-30-8to10 8to10-D	0.0	VWWA: 8-10' bgs, no wood observed. Observation consistent for 10-12' bgs and 12-14' bgs.
10									0.0	SVA: 8-10' bgs, no slag observed. Observation consistent for 10-12' bgs and 12-14' bgs.
								BH-SB-30-10to12	0.0	No slag or visible wood debris in gravel layer.
							100		0.0	
								BH-SB-30-12to14	0.0	
									0.0	
15	@ 15' bgs - very small shell fragments in shoe.								0.0	
										Liner shredded.
							10			
	@ 20' bgs - very small shell fragments and gray silty gravel in shoe.									
20	End of boring @ 20' bgs.									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Cindy Bartlett

LATITUDE 222252.0
LONGITUDE 1225612.2
ANGLE Vertical
PRINTED 11/21/22
REVIEWER Dottie Metcalf -Lindenburger

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, Washington 98101
Phone: 206.496.1450

GS FORM: CORE3 10/00

BOREHOLE LOG

BORING SB-38 **SHEET** 1 OF 1
START DATE 10/3/2022 **Elevation** 10.30
FINISH DATE 10/3/2022
PROJECT Blakely Harbor Park Site
LOCATION Blakely Harbor
PROJECT NUMBER PNG0900

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBOLIC LOG	USCS Classification	WELL: WELL LOG	WELL: WELL CONSTRUCTION MATERIAL	SAMPLES: TYPE	SAMPLES: % RECOVERY	SAMPLES: SAMPLE ID	SAMPLES: PID READING (ppm)	COMMENTS
	Dry, loose, light brownish gray (10YR 6/2), fine SAND with <5% fines and gravels.		SP				85	BH-SB-38-2to4 2to4-D	0.0	VWWA: 0-2' bgs, no wood observed. Observation consistent down to 10' bgs. VSA: 0-2' bgs, no slag observed. Observation consistent down to 10' bgs.
								BH-SB-38-4to5	0.0	
5	@4.5' bgs - Moist, loose, dark black, apparent SILT (<8" thickness); transitions to		SM							
	Moist, loose, brown (7.5YR 4/3), silty SAND with subrounded gravels (35%); few brick fragments and burnt wood (charcoal).		SM						0.0	Appears to be some slough in second core run.
	Moist, loose, brown (7.5 YR 4/3), silty SAND with subrounded gravels.		SM				100	BH-SB-38-6to8	0.0	
	Moist, medium dense, dark greenish gray (GLEY1 4/1), well graded SAND with clay and gravel.		SW-SC							
	@ 8.0' bgs - becomes wet. @ 8.5' bgs - some organic fibers, likely peat.							BH-SB-38-8to10 8to10-D	0.0	
10	@ 10' bgs - Shell fragments in shoe and top of next core segment; wood.									
	Fresh wood - bark.		WOOD					BH-SB-38-10to12 10to12-D	0.0	VWWA: 10-12' bgs, 6%, black, appears burned, wood chips with one end frayed/fibrous. VSA: 10-12' bgs, <5%, medium dense, appears to be vesicular basalt.
	Well graded SAND with coarse, angular gravel (andesite or basalt).		SW							
	Wet, loose, very dark greenish gray (GLEY1 3/1), silty coarse SAND with fine gravel (15%). @ 13' bgs - becomes very wet, low-sample return.		SM				65	BH-SB-38-12to14	0.0	
15	Wet, loose, dark brown (7.5YR 3/2), silty SAND with subrounded, fine gravel (~15%). @ 15.1' bgs - small brick fragment.		SM					BH-SB-38-14to16	0.0	
	@ 16.2' bgs - andesite cobble.									
	Wet, loose, very dark greenish gray (GLEY1 3/1), silty SAND; increased silt relative to above interval.		ML				100	BH-SB-38-16to18 16to18-D	0.0	
	@ 17.8 ' bgs - twig Moist, stiff, greenish black (GLEY1 2.5/1), SILT with trace sand (10-15%), occasional shell fragments, and black cube of wood.		ML					BH-SB-38-18to20	0.0	
20	End of boring @ 20' bgs.									

CONTRACTOR Cascade Drilling
EQUIPMENT GeoProbe
DRILL MTHD Direct Push
DIAMETER 3.75 inch
LOGGER Dottie Metcalf -Lindenburger **REVIEWER** Dottie Metcalf -Lindenburger

LATITUDE 221838.8
LONGITUDE 1225126.5
ANGLE Vertical
PRINTED 11/21/22

REMARKS: VWWA = Visual Woodwaste Analysis, bgs = Below Ground Surface, btoc = Below Top of Casing, md. = Medium, DTW = Depth to Water, (A) Elevation at top of casing

COORDINATE SYSTEM: NAVD88, Washington State Plane North

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS

BLAKELY HARBOR UPLAND CORES NO ELEV PNG0900.GPJ PNW DEFAULT GINT LIBRARY.GLB 11/21/22

APPENDIX D
Field Sampling Report

Geosyntec consultants

engineers | scientists | innovators

APPENDIX D
SOIL, GROUNDWATER, AND SEDIMENT SAMPLING

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

Geosyntec consultants

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
COPC	chemical of potential concern
DGPS	Differential Global Positioning System
Ecology	Washington State Department of Ecology
FS	Feasibility Study
ft	feet
Geosyntec	Geosyntec Consultants, Inc.
GPS	global positioning system
IDW	investigation-derived waste
LiDAR	light detection and ranging
Mill	former Port Blakely Mill Company
MLLW	mean lower low water
NAVD88	North American Vertical Datum of 1988
PID	photoionization detector
Port Blakely	Port Blakely Tree Farms
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SC	sediment core
SG	sediment grab
SOPs	standard operating procedures
TCLP	Toxicity Characteristic Leachate Procedure
the Site	the Blakely Harbor Park Site
USCS	United Soil Classification System
VWWA	visual wood waste assessment

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020). The area investigated during this RI is called the Study Area.

This appendix describes the Phase 1, Phase 2, and Phase 3 soil, sediment, groundwater, and stormwater sampling conducted during the remedial investigation (RI) by Geosyntec Consultants, Inc. (Geosyntec). Except where noted, field activities, including location control, sample collection, sample handling and processing, reporting, and data management followed guidelines specified in the *RI/FS Work Plan* and associated Field Sampling Plan (FSP), Sampling Analysis Plan (SAP), and Quality Assurance Project Plan (QAPP) (Geosyntec, 2022) and the *Final RI/FS Work Plan Addendum* (Geosyntec, 2023a). Initial results of the Phase 1 and Phase 2 RI investigations were summarized in the *Phase 2 Data Gaps Evaluation Memorandum* (Geosyntec, 2023b), and additional Phase 3 sampling planned to fulfill identified data gaps were described in the *Field Change Request* (Geosyntec, 2023c).

2. OVERVIEW OF RI SAMPLING PROGRAMS

This section provides an overview of the sampling program for the various media sampled in the RI. The overall RI sample counts per each phase and media is provided in Table D-1. RI sampling locations are mapped in Figure D-1, and coordinates are provided in Table D-2.

2.1 Soil Sampling

Soil was sampled to assess the nature and extent of chemical of potential concern (COPCs). Soil exploration included collection of surface and subsurface soil samples within the upland of the Study Area. Soil samples were collected within three major areas:

1. North Upland: including the northern upland peninsula and shoreline; historical mill buildings were located in this area. Elevated concentrations of COPCs were detected during previous environmental investigations.
2. South Upland: including the southern upland peninsula and shoreline; a portion of historical mill buildings were located in this area. Previous environmental investigations were not conducted in this area.
3. Perimeter: including the perimeter of the approximate RI boundary as presented in the RI/FS Work Plan and Work Plan Addendum.

Upland soil sampling locations are shown in Figure D-2.

2.2 Groundwater Sampling

Groundwater was sampled to assess the presence of COPCs and potential migration of COPCs from soils. Groundwater sampling targeted the northern upland peninsula and the northern shoreline in areas where historical mill buildings were located and elevated concentrations of COPCs were detected during previous environmental investigations.

Groundwater sampling locations are shown in Figure D-2.

2.3 In-water Sampling and Surveys

Sediment sampling and survey included collection of surface and subsurface samples and surveying in three major areas of the Study Area shown in Figure D-1 and described below:

1. Mill Pond: former Mill Pond and an unnamed creek to the west.
2. Inner Harbor: northern and southern shorelines in the western portion of the harbor.
3. Outer Harbor: northern and southern shorelines in the easter portion of the harbor.

Sampling locations are shown in Figure D-3 and listed in Table D-1.

3. LOCATION CONTROL

Location control was implemented in accordance with Section 2.9 of the SAP/QAPP. During sampling, accuracy of horizontal positioning was maintained to the nearest 10 feet (ft) for upland sampling locations and 1 ft for in-water sampling locations. Coordinates and elevations of sampling locations were recorded to nearest foot. The reference data used were the following:

- Horizontal: North American Datum of 1983 (NAD83) Washington State Plane North (feet).
- Vertical: the North American Vertical Datum of 1988 (NAVD88) for upland and mean lower low water (MLLW) for in-water stations.

Multiple surveys were conducted during upland and in-water sampling, and sampling equipment varied with the scope and purpose of the surveys. A comprehensive list of sampling equipment used for the surveys is summarized in the following subsections.

3.1 Upland Sampling

A licensed surveyor placed a reference point prior to beginning of field activities, and GPS accuracies were confirmed using this reference point.

In 2021, 2022, and 2023, before upland sampling activities began, Geosyntec contacted the Utility Notification Center of Washington State to request a locate inspection and clear subsurface utilities. Upland sampling locations were confirmed to be accessible and not in proximity of underground or overhead utilities.

During Phase 1 and Phase 3, hand auger sampling locations were located using a handheld global positioning system (GPS). The Trimble Geo Explorer 6000 and the Trimble 461 Survey GPS series were used to measure horizontal and vertical positioning during field activities conducted within the upland and shoreline areas. Cellphones were used as backups to measure coordinates of sampling locations when the GPS unit was not working.

During Phase 2, hand auger locations and soil borings were surveyed by a Washington State licensed surveyor (Pace Engineers). The surveyor's report is included in Attachment D-1.

Samples were collected within a 50-ft radius of the proposed target location, with a few exceptions among the surface soil sampling stations where alternative target locations were established based on field observations after discussion with the Project Coordinator or the Project Manager. Deviations from the work plans are further discussed in Section 6 and in the main RI Report.

3.2 In-water Sampling and Surveys

In-water sampling included collection of surface grabs and sediment core samples. In addition, diver surveys and probing surveys were conducted during in-water sampling activities and are further discussed in Section 4.6.

In general, horizontal location control was achieved utilizing the positioning system unit on the research vessels, although different vessels were used to sample different areas of the Study Area:

- In the Inner and Outer Harbor, a differential global positioning system (DGPS) unit on the research vessel was utilized to confirm sampling locations to an accuracy of 1 to 2 meters, where applicable, during Phase 1, 2, and 3 sampling events.
- During the diver transect surveys in the harbor, the transect ends were surveyed using the vessel DGPS unit. Soft sediment probing locations along each transect were recorded manually as horizontal distance from one of the surveyed ends. The DGPS accuracy was confirmed daily at an established benchmark (the block wall proximal to the pedestrian bridge).
- In the Mill Pond, a smaller vessel was utilized for sampling due to limited access, and the Trimble 461 Survey GPS unit was used to verify horizontal positioning during sediment sampling and the soft sediment probing during Phase 1. During Phase 2, four sediment grab sampling locations in the unnamed creek were surveyed by the surveyor (Pace Engineers). The surveyor's report is included in Attachment D-1.

Vertical elevation was determined for sediment sample and probing locations as depth to sediment (at mudline) from the water surface and water level to the nearest 0.1 ft. The depth to sediment was measured before sampling each station using graduated lead line and confirmed with an electronic fathometer onboard the vessel when necessary.

In few instances positioning within 50 ft of the proposed sampling location was not possible, and alternate sampling locations were selected after discussion with the Project Coordinator or the Project Manager. Deviations from the work plans are further discussed in Section 6 and in the main RI Report.

Sample collection and logging procedures are detailed in Section 4.

4. SUMMARY OF FIELD INVESTIGATIONS

RI field investigations occurred between September 2020 and December 2023 following a phased approach. Physical surveys were performed in 2020, 2021, and 2022. Soil, groundwater, and sediment sampling were performed in 2021, 2022, and 2023. A selection of pictures showing the sampling methods is provided in Attachment D-2. A summary of the physical surveys and soil, groundwater, and sediment sampling is reported in the following subsections.

4.1 Physical Surveys

Physical surveys conducted in the Study Area included the following:

- A bathymetry and light detection and ranging (LiDAR) survey in autumn 2020, discussed in Appendix B to the RI Report.
- Sediment Profile Imaging and Plain View surveys performed in autumn 2020, discussed in Appendix F to the RI Report.
- A shoreline habitat survey performed in summer 2021, discussed in Appendix G to the RI Report.
- A shoreline structure survey performed in summer 2021, discussed in Appendix H to the RI Report.
- A slag survey performed in summer 2022, discussed in Appendix I to the RI Report.
- A wood debris diver and probing survey performed in summer 2021, discussed in Appendix J to the RI Report.
- A timber pile survey performed in summer 2021, discussed in Appendix K to the RI Report.
- An asbestos sampling and mitigation survey performed in spring 2020, discussed in Appendix L to the RI Report.

The Phase 1 sampling program were designed using information collected during the 2020 physical surveys, and additional surveys were completed in 2021 and 2022 to fulfill data gaps identified from the Phase 1 results.

4.2 Soil Sampling

The soil and groundwater sampling programs were designed to characterize the nature and extent of COPCs in surface and subsurface soils and to assess whether soil COPCs were leaching into groundwater in the Study Area.

RI soil sampling activities varied for each Phase as follows:

- Phase 1: A total of 79 soil samples from 23 sampling locations, including 35 hand auger samples (31 primary samples and 4 field duplicates) from sixteen locations and 44 boring samples (40 primary samples and 4 field duplicates) from seven locations.

Twenty-one locations were in the North Upland, and two locations were in the South Upland. Groundwater samples were collected from temporary wells inserted into five soil boreholes.

- Phase 2: A total of 88 soil samples at 22 locations, including 27 hand auger samples (23 primary samples and 4 field duplicates) from fourteen locations and 61 boring samples (54 primary samples and 7 field duplicates) from eight locations. Sixteen locations were in the North Upland, and six locations were in the South Upland.
  - Of the 27 hand auger locations, 12 were placed along the perimeters of the Study Area, 9 in the North Upland, and 3 in the South Upland.
  - Four groundwater monitoring wells were installed.
- Phase 3: 21 hand auger samples (19 primary samples and 2 field duplicates) from nine locations, including 6 in the North Upland and 3 in the South Upland. Six of these hand auger locations were placed along the perimeter of the Study Area.

The sampling programs were completed in accordance with the procedures detailed in Section 2.2 of the SAP/QAPP, Appendix A of the *RI/FS Work Plan* (Geosyntec, 2022), and are detailed in the following subsections.

4.2.1 Hand Auger Soil Sampling

Surface soil samples were collected during three field events, from August 19 to August 24, 2021, from September 13 to September 22, 2022, and from December 13 to December 14, 2023. A total of 39 locations were sampled by Geosyntec's field team and 83 samples were collected (73 primary and 10 field duplicates). A detailed sample count is reported in Table D-1. Sampling locations are shown in Figure D-2 and coordinates are reported in Table D-2. Field observations, including soil classification, visual wood waste and slag assessment (VWWA), are summarized in Table D-3.

Upon reaching a sampling location, field personnel removed the surface vegetation layer and used a hand auger equipped with a "T" handle and stainless-steel auger to collect surface soil samples from depth intervals of 0 to 1 ft and 1 to 2 ft below ground surface (bgs). During Phase 3, one sample was collected from 2 to 3 ft bgs at location HA-37 to extend the depth of COPC concentrations characterization (Geosyntec, 2023c). After soil samples were collected, each boring location was backfilled with the displaced soil material, and the stainless-steel head was decontaminated between every sample. Refusal was met at seven locations and as shown in Table D-3.

Soil samples were placed in a clean stainless-steel bowl, the soil types logged and visually assessed for wood debris and slag, then homogenized and placed into laboratory-supplied containers. Field quality assurance/quality control (QA/QC) samples included field duplicates to a frequency not lower than 5% of the overall sample count per event, and at least one rinseate blank per sampling event. Field observations, geographical coordinates, and sample description were reported on the field logs.

4.2.2 Soil Borings

Soil borings were completed during two field events from September 13 to September 15, 2021, and from September 28 to October 3, 2022. Cascade Drilling mobilized track-mounted direct push drilling rig (Geoprobe 7822 DT) to the Study Area, and soil borings were completed by a Washington-licensed driller under the oversight by a Washington-licensed Geologist.

A total of 15 boring locations were sampled by Geosyntec's field team and 105 samples were collected (94 primary and 11 field duplicates). A detailed sample count is reported in Table D-1. Sampling locations are shown in Figure D-2 and coordinates are reported in Table D-2. Field observations are compiled in the boring logs, included in the main RI Report in Appendix C.

Borings were advanced using direct-push drilling up to a depth of 12 to 24 ft bgs. The top few feet were hand-cleared using a shovel to verify that subsurface utilities were not present. Soil cores were advanced every 5 ft using a 2-inch-diameter core barrel lined with acetate sleeves. Refusal was not encountered, and contingency test pits were not necessary to complete sample collection.

The acetate sleeves were cut open and the soil cores were logged by visual-manual methods using the United Soil Classification System (USCS). The soil intervals were assessed for wood debris and slag following standard operating procedures (SOPs). Field screening for volatile organic compounds (VOCs) was performed on each soil core at regular intervals using a photoionization detector (PID). The PID was calibrated each morning prior to beginning of field activities. Soil boring samples were collected continuously every 2 ft or where significant stratigraphic changes were observed.

Samples were placed in a clean stainless-steel bowl, homogenized, and placed into laboratory-supplied containers. Field QA/QC samples included field duplicates to a frequency not lower than 5% of the overall sample count per event, and collection of at least one rinseate blank per sampling event.

4.3 Groundwater Sampling

Groundwater sampling was conducted during five field events. RI groundwater sampling was organized in phases as follow:

- Phase 1: temporary wells were installed and sampled from five soil boreholes, and six groundwater samples (five primary samples and one field duplicate) were collected during low tide to avoid saltwater intrusion from the harbor.
- Phase 2: monitoring wells were constructed at four locations and sampled quarterly over a one-year period. A total of 20 groundwater samples (16 primary samples and 4 field duplicate) were collected.

Temporary wells were sampled once from September 16 to September 17, 2021. Temporary monitoring wells were installed at five soil boring locations closest to the shoreline following the procedures detailed in Section 2.3 of the SAP/QAPP Appendix A of the *RI/FS Work Plan* (Geosyntec, 2022).

Permanent monitoring wells were sampled quarterly for one year in October 2022 and January, April, and August 2023. Well locations are shown in Figure D-2 and coordinates are reported in Table D-2. Well construction details are reported in Table D-4a, and field parameters collected during sampling events are summarized in Table D-4b.

4.3.1 Temporary Well Installation

Temporary monitoring wells were installed and sampled during Phase 1 drilling activities. One-inch diameter, 10-ft-long, prepacked schedule 40 polyvinyl chloride (PVC) well screens and riser pipe were placed into the boreholes after extraction of the soil cores to depths ranging from 11.5 and 17 ft bgs. Temporary wells were purged, field parameters were collected and recorded, and stabilization was achieved prior to sampling.

4.3.2 Permanent Monitoring Well Installation

Permanent monitoring wells were installed on September 29, 2022, at four locations along the shoreline following the procedure detailed in the *RI/FS Work Plan Addendum* (Geosyntec, 2023a).Wells were installed once target depths were reached in the boreholes. The wells were constructed with 2-inch-diameter schedule 40 polyvinyl chloride riser pipes with 2.5-ft to 5-ft-long pre-packed well screens. Once the prepacked well screens were in place, supplemental sand was placed into the annular space surrounding the well screens and brought above the filter pack. Bentonite chips were placed on top of the sand up to the ground surface to provide the well seal. Aboveground steel monuments were placed around the wells and extended below the ground surface into the bentonite to a minimum depth of 2 ft. The four wells were developed on September 30, 2022, by pumping and surging and until field parameters stabilized. Groundwater samples were collected from the wells beginning October 7, 2022.

4.3.3 Groundwater Sample Collection

Groundwater samples were collected using a peristaltic pump and disposable tubing and low-flow sampling methods were utilized as described in United States Environmental Protection Agency (EPA) guidance (2010). Field parameters collected during purging, including depth to water, temperature, conductivity, redox potential, and dissolved oxygen, were recorded on field forms, and stabilization was achieved prior to sampling. Field QA/QC samples included collection of one field duplicates and one rinseate blank (depth to water meter) for each sampling event. Field observations for groundwater samples, including field parameters, are summarized in Table D-4b.

4.4 Sediment Sampling

The sediment sampling programs were designed to characterize the nature and extent of COPCs in surface and subsurface sediments and to assess the extent of wood debris in the Study Area.

RI sediment sampling activities varied in each phase, as follows:

- Phase 1: A total of 99 sediment samples were taken from forty-two sampling stations, including 32 surface grab samples (29 primary samples and 3 field duplicates) from twenty-nine locations and 67 sediment core samples (63 primary samples and 4 field duplicates) from nineteen locations (some samples were collocated). Seven locations

were in the Mill Pond, 20 were in the Inner Harbor, and 15 were in the Outer Harbor. Sediment coring and grabs were collocated at six sampling stations.

- Phase 2: A total of 46 sediment samples were taken from 17 sampling stations, including 13 surface grab samples (12 primary samples and 1 field duplicate) from twelve locations and 33 sediment core samples (28 primary samples and 5 field duplicates) from eight locations (some samples were collocated). Phase 2 sampling stations included six locations in the Mill Pond, eight in the Inner Harbor, and three in the Outer Harbor. Sediment coring and grabs were collocated at five sampling stations.
- Phase 3: Three surface grab sediment samples (2 primary samples and 1 field duplicate) from two sampling stations located in the Outer Harbor.

Sediment sampling included collection of surface sediment grab and sediment core samples within the in-water portions of the Study Area. The wood debris assessment included physical surveys and characterization of collected samples The sampling programs are detailed in the following subsections.

4.4.1 Surface Sediment Grab Sampling

Surface sediment grab samples were collected during three field events, from August 23 to August 27, 2021, on September 22, from October 10 through October 13, 2022, and on December 14, 2023. A total of 43 locations were sampled and 48 samples were collected (43 primary and 5 field duplicates). A detailed sample count is reported in Table D-1. Sampling locations are shown in Figure D-3 and coordinates are reported in Table D-2. Field observations, including soil classification and visual wood debris assessment, are summarized in Table D-5.

Surface sediment samples were collected following the procedure detailed in Section 2.4 of the SAP/QAPP, Appendix A of the *RI/FS Work Plan* (Geosyntec, 2022). Sampling in the Mill Pond, along the unnamed creek and the shoreline was conducted at high tide by using a ponar sampler deployed from a small vessel or at low tide by using hand tools after accessing the location by foot. Sampling in the Inner and Outer Harbor was conducted from the research vessels by deploying a stainless-steel power grab sampler. Gravity Marine provided vessel and sampling support in the Mill Pond and the Harbor; the research vessel R/V Tieton was equipped with a hydraulic power grab sampler mounted on a cable winch and overhead A-frame for surface sediment sampling. Collected samples were evaluated against the acceptability criteria of the Puget Sound Estuary Program (1997a, 1997b) including achieving desired penetration depth (10 centimeters), obtaining an undisturbed sample with a relatively flat sediment surface, and presence of overlaying water, which indicated minimal leakage. Multiple discrete samples were composited to collect the required sample volume at several sampling locations[1] due to low recovery.

Sediment grab (SG) samples were logged, placed in a clean stainless-steel bowl, homogenized, and placed into laboratory-supplied containers. Field QA/QC samples included collection of field

[1] Adequate sediment volume varied as the analytical suite differed based on sampling location. A maximum of 3 gallons of sediment substrate was required when bioassay testing was planned (SG-46, SG-47, SG-48, SG-49, SG-10, and SG-11). Composite samples were also collected at locations where poor recovery was encountered (SG-03, SG-04, SG05, SG-15, SG-46, SG-47, SG-48, SG-49, and SG-53).

duplicates to a frequency not lower than 5% of the overall sample count per event, and collection of at least one rinseate blank per sampling event. A visual wood debris assessment was performed at each sampling location. Field observations for SG samples including soil classification, wood debris, and slag assessments are summarized in Table D-5.

4.4.2 Sediment Coring and Sampling

Sediment core samples were collected during two field events, from September 13 to September 21, 2021, on October 5, and from October 10 through October 13, 2022. A total of 25 locations were sampled, and 100 samples were collected (91 primary and 9 field duplicates). A detailed sample count is reported in Table D-1. Sampling locations are shown in Figure D-3, and coordinates are reported in Table D-2. Field observations recorded during sediment core collection including location information (coordinates, water depth, tidal height) and accuracy of measurements, drive depth, approximate percent recovery, and narrative or physical description of the core tube are listed in Table D-6a. Field observations, including soil classification and visual wood debris assessment, are summarized in Table D-6b and recorded in the core logs included as Attachment D-3.

Sediment cores were collected at 25 of the 27 proposed locations[2] following the procedures detailed in Section 2.5 of the SAP/QAPP, Appendix A of the *RI/FS Work Plan* (Geosyntec, 2022). Core collection was conducted from in-water for 22 of the 25 successfully sampled locations.[3] Core collection at three locations along the northern shoreline was conducted by using the same methodology as for soil borings; however, samples were processed as sediment cores and submitted for the sediment analytical suite. Sampling in the Mill Pond was conducted by deploying the vibracorer from a small platform anchored with spuds, while sampling in the Inner and Outer Harbor was conducted by deploying the vibracorer from a research vessel. Gravity Marine provided a platform, R/V MJ1, designed for core collection and towed by a small vessel under the pedestrian bridge to reach core sampling locations in the Mill Pond. The platform R/V MJ1was anchored with spud legs and equipped with a vibracorer sampler mounted on a frame located over an opening in the deck for core collection.

Sediment cores were advanced by free fall through soft sediment followed by vibration through the consolidated substrate until either the target drive depth or refusal were achieved. A decontaminated core tube lined with a high-density polyethylene (HDPE) was attached to the vibratory head and secured with a catcher prior to deployment. Cores were advanced in the harbor from the research vessel R/V Tieton equipped with a RIC vibracorer sampler mounted on a cable winch and overhead A-frame. The vessel was equipped with a virtual anchoring system that incorporates an autopilot and two small motors to avoid the need to set fixed anchors and facilitate sample collection. Collected sediment cores were evaluated against the acceptability criteria including presence of overlaying water, absence of obstruction or blocking through the core tube, and achieving of target penetration depth (10 ft) and estimated recovery (above 75%).

[2] Sediment core collection was not successful at two Phase 1 locations (SC-16 and SC-17), and core collection was re-attempted at those locations with aluminum lined barrel during Phase 2 sampling. Sediment cores were not collected at two Phase 2 locations (SC-16 and SC-50).

[3]The RI sampling program included 4 sediment core locations in the Mill Pond and 21 locations in the Inner and Outer Harbor. Three of those locations along the northern shoreline were collected from land by direct-push drilling.

Acceptability criteria were not fulfilled at multiple sampling locations, and additional details regarding deviation from the work plan are provided in Section 6.

4.4.3 Sediment Core Processing

After collection excess water was withdrawn and the core tube was capped, taped, labeled, and secured in a vertical position during transport to the processing vessel. Overlaying water was siphoned off prior to processing the samples. Cores were processed on board of an in-water processing barge also provided by Gravity Marine, the R/V Willapa, that was moored into the harbor during the duration of the sediment coring. The R/V Willapa is a 40-ft aluminum barge setup for stationary anchoring, and it was positioned in the Outer Harbor to provide additional space for processing of sediment cores. Cores were extracted from the core tubes and split open longitudinally, sediment were visually logged using USCS classification. Field screenings for volatile organic was performed on every sample using a PID that was regularly calibrated prior to beginning of field activities. Sediment core (SC) samples were collected continuously every 2 ft or where significant stratigraphic changes occurred. Sediment was collected from the core tube using stainless-steel spoons and avoiding substrate in direct contact with the sidewalls of the tube to minimize cross-contamination. Samples were placed in a clean stainless-steel bowl, homogenized, and placed into laboratory-supplied containers. Field QA/QC samples included collection of field duplicates to a frequency not lower than 5% of the overall sample count per event, and collection of two rinseate blanks per sampling event. A visual wood debris assessment was performed at each boring location.

4.5 Field Screening of Soil and Sediment Samples

Discrete sediment and soil samples collected during the Phase 2 sampling events were screened for the presence/absence of slag accordingly to SOP #107, Appendix A to the *RI/FS Work Plan Addendum* (Geosyntec, 2023a).

An aliquot (1 cup usually) of the homogenized discrete sediment and soil samples was placed and evenly spread out in a thin layer in a rectangular shallow pan to have a clear view of all material. Water was added as needed to facilitate evaluation if sample density required it. A quadrant frame was centered over the pan, the four quadrants were photographed, and the sample was evaluated.

Visual descriptors used to identify and describe slag included: structure and shape, size based on the ASTM International visual-manual classification, color and/or iridescence, texture and presence of vesiculas/intrusions, weight, and density. The percent of slag in each quadrant was estimated separately in three replicates by varying field personnel.

4.6 In-water Surveys

The in-water surveys were completed in accordance with the procedures detailed in Section 2.6 and 2.7 of the SAP/QAPP, Appendix A of the *RI/FS Work Plan* (Geosyntec, 2022). Transect probing surveys were conducted from August 31 to September 2, 2021. The diver probing survey was performed in the Inner Harbor by Global Diving under supervision of Gravity Marine. Two vessels supported the diver surveys: R/V Tieton provided by Gravity and a research vessel provided by Global Diving. A field team of two (Geosyntec personnel) was present on-site during

the surveys to direct the work and collect field observations. The proposed transects included three transects across the Mill Pond from south to north and five transects starting from the northern shoreline and extending into the Inner Harbor. Sampling locations and information recorded during the probing surveys are summarized in Appendix C to the RI Report.

4.6.1 Transects in the Mill Pond

The transect surveys in the Mill Pond were conducted at high tide from a small vessel by using a measuring rod to probe the thickness of unconsolidated (soft) sediments and presence of wood debris. The probe was wiped cleaned upon retrieval and the penetration depth to soft sediment was noted at each sampling location. Field observations at probing locations included penetration depth, substrate density, and potential presence of wood debris, if noted. Measured penetration depth and field observations were documented in the field log by Geosyntec personnel.

4.6.2 Diver Transects in the Harbor

The transect surveys in the Inner and Outer Harbor were conducted by Global Diving with vessel support provided by Gravity Marine. Gravity crew secured a 500-ft measuring tape was placed between two ends of the transect either by using two anchors or a stable point on the shore. A diver entered the water from either the shore or the harbor end of the transect depending on location and probed the sediment with a 5-ft measuring rod to assess the thickness of unconsolidated (soft) sediments and presence of wood debris. Discrete locations were probed every 25-ft or 50-ft along the transects. Field observations at probing locations included surface coverage of wood waste, depth to 100% wood debris, and presence of pilings or distinguishable wood structures. The diver also inspected the former mill wharf footprint areas for submerged structures. Measured penetration depth and field observations were radio-communicated to the vessel crew, and then documented in the field log by Geosyntec personnel.

5. INVESTIGATION DERIVED WASTE

Investigation-derived waste (IDW) generated during the field effort consisted of decontamination, development, and purge water, soil and sediment cuttings, and solid waste consisting of disposable field equipment (used tubing, gloves, etc.). The IDW generated from the upland and sediment sampling events were temporarily stored in sealed and labeled 55-gallon drums staged in the parking lot adjacent to Northeast Blakely Avenue. Field personnel labeled the drums with a waste description, generation date, and generation source. The accumulated IDW consisted of one 55-gallon drum containing decontamination water, and four drums of soil and sediment cuttings mixed with decontamination water. The IDW was sampled and characterized including a fish bioassay test and a lead leachate test using the Toxicity Characteristic Leaching Procedures (TCLP). Once the waste profile was approved by the landfill, the IDW was transported in April 2022 and October 2023 for off-site disposal as nonhazardous waste in Arlington, Oregon. The waste designation, TCLP laboratory report, and disposal receipts are provided in Attachment D-4.

6. DEVIATIONS FROM THE WORK PLAN

Field activities were conducted in agreement with the *RI/FS Work Plan*, the *RI/FS Work Plan Addendum*, and *Field Change Request*. The field crew applied professional judgement and deviate from the initial plan to achieve the best result feasible based on-site specific conditions. Deviations from the *RI/FS Work Plan* are summarized in Table D-7.

7. FIELD QUALITY CONTROL

A set of internal procedures was utilized by the field team to meet prescribed criteria for field data quality. QA/QC procedures associated with field sampling efforts include maintenance of field equipment, collection of field duplicate samples, and collection of equipment blanks. Those are detailed in the following subsections. A record of the QA/QC samples collected during Phase 1 and Phase 2 investigations is summarized in Table D-8.

7.1 Field Equipment Maintenance

Equipment and instruments used to generate field data were calibrated, adjusted, and maintained to operate within manufacturers' specifications and according to the SOPs listed in the SAP. Field personnel was trained to properly use and maintain the equipment. Appropriate schedules and records of equipment calibrations were maintained in the field notebook.

Field equipment and instruments requiring maintenance used during the fieldwork included the following: water level meters, multi-probe water quality monitors, PID, flowmeter, and Trimble GPS. No malfunctioning or other technical issues were reported during field activities.

7.2 Field Duplicates

Collection of field duplicates assessed the precision and accuracy of field sampling techniques. Analytical results of field duplicate samples were used as independent, external checks. Duplicate samples were collected every 20 field samples for each sampling event (i.e., 5%) and were recorded as follows: Duplicates were analyzed for the same chemical suite as parent samples.

7.3 Equipment Blanks

Equipment blank samples were collected at a frequency of one per sampling event and type of sampling equipment. Samples were collected in the field after decontamination of the equipment used for sampling, the instruments and tools were rinsed with deionized water provided by the laboratory, the rinseate was transferred to the appropriate sample bottles and submitted to the laboratory for analysis.

Samples collected were labeled as "EB" and included rinseate of equipment and tools used during hand auger, soil boring, groundwater sampling, surface sediment sampling, collection of sediment cores, and core processing. Equipment included instrument and samplers (hand auger, power grab, and core tubes), and tools used for sample processing (stainless-steel spoons, spatulas, and bowls). During sediment coring two rinseate blanks were collected, one by rinsing the core collection tubes and one by rinsing the bowls and utensils utilized for sample processing.

8. SUMMARY

Field observations and results generated from the RI sampling events were considered sufficient to fulfill the data quality objectives identified in the *RI/FS Work Plan*, *RI/FS Work Plan Addendum*, and *Field Change Requests* (Geosyntec, 2022; 2023a; 2023c).

9. REFERENCES

Geosyntec Consultants, Inc. (Geosyntec). 2022. *Final Remedial Investigation/Feasibility Study Work Plan, Blakely Harbor Park Site.* Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. January 31.

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Puget Sound Estuary Program. 1997a. *Puget Sound Estuary Program: Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound.* Prepared for United States Environmental Protection Agency, Region 10, and the Puget Sound Water Quality Action Team, Olympia, Washington. April.

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United States Environmental Protection Agency (EPA). 2010. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells.* Revision 3. January 19.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. June 24.

TABLES

Geosyntec consultants

Table D-1. Remedial Investigation Analytical Sample Count

Media	Sampling Location Type	No. Sampling Locations	No. Primary Samples	No. Field Duplicates	Rinsate Blanks	No. Samples
Phase 1 Remedial Investigations						
Soil	Hand Auger	16	31	4	1	79
	Soil Boring	7	40	4	1	
Ground Water	Temporary Wells	5	5	1	1	6
Sediment	Surface Sediment	29	29	3	1	99
	Sediment Cores	17	63	4	2	
Phase 2 Remedial Investigaitons						
Soil	Hand Auger	14	23	4	1	88
	Soil Boring	8	54	7	1	
Ground Water	Monitoring Wells	4	16	4	4	20
Sediment	Surface Sediment	12	12	1	1	46
	Sediment Cores	8	28	5	2	
Phase 3 Remedial Investigaitons						
Soil	Hand Auger	9	19	2	1	21
Sediment	Surface Sediment	2	2	1	1	3

Notes

1. Hand auger were advanced at a target depth up to 3 feet below ground surface or refusal, and samples were collected in general at 1-foot intervals. Soil boring were advanced at target depths up to 24 feet below ground surface, and samples were collected in general at 2-feet intervals or where stratigraphy changes occurred.

2. Temporary wells were sampled once. Monitoring wells were sampled quarterly during a one-year monitoring event.

3. Surface sediment grabs were collected between 0 and 10 centimeters below mudline. Sediment cores were advanced up to 10 feet below mudline or refusal, and samples were collected in general at 2-feet intervals or where stratigraphy changes occurred.

Table D-2: Sample Type, Sample Date, Proposed and Actual Coordinate Locations

Area of Investigation	Sampling Event	Media Sampled	Date Sampled[a]	Location ID	Proposed Coordinates		Confirmed Coordinates[b]		Surface Elevation[c] (ft)	Water Depth[d] (ft)
					Northing	Easting	Northing	Easting		
North Upland	Hand Auger	Soil	8/19/2021	HA-01	222458	1224824	222458	1224824	17.3	-
South Upland	Hand Auger	Soil	8/20/2021	HA-02	221689	1225034	221689	1225034	--	-
South Upland	Hand Auger	Soil	8/20/2021	HA-03	221796	1225073	221796	1225073	10	-
North Upland	Hand Auger	Soil	8/20/2021	HA-04	222491	1225269	222491	1225269	14	-
North Upland	Hand Auger	Soil	8/19/2021	HA-05	222197	1225248	222197	1225248	11	-
North Upland	Hand Auger	Soil	8/19/2021	HA-06	222207	1225341	222207	1225341	11	-
North Upland	Hand Auger	Soil	8/24/2021	HA-07	222652	1225412	222652	1225412	23	-
North Upland	Hand Auger	Soil	8/24/2021	HA-08	222364	1225405	222364	1225405	11	-
North Upland	Hand Auger	Soil	8/24/2021	HA-09	222339	1225549	222339	1225549	14	-
North Upland	Hand Auger	Soil	8/24/2021	HA-10	222242	1225661	222242	1225661	11	-
North Upland	Hand Auger	Soil	8/23/2021	HA-11	222597	1225686	222561	1225712	--	-
North Upland	Hand Auger	Soil	8/23/2021	HA-12	222453	1225713	222546	1225726	--	-
North Upland	Hand Auger	Soil	8/23/2021	HA-13	222246	1225832	222246	1225832	6	-
North Upland	Hand Auger	Soil	8/23/2021	HA-14	222308	1225851	222308	1225851	19	-
North Upland	Hand Auger	Soil	8/23/2021	HA-15	222242	1225958	222242	1225958	3	-
North Upland	Hand Auger	Soil	8/23/2021	HA-16	222404	1226057	222393	1226041	--	-
North Upland	Hand Auger	Soil	9/14/2022	HA-31	222650	1224838	222609	1224850	28	-
North Upland	Hand Auger	Soil	9/14/2022	HA-32	222759	1225183	222683	1225101	44	-
North Upland	Hand Auger	Soil	9/15/2022	HA-33	222798	1225583	222757	1225564	45	-
North Upland	Hand Auger	Soil	9/14/2022	HA-34	222703	1225796	222661	1225850	45	-
North Upland	Hand Auger	Soil	9/13/2022	HA-35	222404	1226084	222425	1226077	31	-
South Upland	Hand Auger	Soil	9/13/2022	HA-36	221737	1224866	221741	1224871	16	-
South Upland	Hand Auger	Soil	9/13/2022 12/14/2023	HA-37	221689	1225098	221720	1225109	15	-
South Upland	Hand Auger	Soil	10/6/2022	HA-38	222920	1224712	223002	1224709	173	-
North Upland	Hand Auger	Soil	10/6/2022	HA-39	222978	1225182	223009	1225161	154	-
North Upland	Hand Auger	Soil	10/6/2022	HA-40	222975	1225468	222978	1225493	119	-
North Upland	Hand Auger	Soil	10/6/2022	HA-41	222892	1225741	222949	1225723	105	-
South Upland	Hand Auger	Soil	10/6/2022	HA-42	221759	1224574	221757	1224585	21	-
South Upland	Hand Auger	Soil	10/6/2022	HA-43	221639	1224782	221693	1224765	23	-
South Upland	Hand Auger	Soil	9/13/2022	HA-48	222221	1224516	222188	1224513	19	-
North Upland	Hand Auger	Soil	12/13/2023	HA-44	222728	1225980	222712	1225987	125	-
North Upland	Hand Auger	Soil	12/14/2023	HA-45	222424	1225886	222431	1225882	36	-
South Upland	Hand Auger	Soil	12/14/2023	HA-46	221717	1224986	221723	1224997	--	-
South Upland	Hand Auger	Soil	12/13/2023	HA-47	221417	1225199	221427	1225203	49	-
North Upland	Hand Auger	Soil	12/14/2023	HA-49	222305	1226067	222352	1226056	20	-
North Upland	Hand Auger	Soil	12/14/2023	HA-50b	222447	1226213	222454	1226273	43	-
North Upland	Hand Auger	Soil	12/14/2023	HA-51	222514	1226056	222515	1226038	49	-
North Upland	Hand Auger	Soil	12/13/2023	HA-52	223069	1225754	223062	1225755	164	-

Table D-2: Sample Type, Sample Date, Proposed and Actual Coordinate Locations

Area of Investigation	Sampling Event	Media Sampled	Date Sampled[a]	Location ID	Proposed Coordinates		Confirmed Coordinates[b]		Surface Elevation[c] (ft)	Water Depth[d] (ft)
					Northing	Easting	Northing	Easting		
North Upland	Temporary Well	Soil Groundwater	9/15/2021	SB/GW-17	222226	1225173	222226	1225173	13	-
North Upland	Temporary Well	Soil Groundwater	9/14/2021	SB/GW-18	222101	1225217	222101	1225217	15	-
North Upland	Temporary Well	Soil Groundwater	9/14/2021	SB/GW-19	222147	1225398	222147	1225398	8.4	-
North Upland	Temporary Well	Soil Groundwater	9/13/2021	SB/GW-20	222236	1225535	222236	1225535	11.4	-
North Upland	Temporary Well	Soil Groundwater	9/13/2021	SB/GW-21	222220	1225739	222220	1225739	9.7	-
North Upland	Boring	Soil	9/15/2021	SB-22	222340	1225290	222340	1225290	11.5	-
North Upland	Boring	Soil	9/15/2021	SB-23	222452	1225410	222452	1225410	15.7	-
North Upland	Monitoring Well	Soil Groundwater	10/7/2022	SB/GW-24	222375	1225286	222379	1225313	10.2	-
North Upland	Monitoring Well	Soil Groundwater	10/7/2022	SB/GW-26	222222	1225398	222227	1225397	11.3	-
North Upland	Monitoring Well	Soil Groundwater	10/7/2022	SB/GW-27	222299	1225718	222253	1225730	9.8	-
North Upland	Monitoring Well	Soil Groundwater	10/7/2022	SB/GW-29	222430	1225438	222432	1225439	14.5	-
North Upland	Soil Boring	Soil	9/29/2022	SB-25	222166	1225222	222155	1225227	10.8	-
North Upland	Soil Boring	Soil	9/28/2022	SB-28	222512	1225320	222469	1225308	13.2	-
North Upland	Soil Boring	Soil	9/30/2022	SB-30	222351	1225635	222252	1225612	9.0	-
South Upland	Soil Boring	Soil	10/3/2022	SB-38	221823	1225118	221838	1225127	10.4	-
Mill Pond	Sediment Grabs	Sediment	8/23/2021	SG-01	222391	1224525	222388	1224525	--	--
Mill Pond	Sediment Grabs	Sediment	8/24/2021	SG-02	222356	1224643	222355	1224643	--	--
Mill Pond	Sediment Grabs	Sediment	8/27/2021	SG-03	221875	1224889	221871	1224896	2.0	7
Mill Pond	Sediment Grabs	Sediment	8/27/2021	SG-04	222047	1224905	222048	1224897	2.8	5.7
Mill Pond	Sediment Grabs	Sediment	8/26/2021	SG-05	222228	1224971	222223	1224969	3.4	6.1
Mill Pond	Sediment Grabs	Sediment	8/23/2021	SG-06	222479	1225127	222479	1225127	--	--
Inner Harbor	Sediment Grabs	Sediment	8/24/2021	SG-08	221732	1225189	221732	1225188	--	--
Inner Harbor	Sediment Grabs	Sediment	8/24/2021	SG-09	221877	1225162	221877	1225162	--	--
Inner Harbor	Sediment Grabs	Sediment	8/24/2021	SG-10	222005	1225209	222006	1225209	--	--
Inner Harbor	Sediment Grabs	Sediment	8/24/2021	SG-11	222055	1225312	222057	1225312	--	--
Inner Harbor	Sediment Grabs	Sediment	8/23/2021	SG-13	221784	1225354	221788	1225354	0.73	7.3
Inner Harbor	Sediment Grabs	Sediment	8/24/2021	SG-15	221917	1225370	221918	1225369	0	5.6
Inner Harbor	Sediment Grabs	Sediment	8/25/2021	SG-18	221692	1225570	221689	1225571	-2	10.9
Inner Harbor	Sediment Grabs	Sediment	8/25/2021	SG-19	221663	1225749	221664	1225750	-1	9.6
Inner Harbor	Sediment Grabs	Sediment	8/25/2021	SG-22	221891	1225785	221891	1225785	-14	16.49
Inner Harbor	Sediment Grabs	Sediment	8/23/2021	SG-23	222090	1225890	222082	1225890	-11	12.5
Inner Harbor	Sediment Grabs	Sediment	8/25/2021	SG-25	222218	1226009	222219	1226009	--	--
Inner Harbor	Sediment Grabs	Sediment	8/25/2021	SG-26	221762	1225906	221764	1225909	-3	4.58
Inner Harbor	Sediment Grabs	Sediment	8/25/2021	SG-27	221861	1225938	221852	1225942	-22	26.8
Outer Harbor	Sediment Grabs	Sediment	8/25/2021	SG-28	221535	1226123	221533	1226124	-21	25.48
Outer Harbor	Sediment Grabs	Sediment	8/25/2021	SG-30	221595	1226339	221593	1226335	-32	37.8
Outer Harbor	Sediment Grabs	Sediment	8/26/2021	SG-31	221734	1226339	221731	1226341	-27	31.4
Outer Harbor	Sediment Grabs	Sediment	8/25/2021	SG-33	222125	1226413	222106	1226405	-4	11.9

Table D-2: Sample Type, Sample Date, Proposed and Actual Coordinate Locations

Area of Investigation	Sampling Event	Media Sampled	Date Sampled[a]	Location ID	Proposed Coordinates		Confirmed Coordinates[b]		Surface Elevation[c] (ft)	Water Depth[d] (ft)
					Northing	Easting	Northing	Easting		
Outer Harbor	Sediment Grabs	Sediment	8/24/2021	SG-35	221932	1226729	221930	1226728	-34	33.84
Outer Harbor	Sediment Grabs	Sediment	8/24/2021	SG-36	222091	1226740	222090	1226742	-11	12.8
Outer Harbor	Sediment Grabs	Sediment	8/26/2021	SG-37	221837	1226942	221838	1226943	-39	43.19
Outer Harbor	Sediment Grabs	Sediment	8/24/2021	SG-39	222153	1226940	222155	1226936	-2	5
Outer Harbor	Sediment Grabs	Sediment	8/24/2021	SG-41	222104	1227198	222110	1227197	-17	21.54
Outer Harbor	Sediment Grabs	Sediment	8/24/2021	SG-42	221899	1227427	221900	1227426	-44	51
Creek	Sediment Grabs	Sediment	9/22/2022	SG-43	222000	1225204	222425	1224283		8.2
Creek	Sediment Grabs	Sediment	9/22/2022	SG-44	222045	1225807	222410	1224358		7.4
Creek	Sediment Grabs	Sediment	9/22/2022	SG-45	222423	1224277	222406	1224456		6.1
Mill Pond	Sediment Grabs	Sediment	10/13/2022	SG-46	222409	1224362	222254	1224903	3.6	6.5
Mill Pond	Sediment Grabs	Sediment	10/13/2022	SG-47	222409	1224362	222255	1225029	3.2	6
Mill Pond	Sediment Grabs	Sediment	10/13/2022	SG-48	222261	1224894	222187	1224961	2.9	5.3
Inner Harbor	Sediment Grabs	Sediment	9/22/2022	SG-10A	222254	1225019	222017	1225209		7.3
Inner Harbor	Sediment Grabs	Sediment	9/22/2022	SG-11A	222186	1224953	222053	1225303		4.2
Inner Harbor	Sediment Grabs	Sediment	10/12/2022	SG-49	221411	1225338	221906	1225324	-0.1	7.175
Outer Harbor	Sediment Grabs	Sediment	10/11/2022	SG-53	222172	1227515	222176	1227507	-3.1	11.8
Outer Harbor	Sediment Grabs	Sediment	10/13/2022	SG-54	221993	1227686	221999	1227685	-37.2	43.5
Outer Harbor	Sediment Grabs	Sediment	10/13/2022	SG-55	222282	1227772	222189	1227774	-5.8	12.3
Outer Harbor	Sediment Grabs	Sediment	12/14/2023	SG-56	222039	1227979	222039	1227975	-25.1	36.1
Outer Harbor	Sediment Grabs	Sediment	12/14/2023	SG-57	221897	1227832	221891	1227831	-46.8	56.8
Mill Pond	Sediment Coring	Sediment	9/21/2021	SC-03	221875	1224889	221871	1224890	4	1.7
Mill Pond	Sediment Coring	Sediment	9/20/2021	SC-04	222047	1224905	222054	1224906	2	8.2
Mill Pond	Sediment Coring	Sediment	9/21/2021	SC-05	222228	1224971	222221	1224950	2	4.5
Mill Pond	Sediment Coring	Sediment	9/21/2021	SC-07	222265	1225109	222282	1225064	2	6.5
Inner Harbor	Sediment Coring	Sediment	9/16/2021	SC-12	222147	1225516	222008	1225459	-3	11.7
Inner Harbor	Sediment Coring	Sediment	9/16/2021	SC-14	221842	1225444	221842	1225461	-1	11.4
Inner Harbor	Sediment Coring	Sediment	--	SC-16	222048	1225638	--	--	--	--
Inner Harbor	Sediment Coring	Sediment	--	SC-17	222188	1225774	--	--	--	--
Inner Harbor	Sediment Coring	Sediment	9/14/2021	SC-20	221744	1225741	221745	1225735	0	10.2
Inner Harbor	Sediment Coring	Sediment	9/17/2021	SC-21	221838	1225838	221840	1225835	-16	16.4
Inner Harbor	Sediment Coring	Sediment	9/14/2021	SC-24	222140	1225943	222127	1225944	-6	15.8
Inner Harbor	Sediment Coring	Sediment	9/15/2021	SC-26	221762	1225906	221744	1225922	-13	16.9
Inner Harbor	Sediment Coring	Sediment	9/15/2021	SC-27	221861	1225938	221868	1225942	-23	33.2
Outer Harbor	Sediment Coring	Sediment	9/16/2021	SC-29	221643	1226142	221642	1226135	-26	27.9
Outer Harbor	Sediment Coring	Sediment	9/16/2021	SC-32	221941	1226338	221923	1226347	-28	32.3
Outer Harbor	Sediment Coring	Sediment	9/17/2021	SC-34	222042	1226541	222037	1226545	-19	21
Outer Harbor	Sediment Coring	Sediment	9/13/2021	SC-37	221837	1226942	221832	1226943	-40	48.1
Outer Harbor	Sediment Coring	Sediment	9/14/2021	SC-38	222040	1226943	222032	1226932	-31	37.1

Table D-2: Sample Type, Sample Date, Proposed and Actual Coordinate Locations

Area of Investigation	Sampling Event	Media Sampled	Date Sampled[a]	Location ID	Proposed Coordinates		Confirmed Coordinates[b]		Surface Elevation[c] (ft)	Water Depth[d] (ft)
					Northing	Easting	Northing	Easting		
Outer Harbor	Sediment Coring	Sediment	9/13/2021	SC-40	221939	1227144	221934	1227140	-42	50.74
Inner Harbor	Sediment Coring	Sediment	10/5/2022	SC-10A	222000	1225204	222027	1225210	7	--
Inner Harbor	Sediment Coring	Sediment	10/5/2022	SC-11A	222045	1225307	222056	1225302	4	--
Inner Harbor	Sediment Coring	Sediment	--	SC-16	222046	1225642	--	--	--	--
Inner Harbor	Sediment Coring	Sediment	10/5/2022	SC-17	222201	1225794	222221	1225760	9	--
Inner Harbor	Sediment Coring	Sediment	10/11/2022	SC-49	221911	1225338	221903	1225325	0	8.2
Inner Harbor	Sediment Coring	Sediment	--	SC-50	222149	1225518	--	--	--	--
Inner Harbor	Sediment Coring	Sediment	10/10/2022	SC-51	221988	1225933	221988	1225927	-24	27.1
Inner Harbor	Sediment Coring	Sediment	10/11/2022	SC-52	222089	1226128	222088	1226107	-7	12.1
Outer Harbor	Sediment Coring	Sediment	10/11/2022	SC-53	222172	1227515	222180	1227510	-4	12.8
Outer Harbor	Sediment Coring	Sediment	10/12/2022	SC-54	221993	1227686	221999	1227685	-38	45.6
Mill Pond	Pile Scraping	Timber Pilings	9/1/2021	PS-01-COMP	--	--	222296	1225183	6.1	--
North Upland	Pile Scraping	Timber Pilings	9/2/2021	PS-02-COMP	--	--	222149	1225405	7.7	--
North Upland	Pile Scraping	Timber Pilings	9/2/2021	PS-03-COMP	--	--	222217	1225642	8.9	--
North Upland	Pile Scraping	Timber Pilings	9/2/2021	PS-04-COMP	--	--	222256	1225857	8.0	--
Inner Harbor	Pile Scraping	Timber Pilings	9/3/2021	PS-05-COMP	--	--	222107	1225606	-0.6	--

Footnotes:

a. Temporary wells were sampled once. Monitoring wells were sampled quarterly during a one-year monitoring event.
b. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum
c. Elevation Datum is Mean Lower Low Water for sediment sampling locations, NAVD1983 Datum for soil sampling locations and temporary and monitoring wells.
d. Water depth measurements were approximate and collected by using leadline from the research vessel

Acronyms:

HA = Hand Auger; ft = feet, GW = Groundwater; ID = identification; SB = Sediment Boring; SC = Sediment Coring; SG = Sediment Grabs; PS = Pile Scrape; Comp = Composite; - = Not applicable; -- = Not recorded

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Table D-3. Hand Auger Field Observations

Location ID	Sample ID	USCS	Soil Sample Description	PID	Sheen	ACM	Other Findings	Wood	Wood - Visual descrription	Slag	Slag - Visual Desctiption
HA-01	HA-01-0-12"	0-6" OL 6-12"" ML	0-6" - 10 YR 3/2, dry, soft-loose, organic SILT with few fine to coarse gravels, subrounded; trace organics (rootlets, shells). 6-12" - 10 YR 5/1, dry, loose, SILT with few fine to coarse gravels and cobbles up to 2", subrounded; trace organics (rootlets, shells).	0	N	N	N	0	NA	NA	NA
	HA-01-12-24"	12-15" ML 15-24" ML	12-15"" - 10 YR 5/1, dry, soft, SILT with few fine to coarse gravel, subrounded; trace decomposed wood chips up to 5" diameter. 15-24" - 10 YR 3/2, dry to damp, soft, SILT with trace fine gravel, subrounded; trace few decomposed wood chips, trace shells, trace light blue glass fragments.	0	N	N	N	5	Decomposed wood chips up to 0.5" diameter.	NA	NA
HA-02	HA-02-0-12"	0-6" SM-OL 6-12" - SM	0-6" - 10 YR 3/2, dry, loose, fine silty SAND with trace fine to coarse gravel subrounded to rounded; trace organics (rootlets and treat roots); few glass pieces. 6-12" - 10 YR 4/2, dry, loose, silty SAND with reduced organics, trace brick fragments.	0	N	N	N	0	NA	NA	NA
	HA-02-12-24"	SM	12-24" - 10 YR 4/2, dry, loose, silty SAND salt; trace fill (lightweight granular gray material, possibly brick mortar, angular rock fragments up to 2" diameter). At 18-24", trace brick fragments up to 2", continued roots.	0	N	N	N	0	NA	NA	NA
HA-03	HA-03-0-12"	SP	0-12" - 10 YR 4/4, dry to damp, loose, fine to medium SAND with trace silt, trace fine to coarse gravel, subrounded to rounded; trace organics (rootlets and organic silt) from 0 - 4", trace dark, slightly decomposed wood chips 1/4" - 1/2" diameter.	0	N	N	N	< 2.5	Wood chips from 1/8 - 1/4" diameter, slightly decomposed	NA	NA
	HA-03-12-24"	SP	12-24" - 10 YR 4/4, damp, loose, fine to medium SAND; trace brick fragments, angular fine to coarse gravel 1/8" - 1" in diameter	0	N	N	N	< 2.5	Wood chips from 1/8 - 1/4" diameter, slightly decomposed.	NA	NA
HA-04	HA-04-0-12"	OL	0-12" - 10 YR 2/1, dry to damp with depth, soft, organic SILT with fine to very fine sand and fine to coarse gravel at 0.5'-1' bgs; trace rootlets, trace glass shards and melted glass, small nail (rounded head), trace brick fragments, small piece of charcoal up to 1/8".	0	N	N	Y, nail with rounded head	< 2.5	Charcoal (1/8" diameter square).	NA	NA
	HA-04-12-24"	OL	12-24" - 10 YR 2/1, damp, soft, organic SILT; at 16"-18", larger brick fragments 2"-3", partially burnt dimensional lumber 1" thick, at 18"-22" higher concentration of wood (few to little partially burned lumber and pieces up to 3" diameter).	0	N	N	N	10	Partially burned wood chips and dimensional lumber up to 3" .	NA	NA
HA-05	HA-05-0-12"	OL	0-6" - 10 YR 3/1, dry, soft, organic SILT with trace to few fine to coarse sand and gravel, trace cobbles up to 3" diameter subrounded to rounded; trace rootlets. 6-12" - 10 YR 21, dry, soft, organic SILT with trace to few fine to coarse sand and reduced gravel; trace slag (vitrified nodule).	0	N	N	N	0	NA	NA	NA
	HA-05-12-24"	OL	12-24" - 10 YR 3/1, damp to moist, soft, organic SILT with trace to few fine to coarse sand and gravel; slag nodules up to 3" diameter, trace slightly decomposed wood chips.	0	N	N	N	< 5	Slightly decomposed, black wood chips 1/8 - 1/4" diameter	NA	NA
HA-06	HA-06-0-12" HA-06-0-12"-DUP	0-8" OL 8-12" SC	0-8" - 10 YR 2/2, damp to moist with depth, soft, organic SILT with trace fine gravel; trace rootlets, trace slight to moderately decomposed wood chips, glass pieces, 2"-3" brick fragments. 8-12" - 5 YR 3/2C, damp to moist with depth, loose, clayey SAND with few fine to coarse gravel, trace silt; trace glass pieces, trace wood pieces between 1/4-1/2" diameter, rootlets.	0	N	N	N	~ 7	Slightly to moderately decomposed wood chips up to 1" diameter.	NA	NA
	HA-06-12-24"	12-14" SC 14-24" Shell Midden (disturbed)	12-14" - 5 YR 3/2C, moist, loose, clayey SAND with few fine to coarse gravel and trace silt; trace glass pieces, trace wood pieces between 1/4-1/2" diameter, rootlets. 14-24"- 5 YR 3/2C, moist, loose, clayey SAND with few fine to coarse gravel, trace silt, and few fine to coarse gravels (angular to sub angular); high shell content (60-70%), organics (black, clayey material, potentially charcoal), trace wire, wet and loose, medium dense at 20-21".	0	N	N	Y, trace wire - deposited in disturbed layer of shell midden	<1.25	Wood chips 1/4" diameter, slightly decomposed	NA	NA
HA-07	HA-07-0-12" HA-07-0-12"-DUP	OL	10 YR 2/2, dry, soft, silty organic SILT with clay, trace coarse sand, fine to coarse gravel (sub angular to angular); trace brick fragments and mortar, trace roots/rootlets, trace glass fragments. Refusal was hit after 1ft.	0.1	N	N	N	0	NA	NA	NA
	Refusal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HA-08	HA-08-0-12"	OL	10 YR 3/1 grading to 10 YR 2/1, moist, soft, organic SILT with medium to coarse sand, trace fine to coarse gravel, and cobble up to 3" diameter (subrounded); trace roots/rootlets, trace brick fragments, trace organic clay.	0.1	N	N	N	0	NA	NA	NA
	HA-08-12-24"	12-18" OL 18-24" SM	12-18" - 10 YR 2/1, moist, soft, organic SILT with fine to coarse sand, trace fine to coarse gravel, and cobble up to 3" diameter (subrounded). 18-24" - 10 YR 2/1, moist, loose, organic silty medium to coarse SAND with trace fine to coarse gravel and cobbles up to 3" diameter; trace clay, trace brick fragments, trace ceramics, trace roots/rootlets, wet @ 20" with trace wood pieces 1/8-1/4" diameter.	0	N	N	N	< 5	Moderately decomposed, dark wood chips 1/8 -1/4" diameter.	NA	NA

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Table D-3. Hand Auger Field Observations

Location ID	Sample ID	USCS	Soil Sample Description	PID	Sheen	ACM	Other Findings	Wood	Wood - Visual descrription	Slag	Slag - Visual Desctiption
HA-09	HA-09-0-12"	0-8" ML 8-12" SP/GP	0-8" - 10 YR 3/2, dry, soft, SILT with some sand, fine to coarse gravel (subangular/round), and trace organic silts; trace roots/rootlets, nail observed at 8". 8-12" - 10 YR 4/3, dry, soft, SILT with some sand, fine to coarse gravel (subangular/round), and reduced organic silts, sand becomes medium to coarse with depth.	0.5	N	N	Y, Nail encountered at 8"	0	NA	NA	NA
	HA-09-12-24"	SM	12-24" - 10 YR 5/4, dry, loose, medium to coarse silty SAND with few fine to coarse gravel (subrounded/angular), trace coarse gravel up 1" diameter, trace fine sand; trace roots.	0	N	N	N	0	NA	NA	NA
HA-10	HA-10-0-12"	SP	0-12" - 10 YR 3/3, damp to moist, loose, fine to medium SAND with trace silt, trace fine to coarse gravel (subrounded/angular); trace shells/shell fragments, trace roots, trace glass and ceramics.	0	N	N	Y, trace glass and ceramics	0	NA	NA	NA
	HA-10-12-24" HA-10-12-24"-DUP	SP + OL	12-24" - 10 YR 3/3, damp to moist, loose, fine to medium SAND with trace silt, trace fine to coarse gravel (subrounded/angular) - interbedded lenses of 10 YR 211, moist-wet, soft, organic SILT @ 20'; trace clay, trace wood pieces 1/8 - 1/4" diameter, trace roots/rootlets, trace shells, trace glass.	0	N	N	Y, trace glass	< 5	Moderately to highly decomposed small wood chips 1/4 - 1/2".	NA	NA
HA-11	HA-11-0-12"	SM-ML	10 YR 3/2, dry, loose, fine silty SAND with few fine to coarse gravel (subangular/subrounded) and trace clays; trace organics (soil, rootlets, and shell frags, trace ceramic pieces in 0-6".	0	N	M	Y, trace ceramic fragments	0	NA	NA	NA
	HA-11-12-24"	SM	10 YR 4/4, dry, loose, fine to medium silty SAND with few fine coarse gravel (subrounded/subangular); trace rootlets/roots, trace shells (with higher concentration from 20-24"), trace (calcified?) nodules, trace ceramic fragments.	0.1	N	N	Y, trace ceramic fragments	0	NA	NA	NA
HA-12	HA-12-0-12" HA-12-0-12"-DUP	ML	10 YR 5/2, dry, soft, fine sandy SILT with few fine to coarse gravel (subrounded), few coarse sand, trace clay (clay balls), and trace coarse gravels up to 3" diameter; trace roots/rootlets.	0	N	N	N	0	NA	NA	NA
	HA-12-12-24"	ML	10 YR 5/2, dry, soft, fine sandy SILT grading to SILT with few to trace fine sand, few to trace fine to coarse gravel (subrounded/subangular), few coarse sand; reduced rootlets/roots in 18-24", trace shell fragments in 23-24".	0	N	N	N	0	NA	NA	NA
HA-13	HA-13-0-12"	SM	10 YR 2/2, wet, loose, fine to coarse silty SAND with few to little clay, some to little fine to coarse gravel (subrounded/angular), and trace cobbles up to 2" diameter; trace shells, trace wood chips/fibers encountered from 0 - 4", trace shells and shell fragments, trace slag.	0	N	N	N	< 5	Highly decomposed wood chips and fibers up to 1/2" diameter.	NA	NA
	HA-13-12-24"	12-18" - SM 18 -24" - WOOD (OL)	12-18" - 10 YR 2/2, wet, loose, fine to coarse silty SAND with trace clay, some fine to coarse gravel (subrounded/angular) up to 2" diameter; 18-24" - observed to be ~90% heavily decomposed wood with 10% 10 YR 2/2, wet, loose, silty SAND; trace shells, some lighter colored sawdust.	0	N	N	N	~ 85	Highly decomposed darkened wood chips with sawdust.	NA	NA
HA-14	HA-14-0-12"	0-1" - SM 1-11" - CH 11-12" - SM	0-1" - 10 YR 5/1, damp, loose, fine silt SAND with trace fine to coarse gravel, trace clay; trace shell fragments. 1-11" - 10 YR 516, damp to moist, very soft, high plasticity CLAY with trace fine sand, fine to coarse gravel, trace iron staining. 11-12" - 10 YR 2/7, moist, loose, fine to coarse silty SAND with trace clay, trace fine to coarse gravel (subrounded/angular); trace highly degraded wood pieces up to 1/2" diameter, trace wood fibers and roots.	0	0	N	N	< 5	Wood chips/fibers heavy to moderately decomposed, up to 0.5".	NA	NA
	HA-14-12-24"	OL	12- 24" - 5 YR 3/4, moist, low plasticity, soft, organic SILT with trace fine to medium sand, and trace to fine to coarse gravel (subrounded); few heavily decomposed, moist, amorphous wood pieces; wood fibers, possible sawdust.	0	0	N	N	< 5	Wood chips up to 0.5" heavily decomposed.	NA	NA
HA-15	HA-15-0-12"	SM	10 YR 3/2, wet, loose, fine to coarse silty SAND with few fine to coarse gravel (subrounded/angular), trace wood pieces blackened/decomposed up to 2" diameter, trace glass fragments, and trace clay.	0	0	N	N	< 5		NA	NA
	HA-15-12-24"	SM + WOOD	10 YR 2/2, wet, loose, silty SAND with wood (medium to highly decomposed wood chips, bark, and fibers); saturated @ 20", trace fine to coarse gravels, trace shell fragments, trace clay.	0	0	N	N	75	Bark, small fibers, wood chips, medium to highly decomposed.	NA	NA
HA-16	HA-16-0-12"	OL + SP	0-11" - 10 YR 2/2, dry, soft/loose, organic SILT with fine sand, trace coarse sand, trace fine to coarse gravel up to 2" diameter; trace root/rootlets. 11-12" - 10 YR 3/6, dry, loose, medium silty SAND with few fine to coarse gravel, trace coarse sand; trace roots/rootlets, reduced organic soil, trace glass fragments.	0.2	0	N	N	0	NA	NA	NA
	HA-16-12-24"	SW	12-18" - 10 YR 3/6, dry, loose, few to medium silty SAND; 18-24" - grades into 10 YR 4/4, dry, loose, coarse well graded SAND with few fine to coarse gravel, trace silt, trace gravel (subangular-subrounded) up to 3" diameter.	0	0	N	N	0	NA	NA	NA
HA-31	BH-HA-31-0to1	OL + ML	0-4" - 2.5 YR 2.5/2, very loose/soft, organic SILT and decomposed wood 4-12" - 2.5 YR 3/1 SILT with organics and fine to coarse subangular to rounded gravel; trace rounded cobbles	0.3	N	N	N	50	Decaying tree fibers, not anthropogenic	0	NA
	BH-HA-31-1to2 and BH-HA-31-1to2-D	ML	12-17" - 7.5 YR 3/3 SILT with fine to coarse gravel, some cobbles	0.2	N	N	N	<5	Decaying tree fibers, not anthropogenic	0	NA

Table D-3. Hand Auger Field Observations

Location ID	Sample ID	USCS	Soil Sample Description	PID	Sheen	ACM	Other Findings	Wood	Wood - Visual descrription	Slag	Slag - Visual Desctiption
HA-32	BH-HA-32-0to1	OL + ML +CL	0-6" - 10 YR 2/1, dry SILT with fine roots, non-cohesive 6" - 20% gravel, fine to coarse 6-8" 7.5 YR 6/6, stiff to very stiff, moist, CLAY later	0.2	N	N	N	<5	NA	0	NA
	BH-HA-32-1to2	CL+RO	12" - transitions silt CLAY to weathered ROCK with gravel and poorly sorted sand. Extremely weak rock.	0	N	N	N	<5	Very fine roots	0	NA
HA-33	BH-HA-33-0to1 BH-HA-33-0to1-D	OL + ML	0-6" - SILT, some roots and organics 6-13" - 7.5 YR 3/1 stiff SILT with 20% gravels and cobbles, subrounded	0.3	N	N	N	<5	Roots/fibers	0	NA
HA-34	BH_HA-34-0to1	ML	0-5" - dense, very stiff SILT with organics (roots, 0.5" thickness and smaller) and gravel (30%) 5-12" - same as above but less roots and up to 40% gravel	1.6	N	N	N (only broken glass)	<5	Roots	0	NA
HA-35	BH-HA-35-0to1	ML	0-6" - 5 YR 3/1, soft/medium,dry, non plastic, massive SILT with gravel and fibrous roots 6-12" - more fine to coarse gravels (rounded to subangular) and less roots	0	N	N	Y - ceramic fragments	<5	Organic roots	0	NA
	BH-HA-35-1to2	ML	12-18" - 5 YR 4/2, soft, dry, non plastic, massive SILT with gravel	0	N	N	N (only glass fragment)	<1	Small roots	0	NA
HA-36	BH-HA-36-0to1	OL + ML	0-4" - organic SILT with >50% fine roots 4-12" - 7.5 YR 2.5/1 soft SILT with 10% fine to coarse gravels, transition to silt	1.3	N	N	N (only cement and concrete)	<5	Organic roots	0	NA
HA-37	BH-HA-37-0to1	OL + ML	0-4" - 7.5 YR 2.5/1 soft, dry, organic SILT with pinecones and roots 4-12" - 7.5 YR 2.5/2 SILT with 10% fine gravels, subrounded	2	N	N	N	<5	Roots	0	NA
	BH-HA-37-1to2	ML	12-24" - same as above with up to 20% gravel (coarsening), occasional pieces of charcoal (<0.5" in size), and small brick fragments (<0.5")	5.3	N	N	N (only brick)	<5	Roots, twigs	0	NA
	BH-HA-37-2to2.9	SM	24-36" - silty SAND, gravel, roots. Refusal encountered due to subrounded gravels	--	N	N	N	<5	Roots	0	NA
HA-38	BH-HA-38-0to1 BH-HA-38-0to1-D	OL	0-6" - 7.5 YR4/2 soft SILT with 30% gravels, fine to coarse, up to 2", angular-subrounded 6-12" - same as above, but less gravel (25%)	1.3	N	N	N	<5	Roots	0	NA
	BH-HA-38-1-2	OL	12-24" same as 6-12" interval, with one cobble at 12"	1.9	N	N	N	<5	Roots/fibers	0	NA
HA-39	BH-HA-39-0to1	OL +CL	0-6" - 7.5 YR 2.5/1 non plastic, soft, organic SILT with >50% roots (fine to pencil width) 6-12" - 7.5 YR 5/2 and 7.5 YR 6/6 low to medium plasticity, very stiff, moist CLAY with occasional gravel (5%).	0	N	N	N	NA	NA	NA	NA
	BH-HA-39-1to2	CL	12-17" - same as 6-12" 17-24" - same as previous interval, with increased moisture	0	N	N	N	NA	NA	NA	NA
HA-40	BH-HA-40-0to1	OL + ML	0-2" - tree roots in SILT 2-5" - 7.5 YR 3/1 dry, non plastic, medium, SILT with 10-15% gravels 5-12" 7.5 YR 4/3 dry, soft-medium, SILT with sand (10%) and gravels (10%)	0	N	N	N	<5	Roots	0	NA
	BH-HA-40-1to2	ML	12-24" - same as previous interval, gravels increase to 25-30% (subrounded, coarse) with cobbles	0	N	N	N	<5	Roots	0	NA
HA-41	BH-HA-41-0to1	OL + ML	0-6" - 7.5 YR 3/1 medium, non plastic SILT with fine to coarse gravels (15%) and organic roots (fine to 0.5cm diameter) 6-12" - 7.5 YR 4/3 dry, soft SILT with <10% sand and 15% gravels	2.8	N	N	N	<5	Fine roots	0	NA
	BH-HA-41-1to2	ML	12-24" - 7.5 YR 5/3 SILT with fine sand (25%) and gravels (15-20%) (sub angular to rounded, fine to coarse)	3.2	N	N	N	<5	Root fibers	0	NA
HA-42	BH-HA-42-0to1	ML	0-11" - 5 YR 3/1-2.5/1 non plastic, soft, dry to slight moist, SILT with few (<1 to 2cm) gravels (2%) and some fine to 0.5cm diameter roots 11-12" - 7.5 YR 3/2 dry, sandy SILT to silty SAND with few gravels (<2%, fine)	0.1	N	N	N	<5	Plant/tree roots	0	NA
	BH-HA-42-1to2	SM + ML	12-15" - same as 11-12" interval 15-24" - color grades to 7.5 YR 4/3, fine, silty SAND	0	N	N	N	<5	Small plant roots	0	NA
HA-43	BH-HA-43-0to1	--	0-3.6" - 2.5 YR 4/1 slightly moist silty SAND with abundant roots 3.6-12" - 5 YR 5/3 moist, silty SAND with coarse gravel (20%) and abundant fine to medium roots	NA	N	N	N	7.17	Rootlets, brown and gray, up to 4cm long	0	NA
	BH-HA-43-1to2	--	12-24" - similar to previous interval, except large cobbles (3"-4") found at 12" and 18"	NA	N	N	N	10.67	Rootlets, brown and gray, up to 5cm long	0	NA
HA-44	BH-HA-44-0to1 BH-HA-44-0to1-D	SM + ML	0-4"- 5YR2.5/1, medium dense, moist, SILT with sand, and abundant roots and organic matter, with 4"-6"- subangular cobbles 6-12"- 5YR2.5/1, medium dense, moist, silty SAND with subangular gravel and abundant rootlets and wood fibers	NA	N	N	N	27	Rootlets and wood fragments	0	NA
	BH-HA-44-1to2	SM + ML	12-24"- 5YR4/6, medium dense, moist, silty SAND with subangular and subround gravel, some rootlets and wood fibers	NA	N	N	N	33	Rootlets and wood fragments	0	NA
HA-45	BH-HA-45-0to1	SM + ML	0-10"- 7.5YR2.5/1 loose, moist, silty SAND with subrounded gravel and rootlets; brick debris at the surface 10-12"- 7.5YR2.5/1 loose, moist, silty SAND with moderate subrounded gravel and rootlets	NA	N	N	N	45	Rootlets and wood fragments	0	NA
	BH-HA-45-1to2	SM + ML	12-18"- 5YR3/2 loose, moist, silty SAND with moderate subrounded gravel and rootlets 12-24"- 5YR3/2, loose, moist, silty SAND with subangular and subround gravel, possibly building debris (bricks fragments)	NA	N	N	N	63	Rootlets and wood fragments	0	NA

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Table D-3. Hand Auger Field Observations

Location ID	Sample ID	USCS	Soil Sample Description	PID	Sheen	ACM	Other Findings	Wood	Wood - Visual descrription	Slag	Slag - Visual Desctiption
HA-46	BH-HA-46-0to1	ML	0-12"- 5YR3/2 loose, moist, sandy SILT with trace subangular gravel, rootlets and organics	NA	N	N	N	28	Rootlets and wood fragments	0	NA
	BH-HA-46-1to1.8	OL	12-24"- 5YR3/2, soft, moist, CLAY with sand and fine to medium subangular gravel, rootlets	NA	N	N	N	28	Rootlets and wood fragments	0	NA
HA-47	BH-HA-47-0to1	SM + ML	0-12"- 7.5YR5/4, loose, moist, silty SAND with fine to coarse subangular and subrounded gravel, abundant rootlets and organics (0-4")	NA	N	N	N	20	Rootlets and wood fragments	0	NA
	BH-HA-47-1to2	SM + ML	12-24"- 7.5YR5/6, loose, moist, silty SAND with fine/medium subangular and subrounded gravel, moderate rootlets and organics	NA	N	N	N	51	Rootlets and wood fragments	0	NA
HA-48	BH-HA-48-0to1	SM + ML	0-10" - 5 YR 4/1 dry, non plastic, non cohesive, soft, silty SAND with 20% gravel (fine to coarse) cobbles up to 8" 10-12" - 10 YR 6/4 soft, nonplastic SILT with sand and fine gravels	0	N	N	N	<5	Roots like grass fibers	0	NA
	BH-HA-48-1to2	SM + ML	12-18" - becoming more SM-ML with depth - fine SAND with 10% rounded fine gravel (0.5") 18-24" - 7.5 YR 5/4, getting more moist with depth	0	N	N	N	<5	Some grass-like roots	0	NA
HA-49	BH-HA-49-0to1	SM + ML	0-12"- 2.5YR5/1, loose, moist, silty SAND with fine to coarse subrounded gravel, abundant rootlets; pieces of clear glass at 10" bgs	NA	N	N	N	45	Rootlets and wood fragments	0	NA
	BH-HA-49-1to2	SM + ML	12-24"- 2.5YR5/1, medium dense, moist, SAND with silt and fine to coarse subrounded gravel, moderate rootlets; shell fragments at 22" bgs	NA	N	N	N	45	Rootlets and wood fragments	0	NA
HA-50b	BH-HA-50b-0to1	SM + ML	0-12"- 5YR2.5/1, medium dense, moist, SAND with silt and fine to coarse subrounded gravel; abundant rootlets and organics at surface (0-3"), decreasing with depth	NA	N	N	N	55	Rootlets and wood fragments	0	NA
	BH-HA-50b-1to1.6	SM + ML	12-19.2"- 5YR2.5/1, medium dense, moist, SAND with silt and fine to coarse subrounded gravel; few rootlets and organics	NA	N	N	N	27	Rootlets and wood fragments	0	NA
HA-51	BH-HA-51-0to1 BH-HA-51-0to1-D	SM + ML	0-12"- 5YR2.5/2, medium dense, moist, SILT with sand and few fine subangular gravel; abundant rootlets and organics at surface (0-4"), decreasing with depth	NA	N	N	N	25	Rootlets and wood fragments	0	NA
	BH-HA-51-1to1.6	SM + ML	12-19.2"- 5YR2.5/2, medium dense, moist, SILT with sand and few fine subangular gravel and trace cobbles	NA	N	N	N	27	Rootlets and wood fragments	0	NA
HA-52	BH-HA-52-0to1	SM + ML	0-6"- 5YR3/2, loose, moist, gravelly (fine subrounded and subangular) SILT with sand, and possibly brick debris 6-12"- 5YR3/2, loose, moist, SILT with fine subrounded gravel and sand; rootlets, charcoal and possibly brick debris	NA	N	N	N	63	Rootlets and wood fragments	0	NA
	BH-HA-52-1to2	SM + ML	12-15"- 5YR3/2, loose, moist, SILT with fine subrounded gravel and sand; rootlets, charcoal and possibly brick debris 15-24"- 5YR4/2, loose, moist, SILT with fine subangular gravel and sand, rootlets and fines increasing with depth	NA	N	N	N	63	Rootlets and wood fragments	0	NA

Acronyms:
ACM = Asbestos Containing Materials; CH = Inorganic Clays of High Plasticity, Fat Clays; GP = Poorly Graded Gravels, Gravel-Sand Mixtures, Little or no Fines; HA = Hand Auger; ID = Identification; ML= Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity; OL = Organic Silt and Organic Silty Clays of Low Plasticity; NA = Not Applicable or Not Available; N = No; SC = Clayey Sands, Sand-Clay Mixtures; SM = Silty Sand, Sand-Silty Mixtures; SP = Poorly Graded Sands, Gravelly Sands, Little or no Fines; SW = Well Graded Sands, Gravelly Sands, Little or no Fines; PID = PID=Photoionization Detector; USCS = Unified Soil Classification System; Y = Yes.

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Table D-4a. Well Construction Details

Location ID	Well Type	Well Monument	Well Diameter (in)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Total Depth of well (ft bgs)	Static Water Level (ft bgs)	Water Level (ft TOC)
SB/GW-17	Temporary	--	1	7	17	17	8.22	8.51
SB/GW-18	Temporary	--	1	2	12	12	10.60	10.60
SB/GW-19	Temporary	--	1	2	12	12	6.90	8.70
SB/GW-20	Temporary	--	1	1.5	11.50	12	10.5	14.00
SB/GW-21	Temporary	--	1	6.47	11.47	12	10.2	10.60
SB/GW-24	Permanent	Above ground	2	4	14	14.3	4.35	7.87
SB/GW-26	Permanent	Above ground	2	5	15	15	3.0	9.95
SB/GW-27	Permanent	Above ground	3.75	9	19	19.25	--	8.59
SB/GW-29	Permanent	Above ground	2	12.9	22.9	23.2	12.0	11.39

Acronyms:
-- = not recorded or not applicable; bgs = below groud surface; ft = feet; in = inches; TOC = top of casing

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Table D-4b. Groundwater Field Parameters

Location ID	Static Water Level (ft bgs)	Sample ID	Date Sampled	Time Sampled	Water Level (ft TOC)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm)	ORP (mV)	Temperature (° C)	Pumping Rate (L/min)	Volume Pumped (L)	Salinity (‰)
Temporary Wells														
GW-17	8.22	BH-GW-17-210916	9/16/2021	9:10	8.51	2.08	11.07	5.56	0.027	-202	14.91	0.15	6.0	0.01
GW-18	10.60	BH-GW-18-210916	9/16/2021	11:00	10.60	4.54	1.64	6.94	43.100	-51	20.66	0.05	7.6	27.70
GW-19	6.90	BH-GW-19-210917	9/17/2021	9:00	8.70	10.85	4.44	7.05	45.700	-326	16.28	0.40	22.7	29.35
GW-20	10.50	BH-GW-20-210917	9/17/2021	10:15	14.00	12.5	5.3	7.55	45.000	84	14.63	0.30	9.5	29.30
GW-21	10.20	BH-GW-21-210917 BH-GW-21-210917-D	9/17/2021	10:50	10.60	4.17	4.27	7.25	43.500	-172	14.2	0.40	18.9	28.00
Monitoring Wells														
GW-24	4.35	BH-GW-24-221007	10/7/2022	10:30	7.87	108.77	-0.03	6.82	0.034	-24.3	15.7	0.23	11.4	--
GW-24	7.45	BH-GW-24-230131	1/31/2023	22:41	7.55	3	0.23	7.25	0.026	-6.9	8	0.30	9.0	15.75
GW-24	6.70	BH-GW-24-230424	4/24/2023	15:18	6.74	1.59	6.24	7.3	0.016	105.1	10.3	0.20	1.5	9.49
GW-24	7.06	BH-GW-24-230801	8/1/2023	12:37	7.11	1.7	0.23	6.69	0.036	159.3	16.2	0.25	4.9	25.96
GW-26	3.00	BH-GW-26-221007	10/7/2022	12:25	9.95	11.82	2.53	6.68	0.045	87.2	15.6	0.24	5.7	--
GW-26	9.70	BH-GW-26-230131	1/31/2023	21:00	9.80	11.7	3.19	6.83	0.020	84.9	7.8	0.25	7.0	11.87
GW-26	9.00	BH-GW-26-230424	4/24/2023	14:00	9.38	4.4	5.51	6.63	0.036	126.4	9.87	0.20	1.8	22.57
GW-26	9.05	BH-GW-26-230801	8/1/2023	10:57	9.50	2.41	1.65	6.2	0.048	175.4	17.36	0.25	4.9	35.52
GW-27	--	BH-GW-27-221007	10/7/2022	14:20	8.59	3.44	6.75	6.6	0.042	122	15.3	0.26	5.7	--
GW-27	10.6	BH-GW-27-230131	1/31/2023	19:08	11.65	13.30	6.99	7.59	0.007	9.1	10.3	0.30	25.0	3.74
GW-27	7.8	BH-GW-27-230424	4/24/2023	12:13	10.32	30.10	9.11	7.19	0.022	88.1	10.91	0.20	4.2	13.04
GW-27	9.7	BH-GW-27-230801	8/1/2023	9:20	10.00	9.29	7.20	6.68	0.042	0.01849	14.3	0.25	6.1	30.70
GW-29	12.0	BH-GW-29-221007 BH-GW-29-221007-D	10/7/2022	15:30 15:30	11.39	2.03	1.66	6.04	0.037	189.2	12.30	0.24	5.7	--
GW-29	10.3	BH-GW-29-230201 BH-GW-29-D-230201	2/1/2023	0:19	10.70	34.9	4.27	7.63	0.002	40.5	7.90	0.28	8.0	0.96
GW-29	9.5	BH-GW-29-230424 BH-GW-29-D-230424	4/24/2023	17:29	9.65	57.6	6.02	7.96	0.000	25.1	8.42	0.20	4.3	0.19
GW-29	10.2	BH-GW-29-230801 BH-GW-29-D-230801	8/1/2023	13:58	10.29	2.82	2.16	6.04	0.036	254.4	12.02	0.20	4.2	25.72

Notes:

1. Depth of sample measured by measuring depth of tubing.
2. Groundwater Parameters Recorded After Stabilization (Low-Flow Sampling Methods).
3. Salinity was measured by using a Horiba 4-500 water quality meter and a refractometer. Results obtained with the refractometer are not reported.
4. Monitoring wells GW-24, GW-26, GW-27, and GW-29 were sampled quarterly during one-year long monitoring events to assess seasonal variability (if any).

Acronyms:

bgs = Below Groundwater Surface; BH = Blakely Harbor; ft = feet; GW = Groundwater; ID = Identification; in = inch; L= Liter; mg = Milligram; min = Minute; mV = Millivolt; NTU = Nephelometric turbidity unit; SB = Soil Boring; mS/cm = MilliSiemen per centimeter; TOC = Top of casing; -- = Value not measured; ‰ = Parts per thousand

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Table D-5. Surface Sediment Grabs Field Observations

Location ID	Sample ID	Equipment Type	Number of Attempts	Reason for multiple attempts	Recovery Depth (cm)	Description of Composite Surface Sediment Sample	Odor
SG-01	SG-01-0to10	Hand	1	-	10	Wet, olive gray, well graded SAND with some fine gravel, change of color observed at 5cm	N
SG-02	SG-02-0to10	Hand	1	-	10	Wet, dark grey, poorly graded fine SAND with silt, trace fine gravel	N
SG-03	SG-03-0to10 (archived)	Ponar	4	Poor recovery	6.5-8.5	Wet, soft, dark grey, sandy SILT (45% sand)	Sulfide
SG-03	SG-03-0to10-R	Ponar	5	Poor recovery	10	Wet, olive gray, silty fine SAND (20% silt)	N
SG-04	SG-04-0to10 (archived)	Ponar	8	Poor recovery	5.5-8	Wet, soft, dark grey, sandy SILT (45% sand)	N
SG-04	SG-04-0to10-R	Ponar	3	Poor recovery	10-13.5	Wet, dark grey (olive gray dusting on surface), silty fine SAND (20% silt)	N
SG-05	SG-05-0to10	Ponar	3	Poor recovery	11.5-12	Wet, dark grey, sandy SILT (40% sand)	N
SG-06	SG-06-0to10	Hand	1	-	10	Wet, dark grey, SILT with some fine sand, change of color observed at 5cm	N
SG-08	SG-08-0to10	Hand	1	-	10	Moist, medium dense, olive gray, well graded SAND with silt and some gravel	N
SG-09	SG-09-0to10	Hand	1	-	10	Moist, medium dense, olive gray/brown, poorly graded fine SAND with some silt	N
SG-10	SG-10-0to10	Hand	1	-	10	Moist, medium dense, olive gray to brown, well graded SAND with silt and fine trace brick (small/fine)	N
SG-11	SG-11-0to10	Hand	1	-	10	Moist, medium dense, brown, well graded SAND with some well graded gravel and brick (<0.5" to full bricks)	N
SG-13	SG-13-0to10	Power Grab	1	-	21.5	Wet, gray, fine grain SAND with trace silt, change of color observed at 2cm	N
SG-15	SG-15-0to10 SG-15-0to10-D	Power Grab	2	Poor recovery	18-19	Wet, medium dense, brown/gray surface, dark gray beneath, silty poorly graded SAND	N
SG-18	SG-18-0to10	Power Grab	1	-	19.5	Wet, low density, dark gray, poorly graded fine SAND	N
SG-19	SG-19-0to10	Power Grab	1	-	19	Medium dense, poorly graded fine SAND, dark grey	N
SG-22	SG-22-0to10 SG-22-0to10-D	Power Grab	1	-	27.5	Wet, dark olive gray/brown, sandy SILT (40% sand)	Sulfide
SG-23	SG-23-0to10	Power Grab	1	-	26	Medium dense, olive brown dusting on surface, dark gray to olive gray, SILT with fine grained sand (45%)	Sulfide
SG-25	SG-25-0to10	Hand	1	-	10	Dense, rounded to semi rounded cobbles on surface. 0-10 poorly graded SAND with trace silt	N
SG-26	SG-26-0to10	Power Grab	1	-	20	Soft to medium dense, light brown dusting on surface, 0-10 wet, sandy SILT (45% sand), dark grey	N

Table D-5. Surface Sediment (

Location ID	Sample ID	Flora and Fauna	Artifacts and Other Findings	Slag	Wood Debris Visual Assessment		
				Visual %	%	% with H2O	visual description
SG-01	SG-01-0to10	Trace kelp	N	0	10	40	Weathered twigs and brown-black fibers
SG-02	SG-02-0to10	N	N	0	20	10	Highly weathered black fibers
SG-03	SG-03-0to10 (archived)	Kelp and twigs at the surface; worm casings, 1/4" to 1/2" shell fragments throughout, small shrimp	N	0	20	29.4	Decomposed, black wood fragments and pulp
SG-03	SG-03-0to10-R	Trace kelp and 1/16" shell fragments at the surface; 1" shell fragments at 3cm, a crab, and a pink worm at 10cm	N	0	0	15	Very fine black wood fibers
SG-04	SG-04-0to10 (archived)	Some seaweed, arthropods, and shell fragments	N	0	60	75	Black and brown fibers
SG-04	SG-04-0to10-R	Weeds, decomposed plants, kelp, twigs, trace shells, and small red worms	N	0	0	50	Fine-grained wood pulp
SG-05	SG-05-0to10	Trace kelp at the surface	N	0	0	10	Brown and black small fibers
SG-06	SG-06-0to10	Trace kelp, trace shells, and small crabs	Some ceramic material	0	0	5	Very decomposed/weathered black fibers, one bark fragment
SG-08	SG-08-0to10	Trace kelp and shells	N	0	0	--	-
SG-09	SG-09-0to10	Trace kelp and shells	N	0	0	--	-
SG-10	SG-10-0to10	Trace shell fragments	N	0	0	--	-
SG-11	SG-11-0to10	Crabs and shells	N	0	5	--	Burned woodchip 2"
SG-13	SG-13-0to10	Trace shells	N	0	0	22.5	Small particles and black fibers (<0.5cm) visible after added water
SG-15	SG-15-0to10 SG-15-0to10-D	Kelp and shells at the surface, trace to some kelp and shells throughout	N	0	0	7.5	Small black fragments (<0.5cm) visible after added water
SG-18	SG-18-0to10	Some seaweed, crab, and shrimp	N	0	0	--	-
SG-19	SG-19-0to10	Trace shells and weeds	N	0	0	--	-
SG-22	SG-22-0to10 SG-22-0to10-D	Crabs and shrimps at the surface, thin small worm throughout	N	<5	30	80	Slightly decomposed wood pulp and small fibers
SG-23	SG-23-0to10	Few shell fragments, shrimp, and worm casing at the surface; small clam shells and rootlets throughout	Brick fragment, 2"x3" ceramics, and an asphalt-like rock	0	0	20	Small wood fibers visible after added water
SG-25	SG-25-0to10	Heavy shell fragments, crab, and trace seaweed	Trace brick fragments throughout, piece of broken glass	0	0	0	-
SG-26	SG-26-0to10	Trace seaweed at the surface; 4 small think pink worms, trace shells and worm casings throughout	N	0	5	--	Small wood pulp (<0.5cm)

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Table D-5. Surface Sediment Grabs Field Observations

Location ID	Sample ID	Equipment Type	Number of Attempts	Reason for multiple attempts	Recovery Depth (cm)	Description of Composite Surface Sediment Sample	Odor
SG-27	SG-27-0to10	Power Grab	3	Wood debris in jaws	17.5	Medium dense, dark grey, silty SAND (35% silt)	N
SG-28	SG-28-0to10	Power Grab	2	Poor recovery	24	Medium dense, olive brown dusting on surface, dark gray sandy SILT (40% sand)	Sulfide
SG-30	SG-30-0to10	Power Grab	1	-	27	Olive brownish to gray, fine to very fine SAND with 25-35% silt, well sorted	N
SG-31	SG-31-0to10	Power Grab	1	-	15.5	Wet, medium dense to dense, greenish/gray to dark gray, change of color observed at 2cm, silty SAND (10% silt)	Sulfide
SG-33	SG-33-0to10	Power Grab	5	Rocks and wood in jaws	12	Wet, soupy, dark grey, poorly graded SAND with some silt	N
SG-35	SG-35-0to10	Power Grab	1	-	24.5	Wet, medium dense, dark gray (except 0-0.5cm lighter in color), sandy SILT	N
SG-36	SG-36-0to10	Power Grab	1	-	23	Wet, medium dense, dark gray, silty SAND with 2"-3" rocks or cobbles	N
SG-37	SG-37-0to10 SG-37-0to10-D	Power Grab	1	-	17.5	Wet, olive gray to dark gray, change of color observed at 0.5 cm, silty SAND (10% silt)	Sulfide
SG-39	SG-39-0to10	Power Grab	1	-	15	Wet, medium dense, dark gray, fine grain SAND with silt	N
SG-41	SG-41-0to10	Power Grab	2	Wood debris in jaws	16	Wet, medium dense, dark gray, fine grain SAND with some silt	N
SG-42	SG-42-0to10	Power Grab	1	-	20	Wet, medium dense, dark gray, fine grand SAND with some silt	N
SG-10	BH-SG-10-0to10 BH-SG-10-0to10-D	Hand	1	-	10	Sandy surface, moist, very loose brown (10 YR 4/3), SAND (above 90%), medium to fine with white and brown grains.	N
SG-11	BH-SG-11-0to10	Hand	1	-	10	Gravel and brick surface then moist, medium dense, dark brown (10YR 3/3) well graded SAND (70%) with well graded generally rounded gravel (20%), and silt (10%)	Natural organic
SG-43	BH-SG-43-0to10	Hand	1	-	10	Very wet white-gray-medium well graded SAND (50%), with green-gray-red and brown, medium to course rounded gravel (40%), and brown silt (10%)	N
SG-44	BH-SG-44-0to10	Hand	1	-	10	Wet, white-gray-brown, well graded SAND (50%) with white-brown-green-gray rounded small to medium gravel (45%), and brown silt (5%)	N
SG-45	BH-SG-45-0to10	Hand	1	-	10	0-3cm: moist, medium dense, very dark gray (10YR 3/1) to dark gray (10YR 3/2) SILT (60%) with fine grained white grain brown sand (40%). Different colored layering observed at 3cm - 5YR 4/6 (yellowish red) sandy SILT. Below 3cm: moist, loose, white gray brown well graded sand (70%) with gravel (15%, fine to medium brown-green-gray) and silt (15%, brown-ish)	N
SG-46	BH-SG-46-0to10	Ponar	3	Insufficient volume recovered	up to 15	Very wet, very dark gray (7.5 YR 3/1), soft, fine, sandy (30-40%) SILT	N

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Table D-5. Surface Sediment (

Location ID	Sample ID	Flora and Fauna	Artifacts and Other Findings	Slag	Wood Debris Visual Assessment		
				Visual %	%	% with H2O	visual description
SG-27	SG-27-0to10	Shell fragments (20%), 1/2" translucent flat worm, and worm casings at the surface; worms, worm casings, a red worm, a 1cm crab, and moderate shell fragments throughout	Sub-rounded brick on surface, small brick fragments throughout	0	0	5	Small fibers visible after added water
SG-28	SG-28-0to10	Some seaweed at the surface	N	0	0	10	Small fibers visible after added water
SG-30	SG-30-0to10	Worm casings and shrimp at the surface; red worm, 1/2" crab, crawfish, clam shell, 2" orange worm at 5cm, shrimp at 10cm, some large worms 10-30cm.	N	0	0	17.5	1/8" to 1/4" wood fibers visible after added water, 2" heartwood fiber observed between 10-30cm depth
SG-31	SG-31-0to10	Some red worms and trace shells at the surface, yellow worms around 4cm, razor clam around 9cm, flat worm at 11 cm	N		0	10	Small (1/16") black fibers observed after added water
SG-33	SG-33-0to10	Trace shells and seaweed	N	0	12.9	7.5	Small black fragments (<0.5cm) and scraps (1/2" -1/8") of wood, large pieces of wood (2ft) caught in the jaws
SG-35	SG-35-0to10	Some shells and seaweed	N	0	45	50	Large fibers/ fragments appearing to be fairly weathered black bark (up to 1cm by 2cm)
SG-36	SG-36-0to10	Abundant shells and some seaweed	N	0	10	7.5	Fibers and small fragments appearing to be fairly weathered black bark up to 1cm
SG-37	SG-37-0to10 SG-37-0to10-D	Trace shell fragments, worm casings, abundant worms and snails at the surface; abundant red worms and green/brown snails throughout, and large pink worm at 4cm (1.5cm girth)	N	0	4.25	15	Small (1/16") black fibers visible after added water
SG-39	SG-39-0to10	Shells, crabs, fish, shrimp, and seaweed	N	0	45	52.5	Small (<0.5cm) wood chips and fragments appearing to be fairly weathered black bark (6cm by 1cm)
SG-41	SG-41-0to10	Shells, fish, kelp, and barnacles	N	0	12	12.5	Small (1/8" to 1/2") fibers and chips, one fragment appearing to be fairly weathered lumber (>1cm)
SG-42	SG-42-0to10	Some shells	N	0	5	--	Small (<1/4") wood scraps
SG-10	BH-SG-10-0to10 BH-SG-10-0to10-D	shell fragments	Some brick fragments	0	<5	--	fine fragments (<0.5 cm), black
SG-11	BH-SG-11-0to10	live crabs and shells on surface	N	0	0	--	N/A
SG-43	BH-SG-43-0to10	none	N	0	0	--	N/A
SG-44	BH-SG-44-0to10	none	1 large brown brick fragment	0	0	--	N/A
SG-45	BH-SG-45-0to10	none	N	0	0	--	N/A
SG-46	BH-SG-46-0to10	worm casings and shrimp on surface, trace rootlets and plant matter 0-10cm	N	0	<10	--	small black fragments (<5cm), and brown rootlets (up to 3cm)

Table D-5. Surface Sediment Grabs Field Observations

Location ID	Sample ID	Equipment Type	Number of Attempts	Reason for multiple attempts	Recovery Depth (cm)	Description of Composite Surface Sediment Sample	Odor
SG-47	BH-SG-47-0to10	Ponar	3	Insufficient volume recovered	up to 16	Surface: silty dusting, uniform in color. 0-10cm: very wet, soft, very dark gray 7.5 YR 3/1, very fine sandy (30-40%) SILT	N
SG-48	BH-SG-48-0to10	Ponar	3	Insufficient volume recovered	up to 14	Surface: silty dusting 0-10cm: wet, soft, very dark gray 7.5YR 3/1 very fine grain sandy (20-30%) SILT	N
SG-49	BH-SG-49-0to10	Ponar	4	Insufficient volume recovered	up to 9	Very wet, very loose, well graded, fine-medium SAND with trace silt	N
SG-53	BH-SG-53-0to10	Ponar	2	Insufficient volume recovered	up to 19	Subrounded (up to 1") poorly graded, yellow, reddish-brown, white gravel (90%) and very wet, dark gray sand (10%)	Natural organic
SG-54	BH-SG-54-0to10	Ponar	1	-	13	Surface: greyish-brown dusting. 0-10cm: wet, soft, very dark greyish-brown (10YR 3/2) sandy (very fine 30-40%) SILT	N
SG-55	BH-SG-55-0to10	Ponar	4	Rocks in jaws	6	Surface: gravel. 0-10cm: wet, soft, very dark gray 10YR 3/1 sandy (20% fine sand) SILT (50%) with rounded, gray/greenish-brown gravel (30%) up to 1 inch in size	N
SG-56	BH-SG-56-0to10	Power Grab	1	-	14	Surface:trace wood and charcoal. 0-10cm: wet, soft, dark gray/green (5Y-3/1) sandy(15%) SILT (75%)	N
SG-57	BH-SG-57-0to10	Power Grab	1	-	17.8	0-10cm: soft, green/brown (2.5Y-3/1) sandy (20%) silt (70%) with clay (10%), moderate plasticity	N

Notes
1. Additional wood debris assessments were performed on 9/22/21 (SG-01, SG-02, and SG-06) and on 10/20/21 (SG-13, SG-15, SG-33, SG-35, SG-36, SG-39, and SG-41)
2. Samples were field screened for sheen, but sheen was not observed.

Acronyms
SG = Sediment Grab
D = Duplicate
R = Replicate
- = Not applicable
-- = Not recorded
" = inches
cm = centimeters
ft = feet
N = Not observed
ID = Identification

Table D-5. Surface Sediment (

Location ID	Sample ID	Flora and Fauna	Artifacts and Other Findings	Slag	Wood Debris Visual Assessment		
				Visual %	%	% with H2O	visual description
SG-47	BH-SG-47-0to10	worms and shrimp on surface, trace plant material and trace whole shells below surface	Some small debris appearing to be charcoal	0	--	35	One large (3"x2") fragment of wood appearing to be hardwood, black and very weathered. Also lots of small fragments (<0.25cm) black and brown in color
SG-48	BH-SG-48-0to10	worms and shrimp on surface, trace half-shells and some seaweed below surface	Substrate was very fine	0	60	60	Small brown and black fragments (<0.5cm) observed when water was added
SG-49	BH-SG-49-0to10	seaweed, crab, 20% shell fragments, barnacle covered cobble, worm casings, shrimp	Brick fragment; bioassay collected	0	--	8.3	Small fragments and black and brown rootlets
SG-53	BH-SG-53-0to10	green seaweed, barnacles (on gravel), crabs, some rootlets, trace shell fragments, centipod	N	0	0	0	None observed during wood debris evaluation, however some rootlets observed in grab sampler
SG-54	BH-SG-54-0to10	some shell fragments and worm casings on the surface and below, also rootles below surface	1 inch long blade of gravel	0	34.5	35	Wood debris up to 2" long, appearing to be bark, black on the outside and reddish on the inside
SG-55	BH-SG-55-0to10	abundant shell fragments and a 2-inch long shell, aquatic plants (seaweed and rootlets) small crab, barnacles observed on rocks	N	0	<10	<7	Small brown and black fragments (<0.5cm) appearing to be roots or plant material
SG-56	BH-SG-56-0to10	Moderate aquatic plants and shell fragments on the surface	N	0	3	3	1 1"x0.5" charcoal fragment
SG-57	BH-SG-57-0to10	Trace aquatic plants, a 2" long broken clam, trace clam fragmetns on the surface.	N	0	2.5	2.5	2 2" long black moderately weathered black wood fragments

Notes
1. Additional wood debris assessments were performed on 9/22/21 (SG-01, SG-02, and SG-06) and on 10/20/21 (SG-13, SG-15, SG-33, SG-35, SG-36, SG-39, and SG-41)
2. Samples were field screened for sheen, but sheen was not observed.

Acronyms
SG = Sediment Grab
D = Duplicate
R = Replicate
- = Not applicable
-- = Not recorded
" = inches
cm = centimeters
ft = feet
N = Not observed
ID = Identification

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Table D-6a. Sediment Core Collection Records

Location ID	Co-located Grab ID	Calculated Distance from Target (ft)	Vessel Collection Data										
			Sample Date	Water Depth (ft)	Tide (ft MLLW)	Mudline Elevation (ft MLLW)	# of Core Attempts	Accepted Core Attempt #	Reason for Multiple Attempts	Drive Depth (ft bml)	Hit Refusal?	Length Recovered (ft)	% Recovery
SC-03	SG-03	5.0	9/21/2021	1.7	6.1	4.4	1	1	--	10	N	9.9	99%
SC-04	SG-04	7.4	9/20/2021	8.2	9.8	1.6	3	1	Refusal/Poor Recovery	10	N	4.2	42%
SC-05	SG-05	22.4	9/21/2021	4.5	6.7	2.2	3	1	Refusal	6.2	Y	5.2	84%
SC-07	BH2-06	48.1	9/21/2021	6.5	8.4	1.9	3	3	Poor Recovery	6.5	Y	6	92%
SC-12	BH-23/BH-11	150.1	9/16/2021	11.7	8.66	-3.0	2	3	Refusal/Poor Recovery	3.23	Y	1.63	50%
SC-14	BH2-10	16.8	9/16/2021	11.4	10.9	-0.5	3	3	Refusal/Poor Recovery	5.9	Y	3	51%
SC-16	BH2-12	--	9/14/2021	--	--	--	3	--	Core Not Collected	--	--	--	--
SC-17	SED-5	--	9/16/2021	--	--	--	1	--	Core Not Collected	--	--	--	--
SC-20	BH2-19	6.3	9/14/2021	10.2	9.85	-0.4	1	1	--	10.1	N	9.3	92%
SC-21	BH2-20	4.1	9/17/2021	16.4	-0.05	-16.5	1	1	--	10	N	9.9	99%
SC-24	BH2-18	12.6	9/14/2021	15.8	10.15	-5.7	3	2	Poor Recovery	8.5	Y	8	94%
SC-26	SG-26	23.6	9/15/2021	16.9	4.36	-12.5	2	2	Poor Recovery	10	N	9.1	91%
SC-27	SG-27	8.4	9/15/2021	33.2	10.22	-23.0	3	2	Poor Recovery	8.9	Y	7.2	81%
SC-29	BH2-27	7.0	9/16/2021	27.9	2	-25.9	1	1	--	10.1	N	8	79%
SC-32	BH2-29	20.2	9/16/2021	32.3	4.2	-28.1	3	2	Refusal/Poor Recovery	7.8	Y	5.7	73%
SC-34	BH2-32	6.7	9/17/2021	21	1.94	-19.1	3	1	Refusal/Poor Recovery	7	Y	5.9	84%
SC-37	BH2-36/SG-37	5.4	9/13/2021	48.1	7.92	-40.2	1	1	--	10.7	N	8.3	78%
SC-38	BH2-37	13.5	9/14/2021	37.1	5.7	-31.4	3	3	Poor Recovery	8.7	Y	7.7	89%
SC-40	BH2-38	6.4	9/13/2021	50.74	8.91	-41.8	1	1	--	11	N	8.95	81%
SC-10	SG-10	27.1	10/5/2022	--	--	7.30	1	1	--	10	N	8	80%
SC-11	SG-11	12.1	10/5/2022	--	--	4.20	1	1	--	10	N	8	80%
SC-16	--	--	10/12/2022	--	--	--	3	--	Core Not Collected	--	--	--	--
SC-17	--	39.9	10/5/2022	--	--	9.00	1	1	Poor Recovery	10	N	5	50%
SC-49	SG-49	15.4	10/11/2022	8.2	8.24	0.04	3	2	Refusal/Poor Recovery	4	Y	2.8	70%
SC-50	--	--	10/12/2022	--	--	--	3	--	Core Not Collected	--	--	--	--
SC-51	--	6	10/10/2022	27.1	2.84	-24.3	3	1	Sed Expansion	8.7	Y	10.1	116%
SC-52	--	21.4	10/11/2022	12.1	4.8	-7.3	3	2	Refusal/Poor Recovery	4.4	Y	2.8	64%
SC-53	SG-53	9.6	10/11/2022	12.8	8.7	-4.1	3	1	Refusal	3.8	Y	4.4	116%
SC-54	SG-54	5.9	10/12/2022	45.6	8	-37.6	1	1	--	10	N	8.8	88%

Notes:

1. Cores were not collected at locations SC-16 and SC-17 during Phase 1 sampling. Cores were not colelcted at locaitons SC-16 and SC-50 during Phase 2 sampling.
2. Distance form target were calcualted based on proposed and measured actual coordinates.
3. Cores drive depth was measured as the penetration depth. Target drive depth of 10 feet below mudline was often not achieved due to refusala nd hard substrate. Percent recovery is calculated as the ratio between core length and drive depth.

Acronyms:

bml = Below Mudline; BH = Blakely Harbor; ft = feet; ID = Identification; MLLW = Mean Lower Low Water; SC = Sediment Core; SG = Sediment Grab; -- = Value not measured

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	Top Sample Depth *in situ* (ft bml)	Bottom Sample Depth *in situ* (ft bml)	Top Sample Elevation (ft MMLW)	Bottom Sample Elevation (ft MLLW)	Description of Composite Sediment Core Sample	Major Constituent (USCS)	Sheen
SC-03	SG-03	9/21/2021	BH-SC-03-0to1	0.0	1.0	4.4	3.4	Wet, loose 5Y 4/2 (olive gray), silty well graded fine to medium SAND; 40% brown bark pieces ≤ 5 inches; shell fragments grade from 0 to 5%.	SM	None
			BH-SC-03-1to3	1.0	3.0	3.4	1.4	Wet, medium stiff, 2.5Y 4/1 (dark gray), sandy SILT; silt is plastic; shells grade from ≤ 5% at 1 foot to 10% at 2.1 feet.	ML	None
			BH-SC-03-3to5	3.0	5.0	1.4	-0.6	Same as above.	ML	None
			BH-SC-03-5to7	5.0	7.0	-0.6	-2.6	Wet, stiff, 2.5Y 4/1 (dark gray), SILT with fine to medium SAND; trace gravel. At circa 6.2 ft a wet, hard, 2.5Y 6/6 olive yellow, 2-inch pocket, lean CLAY.	ML	None
			BH-SC-03-7to10	7.0	10.0	-2.6	-5.6	Wet, stiff, 2.5Y 4/1 (dark gray), plastic SILT. At 8 ft: wet, stiff, 2.5Y 4/1 (dark gray), plastic SILT w/ well graded fine sand; 10% shell fragments; less than 5% shells below 9 feet. Shoe full, same as above.	ML	None
SC-04	SG-04	9/20/2021	BH-SC-04-0to1.3	0.0	3.1	1.6	-1.5	Wet, loose, 2.5Y 3/1 (very dark gray), well graded fine to medium SAND with silt; 10% board-like wood fragments up to 4 inches long. At 0.8 ft: wet, loose, 2.5Y 3/3 (very dark grayish brown), HEARTWOOD pieces (80%); Little silty fine to medium well graded sand; strong sulfur odor.	SW - SM SW WOOD	None
			BH-SC-04-1.3to3	3.1	7.1	-1.5	-5.5	Wet, loose, 2.5Y 3/2 (very dark grayish brown), silty fine to medium well graded SAND; Strong sulfur odor; 5% wood consisting of twigs and tannish-brown heartwood fragments; 5% white shell fragments. At 2.5 ft shell fragments increase to 15%.	SM	None
			BH-SC-04-3to4.2	7.1	10.0	-5.5	-8.4	Wet, loose, 5Y 4/2 (olive gray), silty fine to medium well graded SAND; 50% white shell fragments up to 2 inches and 1 intact and closed clam shell; trace subrounded gravel up to 1.5 inches. Shoe was 10% full. Liner appeared to shift down inside the core barrel and approximately 1 foot of liner was caught in the shoe potentially blocking sediment from entering.	SM	None
SC-05	SG-05	9/21/2021	BH-SC-05-0to1.6	0.0	1.9	2.2	0.3	Very wet, very soft, 2.5Y 3/2 (very dark grayish brown), SILT with poorly graded fine sand (ML); trace large angular gravel; 20% brown wood up to 2 inches long. Sulfur odor at 0.6 ft.	ML	None
			BH-SC-05-1.6to3.2 BH-SC-05-1.6to3.2-D	1.9	3.8	0.3	-1.6	Very wet, very soft, 2.5Y 3/2 (very dark grayish brown), SILT with poorly graded fine sand (ML); 50% reddish brown lightly weathered mix of bark and heartwood. At 2.3 ft: Wet, loose, 2.5Y 3/1 (very dark gray), silty well graded fine to medium SAND (SM); trace subangular gravel; 15 % twigs and bark up to 0.5 inches.	ML SM	None
			BH-SC-05-3.2to5.2	3.8	6.2	-1.6	-4.0	Wet, loose, 2.5Y 3/1 (very dark gray), silty well graded fine to coarse SAND with subrounded well graded small to medium gray gravel (SM); 15% brown weathered bark and heartwood (board-like and tan on inside) pieces up to 3 inches; shell fragments grade from 0% at 3.2 feet to <5% at 4.9 ft. Shoe was full. Wet, loose, 2.5Y 3/1 (very dark gray), silty well graded small to large GRAVEL with sand (GM).	SM GM	None
SC-07	BH2-06	9/21/2021	BH-SC-07-0to2.5	0.0	2.6	1.9	-0.7	Very wet, very soft, 2.5Y 3/3 (dark olive brown) WOOD with sand and silt; 90% wood, 10% sand plus silt; the wood consists of sawdust-like material and bark up to 3 inches; strong sulfur odor; 3 inch brown work with many legs.	WOOD	Trace metallic.
			BH-SC-07-2.5to4.2	2.6	4.4	-0.7	-2.5	Wet, soft, 2.5Y 3/1 (very dark grey) SILT with fine to medium well graded sand; trace tan wood fragments < 1 inch. Substrate becomes coarser with depth.	ML	None
			BH-SC-07-4.2 to6.2	4.4	6.5	-2.5	-4.6	Wet, loose, 2.5Y 3/1 (very dark gray), silty well graded fine to coarse SAND; trace fine subrounded gravel.Shoe was full, same as above.	SM	None
SC-10	SG-10	10/5/2022	BH-SC-10-2to4	2.0	4.0	5.3	3.3	Damp to moist, loose, dark brown (7.5YR 3/2), coarse SAND; with subangular to rounded gravel (coarse, grape-size), < 5% shell fragments.	SW	None
			BH-SC-10-4to6	4.0	6.0	3.3	1.3	Moist, dense, black (7.5YR 2.5/1), WOOD pieces with coarse sand and pebbles; shells and brick fragments. Wet, loose to very loose, black (7.5YR 2.5/1), coarse SAND with silt; scattered shell fragments; scattered wood chips.	WOOD SM	None
			BH-SC-10-6to8	6.0	8.0	1.3	-0.7	Wet, loose to very loose, black (7.5YR 2.5/1), coarse SAND with silt; scattered shell fragments; scattered wood chips. One 1 inch brick fragment at 6.6 feet. Rock fragments below 7.7 feet.	SM GM	None
			BH-SC-10-8to10	8.0	10.0	-0.7	-2.7	Dark greenish gray (Gley1 3/1), COBBLES; some cobbles shattered by drill rig; one 2.5 inch wood chip at 8.4 feet. Loose, fine SAND with silt; scattered wood chips; scattered shell fragments.	GM SM	None

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	PID (ppm)	Odor	Other Contents	Slag	Wood Debris Assessment		
								%	% with water	visual description
SC-03	SG-03	9/21/2021	BH-SC-03-0to1	0.6	None	None	None	34	65	Slightly weathered wood scraps < 3 inches; Slightly weathered wood bark < 3 inches; Slightly weathered wood twigs < 2 inches; highly weathered wood fibers; no odor; no sheen.
			BH-SC-03-1to3	0.3	None	None	None	< 5	< 5	No wood positively identified.
			BH-SC-03-3to5	0.5	None	None	None	< 5	< 5	No wood positively identified.
			BH-SC-03-5to7	0.4	None	None	None	< 5	5	Highly weathered black fibers < 0.125 inches; 1 intact twig; trace wood chips; no odor; no sheen.
			BH-SC-03-7to10	0.1	None	None	None	< 5	5	Highly weathered black fibers < 0.125 inches; 1 intact twig fragment; no odor; no sheen.
SC-04	SG-04	9/20/2021	BH-SC-04-0to1.3	45	Strong sulfur odor.	None	None	26	35	Slightly weathered wood pieces < 3 inches; wood fibers; strong sulfur odor; no sheen;
			BH-SC-04-1.3to3	0.1	Some sulfur odor.	None	None	13	20	Slightly weathered wood chips < 3 inches; weathered bark pieces < 3 inches; weathered burnt fibers < 0.25 inches; weathered twigs < 3; some sulfur odor; no sheen.
			BH-SC-04-3to4.2	NA	None	Coal or charcoal. Shells (up to 2 inches) and trace gravel.	None	11	20	Moderately weathered wood chips < 3 inches; moderately weathered bark < 3 inches; moderately weathered fibers < 0.25 inches; coal or charcoal.
SC-05	SG-05	9/21/2021	BH-SC-05-0to1.6	72.5	Sulfur odor.	None	None	16	20	Moderately weathered wood scraps < 3 inches; very weathered and charred wood fibers; wood chips; sawdust.
			BH-SC-05-1.6to3.2 BH-SC-05-1.6to3.2-D	28.3	Sulfur odor.	None	None	26	30	Wood scraps < 4 inches; wood chips < 1 inch; weathered charred wood fibers; sulfur odor; no sheen.
			BH-SC-05-3.2to5.2	0.1	slight sulfur odor.	None	None	15	15	String-like wood scraps < 5 inches; wood chips < 0.5 inch; twigs < 1 inch; slight sulfur odor; no sheen.
SC-07	BH2-06	9/21/2021	BH-SC-07-0to2.5	25.1	Sulfur odor.	None	None	66	90	Brown to black, weathered, sawdust-like material, < 0.75 inches; black, highly weathered, fibers, < 0.04 inches; tan, lightly weathered, heartwood; brown, lightly
			BH-SC-07-2.5to4.2	8.7	None	None	None	6	30	Lightly weathered heartwood pieces, < 0.4 inches; lightly weathered bark pieces, < 0.2 inches; highly weathered, fibers, <0.04 inches; no odor; no sheen.
			BH-SC-07-4.2 to6.2	0.4	None	None	None	3	10	Highly weathered, black, fibers, < 0.04 inches; lightly weathered, heartwood, < 0.8 inches.
SC-10	SG-10	10/5/2022	BH-SC-10-2to4	PID broken.	None	None	NA	<5	NA	No visible wood debris.
			BH-SC-10-4to6	PID broken.	None	Brick Fragments	NA	19.5	NA	Wood fragments <1.5 inches.
			BH-SC-10-6to8	PID broken.	None	None	NA	17.5	NA	Mostly sawdust and few wood chips <1.5 inches, small fibers.
			BH-SC-10-8to10	PID broken.	None	None	NA	<10	NA	Small fibers in sediment.

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	Top Sample Depth *in situ* (ft bml)	Bottom Sample Depth *in situ* (ft bml)	Top Sample Elevation (ft MMLW)	Bottom Sample Elevation (ft MLLW)	Description of Composite Sediment Core Sample	Major Constituent (USCS)	Sheen
SC-11	SG-11	10/5/2022	BH-SC-11-2to4	2.0	4.0	2.2	0.2	Loose, fine SAND with silt; scattered wood chips; scattered shell fragments. Loose, moist, dark brown (7.5YR 3/2), coarse, SAND with 35 to 40% pebbles and brick fragments.	SW-SM	None
			BH-SC-11-4to6	4.0	6.0	0.2	-1.8	Moist, wet, medium dense, yellowish brown (10YR 5/8), fine WOOD fibers with silty sand and 2 inch brick pieces.	WOOD	None
			BH-SC-11-6to8	6.0	8.0	-1.8	-3.8	Wet, very loose, black (10 YR 2/1) silty WOOD fibers with coarse sand, brick pieces, and 1.5-2.0 inch wood chips and pieces.	WOOD	None
			BH-SC-11-8to10	8.0	10.0	-3.8	-5.8	Boring was through Brown (7.5YR 4/3 solid WOOD (beams or structural lumber).	WOOD	None
SC-12	BH-23/BH-11	9/16/2021	BH-SC-12-0to1.4	0.0	2.7	-3.0	-5.7	VERY wet, very loose, 2.5Y 3/1 (very dark gray), organic SILT with sawdust (30%); the sawdust is brown and fibrous < 0.4 inches; slight sulfur odor; One living 0.4 inch clam.	OL/OH	None
SC-14	BH2-10	9/16/2021	BH-SC-14-0to1.3	0.0	2.6	-0.5	-3.1	Very wet, very loose, 2.5Y 3.1 (very dark gray), silty well graded fine to medium SAND; 5% wood consisting of slightly weathered pieces < 1.5 inches that have brown exteriors and tan interiors; some twigs; strong sulfur odor; no sheen; the gravel is small; trace rootlets; brown worms present 1 inch by 0.04 inch.	SM	None
			BH-SC-14-1.3to2.6	2.6	5.3	-3.1	-5.8	Wet, loose, 2.5Y 3/1 (very dark gray), well graded sandy medium to coarse SAND with gravel; trace wood consisting of bark < 1 inch; 5% shell fragments with one intact shell; small gravel; color grades to 2.5Y 4/2 (dark grayish brown).	SM SW-SM	None
SC-16	BH2-12	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-16	BH2-12	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-17	SED-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-17	NA	10/5/2022	BH-SC-17-0to2	0.0	2.0	9.0	7.0	Moist, loose, very dark gray to brown (10YR 3/1 to 10YR 3/2) coarse to silty SAND with gravel and brick fragments, scattered wood chips.Wet, soft, black, WOOD fibers (80%). Cobble-size SLAG (vesicles orange in color) and WOOD.	SW WOOD SLAG	None
			BH-SC-17-2to3	2.0	3.0	7.0	6.0	Bored through solid wood (beam or structure); interior of wood is pink (7.5YR 8/4).	WOOD	None
			BH-SC-17-9to10	9.0	10.0	0.0	-1.0	Dense, moist, dark brown (7.5YR 3/2), WOOD fibers and pieces; 20-30% sand. Moist to wet, medium dense, dark gray (7.5YR 4/1), GRAVEL with coarse sand and silt.	WOOD GM	None
SC-20	BH2-19	9/14/2021	BH-SC-20-0to1.5	0.0	1.6	-0.35	-1.98	Wet, loose, 2.5Y 3/2 (very dark grayish brown), silty well graded fine to medium SAND; trace brown wood fragments < 0.4 inches; trace shell fragments.	SM	None
			BH-SC-20-1.5to3	1.6	3.3	-1.98	-3.61	As above.	SM	None
			BH-SC-20-3to5	3.3	5.4	-3.61	-5.78	Wet, loose, 2.5Y 3/2 (very dark grayish brown), silty SAND; trace gravel; one pocket of olive brown silt at 3.3 feet; 30% shell fragments up to 2 inches long.	SM	None
			BH-SC-20-5to7	5.4	7.6	-5.78	-7.95	Wet, loose, 2.5Y 3/2 (very dark grayish brown), silty SAND; trace gravel; trace wood branches; 45% shell fragments.	SM	None
			BH-SC-20-7to9	7.6	9.8	-7.95	-10.12	Wet, medium dense, 5Y 3/1 (very dark gray), medium SNDN with 15% silt; trace gravel; trace shell fragments.	SM	None

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	PID (ppm)	Odor	Other Contents	Slag	Wood Debris Assessment		
								%	% with water	visual description
SC-11	SG-11	10/5/2022	BH-SC-11-2to4	PID broken.	None	NA	NA	23.8	NA	Wood chips 0.5 to 2 inches, wood fibers, wood scraps. Wood is dark on outside, light on inside when broken apart with fingers.
			BH-SC-11-4to6	PID broken.	None	NA	NA	>90	NA	Wood fibers, sawdust, and wood chips; some bark.
			BH-SC-11-6to8	PID broken.	None	NA	NA	>90	NA	Sawdust and fibers with some larger pieces >3.75 inches (boring diameter).
			BH-SC-11-8to10	PID broken.	None	NA	NA	>95	NA	Pieces of wood.
SC-12	BH-23/BH-11	9/16/2021	BH-SC-12-0to1.4	3.6	slight sulfur odor.	1 live clam	None	65	90	Weathered sawdust with black fibers < 0.4 inches; no odor; no sheen.
SC-14	BH2-10	9/16/2021	BH-SC-14-0to1.3	1.8	Strong sulfur odor.	Brown worms 0.04 inch by 1 inch	None	26	30	Highly weathered, black, fibers; weathered, wood chips, < 2 inches.
			BH-SC-14-1.3to2.6	0	None	None	None	11	20	Weathered, brown, chips; weathered, brown, fibers; highly weathered, black, fibers < 0.04 inches.
SC-16	BH2-12	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-16	BH2-12	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-17	SED-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-17	NA	10/5/2022	BH-SC-17-0to2	PID broken.	None	Brick Fragments 22% slag pebble sized.	NA	7.5	NA	Small wood fibers.
			BH-SC-17-2to3	PID broken.	None	None	NA	85.0	NA	Wood chips and 2 inch wood pieces, light colored when broken apart.
			BH-SC-17-9to10	PID broken.	None	None	NA	90.0	NA	Wood chips <0.5 inch; cored through some lumber and logs.
SC-20	BH2-19	9/14/2021	BH-SC-20-0to1.5	0	None	None	None	17	35	Bark pieces < 2 inches; highly weathered black fibers.
			BH-SC-20-1.5to3	0.9	None	None	None	15	30	2 pieces of black charcoal < 0.4 inches; highly weathered black fibers.
			BH-SC-20-3to5	0	None	None	None	10	20	Moderately weathered brown chips <0.4 inches; very weathered black fibers <0.04 inches.
			BH-SC-20-5to7	0	None	None	None	12	30	Weathered black fibers <0.4 inches.
			BH-SC-20-7to9	0.1	None	None	None	0	20	Weathered fibers <0.04 inches.

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	Top Sample Depth *in situ* (ft bml)	Bottom Sample Depth *in situ* (ft bml)	Top Sample Elevation (ft MMLW)	Bottom Sample Elevation (ft MLLW)	Description of Composite Sediment Core Sample	Major Constituent (USCS)	Sheen
SC-21	BH2-20	9/17/2021	BH-SC-21-0to1.5	0.0	1.5	-16.45	-17.95	Wet, very loose (soupy), 2.5Y 3/2 (very dark gray), sandy WOOD with silt; very fine wood fragments with scattered shells; strong sulfur odor; poorly graded fine sand; density increases with depth; trace clay.	WOOD	None
			BH-SC-21-1.5to3.7	1.5	3.7	-17.95	-20.15	Wet, soft, 2.5Y 3/2 (very dark gray), sandy SILT; 40% wood; layers of 100% wood at 1.5 feet and 3.3 feet consisting of fragments < 3 inches and lumbered pieces. Wet, loose, 5Y 3/1 (very dark gray), well graded fine to medium SAND with wood fragments.	ML SM	None
			BH-SC-21-3.7to5.8	3.7	5.8	-20.15	-22.25	Interbedded SILT and SAND layers 4 inches wide; 40% shell fragments. Wet, loose, 5Y 3/1 (very dark gray), well graded fine to medium silty SAND. Wet, soft, 5Y 3/1 (very dark gray), SILT with well graded fine to medium sand.	ML SM	None
			BH-SC-21-5.8to8	5.8	8.0	-22.25	-24.45	Wet, loose, 5Y 4/3 (olive), subrounded small GRAVEL with sand and silt; scattered twigs; gravel is < 1 inch. Wet, medium dense, 5Y 4/3 (olive), subrounded to angular GRAVEL < 2 inches with well graded medium to coarse sand and clayey silt; fines have some plasticity; scattered twigs and rootlets; no shell fragments.	SM GM	None
			BH-SC-21-8to10	8.0	10.0	-24.45	-26.45	Moist, dense, 2.5Y 3/1 (very dark gray) sandy GRAVEL; grades to a gravelly SAND at 9.7 feet. Moist, dense, 2.5Y 3/1 (very dark gray) gravelly SAND; becomes dryer with depth.	GM SM	None
SC-24	BH2-18	9/14/2021	BH-SC-24-0to2	0.0	2.2	-5.65	-7.86	Very wet, 10YR 3/1 (very dark gray), organic SILT; trace sand; wood fragments consisting of heartwood tunneled by worms (possibly a piling); trace bark fragments; trace subangular gravels < 1 inch; trace twigs; one yellow-brown board-like wood fragment at 0.4 feet. Wet, soft, 2.5Y 3/2 (very dark grayish brown), gravelly, sandy, ORGANIC SILT; subrounded fine gravel; fine sand; trace roots; 20% shell fragments.	OL	None
			BH-SC-24-2to3.8	2.2	4.2	-7.86	-9.84	Wet, dense, 2.5Y 3/1 (very dark gray), silty well graded fine to medium SAND; trace gravels; 20% shell fragments; silty sand lenses at 3.5 and 3.8 feet both 0.1 feet wide consisting of 5Y 3/2 (dark olive gray) poorly graded fine silty sand; substantial yellow heartwood fibers at 3.6 feet; sand content decreases and gravel content increases with depth.	OL SM	None
			BH-SC-24-3.8to5.9 BH-SC-24-3.8to5.9-D	4.2	6.5	-9.84	-12.16	Wet, soft, 2.5Y 3/2 (very dark grayish brown), SILT with gravel; Increasing gravel content with depth; gravel increases in size with depth; trace shell fragments; one yellow heartwood fragment with reddish bark and worm holes.	MH GM	None
			BH-SC-24-5.9to7.7	6.5	8.5	-12.16	-14.15	Wet, loose, 5Y 3/2 (dark olive gray), well graded fine to coarse gravel; trace shell fragments.	GM	None
SC-26	SG-26	9/15/2021	BH-SC-26-0to2	0.0	2.4	-12.50	-14.94	Very wet, very loose, 2.5Y 3/1 (very dark gray), silty poorly graded medium SAND; two brown worms 1 inch long; 10% wood fragments; one non-weathered yellow wood fragment at 1.4 feet.	SM	None
			BH-SC-26-2to4	2.4	4.9	-14.94	-17.38	Wet, loose, 2.5Y 3/1 (very dark gray), silty SAND with gravel. Interval is "shelly", scattered 1 inch dray dark olive gray silt balls; trace brown bark;	SM SW-SM	None
			BH-SC-26-4to6	4.9	7.3	-17.38	-19.82	Wet, medium dense, 2.5Y 3/1 (very dark gray), well graded fine to medium SAND with silt; < 5% shell fragments; trace subangular gravel.	SW-SM SM	None
			BH-SC-26-6to7.9	7.3	9.6	-19.82	-22.13	Wet, medium dense, 2.5Y 3/1 (very dark gray) silty SAND with fine subrounded gravel; 10% shell fragments; scattered brown slightly weathered bark fragments and a twig below 7 feet.	SM	None
SC-27	SG-27	9/15/2021	BH-SC-27-0to1.7	0.0	2.2	-22.98	-25.14	Very wet, very soft, 2.5Y 3/1 (very dark gray), sandy ORGANIC SILT; trace brown bark-like pieces < 2 inches and twigs.	OL	None
			BH-SC-27-1.7to3.7	2.2	4.7	-25.14	-27.68	Wet, medium dense, 2.5Y 3/1 (very dark gray), well graded fine to coarse SAND with silt; 40% shell fragments < 2 inches; trace fine gravel; no wood observed. Wet, loose, 2.5Y 3/1 (very dark gray), well graded fine to coarse SAND with gravel; trace shell fragments < 1 inch.	SW SW-SM	None
			BH-SC-27-3.7to5.2	4.7	6.6	-27.68	-29.59	Wet, medium dense, 2.5Y 3/1 (very dark gray), well graded silty SAND; trace shell fragments; trace woody debris; one 2" branch.	SM	None
			BH-SC-27-5.2to6.7	6.6	8.5	-29.59	-31.50	As above.	SM	None

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	PID (ppm)	Odor	Other Contents	Slag	Wood Debris Assessment		
								%	% with water	visual description
SC-21	BH2-20	9/17/2021	BH-SC-21-0to1.5	13.6	Strong sulfur odor.	None	None	75	80	Uniform, compressible, heartwood fibers, 0.04 to 0.08 inches; sulfur odor; no sheen; layered brown bark pieces < 1 inch.
			BH-SC-21-1.5to3.7	0.3	Slight sulfur odor.	None	None	30	33	Layer of scattered wood fragments in silt matrix: tan, heartwood < 2 inches; black fibers < 0.04 inches; 2 twigs < 2 inches; trace rootlets; slight sulfur odor.
			BH-SC-21-3.7to5.8	0.2	None	None	None	10	20	black wood fibers < 0.04 inches; no odor; no sheen.
			BH-SC-21-5.8to8	0.2	None	None	None	5	5	Scattered twigs; black wood fibers < 0.04 inches; no odor; no sheen.
			BH-SC-21-8to10	0.2	None	None	None	5	5	Scattered twigs; black wood fibers < 0.04 inches; no odor; no sheen.
SC-24	BH2-18	9/14/2021	BH-SC-24-0to2	0	Strong sulfur odor.	None	None	24	40	Wood chips < 0.8 inches; heartwood pieces 2 to 3 inches; 1 piece of potential piling; sulfur odor; no sheen; black fibers < 0.04 inches.
			BH-SC-24-2to3.8	0.1	None	None	None	12	30	Very weathered brown heartwood < 2 inches; Very weathered brown fibers and fragments < 0.1 inches.
			BH-SC-24-3.8to5.9 BH-SC-24-3.8to5.9-D	0.1	None	None	None	18	40	Very weathered reddish-brown bark pieces up to 3 inches.
			BH-SC-24-5.9to7.7	0.3	None	None	None	0	0	No wood positively identified.
SC-26	SG-26	9/15/2021	BH-SC-26-0to2	0.1	None	2 brown worms	None	18	25	Weathered black fibers < 0.4 inches.
			BH-SC-26-2to4	0.1	None	None	None	7	15	Slightly weathered bark fragments and fibers < 0.8 inches.
			BH-SC-26-4to6	0.1	None	None	None	3	18	Fairly weathered, wood fragments <0.4 inches; fairly weathered fibers < 0.2 inches; no odor; no sheen.
			BH-SC-26-6to7.9	0	None	None	None	6	35	Fairly weathered, black, wood fragments and wood chips <0.4 inches; fairly weathered black fibers < 0.2 inches.
SC-27	SG-27	9/15/2021	BH-SC-27-0to1.7	0.1	None	None	None	14	20	Highly weathered pulp wood and fibers < 0.01 inches; bark pieces < 3 inches.
			BH-SC-27-1.7to3.7	0.1	None	None	None	5	5	Highly weathered, black, fibers, <0.04 inches.
			BH-SC-27-3.7to5.2	0.1	None	None	None	0	0	No wood positively identified.
			BH-SC-27-5.2to6.7	0.1	None	None	None	0	0	No wood positively identified.

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	Top Sample Depth *in situ* (ft bml)	Bottom Sample Depth *in situ* (ft bml)	Top Sample Elevation (ft MMLW)	Bottom Sample Elevation (ft MLLW)	Description of Composite Sediment Core Sample	Major Constituent (USCS)	Sheen
SC-29	BH2-27	9/16/2021	BH-SC-29-0to2	0.0	2.6	-25.90	-28.46	Wet, medium dense, 2.5Y 3/1 (very dark gray), silty poorly graded fine SAND; trace reddish-brown bark < 2 inches; shell fragments; sulfur odor.	SM	None
			BH-SC-29-2to4	2.6	5.1	-28.46	-31.01	Wet, medium dense, 2.5Y 3/1 (very dark ray), silty poorly graded fine SAND.	SM	None
			BH-SC-29-4to6	5.1	7.7	-31.01	-33.57	Wet, medium dense, 2.5Y 3/1 (very dark gray), silty poorly graded fine SAND; 30% shell fragments.	SM	None
			BH-SC-29-6to7.9	7.7	10.1	-33.57	-36.00	Wet, medium stiff, 2.5Y 3/1 (very dark gray), SILT with very fine poorly graded sand; silt is elastic and can roll a 2 inch long by 0.5 inch wide cylinder; 5% shell fragments.	MH	None
SC-32	BH2-29	9/16/2021	BH-SC-32-0to2	0.0	2.8	-28.10	-30.94	Very wet, loose, 2.5Y 3/1 (very dark gray), well graded fine to medium silty SAND; trace shell fragments with one intact 3 inch clam shell. Wet, very loose, 2.5Y 4/2 (dark grayish brown), well graded small to large rounded silty GRAVEL with medium sand; trace shell fragments. Wet, 2.5Y 3/1 (very dark gray), well graded fine to medium SAND with silt and fine subangular gravel; 10% shell fragments.	SM GM SW-SM	None
			BH-SC-32-2to4 BH-SC-32-2to4-D	2.8	5.7	-30.94	-33.77	Wet, 2.5Y 3/1 (very dark gray), well graded fine to medium SAND with silt and fine subangular gravel; 10% shell fragments with two whole intact closed clam shells 1 and 2 inches in diameter located between 2.8 and 3 feet.	SW-SM	None
			BH-SC-32-4to5.5	5.7	7.8	-33.77	-35.90	Wet, 2.5Y 3/1 (very dark gray), well graded fine to medium SAND with silt and fine subangular gravel trace shell fragments; two 0.2 foot wide 5Y 4/3 (olive) intervals at 4.4 and .05 feet.	SW-SM	None.
SC-34	BH2-32	9/17/2021	BH-SC-34-0to1.5	0.0	1.8	-19.06	-20.84	Very wet, very soft (soupy), 2.5Y 3/2 (very dark grayish brown), SILT; 40% wood fragments consisting of pulpy fibers and bark pieces < 2 inches; strong sulfur odor below 1 foot, sheen observed.	ML	Scattered small gray streaks; trace rainbow
			BH-SC-34-1.5to3.3 BH-SC-34-1.5to3.3-D	1.8	3.9	-20.84	-22.98	Wet, soft, 2.5Y 2.5/1 (black), SILT; one whole shell and one round 1 inch orange brick fragment at 2.5 feet; moderate shell fragments; 60% wood fragments; sheen observed.	ML	Scattered, rainbow blooms, 0.25 inches
			BH-SC-34-3.3to4.8	3.9	5.7	-22.98	-24.75	Wet, loose, 1Gley 6/5G (greenish gray), well graded silty COBBLES with fine sand and gravel; rounded cobbles up to 4 inches; shell fragments < 2 inches.	GW-GM	None
			BH-SC-34-4.8 to5.6	5.7	6.6	-24.75	-25.70	Wet, medium dense, 1Gley 6/5G (greenish gray), silty sandy GRAVEL; well graded fine to coarse sand;25% shell fragments < 0.5 inches; becomes siltier with depth.	GW-GM	None
SC-37	BH2-36/SG-37	9/13/2021	BH-SC-37-0to2	0.0	2.6	-40.18	-42.76	Wet, loose, 5Y 3/1 (very dark gray), silty well graded fine to medium SAND; sulfur odor; shell fragments and two intact shells from 1.5 to 2 feet.	SM	None
			BH-SC-37-2to4	2.6	5.2	-42.76	-45.34	Wet, soft, 5Y 3/1 (very dark gray), SILT; trace sand; trace clay; trace shell fragments. Moist, medium stiff , 5Y 3/1 (very dark gray), SILT; trace fine sand; low plasticity; moderate shells from 4.6 to 5.0 feet; non-distinct lenses of slightly higher sand content.	ML MH	None
			BH-SC-37-4to6	5.2	7.7	-45.34	-47.91	Moist, medium stiff , 5Y 3/1 (very dark gray), SILT; trace fine sand; low plasticity; 30% shells.	MH	None
			BH-SC-37-6to8	7.7	10.3	-47.91	-50.49	As above.	MH	None
SC-38	BH2-37	9/14/2021	BH-SC-38-0to1.8	0.0	2.0	-31.40	-33.38	Wet (saturated), very soft, 2.5Y 3/1 (very dark gray), ORGNIC SILT; scattered shell fragments; substantial wood fibers, reddish-brown bark up to 2.5 inches, milled wood; silvery metallic sheen on water at 1 foot.	OL	Trace metallic silvery sheen on standing water at 1 ft below top
			BH-SC-381.8to3.8	2.0	4.2	-33.38	-35.58	Wet (saturated), very soft, Gley 10Y 5/1 (greenish gray), ORGANIC SILT; substantial fine shell fragments and trace subrounded fine gravel.	OL GM	None
			BH-SC-38-3.8to5.8	4.2	6.4	-35.58	-37.79	Wet, medium dense, Gley 10Y 5/1 (greenish gray), silty fine subrounded GRAVEL; substantial fine shell fragments; trace fine sand.	GM	None
			BH-SC-38-5.8to7.9	6.4	8.7	-37.79	-40.10	Wet, medium dense, Gley 5GY 4/1 (dark greenish gray), silty fine subrounded GRAVEL; substantial fine shell fragments; trace fine sand.	GM	None

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	PID (ppm)	Odor	Other Contents	Slag	Wood Debris Assessment		
								%	% with water	visual description
SC-29	BH2-27	9/16/2021	BH-SC-29-0to2	0.1	Sulfur odor.	None	None	18.75	35	3 black bark fragments < 1.5 inches, red colored interior; wood fragments < 0.4 inches; sulfur odor; no sheen.
			BH-SC-29-2to4	0.2	None	None	None	0	< 5	Weathered black wood fibers < 0.04 inches; no odor; no sheen.
			BH-SC-29-4to6	0.3	None	None	None	1	5	1 twig; weathered fibers; brown wood fragments; no odor; no sheen.
			BH-SC-29-6to7.9	0.4	None	None	None	0	< 5	Very weathered black wood fibers < 0.04 inches.
SC-32	BH2-29	9/16/2021	BH-SC-32-0to2	0.2	None	None	None	< 5	5	One 2 inch twig; highly weathered fibers <0.04 inches.
			BH-SC-32-2to4 BH-SC-32-2to4-D	0.2	None	None	None	0	0	No wood positively identified.
			BH-SC-32-4to5.5	0.4	None	None	None	0	0	No wood positively identified.
SC-34	BH2-32	9/17/2021	BH-SC-34-0to1.5	0.7	Sulfur odor.	1 orange brick fragment	None	81	90	5 pieces of bark < 4 inches; brown, lightly weathered, fibers, < 0.8 inches; sulfur odor; visible sheen.
			BH-SC-34-1.5to3.3 BH-SC-34-1.5to3.3-D	0.2	None	None	None	19	40	Apparent lumbered wood < 3 inches; scattered heartwood < 1 inch; weathered decomposed fibers < 0.04 inch; 1 brick fragment; trace swirly sheen.
			BH-SC-34-3.3to4.8	5.2	None	None	None	0	0	Trace black fibers < 0.04 inches.
			BH-SC-34-4.8 to5.6		None	None	None	0	0	No wood positively identified.
SC-37	BH2-36/SG-37	9/13/2021	BH-SC-37-0to2	0	Sulfur odor.	None	None	< 5	20	Trace bark and heart wood fibers < 0.04 inches after the addition of water; no odor; no sheen.
			BH-SC-37-2to4	0	None	None	None	< 5	≤ 5	Fibers and fragments < 0.2 inches.
			BH-SC-37-4to6	0	None	None	None	≤ 3	≤ 5	Black and brown fibers and chips <0.2 inches.
			BH-SC-37-6to8	0	None	None	None	≤ 5	≤ 5	Black fibers and fragments < 0.2 inches.
SC-38	BH2-37	9/14/2021	BH-SC-38-0to1.8	0.3	None	1 Brown worm.	None	55	70	Weathered bark-like pieces and heart wood with apparent saw marks; no odor; no sheen.
			BH-SC-381.8to3.8	0.1	None	None	None	< 5	5	Black, highly weathered, wood fibers and scraps; no odor; no sheen.
			BH-SC-38-3.8to5.8	0.4	None	None	None	0	0	No wood positively identified.
			BH-SC-38-5.8to7.9	0.2	None	None	None	0	0	No wood positively identified.

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	Top Sample Depth *in situ* (ft bml)	Bottom Sample Depth *in situ* (ft bml)	Top Sample Elevation (ft MMLW)	Bottom Sample Elevation (ft MLLW)	Description of Composite Sediment Core Sample	Major Constituent (USCS)	Sheen
SC-40	BH2-38	9/13/2021	BH-SC-40-0to2	0.0	2.4	-41.83	-44.27	Wet, soft, 2.5Y 3/1 (very dark gray), sandy SILT; sand is well graded fine to medium grained and abundance of sand increases with depth.	ML	None
			BH-SC-40-2to4	2.4	4.9	-44.27	-46.72	Wet, stiff, 2.5Y 3/1 (very dark gray), clayey SILT; trace fine sand; scattered shell fragments; becomes moist with depth; pinecone at 5 feet; scattered shell fragments; twig at 7 feet.	MH	None
			BH-SC-40-4to6	4.9	7.3	-46.72	-49.16	Moist, dark gray, silty poorly graded medium SAND. Wet, stiff, 2.5Y 3/1 (very dark gray), clayey SILT; trace fine sand; scattered shell fragments.	SM MH	None
			BH-SC-40-6to8	7.3	9.8	-49.16	-51.61	Wet, stiff, 2.5Y 3/1 (very dark gray), clayey SILT; trace fine sand; scattered shell fragments; becomes moist with depth; pinecone at 5 feet; scattered shell fragments; twig at 7 feet; shell hash from 6.5 to 7.0 feet; twig at 7 feet scattered shells below 8.5 feet; one dead closed intact clam 2 inches in diameter at 8.7 feet.	MH	None
			BH-SC-40-8to9	9.8	11.0	-51.61	-52.83	As above.	MH	None
SC-49	SG-49	10/11/2022	BH-SC-49-0to0.7	0.0	1.0	0.0	-1.0	Wet, medium dense, greenish gray (Gley1 5/1 5GY), well graded fine to medium SAND (white and gray grains) with trace silt; trace white shell fragments; trace apparent red brick fragments (<0.5 inches) that crumble under finger pressure.	SW	None
			BH-SC-49-0.7to2.8 BH-SC-49-0.7to2.8-D	1.0	4.0	-1.0	-4.0	Wet, medium dense, dark gray (10YR 3/1) well graded fine to medium, SAND with trace silt. Wet, medium dense, grab greenish gray (Gley1 3/1 5GY), well graded fine to medium SAND with trace sil.	SW-SM SW	None
SC-50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SC-51	NA	10/10/2022	BH-SC-51-0to2	0.0	1.9	-24.3	-26.1	Very wet, very soft, dark reddish brown (2.5YR 2.5/3), sandy SILT with 30% wood (bark pieces up to 3 inches wide, trace yellow heartwood), trace shell fragments, 1 inch piece of apparent charcoal.	ML	Trace, solid, metallic 1 inch diameter sheen at 1 ft
			BH-SC-51-2to4	1.9	3.7	-26.1	-28.0	Very wet, very soft, dark red (2.5YR 2.5/4), SILT with trace sand and 30% wood (less bark than above and more heartwood, heartwood strands up to 6 inches long); no shells; slight sulfur-like odor.	ML	None
			BH-SC-51-4to5.2	3.7	4.8	-28.0	-29.1	As above.	ML	None
			BH-SC-51-5.2to7.2	4.8	6.7	-29.1	-30.9	Moist, medium dense, greenish gray (Gley1 6/5GY), well graded fine to medium SAND (grains are greenish-gray, black, and gray) with 10% silt and 20% well graded subrounded gravel (red and gray, < 2inches); 40% white shell fragments.	SW-SM	None
			BH-SC-51-7.2to9.4	6.7	8.7	-30.9	-33.0	Moist, medium dense, greenish gray (Gley1 6/10GY), well graded fine to medium SAND (grains are greenish-gray, black, and white) with 10% silt and 30% well graded subrounded gravel (gravel is red, gray, and black), <2 inches; 40% white shell fragments.	SW-SM	None
SC-52	NA	10/11/2022	BH-SC-52-0to1.8 BH-SC-52-0to1.8-D	0.0	2.8	-7.3	-10.1	Very wet, very loose, black (2.5YR 2.5/1) silty, well graded fine to coarse SAND; 10% rounded gravel up to 1 inch. Very wet, very loose, black, red, and gray, well graded, rounded to subrounded GRAVEL (< 2 inches) coated in black (2.5YR 2.5/1) silt and sand.	SM GM	None
			BH-SC-52-1.8to2.8	2.8	4.4	-10.1	-11.7	Very wet, very loose, black (2.5YR 2.5/1), well graded fine to coarse SAND with silt and gravel; one 4 inch rounded grey cobble.	SM	None
SC-53	SG-53	10/11/2022	BH-SC-53-0to1	0.0	0.9	-4.1	-5.0	Very wet, very soft, very dark gray (5YR 3/1), sandy SILT. Very wet, very loose, well graded fine to coarse, SAND with silt and gravel (gravel is red, gray, black, rounded to subrounded <2 inches); 40% sell fragments.	ML SW	None
			BH-SC-53-1to2.4 BH-SC-53-1to2.4-D	0.9	2.1	-5.0	-6.2	Very wet, very loose, reddish gray (5 YR 5/2), well graded fine to coarse, SAND with silt and gravel. 10% shell fragments by area; one intact black Douglas Fir Cone.	SW	None
			BH-SC-53-2.4to4.4	2.1	3.8	-6.2	-7.9	Very wet, very loose, gray, rounded to subrounded, poorly graded GRAVEL (1 to 2 inches); one white 4 inch intact clam shell; 20% shell fragments by area. GRAVEL is covered in greenish-gray (Gley1 6/1/5GY) silt and sand.	GW	None

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	PID (ppm)	Odor	Other Contents	Slag	Wood Debris Assessment		
								%	% with water	visual description
SC-40	BH2-38	9/13/2021	BH-SC-40-0to2	0	None	None	None	5	0	Weathered black and brown fibers < 0.2 inches.
			BH-SC-40-2to4	0	None	None	None	0	0	No wood positively identified.
			BH-SC-40-4to6	0	None	None	None	11	10	Brown bark and pinecone pieces < 0.8 inches ranging from intact to slightly weathered; no odor; no sheen.
			BH-SC-40-6to8	0	None	None	None	26	38	Brown to red, slightly weathered, bark pieces, < 1.2 inches.
			BH-SC-40-8to9	0	None	None	None	0	9	Slightly to moderately weathered pieces of bark and pulp fragments < 0.4 inches.
SC-49	SG-49	10/11/2022	BH-SC-49-0to0.7	0.0	None	0.5 inch brick fragments.	NA	23	35	One 1 inch apparent lumber fragment, wood fragments <0.2 inches become visible after adding water; strong sulfur-like odor.
			BH-SC-49-0.7to2.8 BH-SC-49-0.7to2.8-D	3.4	Strong sulfur-like odor	None	NA	20.0	39.0	Black and brown, weathered and partially decomposed, apparent lumber fragments up to 2 inches. Red when broken apart. Small wood fragments become visible after the addition of water. strong sulfur-like odor.
SC-50	NA	NA	NA	PID broken.	NA	NA	NA	NA	NA	NA
SC-51	NA	10/10/2022	BH-SC-51-0to2	1.8	Sulfur-like odor	One piece of apparent charcoal	None	NA	39	One weathered 2 inch wood scrap and sawdust.
			BH-SC-51-2to4	26.0	Slight sulfur-like odor	None	None	19	NA	Decomposed wood and wood fibers <1 inch.
			BH-SC-51-4to5.2	0.7	None	One big piece of charcoal.	None	47	NA	Weathered and decomposed wood scraps and fragments <2 inches.
			BH-SC-51-5.2to7.2	0.0	None	None	None	NA	6	Fairly weathered, brown, wood scraps and fragments <1 inch.
			BH-SC-51-7.2to9.4	0.0	None	Slag: 0.6 inch greenish in color.	None	NA	21	Weathered and decomposed wood fragments < 1 inch.
SC-52	NA	10/11/2022	BH-SC-52-0to1.8 BH-SC-52-0to1.8-D	0.0	Strong sulfur-like odor	None	NA	NA	<5	Brown and black wood fragments < 0.2 inches become visible after the addition of water. Black in color.
			BH-SC-52-1.8to2.8	0.2	Strong sulfur-like odor	None	NA	32	NA	Wood fragments <1 inch. One decomposed 2 inch bark fragment.
SC-53	SG-53	10/11/2022	BH-SC-53-0to1	0.0	None	One small centipod	NA	<5	<5	Small, brown, natural wood fragments (tree or plant debris).
			BH-SC-53-1to2.4 BH-SC-53-1to2.4-D	0.1	None	None	NA	<5	<5	Brown, natural wood fragments (tree or plant debris), <0.2 inches..
			BH-SC-53-2.4to4.4	0.0	None	None	NA	NA	<5	Tree or plant fragments black and brown in color and < 0.2 inches become visible after addition of water.

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	Top Sample Depth *in situ* (ft bml)	Bottom Sample Depth *in situ* (ft bml)	Top Sample Elevation (ft MMLW)	Bottom Sample Elevation (ft MLLW)	Description of Composite Sediment Core Sample	Major Constituent (USCS)	Sheen
SC-54	S-54	10/12/2022	BH-SC-54-0to1	0.0	1.1	-37.6	-38.7	Very wet, very soft, very dark gray (2.5Y 3/1), sandy SILT; two 0.5 inch red worms; trace white shell fragments.	ML	None
			BH-SC-54-1to2.8	1.1	3.2	-38.7	-40.8	Wet, loose, well graded, subrounded to rounded, tan and gray, GRAVEL up to 2 inches; gravel is coated with fines and sand that is greenish gray (Gley1 6/1/5GY); sand is well graded fine to coarse; trace white shell fragments; three 3 to 4 inch cobbles.	GW	None
			BH-SC-54-2.8to4	3.2	4.5	-40.8	-42.1	Wet, loose, well graded, subrounded to rounded, tan and gray, GRAVEL up to 2 inches with fine to coarse sand; gravel and sand coated with pale yellow (2.5Y 7/3) silts; sand is well graded; no shell fragments; three 3 to 4 inch cobbles.	GW	None
			BH-SC-54-4-6.6 BH-SC-54-4-6.6-D	4.5	7.5	-42.1	-45.1	Wet, loose, dark greenish gray (Gley1 3/1/5GY), well graded fine to coarse SAND with silt and gravel (tan and gray); 20% white shell fragments by area and two 2 inch intact clam shells.	SM	None
			BH-SC-54-6.6to8.8 BH-SC-54-6.6to8.8-D	7.5	10.0	-45.1	-47.6	Moist, medium dense, dark greenish gray (Gley1 3/1/5G), well graded fine to coarse SAND with 10% gravel (up to 0.5 inches) and silt; 10% shell fragments above 7.2 ft; one decomposed Douglas Fir cone at 7 ft. Moist, loose, poorly graded 0.5 inch, rounded, GRAVEL with silt and sand; sand is well graded fine to coarse; fines and sand are dark greenish gray (Gley1 3/1/5G), 10% white shell fragments by area.	SW-SM GW	None

Notes:
1. In situ depth calculated assuming unform recovery throughout the core. Recovery was not uniform at stations SC-04, SC-12, and SC-14 due to specific site conditions. High error may be associated with estimates of compaction factor and in situ depths.
2. Ex situ depths reported in the sample description section to indicate stratigraphic changes when any.
3. PID readings for sediment cores collected in 2021 were taken every 2 feet which not always corresponds to sampled intervals. For sediment cores collected in 2022, PID readings were collected from the center of the sample interval.

Acronyms:
CH = Inorganic Clays of High Plasticity, Fat Clays; GP = Poorly Graded Gravels, Gravel-Sand Mixtures, Little or no Fines; ID = Identification; ML= Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity; OL = Organic Silt and Organic Silty Clays of Low Plasticity; NA = Not Applicable or Not Available; N = No; SC = Clayey Sands, Sand-Clay Mixtures; SM = Silty Sand, Sand-Silty Mixtures; SP = Poorly Graded Sands, Gravelly Sands, Little or no Fines; SW = Well Graded Sands, Gravelly Sands, Little or no Fines; PID = PID=Photoionization Detector; ppm = part per million; USCS = Unified Soil Classification System; Y = Yes.

Table D-6b. Sediment Core Sample Visual Descriptions

Location ID	Co-located Grab	Core Processing Date	Sample ID Processed for Analysis	PID (ppm)	Odor	Other Contents	Slag	Wood Debris Assessment		
								%	% with water	visual description
SC-54	S-54	10/12/2022	BH-SC-54-0to1	0.1	None	Two, 0.5 inch red worms.	NA	13.0	15.0	Black and brown fragments <0.2 inches become visible after the addition of water. Weathered brown bark fragments < 1 inch.
			BH-SC-54-1to2.8	0.6	None	None	NA	NA	5.0	Brown and black wood fragments <0.2 inches become visible after the addition of water.
			BH-SC-54-2.8to4	0.5	None	None	NA	NA	5.2	Black fragments <0.2 inches (rootlets or tree fragments) become visible after the addition of water.
			BH-SC-54-4-6.6 BH-SC-54-4-6.6-D	0.7	None	None	NA	NA	<5	Black fragments <0.2 inches (rootlets or tree fragments) become visible after the addition of water.
			BH-SC-54-6.6to8.8 BH-SC-54-6.6to8.8-D	1.6	None	None	NA	NA	12.1	Black fragments <0.2 inches (rootlets or tree fragments). Few 3 cm long rootlets.

Notes:
1. In situ depth calculated assuming unform recovery throughout the core. Recovery was not uniform at stations SC-04, SC-12, and SC-14 due to specific site conditions. High error may be associated with estimates of compaction factor and in situ depths.
2. Ex situ depths reported in the sample description section to indicate stratigraphic changes when any.
3. PID readings for sediment cores collected in 2021 were taken every 2 feet which not always corresponds to sampled intervals. For sediment cores collected in 2022, PID readings were collected from the center of the sample interval.

Acronyms:
CH = Inorganic Clays of High Plasticity, Fat Clays; GP = Poorly Graded Gravels, Gravel-Sand Mixtures, Little or no Fines; ID = Identification; ML= Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity; OL = Organic Silt and Organic Silty Clays of Low Plasticity; NA = Not Applicable or Not Available; N = No; SC = Clayey Sands, Sand-Clay Mixtures; SM = Silty Sand, Sand-Silty Mixtures; SP = Poorly Graded Sands, Gravelly Sands, Little or no Fines; SW = Well Graded Sands, Gravelly Sands, Little or no Fines; PID = PID=Photoionization Detector; ppm = part per million; USCS = Unified Soil Classification System; Y = Yes.

Table D-7: Deviations from the Work Plan and Work Plan Addendum

Date	Sampling Event	Location(s) ID	Deviation from Work Plan	Reason
Physical Surveys				
--	SPI-PV Survey	128	Nine of the 10 proposed sampling locations were surveyed in the Mill Pond	Limited access due to soft mud and overlaying water
--	SPI-PV Survey	133 and 134	2 additional stations not included in the original scope were surveyed	Need of additional images to characterize the Mill Pond area
Phase 1 RI Sampling				
8/19/2021	Hand Augering	HA-01	Offset 14 ft	Heavy dense vegetation
8/20/2021	Hand Augering	HA-04	Offset 15 ft to the North	Heavy dense vegetation
8/23/2021	Hand Augering	HA-12	Offset 25 ft	Heavy dense vegetation
8/24/2021	Hand Augering	HA-08	Offset 5 ft	Heavy dense vegetation
8/24/2021	Hand Augering	HA-07	1 to 2 ft sample not collected	Refusal encountered over multiple attempts
--	Hand Augering	Applies to all	1 to 2 ft. samples analyzed instead of held pending 0-1 ft. results	--
8/26/2021	Sediment grabs	SG-03 and SG-04	Multiple sediment grabs collected	Poor recovery due to limited capacity of sample method (ponar used in intertidal area)
--	Pile Sampling	Applies to all	No deeper material archived.	Limited penetration of timber piles
9/3/2021	Pile Sampling	PS-05	A 4-point instead of 5-point comopsite was collected in this area	Sample could not be collected by divers due to access limitation
9/3/2021	Diver Transect	BH-T00	An additional transect parallel to the Northern Shoreline was completed by the divers	Collect additional information on the extent of wood derbis in the Inner and Outer Harbor areas
9/15/2021	Sediment Coring	SC-16	No sample collected after 3 attempts	Refusal at surface
9/16/2021	Sediment Coring	SC-12	Sample collected at alternative locations (more than 50ft radius) after discussion with Project Director	Limited access to proposed location
9/16/2021	Sediment Coring	SC-17	No sample collected after 1 attempt	Limited access to proposed location, safety concern at alternative locations, refusal at surface in attempt to collect live-boating
--	Sediment Coring	SC-04, SC-12, SC-14	Acceptability criteria were not fulfilled	Refusal was encountered before target drive depth and core recovery was below 75%
--	Sediment Coring	SC-05, SC-07, SC-24, SC-27, SC-32, SC-34, SC-38	Acceptability criteria were not fulfilled	Refusal was encountered before target drive depth
Phase 2 RI Sampling				
9/13/2022, 9/14/2022	Hand Augering	HA-33, HA-34, HA-36	Sample collected at one depth interval (0 to 1 ft bgs)	Refusal was encountered due to hard substrate and rootlets
10/7/2022	Soil Boring	SB-26	Fewer samples were collected	Poor recovery

Table D-7: Deviations from the Work Plan and Work Plan Addendum

Date	Sampling Event	Location(s) ID	Deviation from Work Plan	Reason
10/12/2022	Sediment Coring	SC-16, SC-50	No sample collected	Refusal at surface and limited access
10/05/2022, 10/10/2022, 10/11/2022	Sediment Coring	SC-17, SC-49, SC-51, SC-52, and SC-53	Core were accepted despite not meeting recovery acceptance criteria	Refusal was encountered due to hard substrate
10/13/2022	Sediment Grab	SG-55	Sampling locations was moved 93 ft from proposed locations	Three attempts to recovery at proposed stations were made but with low recoveries because of hard sediment substrate
Phase 3 RI Sampling				
12/14/2023	Hand Augering	HA-50b	Sample collected at alternative location 50 feet east of proposed coordinates	Refusal was encountered due to hard substrate and rootlets
12/14/2023	Hand Augering	HA-37, HA-46, HA-50b, HA-51	Deeper samples collected at depth intervals 2 to 2.9, 1 to 1.8, 1 to 1.6, and 1 to 1.6 feet below ground surface respectively	Refusal was encountered due to hard substrate and rootlets

Acronyms
ID = Identification; HA = Hand Auger; SC = Sediment Coring; SG = Sediment Grabs; ft = feet; -- = not applicable or not available

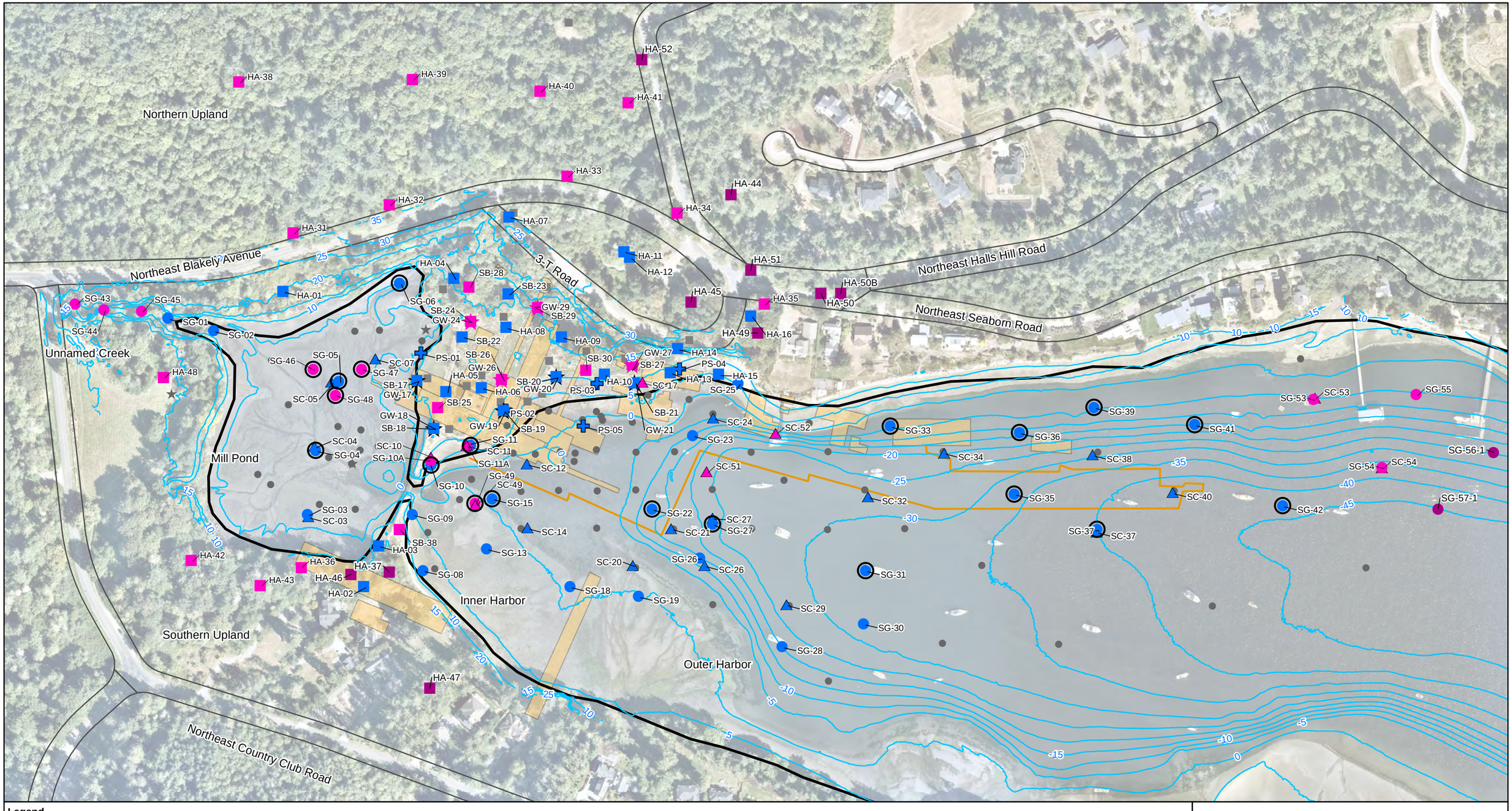
Table D-8. Summary of Field Quality Assurance Samples

RI Phase	Sampling Event	Sample ID	Date
Field Duplicates			
Phase 1	Hand Auger	HA-06-0-12"-DUP, HA-07-0-12"-DUP, HA-10-12-24"-DUP, and HA-12-0-12"-DUP	8/19/21, 8/23/21, and 8/24/21
Phase 1	Sediment Grab	SG-15-0to10-D, SG-22-0to10-D, and SG-37-0to10-D	8/24/21, 8/25/21, and 8/26/21
Phase 1	Groundwater	GW-21-210917	9/17/2021
Phase 1	Soil Boring	SB-17-0to2-DUP, SB-17-6to10-DUP, SB-19-2to6-DUP, and SB-22-6to10-DUP	9/14/21 and 9/15/21
Phase 1	Sediment Coring	SC-05-1.6to3.2-D, SC-24-3.8to5.9-D, SC-32-2to4-D, and SC-34-1.5to3.3-D	9/21/21, 9/14/21, and 9/16/21
Phase 2	Hand Auger	HA-31-1to2-D, HA-33-0to1-D, and HA-38-0to1-D	9/14/22 and 9/15/22
Phase 2	Soil Boring	BH-SB-25-4to6-D, BH-SB-28-8to10-D, BH-SB-30-8to10-D, BH-SB-38-2to4-D, BH-SB-38-8to10-D, BH-SB-38-10to12-D, and BH-SB-38-16to18-D	9/28/22, 9./29/22, 9/30/22, 10/03/22
Phase 2	Groundwater	BH-GW-29-221007-D	10/7/2022
Phase 2	Sediment Grab	SG-10-0to10-D	9/22/2022
Phase 2	Sediment Coring	BH-SC-49-0.7to2.8-D, BH-SC-52-1.8to2.8-D, BH-SC-53-1to2.4-D, BH-SC-54-4-6.6-D, and BH-SC-54-6.6to8.8-D	10/11/22 and 10/12/22
Phase 3	Hand Auger	BH-HA-44-0to1-D, BH-HA-51-0to1-D	12/13/2023 and 12/14/2023
Phase 3	Sediment Grab	BH-SG-57-0to10	12/14/2023
Equipment Blanks			
Phase 1	Hand Auger	BH-EB-HA-210824	8/24/2021
Phase 1	Sediment Grab	BH-EB-SG-210826	8/26/2022
Phase 1	Groundwater	BH-EB-GW-210916	9/16/2021
Phase 1	Soil Boring	BH-EB-SB-210916	9/16/2021
Phase 1	Sediment Coring	BH-EB-SC-210914	9/14/2021
Phase 1	Sediment Coring	BH-EB-SC2-210914	9/14/2021
Phase 2	Hand Auger	BH-EB-HA-220922	9/22/2022
Phase 2	Soil Boring	BH-EB-SB-221003	10/3/2022
Phase 2	Groundwater	BH-EB-GW-221007	10/7/2022
Phase 2	Sediment Grab	BH-EB-SG-221012	10/12/2022
Phase 2	Sediment Coring	BH-EB-SC-221012	10/12/2022
Phase 2	Sediment Coring	BH-EB-SC2-221012	10/12/2022
Phase 3	Hand Auger	BH-EB-HA-231213	12/13/2024
Phase 3	Sediment Grab	BH-EB-SG-231214	12/14/2023

Acronyms:

BH = Blakely Harbor; EB = Equiment Blank; GW = Groundwater; SC = Sediment Coring; SB = Soil Boring; SG = Sediment Grabs

FIGURES



Legend

2023 Sample Location
- Sediment Core
- Sediment Grab
- Soil
- Water

2022 Sample Location
- Sediment Core

- Sediment Grab
- Soil
- Water

2021 Sample Location
- Sediment Core
- Sediment Grab
- Soil

- Water
- Pile Scraping

Historical Sample Location
- Soil
- Sediment
- Water
- Bioassay Sample Location

- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.
4. Background soil sample locations are approximate and may be adjusted based on field conditions.

N

0 260 Feet

RI Sampling Locations

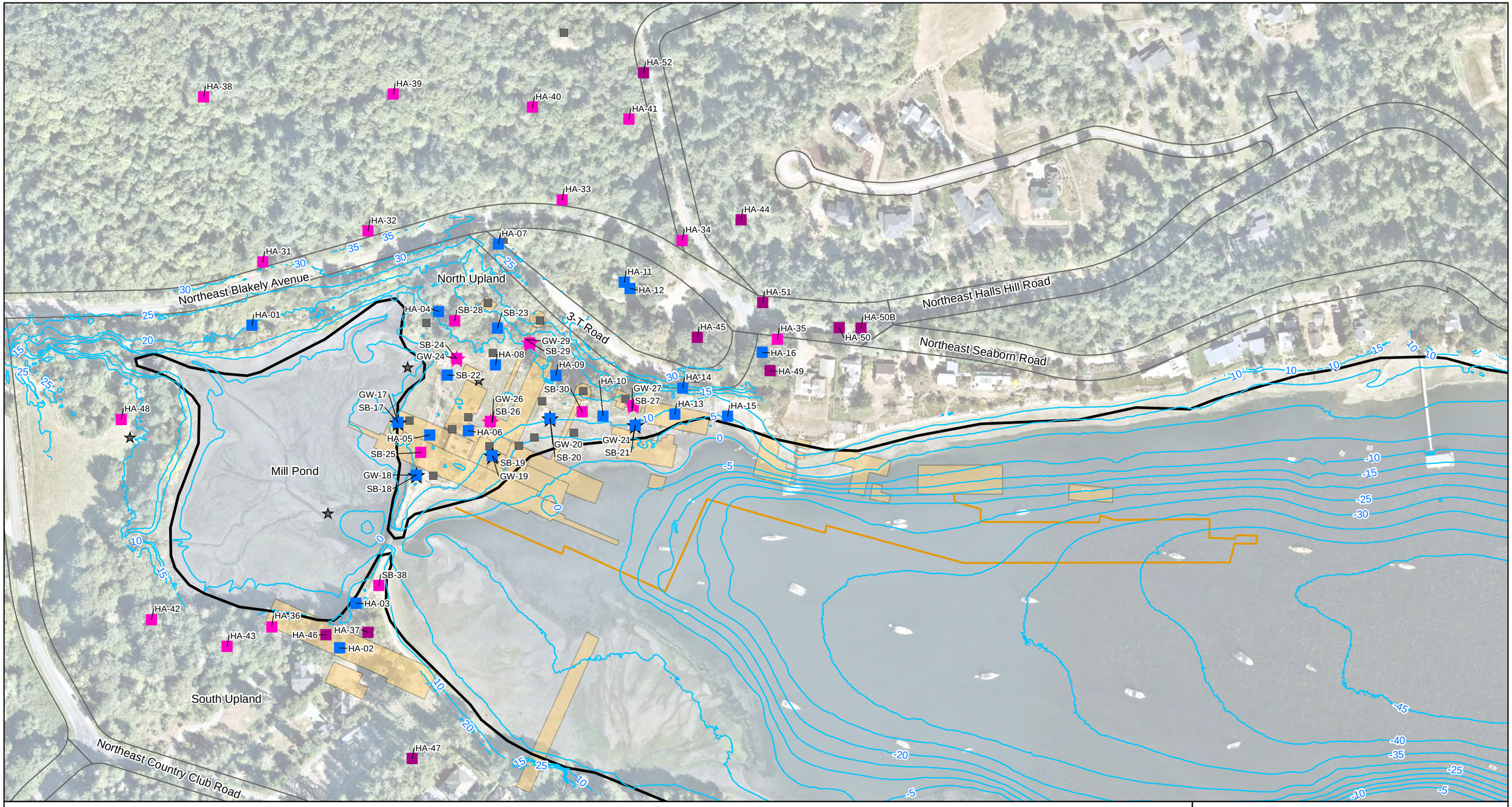
RI Report
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

MVI/Sea | April 2024

Figure D-1

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Figure J-1 2023 Sample Locations.mxd 4/23/2024 6:06:32 AM



Legend

2023 Sample Location
- Soil
- Water

2022 Sample Location
- Soil
- Water

2021 Sample Location
- Soil
- Water

Historical Sample Location
- Soil
- Water

- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 220 Feet

Upland Sampling Locations

RI Report
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

MVI/Sea | April 2024

Figure D-2

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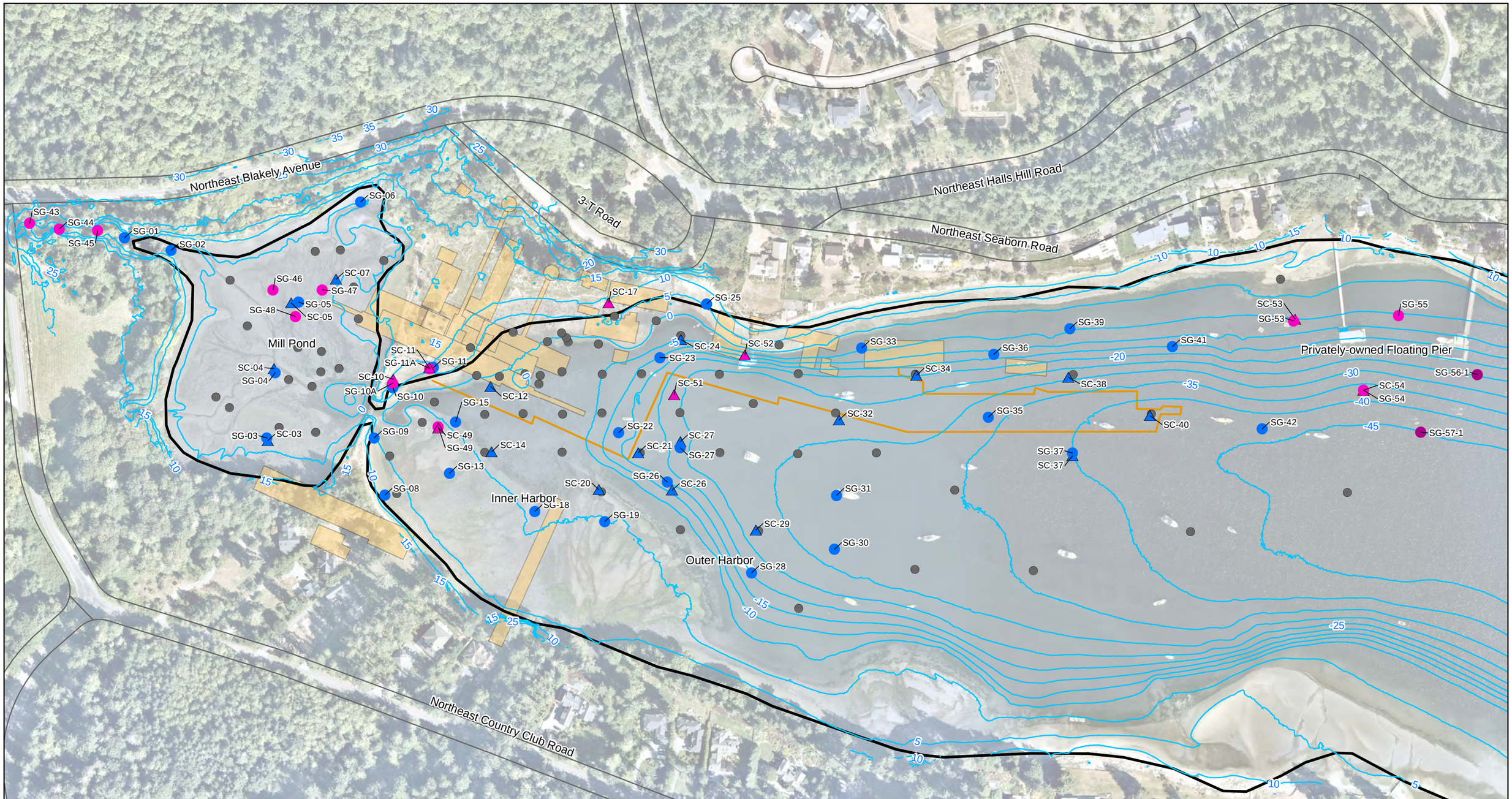


Legend

2023 Sample Location
- Sediment Core
- Sediment Grab

2022 Sample Location
- Sediment Core
- Sediment Grab

2021 Sample Location
- Sediment Core
- Sediment Grab

Historical Sample Location
- Sediment
- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 240 Feet

In-water Actual Sampling Location
RI Report
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

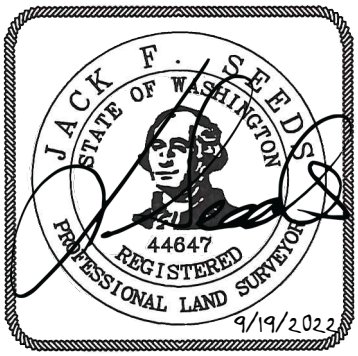
MVI/Sea | April 2024

Figure D-3

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Figure J-3 Inwater Sample Locations.mxd 4/23/2024 6:14:27 AM

ATTACHMENT D-1
Surveyor Records

SEPT. 12-13, 2022



Re: Monitoring Well Survey – PACE No. 22539

Client:	GEOSYNTEC
Project Name:	Geosyntec Bainbridge Island
Site Address:	Blakely Harbor Park
City, and State:	Bainbridge Island, WA

*Horizontal Datum:	NAD 83/2011 Washington SPC North (4601)
*Vertical Datum:	NAVD 88 Based on GPS measurements utilizing the virtual reference network and Geoid 2012A model.

Well Name	Northing	Easting	Elevation
SB-24	222378.8	1225312.5	10.2
SB-25	222155.4	1225227.3	10.8
SB-27	222253.0	1225730.2	9.8
SB-28	222469.2	1225308.2	13.2
SB-30	222252.0	1225612.2	9.0
SB-38	221837.8	1225126.5	10.4
SC-17	222221.0	1225759.6	5.5
SC-50	222211.8	1225498.9	5.4
SC/SH-10	222026.7	1225209.6	6.2
SC/SH-11	222056.2	1225302.1	4.2
SG-43	222424.5	1224283.0	8.2
SG-44	222409.7	1224358.3	7.4
SG-45	222405.9	1224456.2	6.1
HA-31	222608.8	1224850.0	28.4
HA-32	222683.2	1225100.9	43.9
HA-33	222756.6	1225564.3	44.7
HA-34	222655.0	1225867.8	54.7
HA-35	222425.0	1226076.7	31.1
HA-36	221741.2	1224871.2	15.8
HA-37	221720.1	1225108.8	15.3
HA-38	223001.5	1224709.2	173.0
HA-39	223009.2	1225160.6	154.1

PACE Engineers, Inc.
11255 Kirkland Way, Suite 300
Kirkland, Washington 98033-3417
p: 425.827.2014 | *f:* 425.827.5043

www.paceengrs.com

HA-40	222978.0	1225492.8	118.8
HA-41	222949.1	1225723.4	104.6
HA-42	221757.3	1224585.3	20.8
HA-43	221693.1	1224764.5	22.5
HA-48	222234.4	1224513.0	18.7
GW/SB-26	222228.1	1225392.3	8.8
GW/SB-28	222155.4	1225227.2	10.8
GW/SB-29	222417.4	1225486.7	13.8

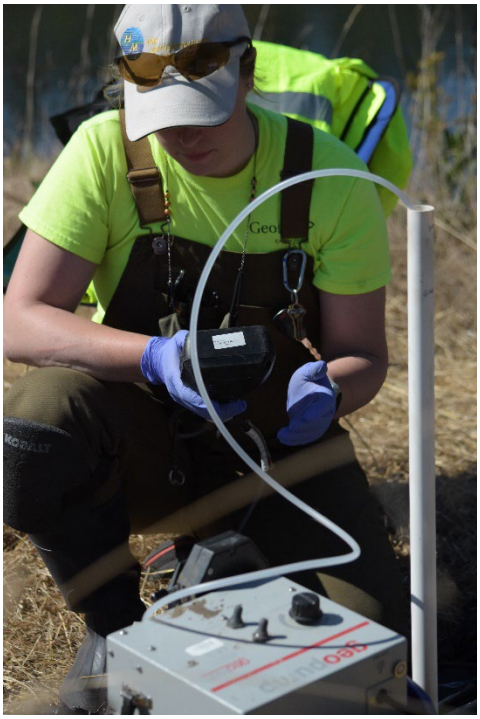
ATTACHMENT D-2
Sampling Methods Photograph Log

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Name: Blakely Harbor Park | **Project Number: PNG0900**

Purpose: Document Sampling Methods | **Site Location: Bainbridge Island, WA**

Title: Research Vessels supporting in water sampling **Date: 09/16/2021** **Location: Outer Harbor** **Comments:** **View of the vessels used to support in-water sampling: the barge for processing sediment cores and the sediment sampling vessel.**	
Title: Groundwater Sampling Equipment **Date: 09/16/2021** **Location: GW-18** **Comments:** **Groundwater sampling using a peristaltic pump and low-flow sampling method.**	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Equipment for Groundwater Analysis

Date: 09/16/2021

Location:

Comments:

Geosyntec staff, analyzing Groundwater sample using a refractometer



Title: Monitoring Well Installation Equipment

Date: 09/17/2021

Location: GW-20

Comments:

Staff maneuvering a Geoprobe 7822 drill rig during upland field activities. The drill rig was used to advance soil borings install temporary monitoring well and to collect.

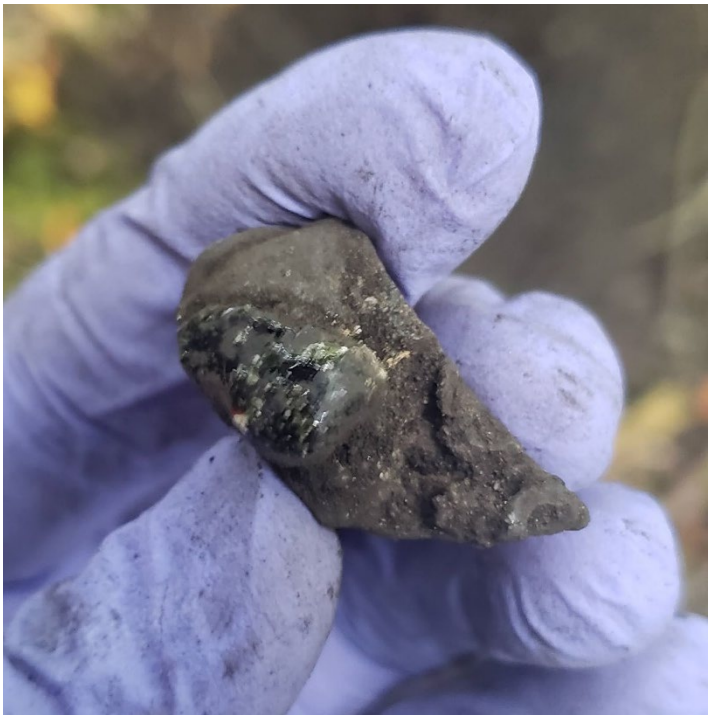


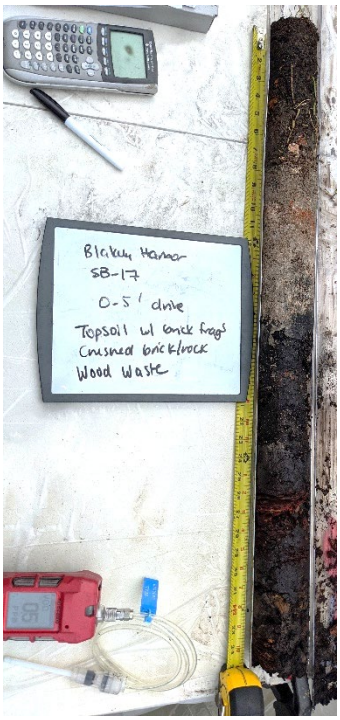
GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Surface Soil Sampling Location **Date: 08/19/2021** **Location: HA-06** **Comments:** **View of sampling location prior to collection of surface soil samples. The vegetation was removed before sampling.**	

Title: Surface Soil Sample **Date: 08/23/2021** **Location: HA-12** **Comments:** **Surface soil sample collected in a stainless-steel bowl. Provided indication of depths intervals of 0-6" and 6-12" (on the left).**	

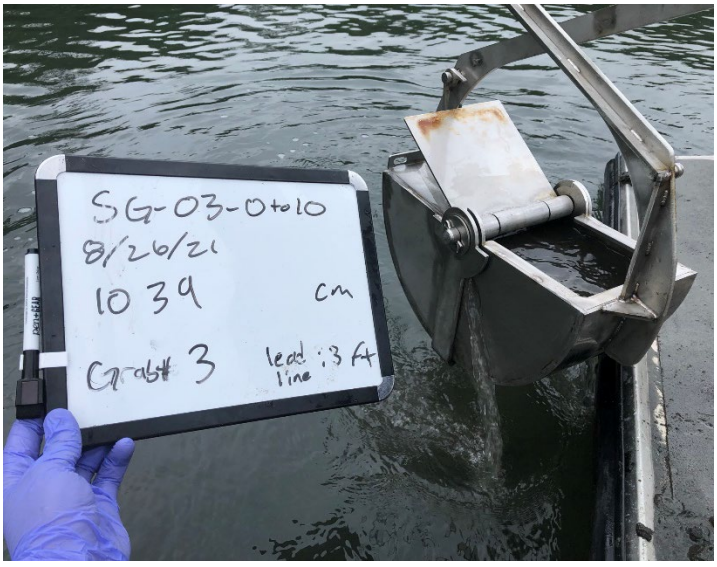
GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Sample of Slag **Date: 08/20/2021** **Location:** **Comments:** **A sample of slag collected during soil explorations. The sample is vitreous with glassy impurities.**	

Title: Soil boring **Date: 09/15/2021** **Location: SB-17** **Comments:** **Soil boring collected by using a drill rig. Different layers correspond to stratigraphy changing through the extent of the boring. Indication of sampling depth provided on the left.**	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Wood Debris **Date: 09/15/2021** **Location: SB-22** **Comments:** **Wood debris in soil borings between 32 and 36 inches below ground surface.**	

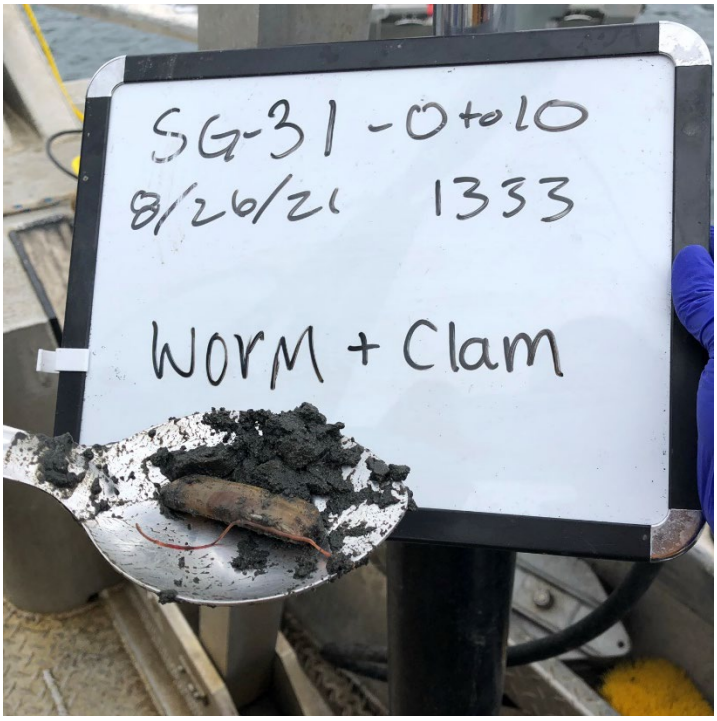
Title: Sediment Grab Sampling Equipment **Date: 08/26/2021** **Location: SG-03** **Comments:** **A stainless-steel power grab was used to collect surface sediment samples at locations. Information on the sampling event provided on the left.**	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Surface Sediment Grab	
Date: 08/26/2021	
Location: SG-37	
Comments: **Sediment grab samples after siphoning overlaying water. First attempt at this location showed a recovery of 17.5 cm and was accepted.**	

Title: Benthic Fauna in Surface Sediment	
Date: 08/26/2021	
Location: SG-31	
Comments: **A red worm and a clam found in a sediment grab.**	

GEOSYNTEC CONSULTANTS
Photographic Record

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Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Sediment Coring Equipment **Date: 09/16/2021** **Location: SC-32** **Comments:** **View looking East from the Outer Harbor during sediment sampling. Sediment cores were collected in a high density polyethylene (HDPE) lined PVC tube by using a vibracore.**	
Title: Sediment Coring Equipment **Date:** **Location: Mill Pond** **Comments:** **View looking East from the Mill Pond during sediment sampling. The vibracore was deployed from a small barge to collect sediment cores in the Mill Pond.**	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Collected Core **Date: 09/17/2021** **Location: SC-21** **Comments:** **View from the top of a sediment core sample. The sample was collected between 3.7 and 5.8 feet below sediment surface, and consists of silt, sand and shell fragments.**	
Title: Diver **Date: 08/31/2021** **Location: Inner Harbor** **Comments:** **A diver preparing for immersion in the Inner Harbor. Divers performed the probing surveys within the inner and outer harbors.**	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Artifacts Collected During Diver Transects **Date: 09/02/2021** **Location: Outer Harbor** **Comments:** **Artifacts including a pair of glasses, a glass, a jar, a boot, and a piece of glass were collected by divers during the diver transects.**	
Title: Wood Waste **Date: 09/16/2021** **Location: SC-14** **Comments:** **Field screening of subsurface sediment sample to evaluate percentage of wood debris. The visual assessment was based on a quadrant method.**	

ATTACHMENT D-3
Sediment Core Logs

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206-496-1471

Sediment Core Processing Log

Mill Pond - South Shore

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 10 ft
Avg. % ~~Compaction~~ recovery: 100%.
Wood waste characterization (Y/N):
drive depth = 10 ft

Core Location/Sample Number: BH-SC-03
Date/ Time: 9/21/21 1600 start Time, 1705 end Time
Sample Logged by: JL
Type/Diameter of Sample: 4" vibracore w/ liner (Gravity Marine)
Sample Quality: (good) fair poor disturbed
Notes: Siphoned overlaying water, Core liner extracted easily from barrel, no sheen observed

CRAHS, lead > Not BG

Recovered Length (ft)	% Compaction	~~USCS~~ Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No	Summary Sketch
1	uniform compaction across core 100%	SM	distinct	80	20	0.6	wet, loose, 5Y 4/2 olivegrey, Silty SAND well graded fine to medium, 40% wood/all bark up to 5" weathered brown, ~~No shells until~~ grades to 5% shells from 0' to 1' no odor		1	1610 BH-SC-03-0to1	wood
2		ML	subtle	MF 30 35	MF 70 65	MF	wet, medium stiff, 2.5Y 4/1 Dark Grey, Sandy SILT, trace shell fragments (<5%), Plastic silt, 1/4" worm no ~~odor~~ wood			1620 BH-SC-02-1to3	Start Hardened SED
3		ML		35	65	0.3	Same as above except shells ~~up to~~ MF 10%			1630	
4						MF				BH-SC-03-3to5	Interval NDS below 3 FT native
5		ML		20	80	0.5	wet, stiff, 2.5Y 4/1 Dark Grey, fine to med. sand w/ trace gravel ~~Sandy SILT~~ MF silt w/ sand, less plastic silt (only a 1/2" worm) no odor		*	1640	
6											

Note: Collect VOC/Sulfide samples before compositing intervals AF

BH-SC-03

Recovered Length (ft)	% Compaction	~~Color~~ USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
			Subtle				at 6.2' wet, hard, 2.5 y 6/6 olive yellow pocket of clay (apparent) 2" in diameter			BH-SC-03-5to7	
		ML		20	80		same as above but 5% shell fragments				
7			distinct			0.1					
		ML		10	90		wet, stiff, 2.5 y 4/1 dark grey, SILT, more plastic than above (1/8" worm), no odor			1050	
8		ML		20	80		wet, stiff 2.5y 4/1 dark grey, SILT w/ sand, well graded fine sand, 10% shells plastic			BH-SC-03-7to10	
9		ML		20	80	0.1	grades to <5% shells, same as above				
							refusal, same as above Sand + gravel (boat)				
10							end of core @ 10ft			shoe = gravel + sand (on boat)	
							No refusal, but slower penetration with depth. 1 attempt dense material				
11											

Note: Collect VOC/Sulfide samples before compositing intervals

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Mill Pond middle

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 4.2
Avg. % Compaction: ~~42%~~ MF 42%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-04
Date/ Time: 9/20/21 Start time: 1820 End time: 1910
Sample Logged by: JL
Type/Diameter of Sample: 4" vibracore w/ liner (Gravity Marine)
Sample Quality: good (fair) poor disturbed
Notes: approx. 1 ft overlying water. Siphoned water after solids settled, core liner removed easily
drive depth = 10 Ft

Attempt #1 (Duplicate)
Lexan tube

AF

Recovered Length (ft)	% Compaction	USCS Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
1	Uniform compaction across core 42%	SW – SM		~~SM~~ MF ~~85~~ 90	10 ~~15~~ MF	45.0	wet, loose, 2.5 Y 3/1 very dark grey, well graded SAND w/ silt, 10% wood fragments up to 4" long (appear as heartwood boards), fine to med sand	1.9		1850	Lexan tube (CAP) Wood 8.6 ft
							80% wood - WOOD layer, wood chunks, heartwood	2.4			
		SW		90	<5%		wet, loose, 2.5 Y 3/3 dark olive brown well graded sand very worn weathered brown wood, fine to med sand strong sulfuric odor 35% wood	3.1	1.3	BH-SC-04-0to1.3	
2		SM		70	30		wet, loose, 2.5 Y 3/2 very dark greyish brown silty SAND, twigs + heartwood fragments, tarnish brown, 5% wood fine to med sand strong sulfuric odor 5% shell frag. <1 inch 20% wood	4.8		1855	
		–	–	–	–			5.2			
3		SM		70	30	0.1	~~MF~~ Same as above except becomes more shelly w/ depth, becomes 15% shell frags @ ~~2.2 ft still 5%~~ MF fine to med sand strong sulfuric odor to 2.5 ft 20% wood	7.1	3	BH-SC-04-3to3	more shells many shells (5) many NDS
								8.3		BH-SC-04-3to3	
4		SM	<5	65	35		wet, loose, 5 Y 4/2 olive grey, silty SAND, 60% fine to med sand, shell fragments up to 2", 50% shells, are intact closed clams shell (not living), trace gravel, subrounded 1.5"	9.3			
		SM	<5	65	35		shoe 10% full, end wasn't capped, same as above approx 1' of liner was caught in shoe	10	4.2	1900	
5							end of core at 4.2 ft whole liner appeared to shift down in core barrel, fingers were inverted.				
							(no refusal but hard driving with depth in compacted sediments)				
6							Note: Collect VOC/Sulfide samples ~~before compositing~~ intervals				

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JL

Vibrated during extraction
(other attempts = refusal + wood + bark.)

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Sediment Core Processing Log

Mill Pond

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 5.2 ft
Avg. % ~~Compaction~~ recovery: 91.2%
Wood waste characterization (Y)N):

Core Location/Sample Number: BH-SC-05
Date/ Time: 9/21/21 START Time: 1130 end Time: 1215
Sample Logged by: JL
Type/Diameter of Sample: 4" vibracore w/ liner (Gravity Marine)
Sample Quality: (good) fair poor disturbed (Lower core limited)
Notes: Removed overlying water (≈1 ft), core + liner extracted easily from barrel, No sheen observed

Recovered Length (ft)	% Compaction	~~Color~~ USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
1	uniform compaction across core 91.2%	ML	<5	20	80	12.5	very wet, very ~~soft~~ firm, 2.5Y 3/2 very dark greyish brown, ~~SLF~~ MF wet SILT w/ sand, very trace very coarse angular gravel, 2% brown wood up to 2" long, weathered, Sulfide odor from 0.6' to 1.6' fine sand	1.1		BH-SC-05-0-1.6-9.21 @ 1150	
1.6								1.8	1.6		
2		ML		20	80		very wet, very ~~loose~~ soft, 2.5Y 3/2 very dark greyish brown SILT w/ sand, 50% wood, reddish brown up to 5", slightly weathered, mix of bark + heartwood, fine sand	2.2		BH-SC-05-1.6-2.3-9.21 @ 1155	
2.3								2.5			
3		SM	<5	60	40		wet, loose, 2.5Y 3/1 very dark grey silty SAND w/ trace gravel subangular, 15% wood, twigs, bark (1/2") fine to medium ~~coarse~~ sand well graded	3.3			
3.2						28.3		3.5	3.2		
3.6		SM	30	40	30		wet, loose, 2.5Y 3/1 very dark grey, grades to 30% gravel, silty SAND w/ gravel, fine to coarse sand, gravel is medium gravel subrounded, grey in color, 15% wood - brown bark, weathered up to 3" long, and heartwood brown on outside tan on inside 3" long appears as a branch	3.9		BH-SC-05-3.2-4.5-9.21 @ 1200	
4								4.4			
4.9		SM	30	40	30		grades to more gravel, trace shell frags (1/4") <5%	5.4			
5		GM	60	20	20	0.1	full shoe, wet, loose, 2.5Y 3/1 VDG, fine to med GRAVEL SILTY GRAVEL w/ sand	5.5			
								5.7	5.2		
6							end of core @ 5.2' hit refusal @ 6.2 FT, no free fall 3 attempts				

Note: ~~Collect VOC/Sulfide samples before compositing intervals.~~

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dioxins/PAHs, lead > Nat BG, mercury > SCO

lead, cPAHs > Nat BG, 1 over conc.

some NDs

native (gravel + shells)

shoe = ~~wood~~ gravel

AL

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Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 6.2 ft
Avg. % ~~Compaction~~ recovery: 95.4%
Wood waste characterization (Y/N):

Core Location/Sample Number: (Mill Pond North)
Date/ Time: BH-SC-07
Sample Logged by: 9/21/2021 Start 1745 JL End 1845
Type/Diameter of Sample: 4" vibracore w/ liner (Gravity Marine)
Sample Quality: good fair poor disturbed
Notes: Syphoned overlaying water, core liner extracted easily from barrel, no sheen observed

Attempt #3

AR

Recovered Length (ft)	% Compaction	~~Color~~ USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
1	uniform compaction across core 95.4%	WOOD		50	50	25.1	very wet, ~~mesic~~ soft, 2.5 Y 3/3 dark olive brown WOOD (w/ silt and sand) 90% wood, 10% silt and sand, Brown sawdust like material and bark up to 3" (base brown). Strong sulfuric odor; 3" red/brown worm w/ lots of legs	1.05		BH-SC-07-0-2.5 1810	90% wood, coarse wood, branches
2							~~wet, loose, 2.5 Y 3/1 very dark grey~~ F	2.1	2.5		
3		ML		20	80	8.7	wet, soft, 2.5Y 3/1 very dark grey 20% sand SILT w/ sand, fine to med. sand, trace tan 1" wood frags.	3.1		BH-SC-07-2.5-4.2 1820	30% fine wood
							grades to coarser sand, Sandy SILT, trace gravel	3.7			
4		ML		35	65			4.2	4.2		
		SM		60	40		wet, loose, 2.5 Y 3/1 VDG, Silty SAND w/ trace gravel, fine to coarse sand, fine subrounded gravel	5.2		BH-SC-07-4.2-6.2 1830	10% fine wood
5						0.4					
		SM	10	70	~~30~~ 20		Silty SAND w/ gravel, otherwise same as above	6.2	5.9		

5.9

Note: Collect VOC/Sulfide samples before compositing intervals

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BH-SC-07

Recovered Length (ft)	% Compaction	Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
	↓						full shoe, same as above	6.5	6.2		
							end of core at 6.2ft				Gravel in clay matrix
							hit refusal at 6.5 Ft drive depth				
							difficult driving throughout (lighter equipment)				
							3 attempts				

7

Note: Collect VOC/Sulfide samples before compositing intervals

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Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 1.7
Avg. % Compaction: 52.6%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-12
Date/ Time: 9/16/21 1745 start end 1830
Sample Logged by: JL
Type/Diameter of Sample: 4" vibracore w/ liner (Gravity Marine)
Sample Quality: (good) fair poor disturbed
Notes: removed liner from core easily by pulling, no sheen, slight sulfuric odor, Lexan tube lined w/ plastic, overlying water siphoned off drive depth = 3.5 Ft

Recovered Length (ft)	% Compaction	USCS Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
1	uniform across core 52.6%	OL/OH			100	3.6	very wet, very loose, 2.5Y 3/1 very dark grey, organic silt w/ sawdust (30%), wood is brown heartwood fibers (<1cm), a 1cm living clam observed, slight sulfuric odor	1.9 / 2.7	1.4	1800 BH-SC-12-0to1.4	
1.4							empty shoe				
1.7							end of core @ 1.7 ft hit refusal at 3.5 Ft (abundant sawdust + wood debris) 3 attempts (other attempts = rock, bricks refusal)				
2											
3											

Note: Collect VOC/Sulfide samples before compositing intervals

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Sediment Core Processing Log

South shore

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 2.9 ft
Avg. % ~~Compaction~~ recovery: 49.2%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-14
Date/ Time: 9/16/2021 1630 end 1745
Sample Logged by: Maddy Ferry
Type/Diameter of Sample: 4" Vibracore (Gravity Marine)
Sample Quality: (good) fair poor disturbed Attempt #3
Notes:

AF

Lexan core lined w/ plastic; dewatered w/ siphon tube (2.5ft)
easy removal from shoe ~~MF~~ core, pulled liner out of core (core drive = 5.9 FT)

Recovered Length (ft)	% Compaction	USCS ~~Color~~	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No	Summary Sketch
1	uniform across core 49.2%	SM	10	70	20	1.8	very wet, very loose, 2.5 Y 3/1 very dark grey, silty well graded fine to medium sand, 5% wood - brown outside tan inside slightly weathered (1.5"), some twigs, strong sulfuric odor, no sheen gravel is small (4.75mm - 19mm) 1mm x 1in brown worms and rootlets	2.0			No exceedences (PAHs > Nat BG)
1.3								2.6	1.3	BH-SC-14-0to2.6	
1.7		distinct						3.5		BH-SC-14-1.3to2.6	
2		SW-SM	30	~~60~~ MF 60	~~20~~ MF 10	0	wet, loose, 2.5 Y 3/1 VDG, well graded ~~SW~~ SM, silty, ~~MF~~ medium to coarse sand w/ gravel, trace wood (<5%) brown 1" long bark, 5% shells w/ one intact shell gravel is small (4.75mm - 19mm) ~~MF~~ color grades to 2.5 Y 4/2 dark grayish brown	4.1			No exceedences
2.6								5.3	2.6	BH-SC-14-2.6to5.3	
2.9							empty shoe	5.9			
3							end of core @ 2.9 ft				

3 attempts
hit refusal on dense/material compact
(clay-like ~~silt~~ material in shoe)
difficult extraction)

Note: Collect VOC/Sulfide samples before compositing intervals

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Sediment Core Drive Log

Job: Blakely Harbor Park Site
Job No: PNG0900
Field Reps: LS, MF, GP
Contractor: Gravity

Core Location: SC-16-A
Date: 09/14/2021 Time: 1345
Attempt #: 1 Accept/(Reject)
Sample Method: Vibracore

Proposed Coordinates	Actual Coordinates
N: 222048 E: 1225638	N: 222046.42 E: 1225632.14
Mudline: —	Mudline: -2.6 ft MLLW
Core Drive: 10'	Core Drive: ~~2 ft~~ 1.6 ft Core Recovery: 0.5 ft



Tide Measurements (Datum: MLLW NOAA; 9445913, Port Blakely)
Time/Height: 1345 / 9.8 ft

DTS Boat: DTS Lead Line: 12.4 ft

Time/Height:

Mudline Elevation: -2.6 ft MLLW

Description:
(free fall, fingers inverted, vibration needed to drive/extract, estimation of density, debris encountered, slopes, refusal, mudline conditions, drive action, etc.)

- No free fall at all
- Vibration at 60 Hz
- Hit refusal at about 12 ft, mostly water in the tube, picture taken and water discarded observed wood fragments (6 inches max lenght) in the recovered material

Total Drive: ~~1.4~~ 1.6 ft Length Recovered: ~~0.2~~ 0.5 ft

Measurement (to nearest 0.1 foot):

Core Tube Length: 10.1 ft

FF 0.0 ft
Vibe 1.3 ft
Fingers 0.3 ft

Avg. % Recovery: 31
Avg. % Compaction:

Section:	Length:	Description at Cuts:
A =		
B =		
C =		
D =		
E =		

Notes: HDOP: 0.9
Satellites: 9

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Sediment Core Drive Log

Job: Blakely Harbor Park Site
Job No: PNG0900
Field Reps: GP
Contractor: Gravity

Core Location: BH-SC-17
Date: 09/6/2024 Time: 1510
Attempt #: 01 Accept/Reject * disturbed core
Sample Method: Vibracore

Proposed Coordinates	Actual Coordinates
N: 222188 E: 1225774 gp	N: 222181 E: 1226852
Mudline: –	Mudline: 0.47'
Core Drive: 10 ft	Core Drive: * Core Recovery: 2 ft



Tide Measurements (Datum: Port Blakely NOAA MLLW)
Time/Height: 1510/10.17 ft

DTS Boat:
DTS Lead Line: 9.7
Time/Height:
Mudline Elevation: 0.47 MLLW

Description:
(free fall, fingers inverted, vibration needed to drive/extract, estimation of density, debris encountered, slopes, refusal, mudline conditions, drive action, etc.)

Live boat to location.
Vibration 60Hz
Collection stopped due to refusal hit.
Turbid water (mudline not visible) in the collected core.
Approximate mudline drawn after 20min.

Core Tube Length: 10.2 ft

Measurement (to nearest 0.1 foot):



Avg. % Recovery:
Avg. % Compaction:

Section:	Length:	Description at Cuts:
A =		
B =		
C =		
D =		
E =		

Total Drive: * Length Recovered: 2 ft

Notes: HDOP: 1.0 / # Satellites 10
Sediment particles settling below mudline

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* Core was collected live boating on not soft sediments. the coreTube was unstable and the surface sediment was disturbed

Pg 1 of 2

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Sediment Core Processing Log

South Shore

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Recovery ~~Sample~~ Length ~~(from log)~~: 9.3 ft
(A+) Avg. % Compaction: (recovery) 92%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-20
Date/ Time: 9/14/2021 Start: 1632 End: 1800
Sample Logged by: E. Dunbar / J. Laurance
Type/Diameter of Sample: 4" Vibracore
Sample Quality: (good) fair poor disturbed
Notes:

overlying water removed with siphon tube after solids; core liner pulled intact from core barrel

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
1	Uniformly Applied	SM		ED 40 / 60	40	0.0	Wet, loose, 2.5 Y3/2 very dark gray-ish brown silty sand Trace wood fragments (up to 1 cm, appear to be brown) Trace shell fragments Medium sand (M-F sand)	1.63	BH-SC-20-0to1.5	1725	
2						0.9			BH-SC-20-1.5to3	1730	
3	2.4							3.26		3	
4		SM		60	40	0.0	Wet, loose, 2.5Y3/2 very dark gray-ish brown silty sand Trace gravel pocket dark olive brown silty approximately 2" diameter at 3 3' 30% shell fragment up to 2" long		BH-SC-20-3to5	1735	
5								5.13	BH-SC-20-5to7	5	
6		SM		60	40		Wet, loose 2.5Y3/2			1740	

SL exceedance

No exceedance (PAHs > Nat Bg)

Trace Shells

(PAHs > Nat Bg)

big Shells 30%

mostly ND (native) (sand + shells)

More and bigger shells

Note: Collect VOC/Sulfide samples before compositing intervals

JL 9/15

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Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 9.3 ft
Avg. % Compaction: 92%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-20
Date/ Time: 9/14/2021
Sample Logged by: E. Dunbar / J. Laurance
Type/Diameter of Sample: 4" Vibracore
Sample Quality: (good) fair poor disturbed
Notes:
See pg. 1

Recovered Length (ft)	% Compaction	USCS ~~color~~	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
7						0.0	very dark gray-ish brown silty sand, Trace gravel, Trace branches, shell fragments (45%)	7.60	BH-SC-20-5to7	7	
8		SM		85	15	0.1	Wet, medium dense, 5Y 3/1 very dark gray medium sand with 15% silt, Trace gravel and Trace shell fragments	9.78	1745 BH-SC-20-7to9	9	mostly Trace shells
9							no recovery	9		X	empty catcher
10							end of core 9.3 ft 5Y 3/1 very dark gray medium sand with 15% silt, Trace gravel and Trace shell fragments				

Note: Collect ~~VOC/Sulfide samples before compositing intervals~~

JL 9/15

inner harbor
edge of pier structure

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520 Pike Street, Suite 2600
Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site

Job Number: PNG0900

No. of Sections: 1

Sample Length (from log): 10 ft

Avg. % ~~Compaction~~ Recov: 100%

Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-21 Attempt #1

Date/ Time: 9/17/21 Start 1010 End 1230

Sample Logged by: JL, ACF (AF also onsite)

Type/Diameter of Sample: 4" vibracore (Gravity Marine) w/ liner

Sample Quality: good (fair) poor disturbed

Notes: very hard to remove liner from core, drilled holes through core, did not siphon water off top, Drive 10 Ft

AF — no free fall

Recovered Length (ft)	% Compaction	Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
	Uniform compaction across core 0-100%	~~All~~ WOOD		15	30		wet, 2.5 Y 3/1 very dark grey, loose, sandy ~~WOOD~~, ~~substantial~~ very fine wood fragments w/ scattered shells (soupy) (1mm shells). Surface was caught in a bowl Strong H_2S odor, homogenous, fine sand increases density @ 1 ft, trace clay, 40% wood WOOD is major constituent.			BH-SC-21-0-1.5 1100	
				55% wood			3" wood fragments at 1.5 ft, wood increases in size w/ depth, woody layer of lumbered ~~lum~~ wood @ 3.3 ft, 4" piece of lumbered wood @ 2.5 ft wet (soft) increased density w/ depth, 2.5 Y 3/2 very dark grey/ish brown strong sulfide odor, 40% wood Sandy SILT, wet,	1.5	1.5	BH-SC-21-1.5-3.7 1110	
		ML		30	70						
				40% wood							
		SM		80	20		well graded fine to med sand w/ wood frags 5 Y 3/1 very dark grey, wet, (loose)	3.7	3.7	BH-SC-21-3.7-5.8 1120	
		ML					40% shells, wet medium dense frag. interbedded silt, sand, shell layers each about 4" w/ 1" MF frag up to 1/2 shell				
							4.8' to 5.1 ~~sandy silt~~ silty sand				
							5.1 to 5.8 sandy silt		5.1		
		SM									
		ML					5.8' to 6' is 80% shell fragments grading to 5Y 4/3 olive	5.8	5.8		

Note: Collect VOC/Sulfide samples ~~before compositing intervals~~

JL 9/17

f:/fieldforms/coreprocess

Appears to be yellow-brown but closest Munsell is olive

Page 1 of 2

BH-SC-21

Recovered Length (ft)	% Compaction	USCS Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
6			50				~~grades to~~ ~~gravelly coarse Sand w/ silt~~ MF 20% shell frag twigs (brown) scattered 5% ~~gravelly silty coarse sand~~, wet JL 9/17				
		GM	~~10~~	~~60~~	20						
			~~20~~	30			~~fine gravelly~~ and Silt GRAVEL with Sand subrounded, small <1" & sandy layer w/ depth dashed liner				
7		SW	~~60~~ fine			0.2				BH-SC-12-25-17	
		GM	55	~~25~~ MF 20	25		silty sandy gravel w/ no shell frags. subrounded angular 2" - med to coarse sand w/ clay, some plasticity, well graded, scattered twigs + rootlets, wet, medium dense, wet				
8			distinct					8	8		
		GM SM	~~40~~ MF 35	50	15	0.2	moist, dense, 2.5 Y 3/1 very dark grey ~~gradational gravel to sand~~ sandy gravel grading to a gravelly sand From 9 to JL 9/17 9.7				
9			gradational								
		SM	20		15		moist (less water) gravelly SAND well graded F-M sand, w/ fine gravel subrounded <1"	9.7	JL 9.7	BH-SC-12-25-17 2.5ft macro	
	↓	SM	40		15		subrounded gravel + sand layers, interbedded w/ silty clay (catcher was full)	10	10		
10											

end of core @ 10.0 ft

drive 10.0 Ft no refusal

uniform driving with depth. AF

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~ JL 9/17

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BH-SC-21

inner harbor north

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Recovery — ~~Sample~~ Length (~~from log~~): 7.7
Avg. % Compaction: recovery 91%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-24
Date/ Time: 9/14/2021 Start: 1330 End: 1540
Sample Logged by: E. Dunbar / J. Laurance
Type/Diameter of Sample: 4" Vibracore by Gravity Marine
Sample Quality: (good) fair poor disturbed
Notes:

AE drive length=8.5' 2nd Attempt processed.
overlying water removed with siphon tube after solids settled;
core liner pulled intact from core barrel

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
		no freefall					Strong rotten egg smell at surface		1455		
1	uniformly applied	OL		10	90	0.0	V. wet, v. soft, v. dk gray (10YR 3/1), organic SILT, w/fine sand (trace); wood frags (heartwood, tumulled by worms; piling frag?; 10 cm) trace bark frags; trace 1-in, gravel, sub ang;	1.1			
		1.7	gradational	Color Change			@ 0.4 soft, one board wood frag, + pulp chip yellow birch, 0.3 ft width; trace twigs.	2.2	2.0		
2		OL	20	30	50		30% fine shell frags.		1500		
	91%	2.7	defined			0.1	@ 1.7 v dk. grayish brown (2.5Y 3/2), gravelly sandy Organic silt; 20% shell frag wet, Soft, subrnd fine grav.	3.0			
3		SM	10	70	20		trace roots, F. sand.	3.3	BH-SC-24-2.1-3.6		
		3.8	defined				@2.7 wet, dense, v dk gray (2.5Y 3/1), silty sand (F-m) trace gravels rnd, 2-in	4.2	3.8		
4			20		80	80 ED	@3.5 sands lens ~0.1 ft wide, no shell, silty, v fine,	4.4	1505		
		MH					@3.8 sand lens 60S, 40F 5Y 3/2 dk olive gray wood fibers				
		5.9	40 distinct		60	600	@3.6 substantial yellow heart wood; little discrep up to 0.3 ft 20% shell frag	5.5	BH-SC-24-3.6-5.9		
5			20 ED				@3.9 wet, soft, v. dk gray brown 2.5Y 3/2, silt increasing gravel w/depth & increase in size wood frag, yellow heart	6.5	5.9		
		GM	80		20	0.1		6.6			
6											

Note: ~~Collect VOC/Sulfide samples before compositing intervals.~~

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Reddish bark
Slightly weathered, some worm holes
trace shell frags

SL extended

cPAHs > Nat BG
mercury > SCO
(wood frags)

cPAHs
lead > Nat BG
mercury > SCO
(interbedded sand, OL)

cPAHs > Nat BG
mercury > CSL
(wood frags + gravel)

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log):
Avg. % Compaction:
Wood waste characterization (Y/N): N

Core Location/Sample Number: BH-SC-24
Date/ Time: 9/14/2021 1330
Sample Logged by: J. Laurance; E. Dunbar
Type/Diameter of Sample: 4" Vibracore
Sample Quality: (good) fair poor disturbed
Notes:

(cont'd)

Recovered Length (ft)	% Compaction	Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
7	9% ↓ 7.7	GM	80		20	0.3	C6.9 wet, loose, dk. olive gray, (5Y 3/2) fine to coarse gravel up to 4cm; trace shell frag;	7.7		1510 BH-SC-24-5.9to7.7	(native) No SL exceedance (gravel + shells) 3/4 full
8	~~8.3~~ EOR							8.5	7.7		gravel in fingers
9							end of core (assume refusal at 8.5 ft in gravel)				

~~Note: Collect VOC/Sulfide samples before compositing intervals~~

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Seattle, WA 98101
206-496-1471

South shore

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log):
~~Avg. % Compaction:~~ Percent Recovery 82%
Wood waste characterization (Y/N): Y

Core Location/Sample Number: BH-SC-26
Date/ Time: 9/15/21 start 1205 end 1405
Sample Logged by: E. Dunbar
Type/Diameter of Sample: 4in Vibracore obtained by Gravity Marine
Sample Quality: (good) fair poor disturbed
Notes:

1 ft overlying water, used syphon tube to dewater after settling solids
Using Lexan tube with liner, core liner easily extracted from barrel

Recovered Length (ft)	% Compaction	~~USCS~~	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
	Uniformly Applied	SM		70	30	0.1	very wet, very loose, 2.5Y 3/1 very dark Gray, silty sand, medium size sand Two brown worms approx 1 inch long in sample bowl during homogenization			BH-SC-26-0to2	
			subtle increase in shell content						1.83		
		SM	10	60	30	0.1	wet, loose, 2.5Y 3/1 VDG, silty sand w/ fine, subang gravel, ~~less than 5%~~ 10% MF shell fragments; [trace wood frag (wood chip, non-weathered, yellow) @ 1.4] "Shelly"		2.44	BH-SC-26-2to4	Shelly
			Defined increase in shell				1" size hard dry dark olive gray silt balls and trace bark (~~<5~~ JL bark is less than 1% and brown.		4.63		
		SW-SM	90	10	0.1		wet, ~~loose~~ MD, 2.5Y 3/1 VDG, ~~poorly~~ well graded sand w/ silt, medium-fine size sand, less than 5% shell fragments; trace subang f. gravel <1%		4.98	BH-SC-26-4to6	Tacky
			Defined decrease in shell content						5.97		
		SM	10	60	30		wet, ~~loose~~ MD, 2.5Y 3/1 VDG, silty sand w/ gravel, ~~less than 5%~~ 10% MF shell fragments f. gravel subrnd				Shelly

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~ JC 9/15

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BH-SC-26

Recovered Length (ft)	% Compaction	Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
6											
7	7.9					0.0	trace scattered bark and a twig from 7-8 ft; bark color: brown slightly weathered		9.63	BH-SC-26-(7-8)-FF-9.63	
8							No Recovery end of core @ 8.2 ft				
9							Shoe was empty				

Note: Collect VOC/Sulfide samples before compositing intervals

JL 9/15

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Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 7.2 FT
Avg. % ~~Compaction~~ Recovery: 78, 7%
Wood waste characterization (Y/N): Y

Core Location/Sample Number: SC-27
Date/ Time: 9/15/21 / 1635
Sample Logged by: Jon Laurance
Type/Diameter of Sample: 4" lexan tube with core liner vibracore
Sample Quality: good (fair) poor disturbed
Notes: <10 ft drive 80.9% Recovery (S) measured on boat
drive = 8.9 FT
1 ft of overlying water, used syphon to drawdown after settling solids
Easily extracted from (JL 9/15) liner from base.

Recovered Length (ft)	% Compaction	USCS Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
1		OL		20	80	0.1	very wet, very soft, 2.5y 3-1 very dark grey Sandy organic silt with sand trace woody debris, bark like, brown, up to 2" twigs			BH-SC-0 to 1.7	
SW 1.7	SW	SW		distinct			wet, medium dense, 2.5y 3-1, very dark grey well graded sand (fine to coarse) with silt. 40% shell fragments up to 2" trace small gravel, no wood observed (rnd)	2.2	1.7		
2		SW		95	5	0.1					
2.8				Subtle							
3		SW-SM	20	80/75	5		wet, loose, 2.5y 3-1, very dark grey well graded sand (fine to coarse) with gravel trace shell fragments up to 1" (<5% shells)				
3.7				distinct				4.7	3.7	BH-SC-1.7 to 3.7	
4		JL 9/15 ~~SM~~ SM	10	70	20	0.1	wet medium dense, 2.5y 3 1, very dark grey well graded (JL 9/15) ~~silty~~ Silty Sand trace shell fragments (<5% shells) trace woody debris (one 2-in, 1/2-in wide branch)				
5								6.6	5.2	BH-SC-3.7 to 5.2	
6						0.1					

Read 2 Nat BG
CPAHs > Nat BG
Shells
Fining ups
No SL discrepancies

Note: Collect VOC/Sulfide samples before compositing intervals

JL 9/15

SC-27

2 of 2

Recovered Length (ft)	% Compaction	Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
6.6							~~Increased shell at bottom 15%~~ Shell content increases to 15% at 6 to ~~6~~7 ft JL 9/5				
6.7								8.5	8.5 JL 9/15	BH-SC-27-5.2+6.7	
7							Empty shoe	8.9	8.9 JL 9/15		empty shoe
							End of core 7 Ft below mudline				
							hit refusal @ 8.9 Ft				
							6.7 feet				

~~Note: Collect VOC/Sulfide samples before compositing intervals~~

JL 9/15

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Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 7.9ft
Avg. % Compaction: 18.2%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-29
Date/ Time: 9/16/2021 10ft ED 1015 end 1215
Sample Logged by: J. Laurance
Type/Diameter of Sample: 4" vibracore by Gravity
Sample Quality: (good) fair poor disturbed
Notes: dewatered with siphon tube. Overlying water dewatered with siphon tube, after sediment settled. Core extracted easily by pulling core barrel.

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
	18.2% compaction applied uniformly across core	SM	subtle	80	20		wet, loose, 2.5Y 3/1 very dark grey, silty sand, ~~well graded~~ MF fine to medium gr sand, trace wood debris - ~~& twigs~~ a twig (4"), piece of brown bark (2") ~~& poorly graded~~	0.5		1115	Shells
		SM		70	30	0.1	wet, medium dense, 2.5Y 3/1 VDG, silty ~~well~~ Poorly GRADED graded fine sand, trace bark - reddish brown up to ~~2.5~~ MF 2", 15% shell fragments - white anoxic odor - sulfuric	1.3			
				distinct				2.6	2	BH-SC-29-0to2	
		SM		70	30	0.2	wet, medium dense, 2.5Y 3/1 VDG, silty ~~well~~ MF graded fine sand, ~~trace reddish brown bark (only one 2" piece), 5% shell fragments~~ no wood observed	3.8		1125	less shells
								5.1	4	BH-SC-29-2to4	
				distinct				5.8		1135	
		SM		70	30	0.3	wet, medium dense, 2.5Y 3/1 VDG, silty ~~well~~ MF graded fine sand, 30% shell fragments a single piece of reddish brown wood (2")	6.4			Shells
				distinct				7.7	6	BH-SC-29-4to6	

Note: Collect VOC/Sulfide samples before compositing intervals

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initial PID reading across the core reported 0.0

BH-SC-29

Recovered Length (ft)	% Compaction	USCS ~~Color~~	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
							@ ~~M. stiff~~				
		MH		15	85	0.4	wet, ~~dense~~, 2.5 Y 3/1 VDG, silt w/ sand, very fine sand, ~~well~~ poorly graded, elastic silt - can roll a 2" long worm w/ 1/2" diameter, less than 5% shell fragments	9.0		1145 BH-SC-29-6to7.9	~~grass~~ shells
								9.7			
7.6							Shoe inverted but full of material same as above	10.1	7.9		
7.9 8							end of core @ 7.9 ft				
							note: no sheen observed in core				
9											
10											

~~Note: Collect VOC/Sulfide samples before compositing intervals~~

empty ziploc bag up to 0.4 ppm

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Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

edge of inner harbor
edge of wharf

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 5.5
Avg. % Compaction: 91.7%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-32
Date/ Time: 9/16/21 Start 1305 End 1450
Sample Logged by: JL
Type/Diameter of Sample: 4" vibracore and liner - gravity marine
Sample Quality: (good) fair poor disturbed
Notes: no wood observed

overlying water, dewatered } no odor, no sheen throughout
using siphon tube after solids had settled, core liner extracted easily by pulling from core barrel

Recovered Length (ft)	% Compaction	Color / USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No	Summary Sketch
0.5	↑ uniformly applied	SM distinct		80	20	—	very wet, loose, 2.5Y 3/1 very dark grey, well graded fine to medium silty sand, trace shell fragments, one 3" intact clam shell ↑ <5%	0.55		BH-SC-32-0to2 1345	color change
1		~~GW~~ MF GM	~~85~~ HF 60	~~5~~ MF 20	~~10~~ MF 20	0.2	wet, very loose, 2.5Y 4/2 dark grayish brown well graded ~~gravel w/ silt~~ * trace sand - medium ↑ small to large, rounded * silty gravel w/ sand less than 5% shell fragments	1.1			
1.5		distinct						1.6			
2		SW -SM	20	60	20	—	wet, ~~medium dense~~ MF, 2.5Y 3/1 very dark grey, well graded fine to medium sand w/ silt and gravel*, trace 10% shell fragments, 2 (1" and 2") whole intact closed clams * fine gravel, subangular	2.2	2	BH-SC-32-2to4 1355	sandy
3						0.2	btwn 2.8 and 3 ft	3.3			
4		- - - -	- - - -	subtle		—	- - - - - - - - - - - - - - - - - - - -	4.4	4		
5		SW -SM	20	60	20	0.4	wet, 2.5Y 3/1 very dark grey, well graded fine to medium sand w/ silt and fine subangular gravel, trace shell fragments, ~~very trace shell fragments~~ MF <5%. 2 0.2 ft intervals of 5Y 4/3 olive color starting at 4.4ft and 5.0 ft	5.5		BH-SC-32-4to5.5 1405	color change
5.2								5.7			
5.5						—	shoe half full, inverted fingers, contains same material as above	6.0	5.5		
6							end of core at 5.5 ft				

Note: Collect VOC/Sulfide samples before compositing intervals

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No Exceedance

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North wharf

Sediment Core Processing Log

Page 1 of 2

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log): 5.9
Avg. % ~~Compaction~~ Recovery: 84%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-34
Date/ Time: 9/17/21 Start 1300 End 1430
Sample Logged by: J. Lavrance, Anna Fitz, Sasha Williams, Maddy Ferry
Type/Diameter of Sample: 4" Vibracore, Lexan Core Tube, Lined
Sample Quality: (good) fair poor disturbed
Notes: more than 2ft overlying water

drive = 7.8' extracted easily, siphoned water but very turbid + soupy, left the water in the sample

SQO Benthic Exceedance

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Insitu Sample Depth	Subsample No.	Summary Sketch
							Scattered, ~~rainbow~~ gray streaks to gray, sheen) Florets (≤ 10)				
							Surface = water 2.5Y 3/2 very dark grayish brown				
		ML	0	10	90		soupy, very wet, ~~brownish black~~, (very soft) SILT w/ 40% wood frags, trace F sand		0 to 1.7	13:45	
							(w/ 40% wood)			SC-34 0 to 1.5	
1						0.7	strong H_2S below 1 Ft				
							No free fall				
							wood = 2" long bark, wood fibers, pulpy				
							gradational contact to more wood + brownish black				
1.5		-	-	-	-	-	-	1.7			
							wet, (soft), black 2.5Y 2.5/1 SL		1.7 to 3.9	13:55	
							@ 2.5 Ft ~~Half~~ shell F-sandy SILT w/ brick flags, wood fiber				
2		ML		20	80		white w/ 1" rounded orange			SC-34-1.5 to 3.3	
				w/ 60%	WOOD		moderate shell + wood fragments,				
	2.7			1"			60% WOOD up to 3", larger w/ depth				
		ML			100	0.2	sandy SILT no wood 1 mm & up to 5" long wood bark	3.9			
3							transitional contact w/ below				
	3.3			grading							
							well graded. Gravel +			14:05	
							Wet, ~~med~~ loose, silty F-SAND COBBLES				
		GW-GM	70	15	15		1GLEY 6/5G greenish gray w/ moderate	4	3.9 to 5.7		
							rounded cobbles up to 4" & shell frags			SC-34 3.3 to 4.8	
4							2 intact 1/2 shells up to 2"				
							gradational contact from cobbles to gravel				
4.8			dashed					5.7			
							Wet, med dense, greenish gray, sl. ~~sh~~ silty		5.7 to 7.0	14:15	
5		GW-GM	55 to 60	20	25	5.2	sandy GRAVEL (F-C sand), more silt			SC3+ 4.8 to 5.6	
							fewer shell frags 25%+ up to 0.5" than above.				
5.6	(no shoe)										
							Shoe 1/4 full = sandy Gravel, SAA	7.0		X	
5.9	with shoe										

Note: Collect VOC/Sulfide samples before compositing intervals

end of core @ 5.9
~~hit~~ refusal @ 7.0'

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Page 1 of 2

BH-SC-34 9/17/21 Page 2 of 2

Recovered Length (ft)	% Compaction	Color	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
							Bottom of Core @ 5.6 Ft @ 5.9 Ft w/ shoe				
						*	Note: dwy wood waste visual inspection in cake pan (1.5 to 3.3 Ft) depth, small rainbow blooms 1/4" & were emerging, trace s rainbow sheen / swirly streaks 1" long, scattered (less than 10) in cake pan. (strong sheen was stronger in 2nd interval)				
						*	Note: trace sheen, no blooms/ floats gray streaks on sed surface in mixing bowl from 0 to 1.5 Ft.				
						*	Jar Sheen Test = 0 to 1.5 Ft in 4oz jar w/ water = same as mix bowl small gray streaks, scattered, trace rainbow				

Note: Collect VOC/Sulfide samples before compositing intervals

f:/fieldforms/coreprocess

Page 2 of 2

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
~~Sample Length (from log):~~ Recovered length: 8.3 feet
Avg. % Compaction: ~~recovery~~ 77.5% (AF)
Wood waste characterization (Y/N): (Y)

Core Location/Sample Number: BH-SC-37
Date/ Time: 9/13/2021 1700
Sample Logged by: E. Dunbar, J. Lawrence
Type/Diameter of Sample: 4" vibracore by Gravity Marine
Sample Quality: (good) fair poor disturbed
Notes: drive length 10.7' ft of overlying water, dewatered with siphon tube after solids settled; lexan tube lined w/ plastic liner; extracted from outer core barrel by pulling liner

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
		Free	fall = 0.5 Ft				5Y 3/1 very dark grey wet, loose, silty F-M sand, sulfuric odor, shell frag. from 1.5 to 2 feet (0.3ft long) ↑ 2 intact half shells (@1.8)		1742 BH-SC-37-0to2		CDAHD > Natural BG, Hard distinct contact, Shells
	77.5%	SM		70	30	0.0		2.6		2	
		ML		10	90	0.0	5Y 3/1 very dark grey wet, soft, silt w/ trace sand, trace clay, trace shell fragments		1744 BH-SC-37-2to4		
							Subtle contact	5.0			
		MH		45	95	0.0	5Y 3/1 VDG, moist (trace fine sand) SiH, some low plasticity @4.6 to 5ft increased shells - moderate @5.6 to 6 ft med shell hash, medium-stiff	5.2		4	
							occasionally higher sand content; very subtle grain size changes; in non-distinct lenses	7.7	1750 BH-SC-37-4to6	6	

decreasing moisture, increasing clay & silt

No SL exceedances →

~~Note: Collect VOC/Sulfide samples before compositing intervals~~

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log):
Avg. % Compaction:
Wood waste characterization (Y/N): Y
1745
on the sample interval

Core Location/Sample Number: SC-37
Date/ Time: 9/13/2021 1700
Sample Logged by: E. Dunbar
Type/Diameter of Sample: 4" Vibracore
Sample Quality: (good) fair poor disturbed
Notes:

cont'd

Recovered Length (ft)	% Compaction	~~Color~~ USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
			soft	driving ↓		3 ft	See previous page	7.7		6	
	17.6%	MH				0.0			BH-SC-37-6to8		
7.7							30% many shell fragments "shelly"	9.9	1755		
								10.3		8	
							No Recovery	10.7			
							Bottom of core no refusal				
							empty shoe				

7 8 9 10

No sed in shoe

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~

Pg 1 of 2

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206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
~~Sample Length (from log)~~: Drive: 8.7 Ft
Avg. % Compaction: recovery 91%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-38
Date/ Time: 9/14/21 START Time: 1040 End Time: 1300
Sample Logged by: ~~I. Lowrimore~~ E. Dunbar
Type/Diameter of Sample: 4" Lexan Core barrel Lined
Sample Quality: good fair poor disturbed
Notes: recovered = 7.9 Ft

AF

3rd Attempt logged "C"

overlying water removed with siphon tube after solids; corelinder pulled from core barrel intact.

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
0											
1	Appeared uniformly	OL	gradual/subtle		100	0.3	wet, Very Sat., Very Soft organic SILT, Scattered Fine Shell Frag pieces, Substantial Wood fibers, 2.5Y 3/1 very dark gray Silvery metallic sheen on Water at 1 Ft Large bark up to 0.2 ft, reddish brown and Milled wood from surface to 1 ft, brown worm at 1.6 inches	1.1			Woody; PAHs > HH & direct cont; lead, mercury > NB; * See next page; some wood
1.8	~~1.8~~							2.0	1.8	BH-SC-38-0-1.8 1155	
2		OL	3 distinct		97		wet to Sat. liquid, Very Soft Organic SILT gley 10Y 5/1 greenish grey	2.2		BH-SC-38-1.8to3.8 1200	Trace gravel
2.5	~~2.5~~						Substantial fine Shell frag same fine Sub rnd gravel				Shells large; Gravels large
3	91%	GM	40		60		Very wet very soft organic silt, gravelly SILT up to 0.3 ft, Large Shell up to 0.2 ft, Substantial fine shell fragments, trace gravel Coarse. Same color as above	3.3			
3.6	~~3.6~~		subtle			0.1		4.2	3.6		
4								4.4		BH-SC-38-3.8to5.8 1205	F. gravel
	91%	GM	65		35	0.4	Wet, medium dense, Silty fine Sub rounded gravel Substantial fine shell frag Trace fine sand. Same color as above	5.5			
5											
5.8			gradual contact				— — — —	6.4	5.8		
								6.6			

ND exceedances →

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~

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Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log):
Avg. % Compaction:
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-38
Date/ Time: 9/14/21
Sample Logged by: E. Dunbar / J. Laurance
Type/Diameter of Sample:
Sample Quality: good fair poor disturbed
Notes:
3rd Attempt logged

cont'd ↓

Recovered Length (ft)	% Compaction	~~Color~~	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
	9%	GM	80		20	0.2	grades to less silt content and color grades to grey 5gy 4/1 dark greenish grey, wet, M.D., silty f. gravel (sub rnd) trace fine shell frag.	7.7 8.7	7.9	1210 BH-SC-38-5.8-7.9	full shoe
							end of core @ 7.9 ft bgs refusal				shell frags in the fingers
							* From 1 to 1.8; gray-green silt mixed w/ wood frags from above; transition btn two intervals (above + below)				

6
7
8
9

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~

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206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Recovered length
~~Sample Length (from log):~~ 9 ft.
AF
Avg. % recovery ~~Compaction~~ ~~90%~~ 82%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-4D
Date/ Time: 9/13/2021 1410
Sample Logged by: E. Dunbar
Type/Diameter of Sample: 4" vibracore by Gravity Marine
Sample Quality: (good) fair poor disturbed
Notes:

drive = 11.0 ft Several ft of water overlying; used siphon to dewater after solids settled; lexan lined with plastic liner
liner pulled from outer core easily

Recovered Length (ft)	% Compaction	~~Color~~ USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
		~~SAA~~ ML		45	55		wet, soft, very dark grey 2.5Y 3/1, sandy silt fine to medium sand trace bark like material reddish brown @ 0.6 ft. and clam shell			1550	Per PSEP, more likely, less silty sand (sm) 55 (s) 45 (f)
0.9		ML	gradational						1.2		
		~~SAA~~ ML	subtle	40	60	0.0	wet, ~~medium stiff~~ dense, very dark grey, 2.5 Y 3/1 ~~silty sand~~ ~~sandy silt~~ fine to medium sand @ 1.5 larger shell fragments up to 0.2 feet long to 2.0	2.4 2.2	2	BH-SC-4D-0to2	lead > NB CPAHs > NB occ. shell
2.2		MH		10	90	0.0	clayey silt, wet, very dark grey, trace very fine sand, scattered shell fragments, stiff, grades to moist w/ depth pine cone @ 5 feet scattered shell frag throughout twig @ 7 feet	2.4 2.7		1558	
3.9			subtle				~~4 mm rock @ 3 feet~~ ~~barklike fragment~~ reddish orange ~~inside appears laminated~~ dark + light red	4.3 4.6 4.9	4	BH-SC-4D-2to4	
		SM		55	45		~~shoe is felt~~	5.2		1610	
4.7			subtle						5.7		
		MH		10	90	0.0	closed clam @ ~~5.7 ft~~ SM: v. dk gray, moist, MD, silty sand, v. fine SAA (MH)			BH-SC-4D-4to6	
								7.3	6		

No SL exceedances →

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~

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Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log):
Avg. % Compaction:
Wood waste characterization (Y/N): Y

Core Location/Sample Number: SC-40
Date/ Time: 9/13/2021
Sample Logged by: E. Dunbar
Type/Diameter of Sample: 4" vibracore
Sample Quality: good fair poor disturbed
Notes:

cont'd ↓

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
								7.3	1615		
						0.0	@ 6.5–7 shell hash is moderate @ 7 1/4-inch twig		BH-SC-40-6 to 8		
								8.9			
						0.0	@ 8 Ft 4-inch dia wood frag. bark-like reddish-brown; x-section is laminated lt/dk red @ 8.5 to 9 scatter shell. @ 9 closed clam 0.15 Ft wide	9.8	1620 BH-SC-40-8 to 9		
9.0							end of core no refusal (easy vibration throughout core drive)	11			Shoe Full (Same as above) clam shell in fingers

No odors during processing.

Note: ~~Collect VOC/Sulfide samples before compositing intervals.~~

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Sediment Core Processing Log

outer harbor

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Recovered length ~~Sample Length (from log):~~ 9 ft.
Avg. % Compaction: ED ~~70%~~ 82%
Wood waste characterization (Y/N):

Core Location/Sample Number: BH-SC-4D
Date/ Time: 9/13/2021 1410
Sample Logged by: E. Dunbar
Type/Diameter of Sample: 4" vibracore, by Gravity Marine
Sample Quality: (good) fair poor disturbed
Notes:

Several ft of water overlying; used siphon to dewater after solids settled; Lexan lined with plastic liner liner pulled from outer core easily

Recovered Length (ft)	% Compaction	~~Color~~ USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
		~~SM~~ ML		45	55		wet, soft, very dark grey 2.5 Y 3/1, sandy silt fine to medium sand trace bark like material reddish brown @ 0.6 ft. and clam shell			1550	Per PSEP, more likely, less silty sand (SM) 55 (S) 45 (F)
0.9		—	gradational						1.2		
		~~SM~~ ML		40	60	0.0	wet, medium ~~stiff~~ dense ED, very dark grey, 2.5 Y 3/1 ~~silty sand~~ sandy silt fine to medium sand ED @ 1.5 larger shell fragments up to 0.2 feet long to 2.0	ED 2.4 2.2 ED	2	BH-SC-4D-0102	occ. shell
2.2			subtle								lead > Nat BG
		MH		10	90	0.0	clayey silt, wet, very dark grey, trace very fine sand, scattered shell fragments, stiff, grades to moist w/ depth piston core @ 5 feet scattered shell frag throughout twig @ 7 feet	ED 2.4 2.7		1558	
3.9			subtle				~~Animal @ 3 feet bark like fragment reddish orange inside appears laminated dark + light red~~	ED 4.3 4.8 ED 4.4 4.9	4	BH-SC-4D-2to4	
		SM		55	45					1610	
4.7			subtle				~~Shoe is full~~ ED	ED 5.2 5.7			many NDS (sand + shells)
		MH		10	90	0.0	Closed clam @ 6.7 ft. ED SM: v.dk gray, moist, MD, silty sand, v. fine SAA (MH)			BH-SC-4D-4to6	
								ED 6.7 7.3	6		

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~

Geosyntec consultants
520 Pike Street, Suite 2600
Seattle, WA 98101
206-496-1471

Sediment Core Processing Log

Job: Blakely Harbor Park Site
Job Number: PNG0900
No. of Sections: 1
Sample Length (from log):
Avg. % Compaction:
Wood waste characterization (Y/N): Y

Core Location/Sample Number: SC-40
Date/ Time: 9/13/2021
Sample Logged by: E. Dunbar
Type/Diameter of Sample: 4" vibracore
Sample Quality: good fair poor disturbed
Notes:

Recovered Length (ft)	% Compaction	Color USCS	Size % - G	Size % - S	Size % - F	PID	Description (grain size, color, moisture, sheen/odor, biota, wood, other debris)	Insitu Actual Depth (ft)	Sample Depth	Subsample No.	Summary Sketch
								7.3	1015		
						0.0	@ 6.5–7 shell hash is moderate @ 7 1/4-inch twig		BH-SC-40-6 to 8		mostly WDS (sand + shells)
								8.9			
						0.0	@ 8 ft 4-inch dia wood frag bark-like reddish-brown; x-section is laminated lt/dk red @ 8.5 to 9 scatter shell. @ 8.7 closed clam 0.15 ft wide	9.8 11	1620 BH-SC-40-8 to 9		Shoe Pull (same as above)
9.0							end of core No odors during processing.				

Note: ~~Collect VOC/Sulfide samples before compositing intervals~~

ATTACHMENT D-4
Investigation Derived Waste Inventory and Disposal Receipts

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
None Required	1	800-337-7455	PBTF-102523

GENERATOR

5. Generator's Name and Mailing Address
Port Blakely Tree Farms LP
8133 River Drive SE
Tumwater WA 98501
Att: Mike Warjone
Generator's Phone: 360 570-1992

Generator's Site Address (if different than mailing address)
Port Blakely Tree Farms LP
Blakely Avenue & 3-T Road
Bainbridge Island WA 98110

6. Transporter 1 Company Name: DH Environmental Inc.
U.S. EPA ID Number: WAH000047217

7. Transporter 2 Company Name: Chemical Waste Management
U.S. EPA ID Number: ORD089452353

8. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC
17629 CEDAR SPRINGS LANE
ARLINGTON OR 97812
Facility's Phone: 541 454-2643
U.S. EPA ID Number: ORD089452353

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-RCRA, non-DOT (IDW Soil OR350242)	001	DM	600	P	
2.	Non-RCRA, non-DOT (IDW Water OR350243)	003	DM	1200	P	
3.						
4.						

13. Special Handling Instructions and Additional Information
Non-RCRA, non-DOT (IDW) OR350243

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Jacob Brice (on behalf of Port Blakely Tree Farms LP) Signature: _____ Month: 10 Day: 26 Year: 23

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: _____
Transporter Signature (for exports only): Date leaving U.S.: _____

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Jacob Brice Signature: _____ Month: 10 Day: 26 Year: 23

Transporter 2 Printed/Typed Name: PEGE LAPRATT Signature: _____ Month: 10 Day: 26 Year: 23

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Signature: Month: Day: Year:

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
None Required	1	800-337-7455	PBTF-MT

GENERATOR

5. Generator's Name and Mailing Address
Port Blakely Tree Farms LP
8133 River Drive SE
Tumwater WA 98501
Attn: Mike Warjone
Generator's Phone: 360 570-1992

Generator's Site Address (if different than mailing address)
Port Blakely Tree Farms LP
Blakely Avenue & 3-T Road
Bainbridge Island WA 98110

6. Transporter 1 Company Name
DH Environmental Inc.
U.S. EPA ID Number
WAH000047217

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Lafarge North America
5400 W Marginal
Seattle WA 98106
U.S. EPA ID Number
Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Non-RCRA, non-DOT (Empty drums)	002	DM	60	P	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information
1)

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Jacob Bilcik on behalf of (Blakely Tree Farms LP) Signature: [signature] Month: 10 Day: 26 Year: 23

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Jacob Bilcik Signature: [signature] Month: 10 Day: 26 Year: 23

Transporter 2 Printed/Typed Name: Signature: Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Signature: Month: Day: Year:

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
None Required	1	(800)337-7455	PBTF-IDW-041422-01

GENERATOR

5. Generator's Name and Mailing Address
Port Blakely Tree Farm LP
8133 River Dr SE
Tumwater, WA 98501
Generator's Phone: 360.5701992 Attn: Mike Werjone

Generator's Site Address (if different than mailing address)
Blakely Ave & 3-T Rd
Bainbridge Island, WA 98110

6. Transporter 1 Company Name: DH Environmental, Inc. — U.S. EPA ID Number: WAH000047217

7. Transporter 2 Company Name: Chemical Waste Management — U.S. EPA ID Number: ORD089452353

8. Designated Facility Name and Site Address
Chemical Waste Management
17629 Cedar Springs Lane
Arlington, OR 97812
(541)454-2643
Facility's Phone:
U.S. EPA ID Number: ORD089452353

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-RCRA, Non-DOT (Non Regulated IDW Soil OR350242)	03	DM	2400	P	
2.	Non-RCRA, Non-DOT (Non Regulated IDW Water OR350243)	01	DM	350	P	
3.						
4.						

13. Special Handling Instructions and Additional Information
1: Profile-OR350242
2: Profile-OR350243

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: On Behalf of Jake Heatherly — Signature — Month: 04 Day: 14 Year: 22

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Jake Heatherly — Signature — Month: 04 Day: 14 Year: 22

Transporter 2 Printed/Typed Name: KELLY CAMPAIN — Signature — Month: 4 Day: 19 Year: 22

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month: Day: Year:

THIS MEMORANDUM

is an acknowledgement that a bill of lading has been issued and is not the Original Bill of Lading, not a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

Shipper's No. _____

Carrier's No. _____

Carrier DH Environmental SCAC Date

TO:
Consignee LaFarge
Street 5400 W Marginal Way
Destination Seattle, WA Zip 98106

FROM:
Shipper Port Blakely Tree Farm
Street Blakely Ave & 3 Rd
Origin Bainbridge Is, WA Zip 98110

Route

Vehicle Number OH13-Hino

U.S. DOT Hazmat Reg. No.

Number and Type of Packages	HM	I.D. Number	Description of Articles	Hazard Class	Pkg. Grp.	Total Quantity (mass, volume, or activity)	Weight (subject to correction)	Class or Rate
1			Empty drum			1	40	

Remit COD to:
Address:
City: State: Zip:

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ Per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

COD AMT: $

TOTAL CHARGES: $

COD FEE: Prepaid ☐ Collect ☐ $

FREIGHT CHARGES: ☐ Prepaid ☐ Collect

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications and rules that have been established by the carrier and are available to the shipper, on request; and all applicable state and federal regulations; the Property described above, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above, which said company (the word company being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to delivery at said destination, if on its route, or otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said Property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said Property that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained, including the conditions on the back hereof, which are hereby agreed to by the shipper and accepted for himself and his assigns.

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NAME OR CONTRACT NUMBER OR OTHER UNIQUE IDENTIFIER:

209-BLC-Q 3 12461 (Rev. 9/10)

APPENDIX E
Vulnerable Population Screening Report

Geosyntec consultants

engineers | scientists | innovators

APPENDIX E
VULNERABLE POPULATION SCREENING REPORT

DRAFT REMEDIAL INVESTIGATION REPORT

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

Geosyntec consultants

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ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	Feasibility Study
Port Blakely	Port Blakely Tree Farms
RI	Remedial Investigation
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix summarizes the environmental justice and vulnerable population screening conducted for the Blakely Harbor Park Site. The screening was conducted for the limited purposes of site prioritization (WAC 173-340-3401, 173-340-350 through 173-340-390) as described in the Implementation Memorandum No. 25 (Ecology, 2024).

2. SUMMARY OF SCREENING REPORT

The Environmental Health Disparities (EHD) Index from the EHD Map maintained by the Washington State Department of Health (DOH, 2022) and the Environmental Justice (EJ) Screening and Mapping (EJScreen tool, EPA, 2024) were used to assess presence of vulnerable populations at the Site.

The EHD map shows an assigned environmental health disparity index for communities organized based on census tracts utilizing a 1 to 10 ranking scale, with 1 being low risk and 10 being high risk for environmental health disparities. The Site is under the 091000-census tract and the EHD index assigned is 1, indicating the population at the Site is not considered at risk of environmental health disparity. A screenshot of the EHD map for the Site is included in Attachment E-1.

The EJScreen tool generates a report of EJ indices and socioeconomic indicators. The mapping tool was used for an area of about 506 acres including the Site and a buffer area extending 0.2 miles from the Site proximity. The Report shows a Demographic Index (low income and people of color) for within the 10th percentile for the state and 12th percentile for the nation. The Supplemental Demographic Index (low income, unemployment, lack of English proficiency, less than high school education, and low life expectancy) is within the 8th percentile for the state and 7th percentile for the nation. The detailed report is included as Attachment E-2.

The screening performed according to Ecology guidance indicates that the potentially exposed population at the Site does not include a likely vulnerable population or overburdened community.

3. REFERENCES

United States Environmental Protection Agency (EPA). 2024.Environmental Justice Screening and Mapping Tool. Retrieved from: https://www.epa.gov/ejscreen.

Washington State Department of Health (DOH). 2022. Environmental Health Disparities Map (Version 2.0). July 28. https://fortress.wa.gov/doh/wtnibl/WTNIBL/, Accessed March 8. 2024.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

Washington State Department of Ecology (Ecology). 2024, Implementation Memo No. 25: Identifying Likely Vulnerable Populations and Overburdened Communities Under the Cleanup Regulations. Publication 24-09-044. January.

ATTACHMENT E-1

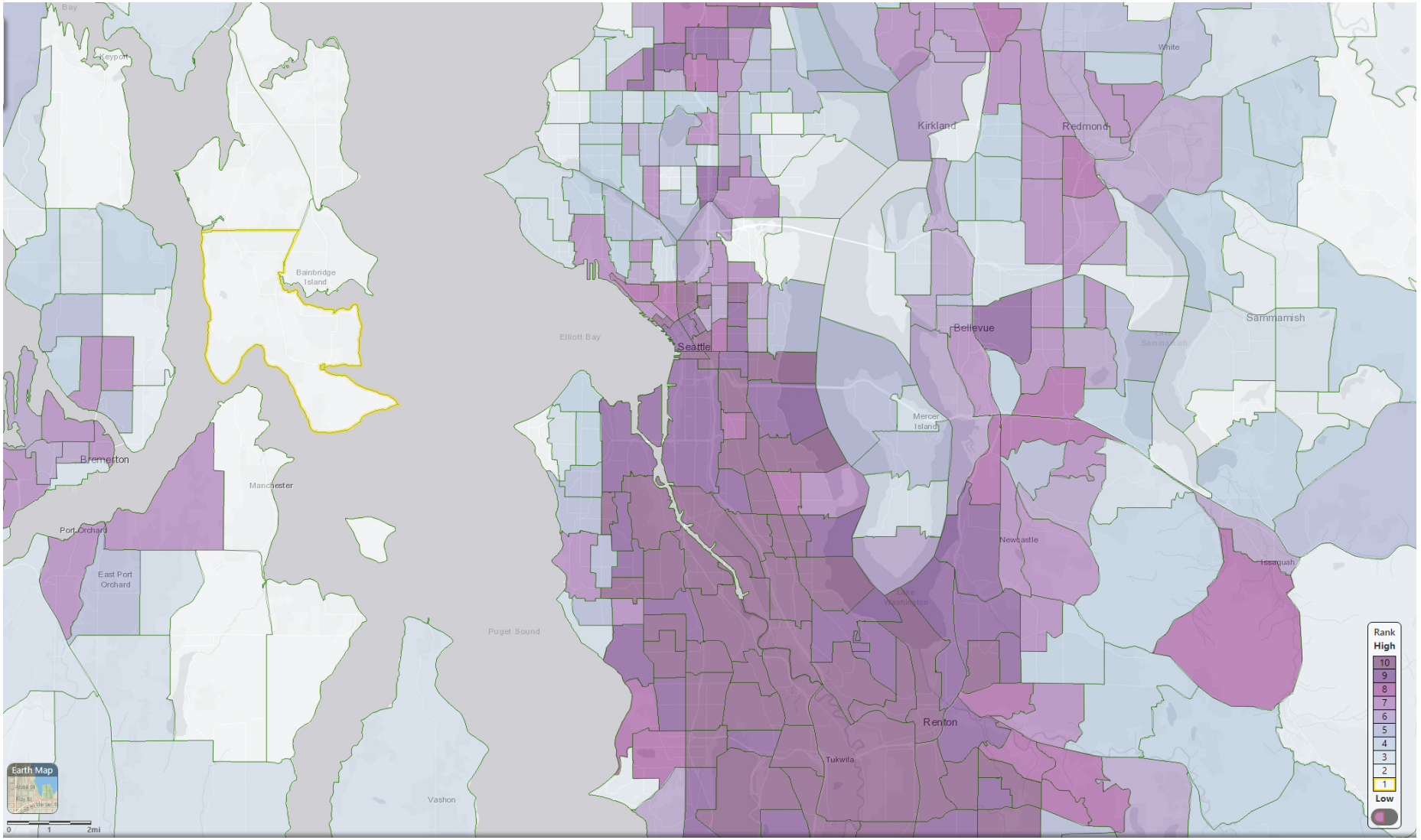
EHD Map of Blakely Harbor Census Tract

Washington State Department of Health

Selection: Environmental Health Disparities V 2.0

Environmental Exposures, Environmental Effects, Socioeconomic Factors, Sensitive Populations

Date: 04/11/2024 at 4:57 PM



ATTACHMENT E-2

EJ Report for Blakely Harbor Park Site

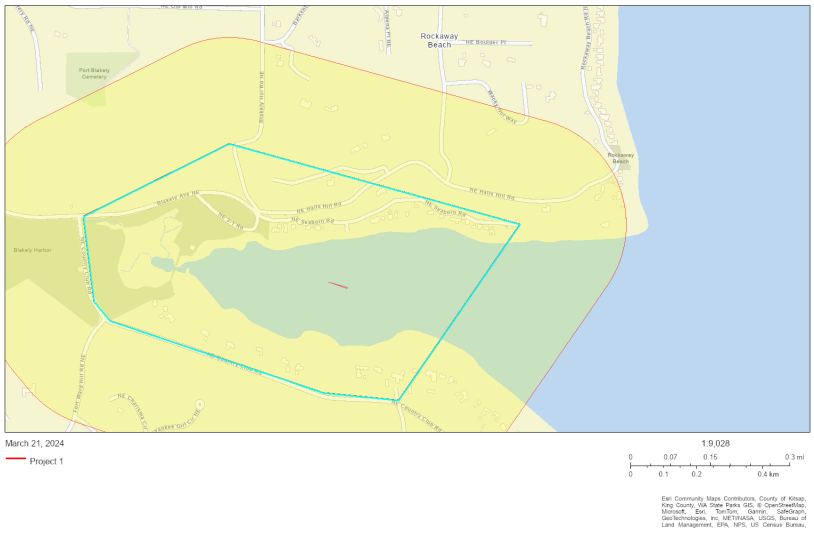
EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Bainbridge Island, WA

0.2 miles Ring around the Corridor
Population: 139
Area in square miles: 0.79

A3 Landscape



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
No language data available.	

COMMUNITY INFORMATION

- Low income: 6 percent
- People of color: 16 percent
- Less than high school education: 0 percent
- Limited English households: 0 percent
- Unemployment: 6 percent
- Persons with disabilities: 10 percent
- Male: 51 percent
- Female: 49 percent
- 84 years — Average life expectancy
- $98,794 — Per capita income
- Number of households: 69
- Owner occupied: 81 percent

BREAKDOWN BY RACE

- White: 84%
- Black: 0%
- American Indian: 1%
- Asian: 6%
- Hawaiian/Pacific Islander: 0%
- Other race: 0%
- Two or more races: 2%
- Hispanic: 7%

BREAKDOWN BY AGE

From Ages 1 to 4	2%
From Ages 1 to 18	11%
From Ages 18 and up	89%
From Ages 65 and up	27%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	0%
Speak Other Indo-European Languages	0%
Speak Asian-Pacific Island Languages	0%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

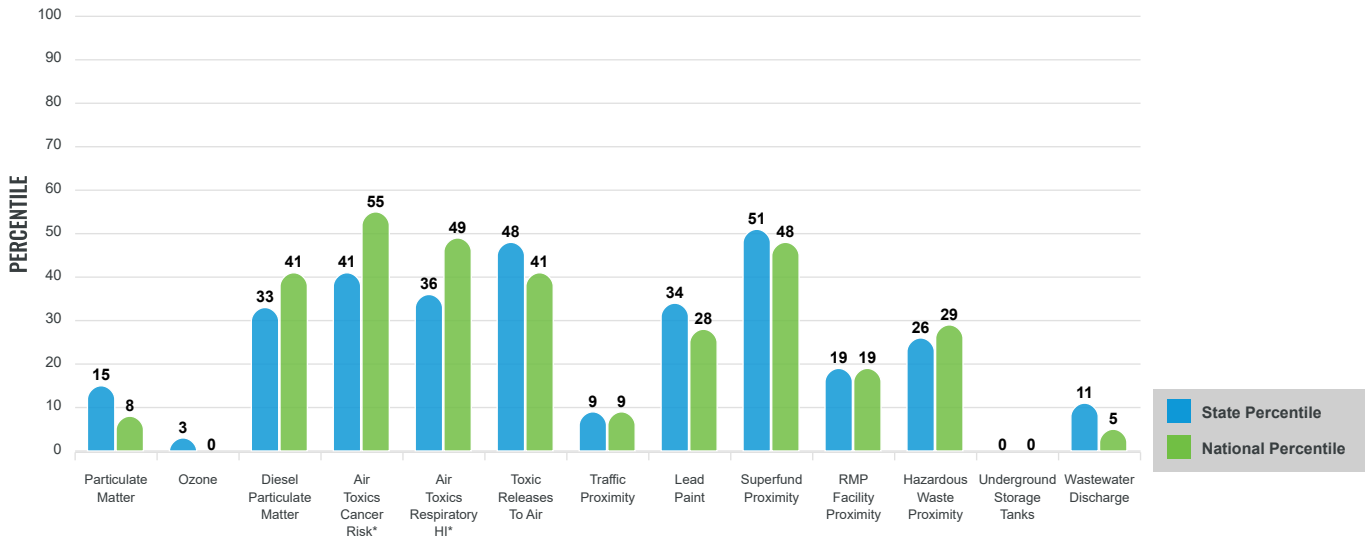
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

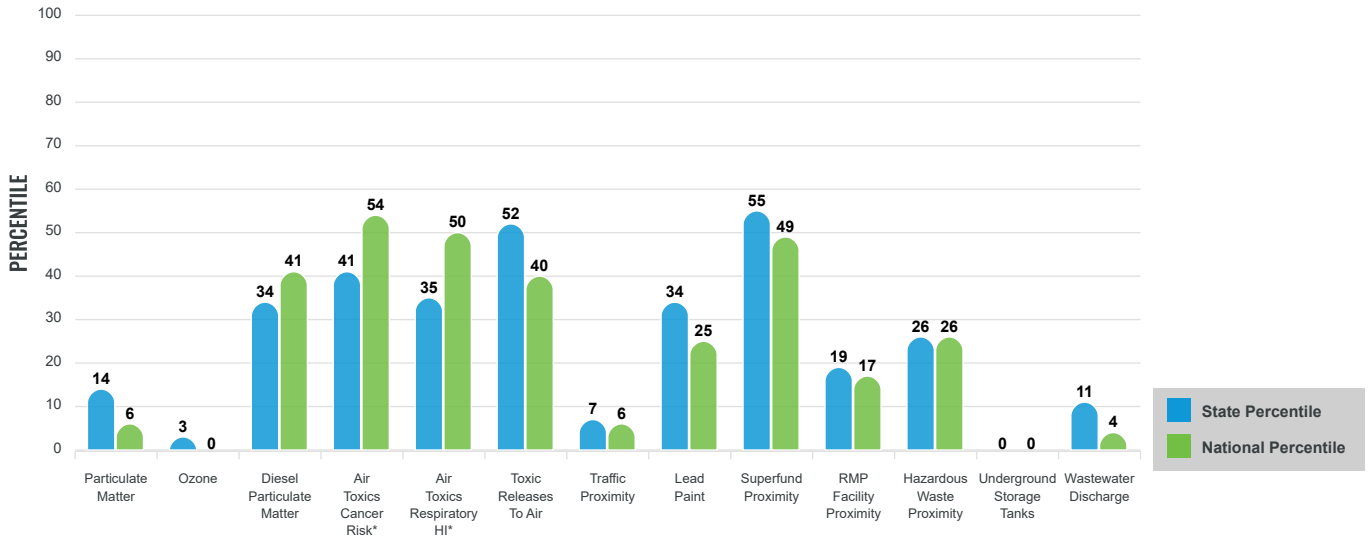
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for 0.2 miles Ring around the Corridor

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (µg/m^3)	6.34	7.02	23	8.08	11
Ozone (ppb)	45.3	49.8	4	61.6	0
Diesel Particulate Matter (µg/m^3)	0.362	0.355	58	0.261	78
Air Toxics Cancer Risk* (lifetime risk per million)	30	27	37	25	52
Air Toxics Respiratory HI*	0.4	0.39	39	0.31	70
Toxic Releases to Air	3,400	1,800	89	4,600	81
Traffic Proximity (daily traffic count/distance to road)	5.3	190	11	210	11
Lead Paint (% Pre-1960 Housing)	0.19	0.23	59	0.3	47
Superfund Proximity (site count/km distance)	0.67	0.18	94	0.13	96
RMP Facility Proximity (facility count/km distance)	0.1	0.4	29	0.43	30
Hazardous Waste Proximity (facility count/km distance)	0.44	1.6	43	1.9	47
Underground Storage Tanks (count/km^2)	0	6.3	0	3.9	0
Wastewater Discharge (toxicity-weighted concentration/m distance)	8.4E-07	0.024	17	22	8
SOCIOECONOMIC INDICATORS					
Demographic Index	11%	28%	10	35%	12
Supplemental Demographic Index	5%	12%	8	14%	7
People of Color	16%	32%	25	39%	32
Low Income	6%	24%	13	31%	11
Unemployment Rate	6%	5%	68	6%	66
Limited English Speaking Households	0%	4%	0	5%	0
Less Than High School Education	0%	8%	0	12%	0
Under Age 5	2%	6%	16	6%	19
Over Age 64	27%	16%	86	17%	84
Low Life Expectancy	14%	18%	8	20%	6

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	3
Air Pollution	0
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	0

Other environmental data:

Air Non-attainment	No
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	No
Selected location contains an EPA IRA disadvantaged community	No

Report for 0.2 miles Ring around the Corridor

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	14%	18%	8	20%	6
Heart Disease	4.9	5.3	39	6.1	26
Asthma	9.3	10.5	16	10	33
Cancer	7.9	6.3	86	6.1	87
Persons with Disabilities	8.7%	13.1%	24	13.4%	23

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	11%	11%	70	12%	68
Wildfire Risk	0%	12%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	0%	9%	0	14%	0
Lack of Health Insurance	0%	6%	0	9%	0
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Report for 0.2 miles Ring around the Corridor

APPENDIX F
Sediment Profile Imaging and Plain View Survey Report

Geosyntec consultants

engineers | scientists | innovators

APPENDIX F
SEDIMENT PROFILE IMAGING AND PLAN VIEW SURVEY

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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ACRONYMS AND ABBREVIATIONSU

AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	Feasibility Study
GPS	global positioning system
Port Blakely	Port Blakely Tree Farms
PV	Plan View
RI	Remedial Investigation
SPI	sediment profile imaging
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the sediment profile imaging (SPI) survey and a plan view (PV) survey conducted at Blakely Harbor during Phase 1 of the RI. Except where noted, field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, the Sampling and Analysis Plan, and the Quality Assurance Project Plan (Geosyntec, 2022). Any deviation from the RI/FS Work Plan is reported in Section 4.4 of the RI Report; deviations were minimal and did not impact the survey results.

2. SUMMARY OF FIELD INVESTIGATIONS

In October 2020, Integral Consulting conducted SPI and PV surveys and Geosyntec field staff provided on-site oversight during field activities. Surveys were conducted overwater and overland where needed due to boat access constraints. Images were collected in two separate phases:

1. The former Mill Pond was surveyed at low tide by accessing the Site overland from the shoreline. Images were acquired by using a lightweight, handheld SPI camera prism and housing. A Trimble® global positioning system (GPS) unit was used for location control. A total of 11 stations were surveyed, including nine[1] of the 10 proposed sampling locations, and two additional locations that were identified during the survey.[2]
2. The inner and outer harbors were surveyed by deploying the SPI-PV camera system from a research vessel with digital GPS unit for location control. Research Support System (RSS) provided vessel support. SPI and PV images were collected at the 89[3] proposed sampling locations.

Three images were attempted at each sampled location for dual purposes of (i) obtaining more than one analyzable image per location and (ii) quality control. The captured images were processed and reviewed for several parameters, including sediment texture and composition, presence and abundance of woody debris, prism penetration depth and surface boundary roughness, apparent

[1] Due to soft mud and overlying water, one planned station (Station 128) was not safely accessible for the field staff.
[2] Two additional stations (Stations 133 and 134) were added by the field team to capture woody debris observed in surface sediments at those locations.
[3] Two replicates from Station 95 were not analyzable due to no penetration of the prism into substrate composed of gravel and cobble. At Stations 109 and 117, both replicates were only partially analyzable due to minimal penetration as a result of either woody debris or gravel. At Stations 108, 110, 114, and 118, one replicate was not fully analyzable due to minimal penetration into the gravel and cobble. At Station 126, in the Mill Pond, both replicates were only partially analyzable as a result of overpenetration into the soft silt.

redox potential discontinuity depth, organic loading, infaunal successional stage, and presence of other biological features.

The survey sampled a total of 100 locations (11 in the former Mill Pond and 89 in the harbor). A total of 196 SPI images and a total of 177 PV images were collected and analyzed during this survey. Images represent the upper 9.8 centimeters (cm) of sediment based on average penetration depths. Relatively high levels of woody debris (ranging in from very small splinters to chips and large chunks) are present in the vicinity of the former overwater structures, historical wharf, and within the former Mill Pond. Benthic habitats vary across the Site and appear to be related to substrate texture rather than seasonal variations (e.g., seasonal hypoxia would be revealed in SPI images by buried, relict aRPDs). The former Mill Pond appears to be an area of high organic loading and sediment oxygen demand.

Results of the surveys are provided in Attachment F-1.

3. REFERENCES

Geosyntec Consultants, Inc. 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 31 January.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

ATTACHMENT F-1

Sediment Profile Imaging and Plan View Survey Report

Blakely Harbor Park Site

Sediment Profile Imaging and Plan View Survey

Prepared for
Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, WA 98101

Prepared by

1205 West Bay Drive NW
Olympia, WA 98502

DRAFT
June 2021

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ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
aRPD	apparent redox potential discontinuity
DCAP	draft cleanup action plan
DGPS	differential global positioning system
Ecology	Washington State Department of Ecology
Eh	oxidation/reduction potential
GIS	geographic information system
GPS	global positioning system
GUI	graphical user interface
Integral	Integral Consulting Inc.
ISO	International Standards Organization
iSPI	MATLAB-based image analysis software
MTCA	Model Toxics Control Act
MSS	Marine Sampling Services
NEF	Nikon Electronic Format
OIS	Ocean Imaging Systems
PV	plan view
Port Blakely	Port Blakely Tree Farms
RCW	Revised Code of Washington
RI/FS	remedial investigation and feasibility study
RSS	Research Support Services
Site	Blakely Harbor Park Site
SLR	single lens reflex
SOD	sediment oxygen demand
SPI	sediment profile imaging
SPI–PV	sediment profile imaging and plan view
SWI	sediment-water interface
USB	universal serial bus
WGS84	World Geodetic System 1984

1 INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (Site) located in Bainbridge Island, Washington (Figure 1-1). In accordance with the AO and the Model Toxics Control Act (MTCA) Revised Code of Washington (RCW) 70A.305.050(1), the Site will be defined as the extent of contamination caused by release of hazardous substances from historical operations associated with the former Port Blakely Mill, which ceased operations in 1923.

The scope of this work included two components—a sediment profile imaging (SPI) survey and a plan view (PV) survey. A SPI–PV camera system was deployed from a vessel and used to acquire co-located SPI–PV images in Blakely Harbor, and a handheld SPI camera was deployed from overland in the former Mill Pond during low tide (Figure 1-1). The SPI and PV images were analyzed for the standard suite of SPI and PV parameters plus the relative abundance of wood debris as detailed in Section 3.

This report presents the results of the October 2020 SPI–PV survey conducted at the Site. The document is organized as follows:

- Section 2: Survey Plan Objectives
- Section 3: Methods (for SPI–PV image acquisition and analysis)
- Section 4: SPI–PV Survey Results
- Section 5: Summary
- Section 6: References.

2 SURVEY PLAN OBJECTIVES

The primary objective of this survey was to map the distribution of wood debris in surface sediments in the harbor and Mill Pond and to evaluate the associated benthic habitat quality throughout the Site. This SPI–PV survey was conducted to provide information regarding wood debris, sediment type and composition, depth of apparent redox potential discontinuity, organic loading, biological features, and presence of infauna and epifauna at the Site.

3 METHODS

This section describes the image collection and image analysis methods used for this survey. Except where noted, all field tasks and image analysis were performed in accordance with the Field Sampling Plan (Geosyntec 2020). Copies of SPI–PV collection forms are provided in Appendix A and all sampled station coordinates are provided in Table 3-1. SPI–PV data are provided in Tables 3-2 and 3-3, respectively. All SPI and PV high-resolution images are provided electronically.

The SPI–PV survey was conducted in two separate phases: overland image collection in the Mill Pond and on-water sampling in Blakely Harbor. The first phase occurred during low tide in the Mill Pond on October 13, 2020. The Mill Pond area was not accessible by boat and field staff walked to each target location, navigating with a handheld Trimble® global positioning system (GPS) unit. A lightweight, handheld SPI camera prism and housing was used to acquire images. No PV images were taken in the Mill Pond. Longitude and latitude coordinates were obtained under the World Geodetic System 1984 (WGS84) reference coordinate system during sampling operations. Coordinates, deployment attempt, date, and time were recorded when the SPI–PV camera was inserted into the substrate. After completion of the overland survey, the coordinates were transferred by Integral Consulting Inc.'s (Integral's) geographical information system (GIS) personnel to Trimble® Pathfinder® Office and GPS corrections were applied. Nine of the 10 target Mill Pond locations were sampled. Station 128 was not safely accessible due to soft mud and overlying water. Two additional stations (133 and 134) were selected by the field team in order to capture wood observed in surface sediments at those locations.

The Blakely Harbor survey was conducted from October 27–29, 2020, aboard the *R/V Carolyn Dow* chartered from Research Support Services (RSS). The SPI–PV camera system shown in Figure 3-1 was used to acquire images at the harbor locations shown in Figure 3-2. Navigation and collection of coordinates was conducted by RSS using a differential global positioning system (DGPS) with sub-meter accuracy. Longitude and latitude coordinates were obtained under the reference coordinate system WGS84 during sampling operations. Coordinates, deployment attempt, date, time, and water depth were recorded when the SPI–PV camera touched bottom. After completion of survey, the coordinates were transferred by RSS to Trimble® Pathfinder® Office and GPS corrections were applied.

Following completion of the survey, all SPI–PV JPEG image files were labeled using the following convention:

BHPS-35-A-SPI or BHPS-MP-127-A-SPI

Where:

BHPS = Blakely Harbor Park Site

MP = Mill Pond

127 = Station number

A = replicate (A, B, C)

SPI = image type (SPI or PV), so the co-located PV image taken during the same drop is:

BHPS-35-A-PV

3.1 SPI–PV CAMERA SURVEY

SPI was commercialized in the 1980s as a rapid reconnaissance tool for characterizing physical, chemical, and biological seafloor processes, and has been used in numerous seafloor surveys throughout North America, Asia, Europe, and Africa (Rhoads and Germano 1982, 1986, 1990; Revelas et al. 1987; Diaz and Schaffner 1988; Valente et al. 1992). Germano et al. (2011) provide a comprehensive history of the technology's development and its applications. A PV camera can be deployed with the SPI camera to obtain a view of the seabed from above, before the SPI image is obtained. This SPI–PV camera combination was used for the entirety of the survey in Blakely Harbor; only SPI images were collected in the Mill Pond.

3.1.1 SPI–PV Image Collection

Figure 3-2 shows locations sampled with the SPI–PV camera system and handheld SPI camera. At each of the 89 harbor locations and 9 of the 10 Mill Pond locations, at least three SPI–PV replicate drops were attempted in order to obtain two analyzable images per location. Table 3-1 lists the SPI–PV station and replicates analyzed for this survey, along with the water depth and positional information recorded during image acquisition. Two replicates from Station 95 were not analyzable due to no penetration of the prism into substrate composed of gravel and cobble. At Stations 109 and 117, both replicates were only partially analyzable due to minimal penetration as a result of either wood debris or gravel. At Stations 108, 110, 114, and 118, one replicate was not fully analyzable due to minimal penetration into the gravel and cobble. At Station 126, in the Mill Pond, both replicates were only partially analyzable as a result of over-penetration into the soft silt. A total of 196 SPI images were analyzed from this survey.

Table 3-1 lists the PV station and replicates analyzed, along with the water depth and the positional information recorded during image acquisition. At three stations (39, 40, and 78), one replicate from each station was not analyzable due to suspended sediment in the water column obscuring the seafloor. A total of 177 PV images were analyzed from this survey. Appendix A provides the SPI–PV image collection field forms. The field forms provide details on the camera system's configuration for each station, including stop collar settings and the number of weights

used to optimize prism penetration. The following subsections detail the respective SPI and PV sampling equipment setup and image collection process.

3.1.1.1 SPI Camera Settings

Integral used its Ocean Imaging Systems (OIS) Model 3731-D SPI system to take high-resolution *in situ* digital images of the sediment-water interface (SWI) for this survey in Blakely Harbor. The camera system features a Nikon D7100 digital camera set within a water-tight housing on top of a wedge-shaped prism. This prism assembly is mounted on a moveable carriage within a robust stainless-steel frame. The frame is lowered to the seafloor on a winch wire, and the tension on the wire keeps the prism in its "up" position. When the frame lands on the seafloor and the winch wire goes slack, the camera prism descends into the sediment at a slow, controlled rate by the dampening action of a hydraulic piston to minimize disturbance of the SWI. On the prism's descent, a trigger is tripped that activates a time-delay circuit of variable length (15 seconds for this survey) to allow the camera to penetrate the seafloor before the image is taken. The prism has a Plexiglas® window at the front and a mirror on the bottom wedge at a 45-degree angle. The camera lens looks down at the mirror, which reflects the image of the sediment column against the window. The resulting images give the viewer the same perspective as looking through the side of an aquarium filled with sediment. The prism has an internal strobe mounted inside at the back of the wedge to provide illumination for the image; this chamber is normally filled with distilled water, so SPI image quality is unaffected by near-bottom water turbidity. After the first image is obtained at a target location, the camera is raised approximately 1–2 meters off the bottom and a wiper blade mounted on the frame removes sediment adhering to the faceplate. The strobe recharges and the camera is ready to be lowered again for a replicate image. For this survey, a minimum of one minute was allowed to pass between station replicates to avoid taking photographs of re-suspended sediments from the previous drop.

Two types of adjustments to the SPI camera frame system are typically made in the field to optimize prism penetration: 1) adjusting the chassis stop collars to set how far the prism assembly can descend; and 2) adding or subtracting lead weights to the chassis. Both adjustments can affect the prism penetration depth into the substrate. Settings for stop collar height and number of weights per deployment were recorded on the image collection forms (Appendix A).

Camera settings (i.e., f-stop, shutter speed, International Standards Organization [ISO] equivalents, digital file format, color balance, etc.) are selectable through a water-tight universal serial bus (USB) port on the camera housing and Nikon Camera Control Pro 2® software. At the beginning of the survey, the time on the SPI camera's internal data logger was synchronized with the internal clock on the navigation system to Pacific Standard Time. Details of the camera settings for each digital image are available in the associated parameters file embedded in the electronic image file. For this survey, in both the harbor and Mill Pond, the ISO-equivalent was

set at 640, shutter speed to 1/250, aperture to f 11, white balance to flash, color mode to sRGB, Active D-lighting to off, and High ISO Noise Ratio to normal. Images were stored as lossless compressed raw (14 bit) Nikon Electronic Format (NEF) files (6,000 x 4,000 pixels) and optimal quality JPEG (fine; 6,000 x 4,000 pixels). Recording modes for two 32-MB SD memory cards were set as NEF in slot 1 and JPEG in slot 2.

The handheld SPI camera (used in the Mill Pond) was provided by Marine Sampling Systems (MSS; Olympia, Washington). The handheld camera is also an OIS Nikon D7100 camera contained within a watertight housing that sits atop a water-filled prism. The housing and prism are identical in shape to the vessel deployed camera system, but they are made of aluminum rather than stainless steel in order to reduce the carrying weight. In addition, the handheld prism has handles on each side so it can be carried and deployed by two field staff. When fully set up, the handheld housing and prism weighs approximately 100 lb. When deployed, the prism is gently pushed into the sediment so that approximately ¾ of the prism widow is below mudline. At some locations, the sediment was so soft that it was impossible for staff to not over-penetrate or disturb the SWI adjacent to where the prism was inserted into sediment. Consequently, the quality of some Mill Pond SPI images were sub-optimal.

Calibration information for the SPI images was determined by measuring 1-cm gradations from the Kodak® Color Separation Guide image, which was obtained by placing the guide card against the SPI prism. This calibration information was applied to all SPI images that were analyzed. Linear and area measurements were recorded as number of pixels (conversion factor of 14.52 pixels per centimeter) and converted to metric units using the calibration information.

Three replicate images were taken at each station in an effort to ensure the successful acquisition of at least two analyzable SPI and PV images per location. When reviewing image quality during the field effort, the unique time stamp on each digital image was cross-checked with the time stamp in the navigational system's computer data file. The field crew kept redundant written sample logs of image acquisition time and sampling stations (Appendix A). Images were downloaded after the first station and then periodically thereafter to verify successful image acquisition and assess prism penetration. The image files were labeled with the appropriate station name as noted above.

3.1.1.2 Plan View Camera Settings

An OIS Model DSC 24000 PV underwater camera system with a wide-angle dome port (rated to 6,000 m) was attached to the SPI camera frame and used to collect PV photographs of the seafloor surface during each "drop" of the system (Figure 3-1). The PV system consisted of Nikon D7100 digital single lens reflex (SLR) camera encased in a 17-4PH stainless-steel housing with a domed glass port, a 24 VDC autonomous power pack, a 500W strobe, and a bounce trigger. A 2-lb weight was attached to the bounce trigger with a 2-ft nylon line (50-lb tensile breaking point) so that the weight hung below the camera frame. Two OIS Model 400-37 Deep

Sea Scaling lasers were mounted to the DSC 24000 housing that projected two red laser dots separated by a constant distance of 26 cm regardless of the field of view of the PV image, which is a function of the length of the trigger wire. As the SPI–PV camera frame was lowered to the seafloor, the weight attached to the bounce trigger contacted the seafloor prior to the SPI–PV camera frame, hitting the bottom and triggering the PV camera to fire (Figure 3-1). Details of the PV camera settings for each digital image are available in the associated parameters file embedded in each electronic image file; for this survey, the ISO-equivalent was set at 500. The additional camera settings used were as follows: shutter speed to 1/30, aperture to f 16, white balance to flash, color mode to sRGB, Active D-lighting to off, and High ISO Noise Ratio to normal. Images were stored as lossless compressed raw (14-bit) NEF files (6,000 x 4,000 pixels) and optimal quality JPEG (fine; 6,000 x 4,000 pixels). Recording modes for two 32-MB SD memory cards were set as NEF in slot 1 and JPEG in slot 2. As with the SPI camera, the internal clock in the digital PV camera was synchronized with the navigation system computer during field operations. Throughout the survey, PV images were downloaded at the same time as the SPI images for image quality review.

The ability of the PV system to collect useful information on sediment bed conditions is dependent on the clarity of the near-bottom water column; the second or third PV replicate can be poor quality due to the bottom turbidity kicked up by the SPI–PV camera frame during the first drop. Also, for this survey, at a number of locations, the entire substrate was covered with *Ulva lactuca* (sea lettuce), which prevented the imaging of surface sediment textures and features.

3.2 SPI–PV IMAGE ANALYSIS

Integral uses its integrated, MATLAB-based image analysis software (iSPI v1.2) to analyze the SPI and PV images. The image files along with the metadata-containing Microsoft® Excel files generated during the field survey are imported directly into iSPI for analysis. A menu-structured graphical user interface (GUI) in iSPI allows the image analyst to manually or semi-automatically measure and/or add descriptive comments for key imaged features (Figure 3-3). The draft data are stored in the system for review by a senior scientist. Following the quality assurance check of all measured and descriptive parameters, the SPI–PV data set is compiled and identified as final; the data can then be evaluated and exported as desired.

The subsections below describe the methods used to identify and measure features observed in SPI (Sections 3.2.1 through 3.2.8) and PV (Section 3.2.9) images and the underlying interpretive rationale.

3.2.1 Sediment Type and Composition

The sediment grain-size major mode and range are estimated by visually comparing the textures in each image with a photograph set (grain-size comparator) that was generated by imaging a series of sieved Udden-Wentworth sediment size class samples (equal to or less than coarse silt up to granules) placed against the SPI camera prism in the laboratory. Seven grain-size classes (phi units) are on this comparator: >4 (silt-clay), 4–3 (very fine sand), 3–2 (fine sand), 2–1 (medium sand), 1–0 (coarse sand), 0–(-1) (very coarse sand), and <(-1) (granule and larger). The lower limit of optical resolution of the photographic system is about 62 microns, allowing recognition of grain sizes equal to or greater than coarse silt (>4). The image analyst documents the predominant major modal grain size across the entire image (or notes the major mode of obvious layers if present) and total grain size range (minimum to maximum particle size) observed in each image.

3.2.2 Wood Debris

In addition to identifying grain size textures, the analyst noted the presence, relative abundance, and type (e.g., sticks, chips, fragments) of wood and other debris, if present, in the Blakely Harbor SPI and PV images. The approximate percentage area of wood debris in each SPI and PV image analyzed were visually estimated and classified as follows: N = none, L = low (1–20%), LM = low/medium (21–40%), M = medium (41–60%), MH = medium/high (61–80%), and H (>80%). In addition, the type or types of wood debris present in each image were noted in the data table comment fields.

3.2.3 Prism Penetration Depth

The maximum possible penetration depth for the instrument is 21.5 cm. The reported SPI prism penetration depth is the average depth in centimeters from the SWI to the bottom of the image. The analyst traces the SWI in each image and the iSPI software calculates the total cross-sectional area of the sediment column in the image; this area is divided by the linear width (14.52 cm) of the image to determine the average penetration depth.

The penetration depth is a function of the bearing capacity and shear strength of the sediments, and the number of weights used during the camera deployment. If the number of weights is the same during a survey (0 to 250 lb can be added to the camera prism frame in 50-lb increments), as was the case in this survey for 86 of the 98 stations sampled in the harbor, then relative penetration values across the site are indicative of the relative bearing strength of the sediment bed.

3.2.4 Small-Scale Boundary Roughness

The iSPI software determines surface boundary roughness automatically by calculating the vertical distance between the highest and lowest points of the SWI (Figure 3-3). The surface boundary roughness may be related to either physical structures (e.g., wood debris, sand ripples) or biogenic features (e.g., burrow openings, fecal mounds, foraging depressions).

3.2.5 Apparent Redox Potential Discontinuity Depth

Near-surface marine sediments are typically aerobic and have higher optical reflectance than the underlying reduced or anaerobic sediments. Surface sands washed free of mud also have higher optical reflectance than underlying muddy sands. These differences in reflectance with depth in the sediment column are readily apparent in SPI images. The oxidized surface sediment particles are coated with ferric hydroxide, which has a brownish or olive color, while reduced sediments below this oxygenated layer are darker, generally gray to black (Fenchel 1969; Lyle 1983). The boundary between the colored ferric hydroxide surface sediment and underlying gray to black sediment is called the apparent redox potential discontinuity (aRPD)[1].

In iSPI manual mode, the average aRPD depth is measured in each image by the analyst tracing the color boundary across the image (Figure 3-3). This boundary can be undulated or wavy as a function of the distribution of individual macrofauna and their localized biogenic mixing activities. The average depth of the aRPD across the entire width of the image is then calculated automatically and displayed in iSPI (Figure 3-3).

The aRPD is a key SPI parameter for documenting changes (or gradients) that develop over time in response to benthic disturbance factors (e.g., sediment erosion or depositional events), demersal fish foraging, and temporal (seasonal or yearly cycles) changes in environmental factors, such as water temperature and organic loading. Overall, time-series RPD measurements following a disturbance are a diagnostic element in assessing the rate and degree of recovery in an area following a perturbation (Rhoads and Germano 1982, 1986) (Figure 3-4).

Finally, it is important to note that there are physical factors that may influence the aRPD depth in a SPI image. For example, in well-sorted sands with little or no silt or organic matter, the depth of the aRPD can be influenced by factors such as sediment porosity and near-bottom current flow velocities that force surface water into the substrate. If such factors are inferred by the analyst based on bottom texture and environmental setting, then these aRPD depths are considered physical aRPDs (i.e., they are not solely a function of infaunal biogenic mixing).

[1] Note that this measurement is referred to as the *apparent* RPD as the actual RPD is the horizon that separates the positive oxidation/reduction potential (Eh) (oxidizing) region of the sediment column from the underlying negative Eh (reducing) region, which can only be determined with microelectrodes.

3.2.6 Organic Loading, Sedimentary Methane and Thiophilic Bacterial Colonies

If organic loading is high in marine sediments, then porewater sulfate is depleted and methanogenesis occurs. In SPI images, methanogenesis can be revealed by the appearance of methane bubbles in the sediment column. These gas-filled voids are readily discernable in SPI images because of their irregular shape and glassy texture (due to the reflection of the strobe off the gas). The image analyst notes the presence of these methane voids, and visually estimates the percent area of the voids (N = none, L= low [0–20%], M = medium [20–50%], H = high [>50%]).

A potentially related feature that indicates an area is suffering severe sediment oxygen demand (SOD) due to organic enrichment and/or depleted water column dissolved oxygen levels (i.e., hypoxia or anoxia) is the presence of the sulfur-oxidizing bacterial colonies at or just below the SWI. These bacterial colonies have diagnostic bright white or orange filamentous morphology that has been documented in numerous SPI surveys (Germano et al. 2011). The presence of sulfur-oxidizing bacterial colonies appear when boundary-layer dissolved oxygen concentrations drop into the "hypoxic" range from 0–1 mL/L (Rosenberg and Diaz 1993).

3.2.7 Infaunal Successional Stage

After a disturbance in soft-bottom marine sediments, macrobenthic infaunal communities generally follow a succession pattern. Figure 3-4 illustrates this progression from an initial community of densely populated, small, tubiculous, surface-dwelling polychaetes (Stage 1) to an equilibrium community of deep-dwelling, head-down deposit feeders (Stage 3). The identification of benthic infaunal successional stages in SPI images is based on empirical evidence that organism-sediment interactions in fine-grained sediments follow this predictable sequence after a seafloor disturbance (Pearson and Rosenberg 1978; Rhoads and Germano 1982; Rhoads and Boyer 1982). This interpretive paradigm is based on observations that primary benthic succession results in:

> …the predictable appearance of macrobenthic invertebrates belonging to specific functional types following a benthic disturbance. These invertebrates interact with sediment in specific ways. Because functional types are the biological units of interest..., our definition does not demand a sequential appearance of particular invertebrate species or genera (Rhoads and Boyer 1982).

This continuum of change in animal communities after a disturbance (primary succession) has been divided into four primary stages:

- Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a major physical disturbance or in close proximity to an organic enrichment source.
- Stage 1 is the initial community of tiny, densely populated, tubicolous, surface-dwelling polychaete assemblages.
- Stage 2 is the start of the transition to head-down deposit feeders and can also consist of shallow-dwelling bivalves and tube-dwelling amphipods.
- Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders that create distinctive feeding voids and aerated burrows that are visible in SPI images.

However, in temporal and spatially dynamic marine environments, benthic communities are unlikely to progress completely and sequentially through all four stages in accordance with the idealized conceptual model depicted in Figure 3-4. Various and transitional combinations of these basic successional stages are possible (e.g., Stage 1 going to Stage 2). More frequently, secondary succession can occur in response to additional labile carbon input to surface sediments, with surface-dwelling Stage 1 or 2 organisms co-existing at the same time and place with Stage 3, resulting in the assignment of a "Stage 1 on 3" or "Stage 2 on 3" designation. The image analyst will assign an infaunal successional stage for each SPI image analyzed based on this interpretive paradigm.

As a final note, the successional dynamics of benthic invertebrate communities noted above are based on well-documented studies of fine-grained benthic environments; the successional dynamics of invertebrate communities in sand and coarser sediments are less well-known and biogenic structures are less-well preserved or discernable in sands, e.g., due to limited penetration. As a result, the interpretation of successional patterns from SPI images in sandy and coarse-grained bottoms is relatively limited and the successional stage is often indeterminate.

3.2.8 Biological Features

In addition to the infaunal successional stage designation, specific biological features can be observed, counted, and measured in the images. These features typically include: 1) the infaunal organisms themselves (bivalves, polychaetes, crustacea); 2) the feeding pockets or voids that subsurface, deposit-feeding polychaetes produce; and 3) the burrows that polychaetes, bivalves, and crustacea can produce. When present in the images, feeding voids, infauna (worms, clams), and burrows were enclosed by the analyst, and their number, size, and depth in the sediment column is recorded in iSPI.

3.2.9 Plan View Image Analysis

A PV image provides a different view of the seafloor than the associated SPI image. This complementary perspective can provide valuable information on the broader seabed topography and the presence and density of epifauna, surface-dwelling infaunal, demersal fauna and/or their biostructures, such as burrow openings and fecal casts. The PV image can also provide a broader, spatial context for any features detected in the SPI image that exhibit a visible surface manifestation.

The scale information provided by the underwater lasers deployed with the PV camera (see Figure 3-3) allows accurate density counts (number per square meter) of epifauna, sediment burrow openings, or larger macrofauna captured in the images. Presence of surface *Beggiatoa* bacterial colonies along with information on sediment transport dynamics and bedform wavelengths can also be observed in the PV images. For this survey, the key features noted in the PV images are listed below:

- Sediment type (e.g., sand and silt, wood and sand)
- Wood debris (N = none, L= low [1–20%], LM = low/medium [21–40%], M = medium [41–60%], MH = medium/high [61–80%], H = high [>80%])
- Bedforms (presence: yes/no)
- Burrows (presence: yes/no)
- Tubes (presence: yes/no)
- Tracks (presence: yes/no)
- Macroalgae/aquatic vegetation type (e.g., ulva, brown algae, eelgrass)
- Epifauna (presence: yes/no)
- Epifauna type(s)/count (e.g., urchin [5], sea star [1])
- Mudclasts (presence: yes/no)
- *Beggiatoa* (N = none, T = trace [<5%], L = low [5–20%], M = medium [20–50%], H = high [>50%])
- Comments by analyst.

4 SPI–PV SURVEY RESULTS

The SPI–PV results are discussed in this section. The labeled, high-resolution SPI and PV images analyzed for this report are provided electronically. Table 3-1 list the SPI and PV survey metadata (date, location, water depth, coordinates etc.) for each image analyzed. The image analysis results for each SPI and PV image analyzed for this report are compiled in Tables 3-2 and 3-3, respectively. The following parameters are discussed in the sections that follow:

- Sediment texture and composition—grain size (major mode in phi units) and structures (e.g., strata); wood debris distribution
- Prism penetration depth (cm) and surface boundary roughness (cm)
- aRPD depth (cm)
- Infaunal successional stage and other biological features
- Features observed in the PV images.

4.1 SEDIMENT TEXTURE AND COMPOSITION

A combination of silt, fine to medium sands, gravel, cobble, and large wood debris (1–2 cm chips and larger), and fine wood fibers/splinters mixed with silt and sand were observed in the Blakely Harbor images. Figure 4-1 displays the dominant grain size for each station replicate analyzed across the survey area. The harbor is dominated by fine to medium sands south of the historical wharf structure and very fine sands and silt within the boundaries of the former structures and wharf. Coarse-grained material, ranging from granules to cobble, dominate the northwest cove and the northern shoreline. Grain size could not be determined at Station 109 where the bottom consisted of large wood debris, which precluded SPI prism penetration into the bottom. In the Mill Pond, the substrate is predominantly silt (≥4 phi); one replicate (131-C) consisted of very fine sand.

The relative abundance of wood debris in each SPI image (high, medium/high, medium, medium/low, low, and none) was estimated visually by the image analyst; those results are mapped in Figure 4-2. Examples of the relative abundance of wood debris observed in the images are shown in Figure 4-3 in three sample pairs, representing high, medium, and low percentages. Approximately 16% (32 of 198) of the SPI stations exhibited medium to high levels (40 to >80%) of wood debris (see bar graph insert on Figure 4-2). These relatively high levels of wood debris (wood fragments, chips, and fibers) are predominantly found at station locations within the former footprint of the old overwater structures and former wharf. Low/medium (20–40%) levels of wood debris generally surround the area of medium to high level. Approximately 74% (147 of 198) of the SPI stations exhibited none to low levels (0–20%) of wood debris and are widespread across much of the rest of the harbor. These lower levels of

wood debris and widespread distributions may not be anthropogenic and may reflect natural inputs of fine wood debris from the forested areas surrounding the harbor. SPI images from the following stations (e.g., 49-A, 61-A, and 71-A) show the fine wood fibers that may be natural inputs. The comment fields in Tables 3-2 and 3-3 include descriptions of the type of wood debris observed in each image where wood was evident.

Within the Mill Pond, medium levels of wood abundance were found at two stations (125 and 131) and medium/low wood abundance was evident at three stations (124, 133, and 134).

The relative abundance of wood debris in each PV image was estimated visually by the image analyst; those results are mapped in Figure 4-4 and presented in Table 3-3. As in the SPI images, the majority of locations with medium to high wood abundance designations generally follow the outlines of the historical structures along the northern portion of the harbor. In addition, *Ulva lactuca* obscured the seafloor in many of the PV images, resulting in low or none wood abundance designations in areas where wood debris was expected (e.g., Stations 96 and 97).

4.2 PRISM PENETRATION DEPTH AND SMALL-SCALE SURFACE BOUNDARY ROUGHNESS

Figures 4-5 and 4-6 show the station replicate SPI camera penetration depths and sediment surface boundary roughness measured at each location, respectively. Prism penetration, an approximation of surface sediment bearing strength, varied throughout Blakely Harbor, reflecting the gravel, cobble, sand, and silts. As expected, relatively low to no penetration (<9 cm) was obtained on the firmer sand substrates in portions of the harbor and gravel cobble substrate (0–4 cm) along the north side of Blakely Harbor. Deeper penetration (>10 cm) was obtained in areas of very fine sands and/or silt in the vicinity of the historical overwater structures and in the Mill Pond. Table 3-2 presents summary statistics for penetration depth and boundary roughness measurements. Across all SPI replicates, penetration depth ranges from 0.2 to 20.5 cm; this large range reflects the variability in bottom textures across the survey area. The maximum possible penetration depth for this equipment is 21.5 cm.

Station boundary roughness values range from 0.3 to 6.2 cm with an average of 1.3 cm (Table 3-2). Station boundary roughness was physical in origin in many of the images, reflecting wood debris and coarser grain substrates along the northern shoreline. Roughness was also biogenic in origin in many of the images from finer-grained areas with burrows, tracks, and trails and biogenic depressions.

4.3 RPD DEPTHS AND OTHER GEOCHEMICAL FEATURES

Figure 4-7 displays the distribution of aRPD depths in Blakely Harbor and the Mill Pond. The station replicate aRPD depths range from 0.5 to 3.6 cm with an average depth of 1.9 cm (Table 3-

2). Relatively deep aRPD depths (2.6 to 3.6 cm) were found at subset of stations along the southwest portion of the harbor and at a number of stations in the vicinity of the historical wharf structure. Relatively shallow aRPDs depths (≤2 cm) are found in the middle of the harbor and along the southern shoreline. Shallow and/or indeterminate aRPDs were found in intertidal locations.

A majority of the stations along the northern shoreline exhibited indeterminate aRPDs, primarily due to the coarse substrate and/or a disturbed SWI due to the abundant *Ulva lactuca* getting dragged down into the sediment column from the insertion of the prism. A majority of the stations (10 of 11) within the Mill Pond had indeterminate depth of aRPD; this was due to disturbed SWIs that resulted from the manual insertion of SPI prism into the very soft Mill Pond sediments.

Sedimentary methane was observed in nine stations within the Mill Pond (123, 124, 125, 126, 127, 130, 131, 132, and 134) and two stations (35-A and 42-A) within Blakely Harbor (Table 3-2 and Figure 4-7). As stated in Section 4.1, the Mill Pond stations were primarily comprised of silt and the widespread sedimentary methane indicates it is organically enriched and SOD is high. The harbor stations (35 and 42) that exhibit methane are located along the southern wooded shoreline. The organic enrichment in those areas may reflect the input of natural organic material (e.g., leaves and wood debris). No methane was observed at locations along the northern portion of the harbor with high concentrations of wood debris. This suggests this weathered, organic matter in this area is more refractory than the organic material in the Mill Pond and along the southern shoreline. Also, the bottom texture in that area, i.e., larger wood debris intermixed with fine sand and silt, may minimize or preclude methane bubbles from being trapped in the upper sediment column.

Sulfur-oxidizing bacterial colonies (i.e., *Beggiatoa*) were noted in one SPI image, 112-A (Table 3-2). The bacterial colonies have diagnostic bright white filamentous morphology (see SPI image 112-A). The substrate is completely covered with *Ulva lactuca* in the co-located PV image from this location. As noted in Section 3.2.6, sulfur-oxidizing bacterial colonies form when boundary-layer dissolved oxygen concentrations drop into the "hypoxic" range between 0 and 1 mL/L (Rosenberg and Diaz 1993). Their presence at this station points to low dissolved oxygen levels at and just above the SWI waters during this survey. High concentrations of *Ulva lactuca* were found in three of the replicate images from Station 112, in both the SPI and PV images. Station 112 had an observed water depth of 28 ft while surrounding stations were significantly shallower. This suggests a localized "hole" where detrital macroalgae and wood debris is/has accumulated, creating a low dissolved oxygen/high SOD area.

4.4 SUCCESSIONAL STAGE AND OTHER BIOLOGICAL FEATURES

Figure 4-8 shows the distribution of infaunal successional stages in the Site. The station replicate successional stage designations are also included in Table 3-2. Several replicates from this survey were assigned transitional successional stages (e.g., 1->2 and 2->3; Stations 92-B and 73-B) and are mapped as such. The presence of Stage 3 infauna is revealed by the presence of subsurface feeding pockets or voids. When present, the number of feeding voids observed in the SPI images ranged from 1 to 4; these values are plotted in Figure 4-8. There is no obvious pattern or gradient in the number of voids across the stations where they occur.

High-order successional stages (Stage 2->3 and 3) are most prevalent along the southwest shoreline and at locations proximal to the historical wharf structure, including a number of stations that show medium to high wood debris levels. Figure 4-9 shows examples of SPI images with wood debris and Stage 3 assemblages. The majority of low-order successional stages (Stage 1 and 1-> 2) are found in the offshore, fine and medium sand–dominated central portion of the harbor where wood abundance is low. This may reflect higher levels of physical disturbance in that area compared with the nearshore areas. Finally, most of the indeterminate successional stage designations are concentrated along the northern shoreline, where penetration was minimal due to coarse gravel and sand substrates.

The PV imagery provided evidence of epifaunal organisms in Blakely Harbor. Surface sediment and water-column dwelling fauna observed include barnacles, snails, shrimp, sculpin, and Dungeness crab. The presence and number of organisms in each PV image are compiled in Table 3-3. Other evidence of the presence of both infauna and epifauna, such as tubes, tracks, and burrows, are also evident in the PV images.

5 SUMMARY

The October 2020 SPI–PV camera survey results reported here document surface sediment physical, geochemical, and biological conditions in Blakely Harbor and the Mill Pond in October 2020. Images represent surface sediment in the upper 21 cm based on penetration depths. Relatively high levels of wood debris (ranging in from very small splinters to chips and large chunks) are present in the vicinity of the former overwater structures and historical wharf (and within the Mill Pond). Benthic habitat quality, as inferred from the SPI–PV imaging approach, is not obviously impaired in areas with high wood debris. Gradients in benthic assemblages in the harbor appear to be more related to gradients in substrate texture, which may be a function of physical disturbance factors. The Mill Pond appears to be an area of high organic loading and SOD.

Finally, it should be noted that this survey, conducted in the fall of 2020, presents a "snapshot" of benthic conditions in Blakely Harbor at that time. Some features, such as the distribution and type of wood debris, are not likely to change notably seasonally or over annual time frames, although decay and remineralization of the wood particles is likely on a decadal time scale. Biologically controlled parameters, such as the aRPD depths, biogenic structures, and the infaunal successional stages, may exhibit a seasonal or interannual variations as a function of temporal changes in water temperature, organic matter inputs (e.g., plankton/macroalgae blooms, precipitation controlled runoff), and physical factors (e.g., winter storms). However, there is no evidence in the images that this seasonal variation is dramatic in Blakely Harbor, e.g., seasonal hypoxia would be revealed in SPI images by buried, relict aRPDs. So while some seasonal variations in the parameters measured is likely, this fall survey appears to provide a relatively stable "picture" of the benthic habitat quality at the site.

6 REFERENCES

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Figures

N:\GIS\Projects\ Projects 3000 to 3999\C3089 BlakelyHarborPark GC\Production MXDs\Blakely Oct 2020 Report\Figure 1 1 Blakely Harbor Site.mxd 6/8/2021 12:44:14 PM

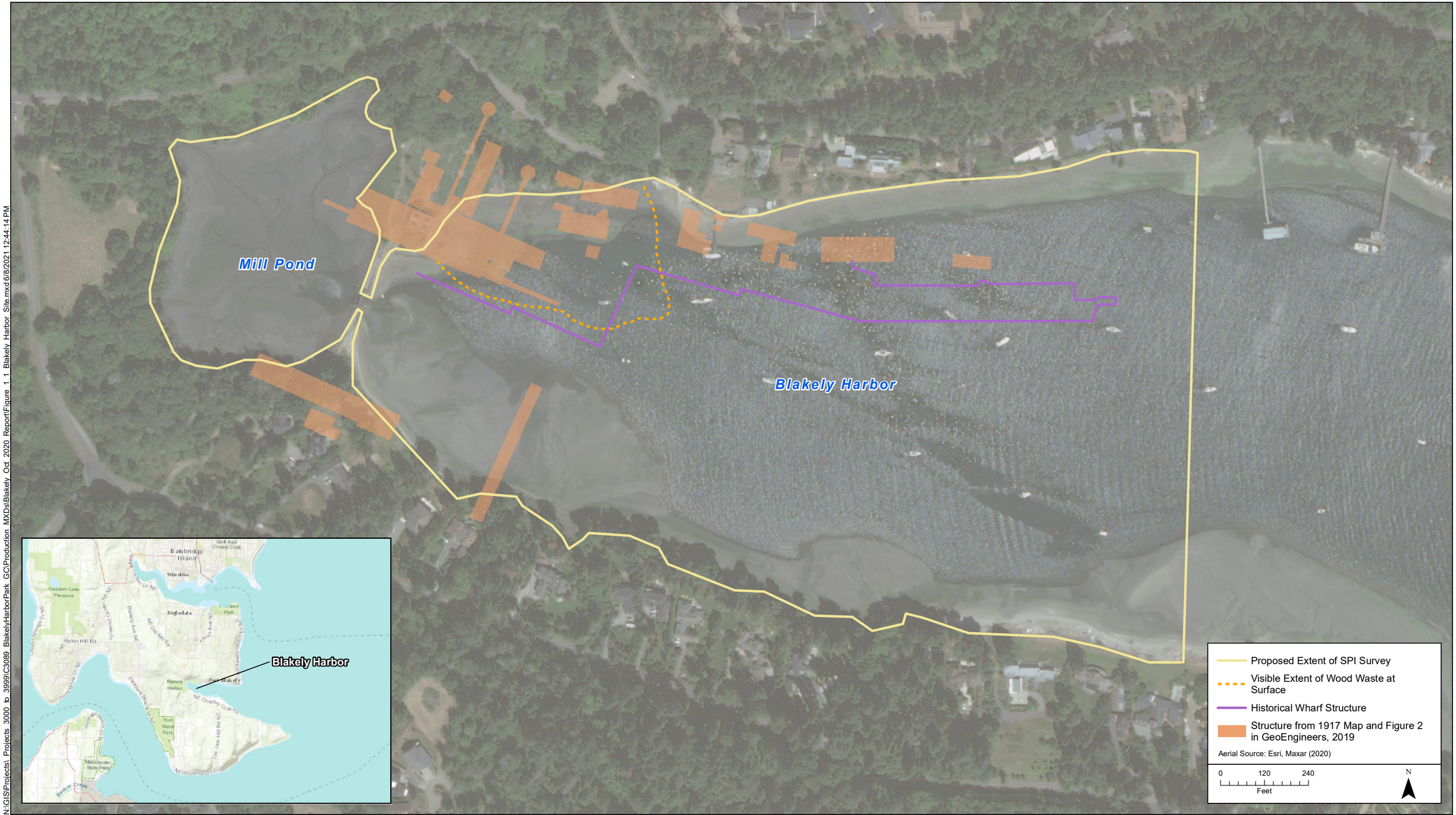

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Figure 1-1.
Blakely Harbor Park Site Vicinity Map

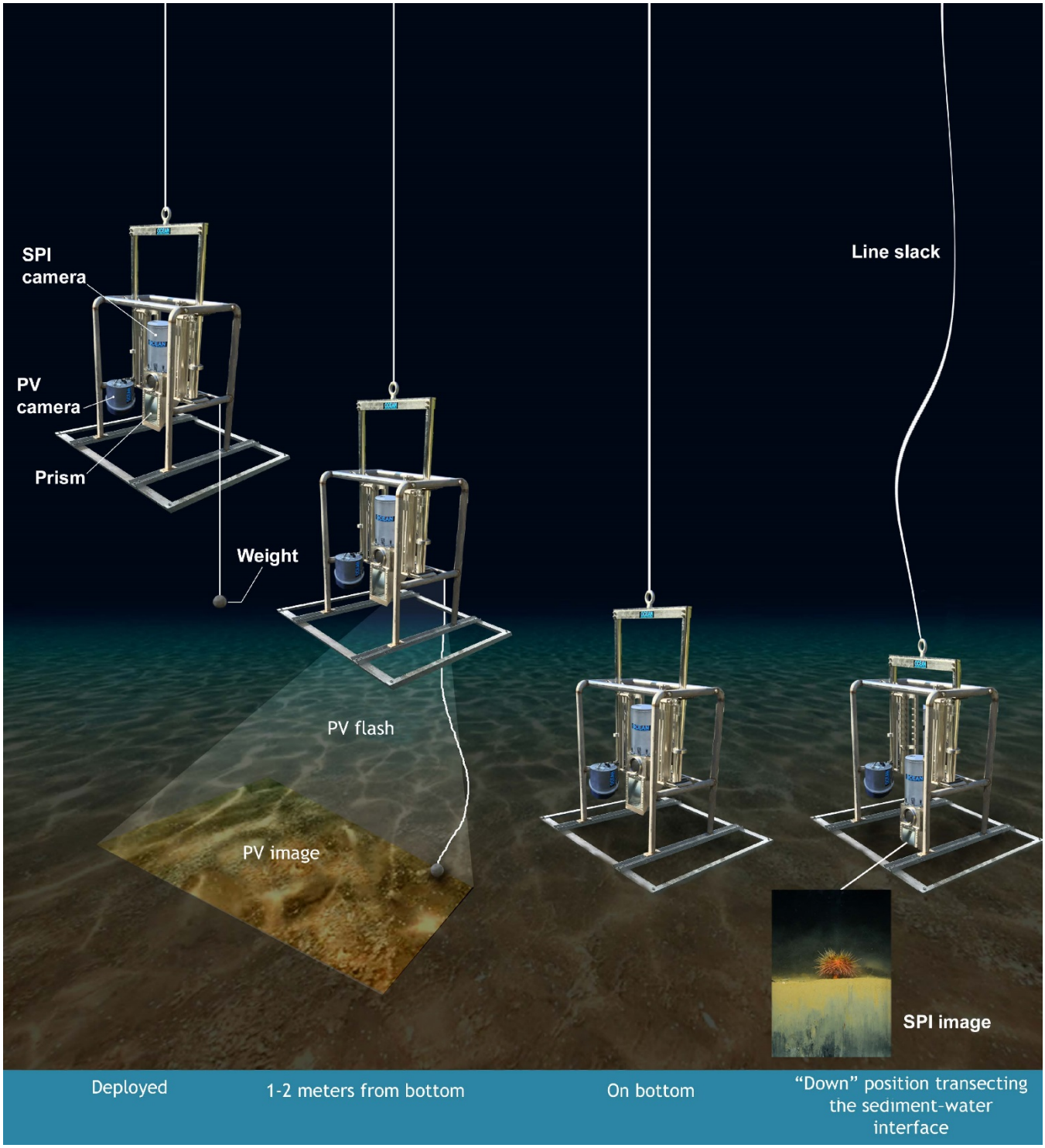

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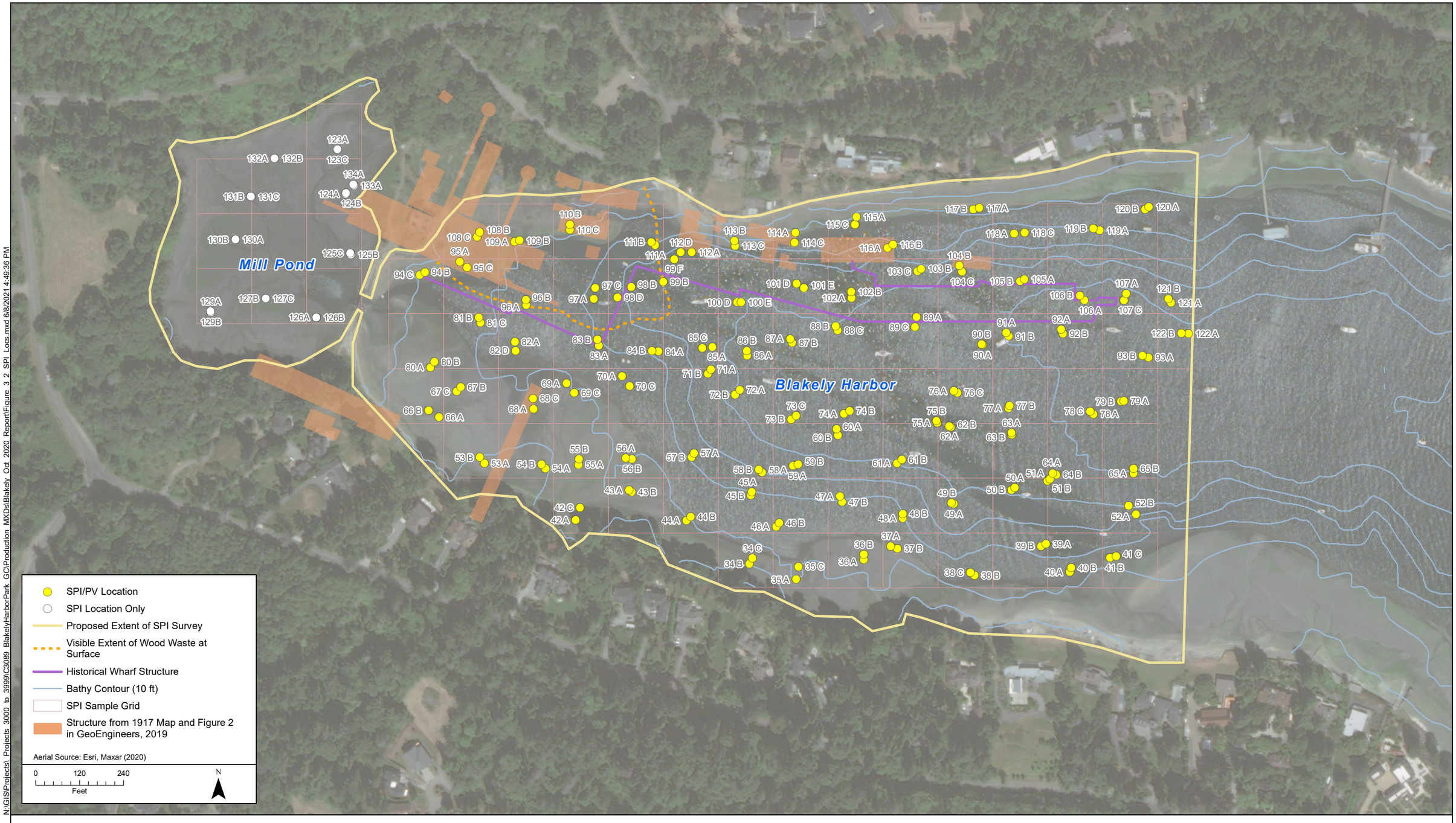
Figure 3-1.
Sediment Profile and Plan View Camera System Deployment



N:\GIS\Projects\ Projects 3000 to 3999\C3089 BlakelyHarborPark GC\Production MXDs\Blakely Oct 2020 Report\Figure 3 2 SPI Locs.mxd 6/8/2021 4:49:36 PM

Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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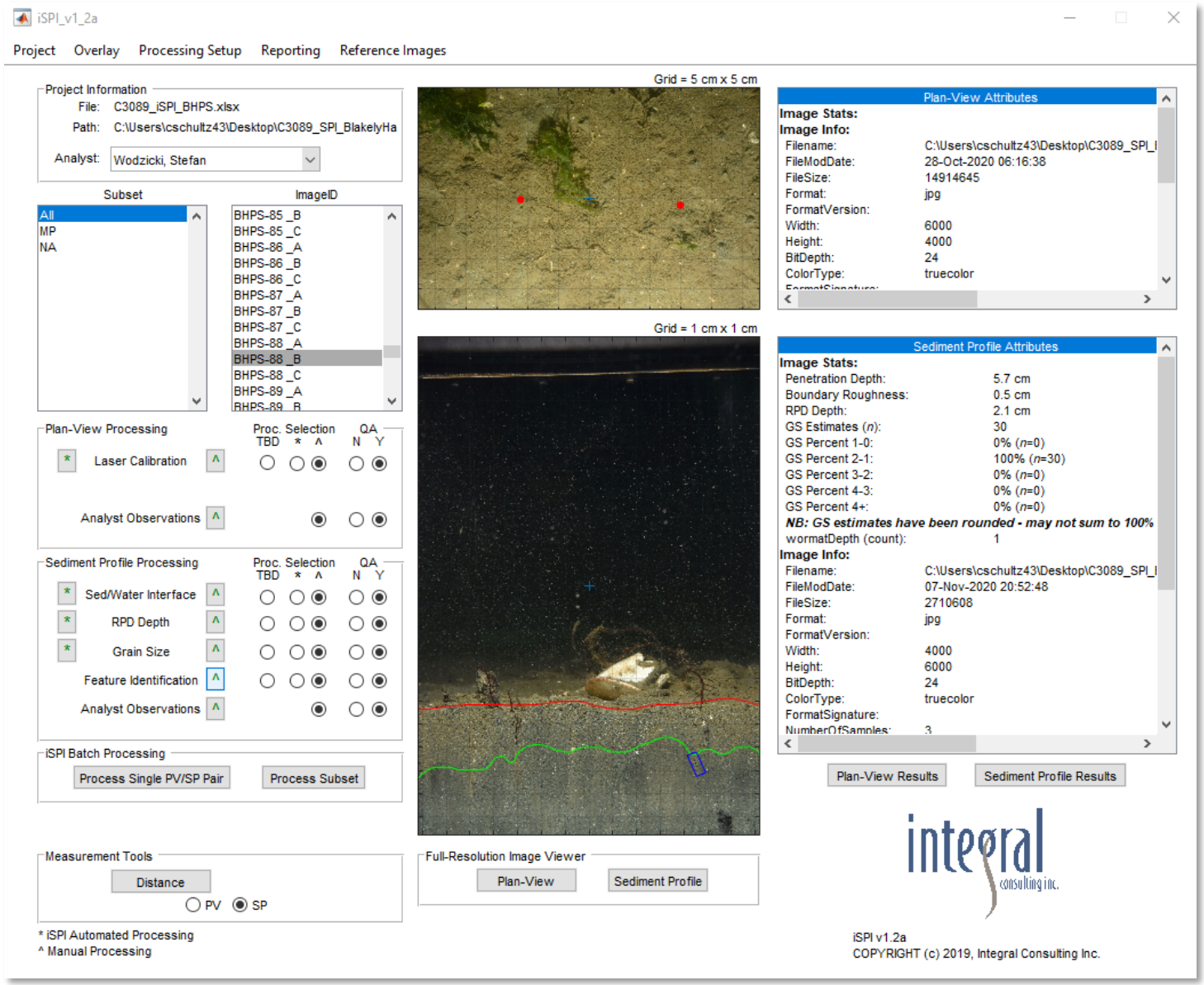
Figure 3-2.
SPI/PV Stations Sampled in Blakely Harbor Park Site 2020
Bainbridge Island, WA



Red dots in PV image are 26-cm-spaced laser scalers.

SPI Image Lines:

- red = sediment-water interface
- green = aRPD boundary
- blue = encircle feeding voids and worms

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Figure 3-3.
iSPI Display

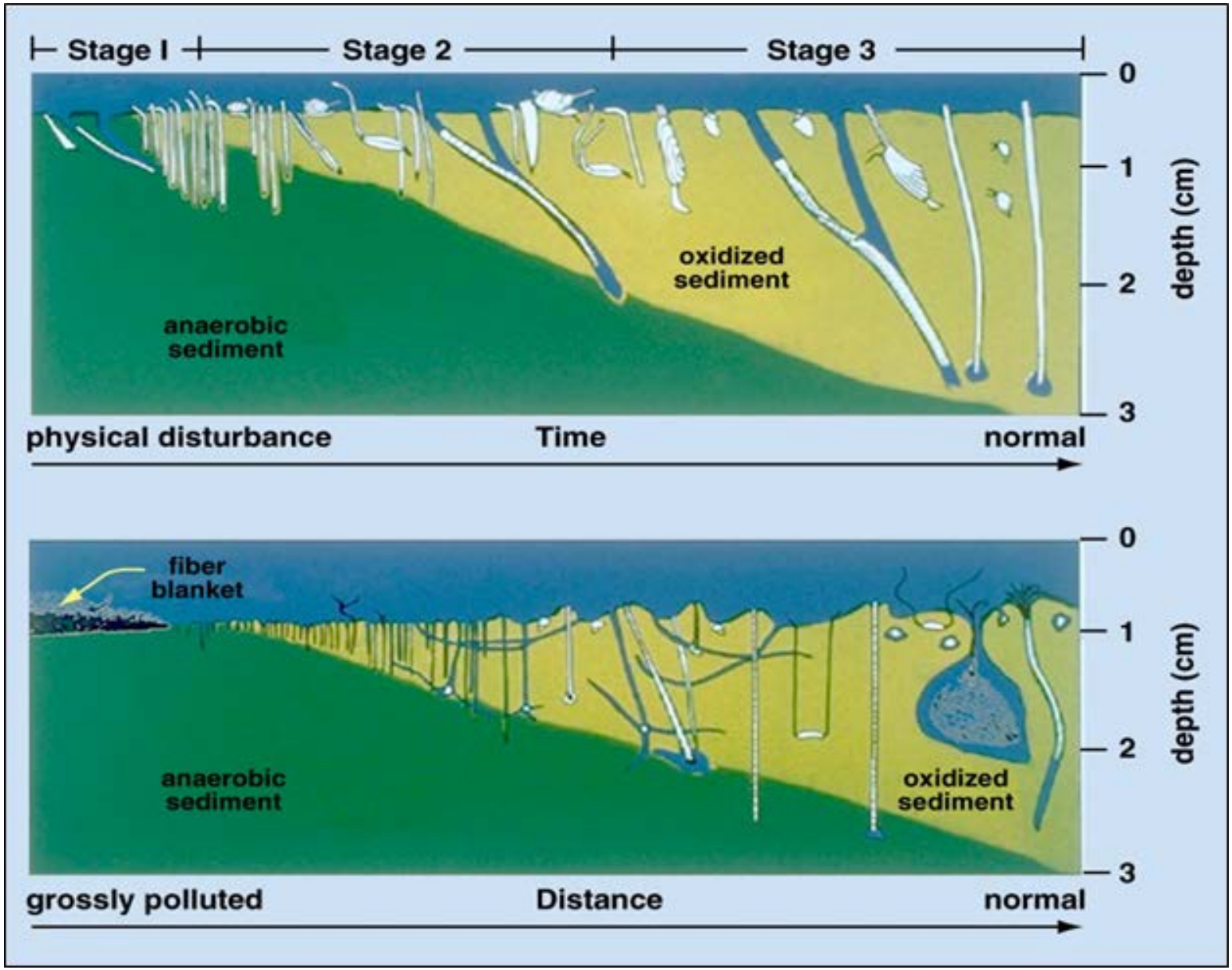

Figure 3-4.
Benthic Infaunal Successional Stages that Develop Over Time or Space Following a Disturbance (from Rhoads and Germano 1982)

N:\GIS\Projects\ Projects 3000 to 3999\C3089 BlakelyHarborPark GCI\Production MXDs\Blakely Oct 2020 Report\Figure 4 1 Major Grain Size.mxd 6/9/2021 1:30:14 PM

Mill Pond

Blakely Harbor

Dominant Grain Size (phi)

- Granule (-1) to Cobble (-7)
- Medium Sand (2-1)
- Medium Sand (2-1) over Fine Sand (3-2)
- Medium Sand (2-1) over Very Fine Sand (4-3)
- Fine Sand (3-2)
- Fine Sand (3-2) over Medium Sand (2-1)
- Fine Sand (3-2) over Very Fine Sand (4-3)
- Fine Sand (3-2) over Silt (>4)
- Very Fine Sand (4-3)
- Very Fine Sand (4-3) over Medium Sand (2-1)
- Very Fine Sand (4-3) over Fine Sand (3-2)
- Silt (>4)
- Indeterminate
- Proposed Extent of SPI Survey
- Visible Extent of Wood Waste at Surface
- Historical Wharf Structure
- Bathy Contour (10 ft)
- SPI Sample Grid
- Structure from 1917 Map

Aerial Source: Esri, Maxar (2020)

0 120 240
Feet

N

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Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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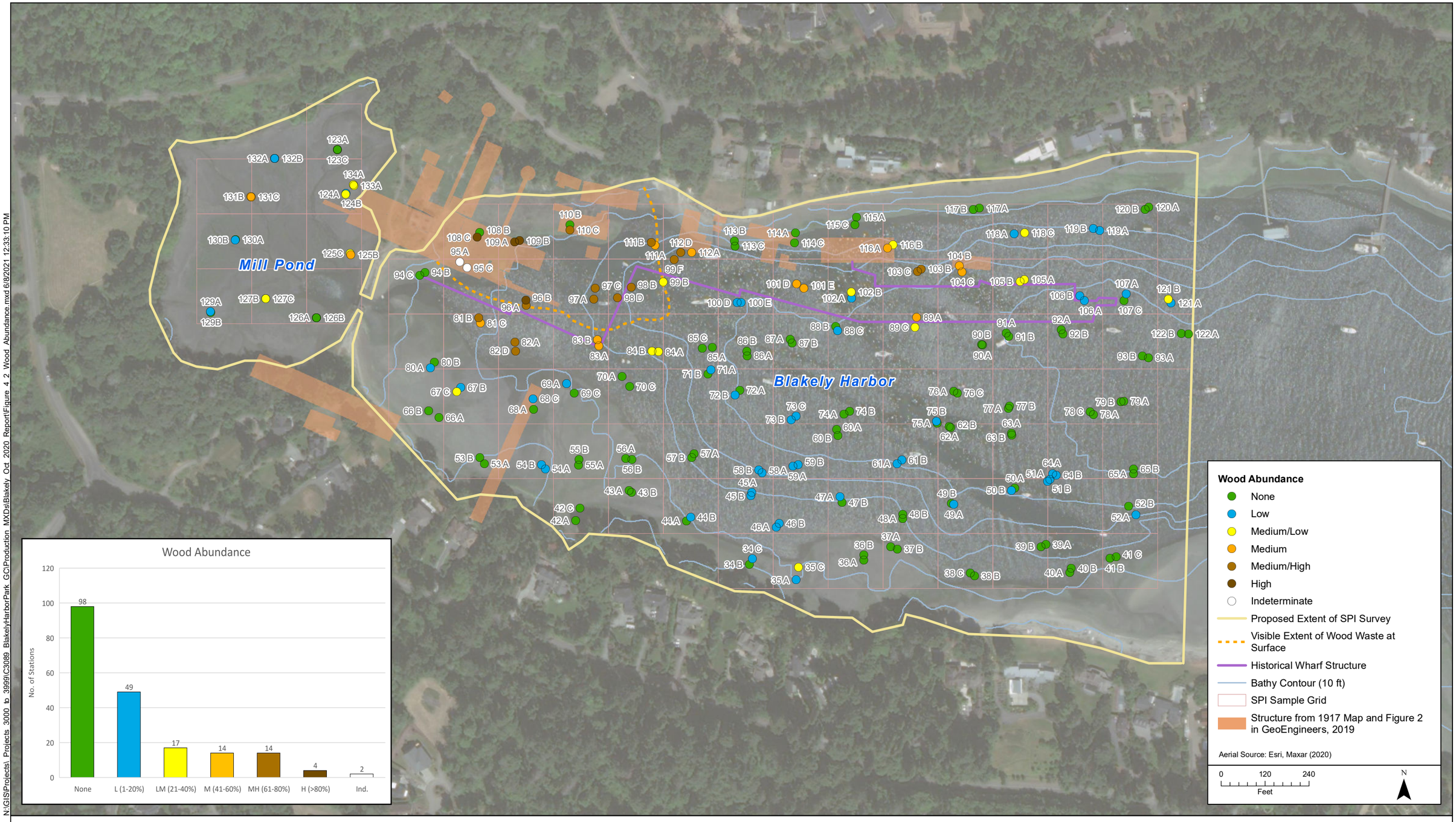
Figure 4-1.
Dominant Grain Size at Each Station in the Blakely Harbor Park Site SPI Images
Bainbridge Island, WA



N:\GIS\Projects\ Projects 3000 to 3999\C3089 BlakelyHarborPark GCI\Production MXDs\Blakely Oct 2020 Report\Figure 4 2 Wood Abundance.mxd 6/8/2021 12:33:10 PM

Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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Figure 4-2.
Relative Wood Abundance at Each Station in the Blakely Harbor Park Site SPI Images
Bainbridge Island, WA

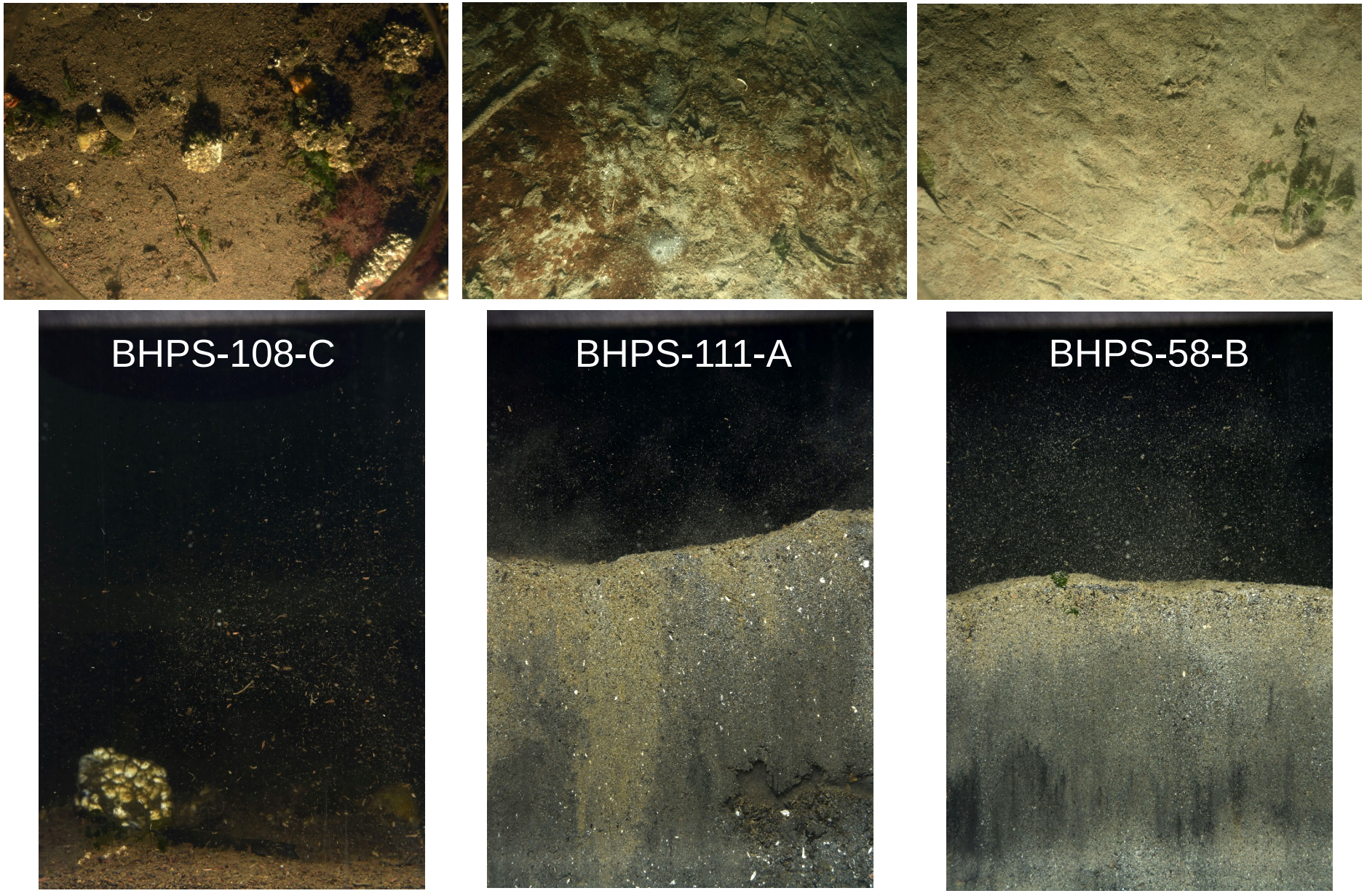

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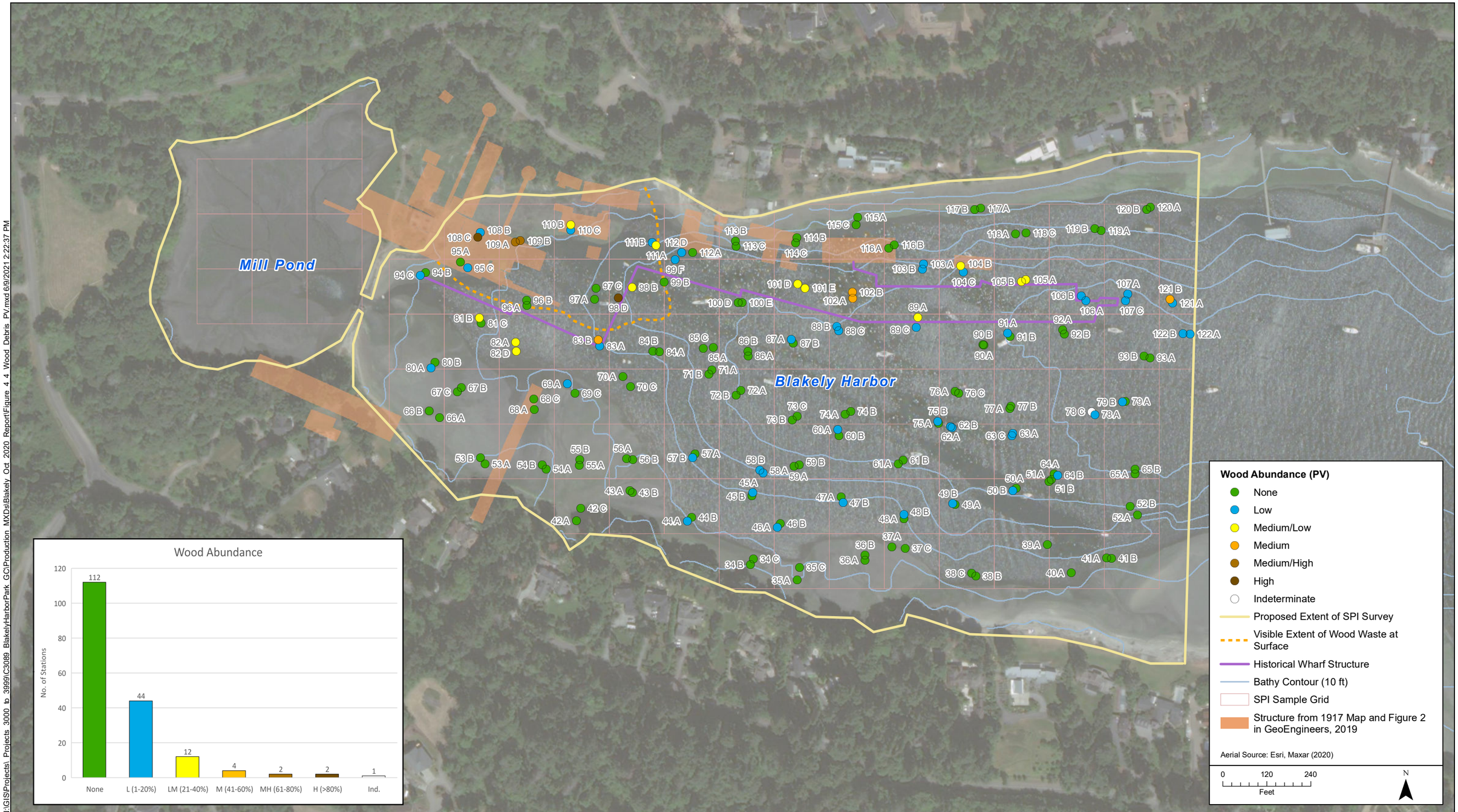
Figure 4-3.
Relative Wood Debris Abundance in SPI and PV Image Pairs across Blakely Harbor Park Site (2020). BHPS-108-C: High wood abundance in both PV and SPI images. BHPS-111-A: Medium wood abundance in both PV and SPI images BHPS-58-B: Low wood abundance in both PV and SPI images. Scale: width of SPI images = 14.4 cm; width of PV BHPS-108-C = 43 cm, BHPS-111-A = 78 cm, BHPS-58-B = 79 cm.



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Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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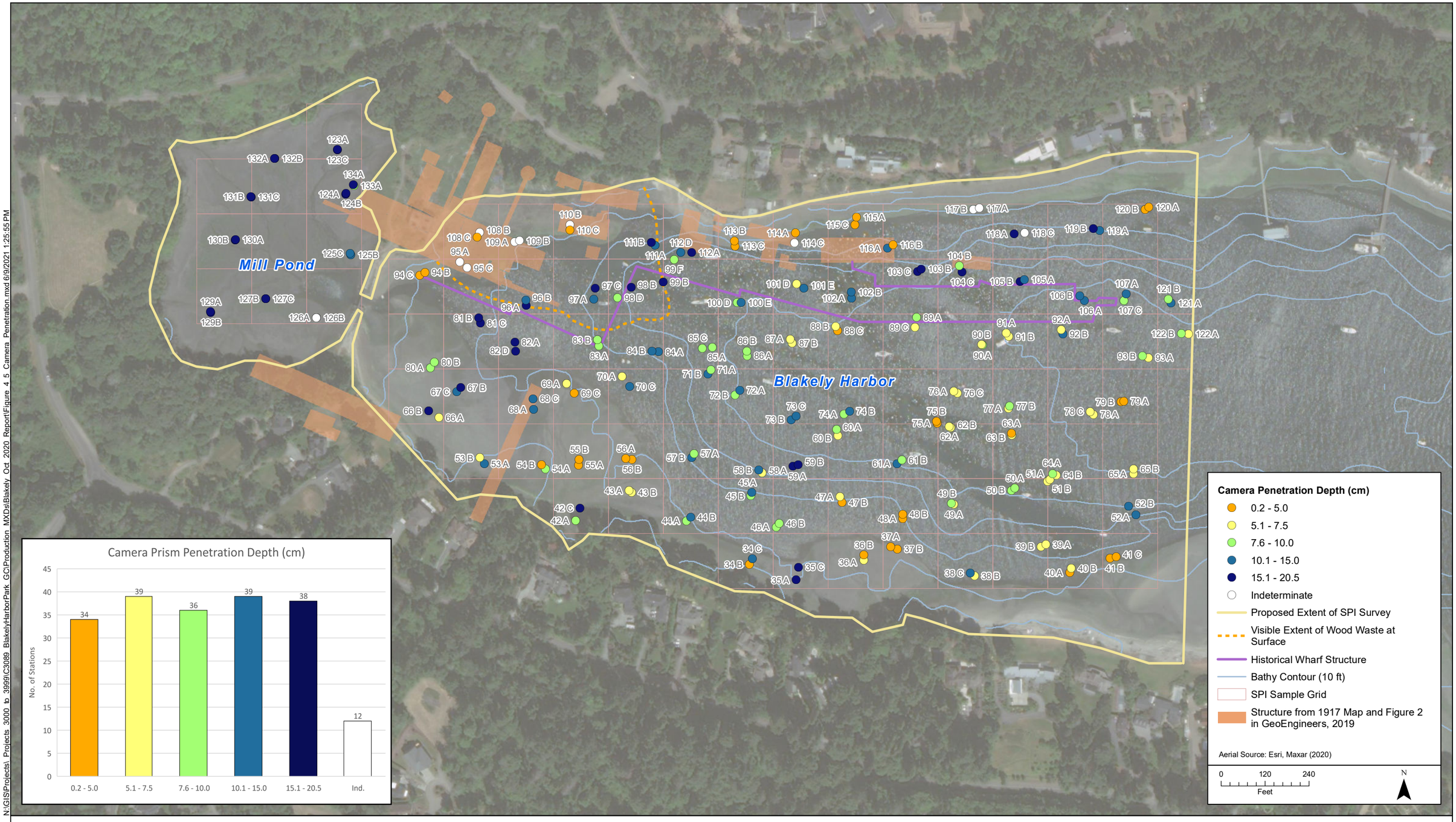
Figure 4-4.
Relative Wood Abundance at Each Station in the Blakely Harbor Park Site PV Images
Bainbridge Island, WA



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Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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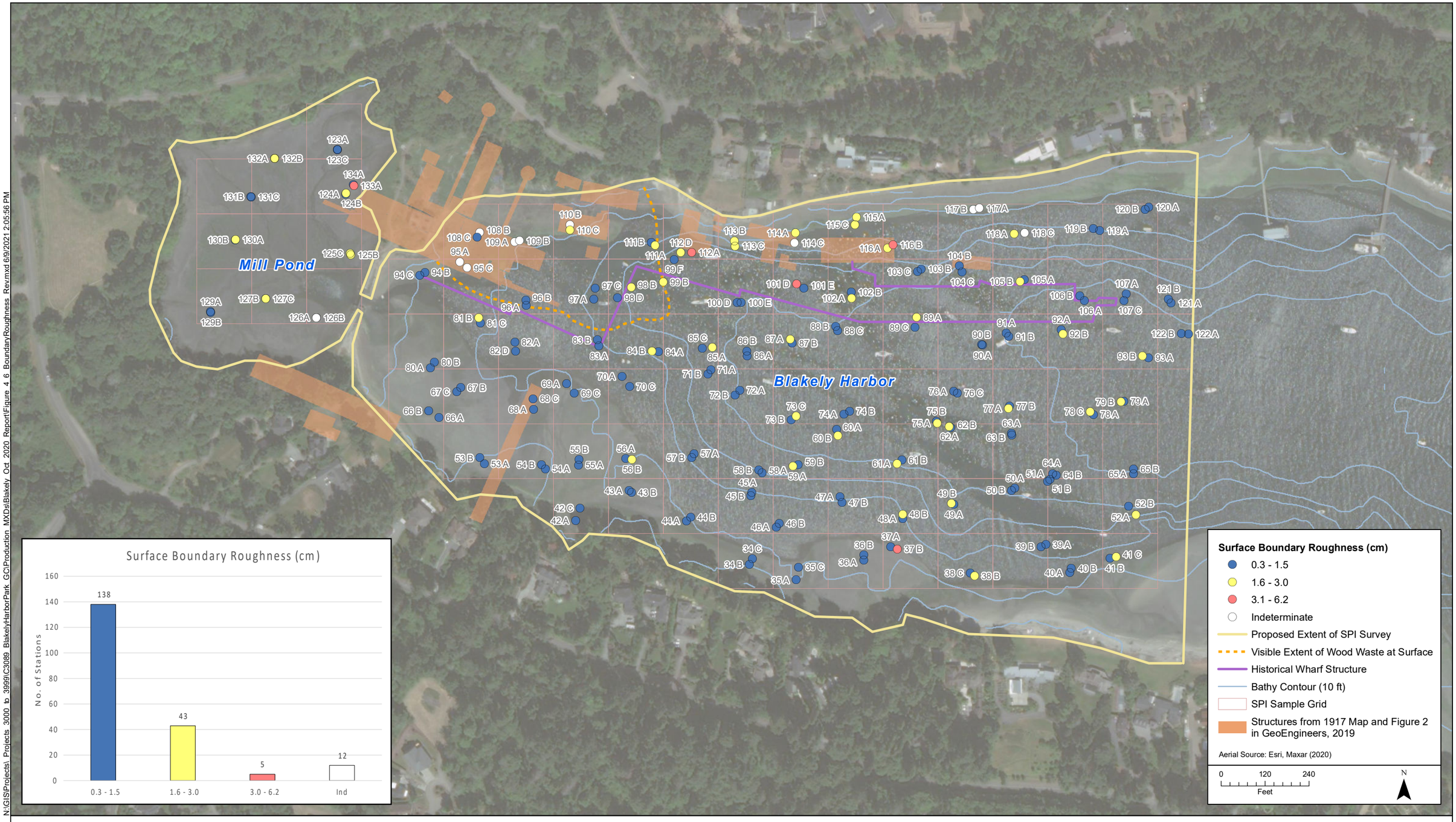
Figure 4-5.
SPI Prism Penetration Depth at Each Station in the Blakely Harbor Park Site SPI Images
Bainbridge Island, WA



N:\GIS\Projects\ Projects 3000 to 3999\C3089 BlakelyHarborPark GCI\Production MXDs\Blakely Oct 2020 Report\Figure 4 6 BoundaryRoughness Rev.mxd 6/9/2021 2:05:56 PM

Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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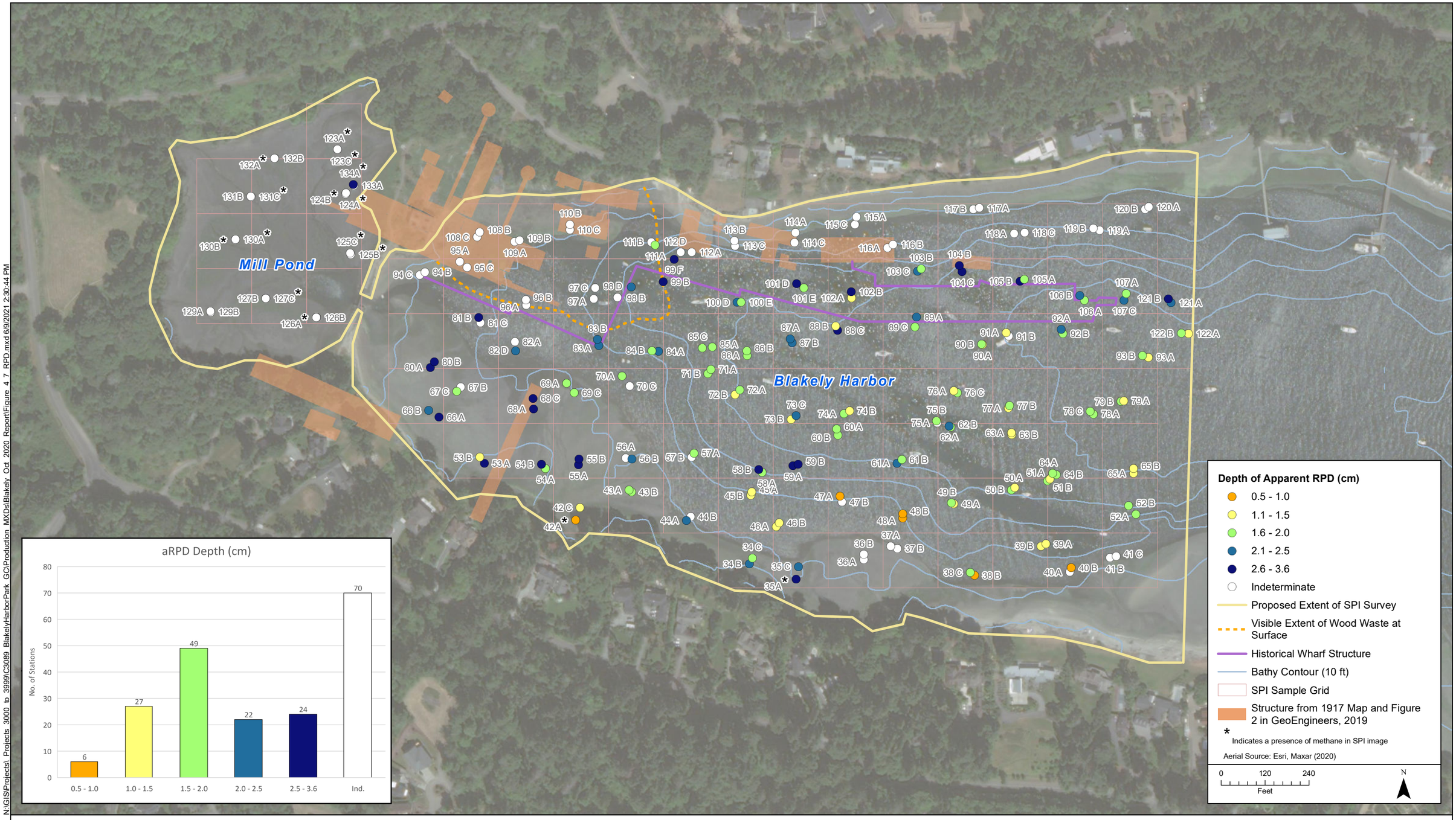
Figure 4-6.
Surface Boundary Roughness at Each Station in the Blakely Harbor Park Site SPI Images
Bainbridge Island, WA



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Notes:
1. Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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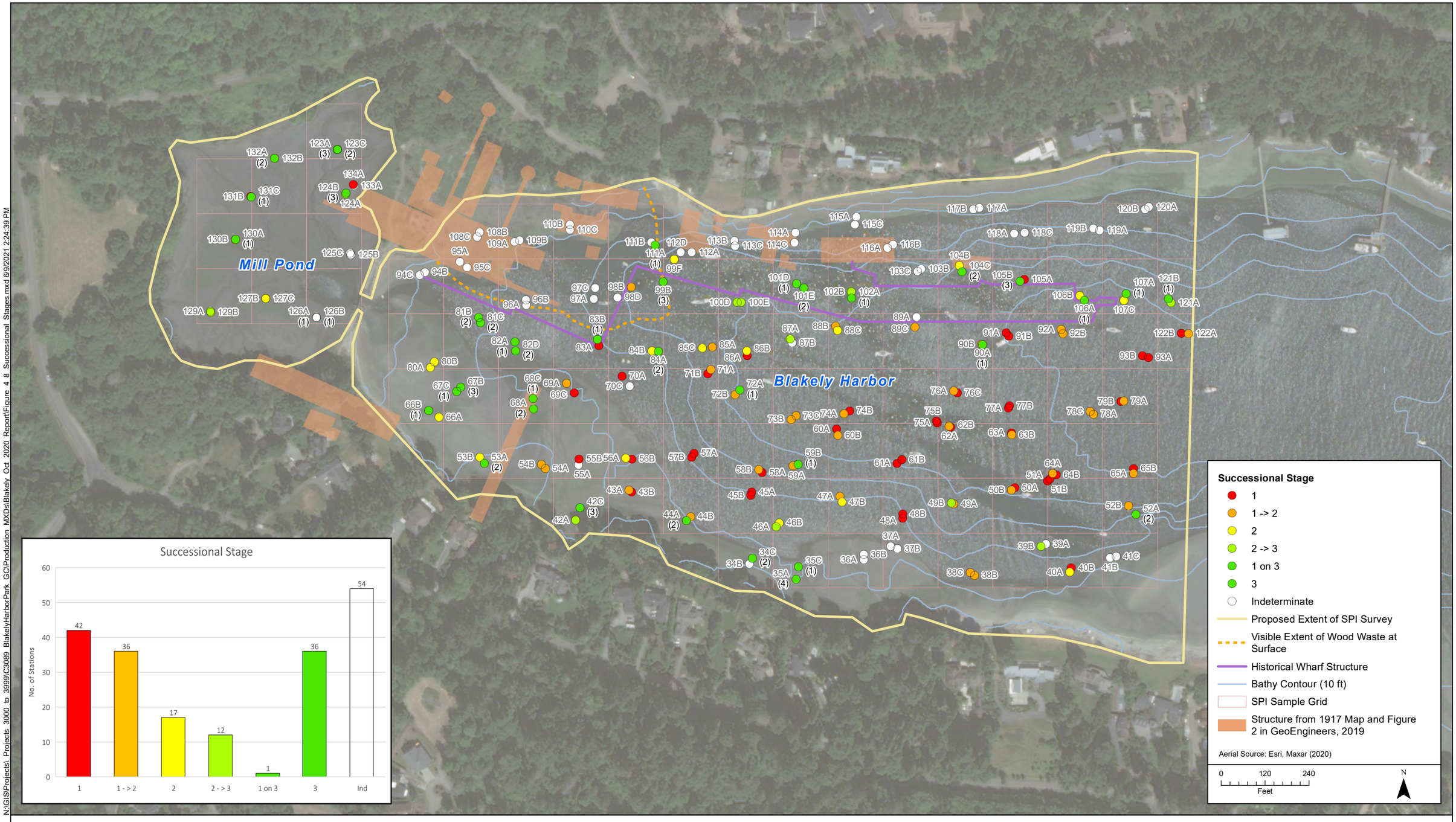
Figure 4-7.
aRPD Depth at Each Station in the Blakely Harbor Park Site SPI Images
Bainbridge Island, WA



N:\GIS\Projects\ Projects 3000 to 3999\C3089 BlakelyHarborPark GC\Production MXDs\Blakely Oct 2020 Report\Figure 4 8 Successional Stages.mxd 6/9/2021 2:24:39 PM

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Bathymetry Source: *University of Washington (2005) Data Archives for Puget Sound. Retrieved from https://ocean.washington.edu/data/pugetsound*

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Station and Replicate ID: 031A (3) — Feeding Void Count

Figure 4-8.
Benthic Infaunal Successional Stage at Each Station in the Blakely Harbor Park Site SPI Images
Bainbridge Island, WA



BHPS-99-B



BHPS-82-D



BHPS-81-B

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Figure 4-9.
Blakely Harbor Park Site: High Successional Stage with Wood Debris. Three SPI images with high successional stage and wood debris. BHPS-99-B = Stage 3 and low/medium (wood debris). BHPS-82-D = Stage 3 and medium/high (wood debris). BHPS-81-B = Stage 3 and medium/high (wood debris). Scale: Image width is 14.6 cm.

Tables

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-34	A	10/27/2020	14:55	7	1226203.904	221223.31		
BHPS-34	B	10/27/2020	14:57	8	1226218.013	221230.551	X	X
BHPS-34	C	10/27/2020	15:01	9	1226226.452	221246.157	X	X
BHPS-35	A	10/29/2020	8:13	4	1226345.78	221187.8435	X	X
BHPS-35	B	10/29/2020	8:15	5	1226349.22	221204.9		
BHPS-35	C	10/29/2020	8:16	6	1226352.113	221223.4	X	X
BHPS-36	A	10/27/2020	14:11	8	1226530.381	221242.493	X	X
BHPS-36	B	10/27/2020	14:12	9	1226530.171	221256.089	X	X
BHPS-36	C	10/27/2020	14:13	9	1226517.118	221237.88		
BHPS-37	A	10/27/2020	13:54	10	1226604.053	221279.316	X	X
BHPS-37	B	10/27/2020	13:57	10	1226622.32	221272.3699	X	
BHPS-37	C	10/27/2020	14:00	10	1226640.607	221275.19		X
BHPS-38	A	10/27/2020	13:45	16	1226838.269	221188.72		
BHPS-38	B	10/27/2020	13:48	16	1226833.104	221199.322	X	X
BHPS-38	C	10/27/2020	13:50	16	1226821.537	221206.788	X	X
BHPS-39	A	10/27/2020	13:16	28	1227028.363	221284.491	X	X
BHPS-39	B	10/27/2020	13:17	28	1227014.37	221279.177	X	X
BHPS-39	C	10/27/2020	13:19	28	1226998.935	221273.697		
BHPS-40	A	10/27/2020	13:11	15	1227092.938	221208.058	X	X
BHPS-40	B	10/27/2020	13:12	15	1227097.077	221219.483	X	X
BHPS-40	C	10/27/2020	13:13	15	1227099.544	221233.787		
BHPS-41	A	10/27/2020	13:03	10	1227189.753	221247.731		X
BHPS-41	B	10/27/2020	13:05	10	1227202.746	221247.454	X	X
BHPS-41	C	10/27/2020	13:06	10	1227219.34	221251.05	X	
BHPS-42	A	10/27/2020	15:29	5	1225743.963	221350.107	X	X
BHPS-42	B	10/27/2020	15:30	7	1225753.02	221367.353		
BHPS-42	C	10/27/2020	15:31	7	1225755.499	221384.028	X	X
BHPS-43	A	10/27/2020	15:23	10	1225889.749	221432.105	X	X
BHPS-43	B	10/27/2020	15:24	10	1225895.814	221426.668	X	X
BHPS-43	C	10/27/2020	15:26	10	1225912.665	221426.385		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-44	A	10/27/2020	15:17	13	1226046.339	221349.181	X	X
BHPS-44	B	10/27/2020	15:18	13	1226057.414	221359.469	X	X
BHPS-44	C	10/27/2020	15:19	13	1226066.684	221371.553		
BHPS-45	A	10/27/2020	14:49	25	1226224.742	221426.462	X	X
BHPS-45	B	10/27/2020	14:50	25	1226222.133	221417.241	X	X
BHPS-45	C	10/27/2020	14:51	25	1226212.544	221408.913		
BHPS-46	A	10/27/2020	14:22	16	1226291.237	221332.662	X	X
BHPS-46	B	10/27/2020	14:23	16	1226299.426	221342.704	X	X
BHPS-46	C	10/27/2020	14:24	17	1226310.487	221354.453		
BHPS-47	A	10/27/2020	14:17	24	1226465.797	221414.394	X	X
BHPS-47	B	10/27/2020	14:18	23	1226471.146	221399.472	X	X
BHPS-47	C	10/27/2020	14:19	23	1226478.49	221389.131		
BHPS-48	A	10/27/2020	14:06	27	1226637.396	221354.795	X	X
BHPS-48	B	10/27/2020	14:07	28	1226636.711	221367.554	X	X
BHPS-48	C	10/27/2020	14:08	29	1226642.656	221382.937		
BHPS-49	A	10/27/2020	11:03	33	1226776.69	221394.573	X	X
BHPS-49	B	10/27/2020	11:04	33	1226769.707	221396.637	X	X
BHPS-49	C	10/27/2020	11:04	33	1226760.716	221398.4		
BHPS-50	A	10/27/2020	10:58	38	1226942.786	221438.268	X	X
BHPS-50	B	10/27/2020	10:59	38	1226934.188	221432.357	X	X
BHPS-50	C	10/27/2020	10:59	38	1226928.221	221426.975		
BHPS-51	A	10/27/2020	10:47	41	1227031.749	221456.592	X	X
BHPS-51	B	10/27/2020	10:49	41	1227038.577	221462.533	X	X
BHPS-51	C	10/27/2020	10:50	41	1227048.449	221466.185		
BHPS-52	A	10/28/2020	8:27	37	1227274.261	221365.453	X	X
BHPS-52	B	10/28/2020	8:29	39	1227253.841	221390.09	X	X
BHPS-52	C	10/28/2020	8:30	39	1227263.835	221380.8		
BHPS-53	A	10/27/2020	15:40	8	1225493.977	221505.332	X	X
BHPS-53	B	10/27/2020	15:42	8	1225482.012	221521.378	X	X
BHPS-53	C	10/27/2020	15:43	7	1225465.337	221529.68		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-54	A	10/27/2020	15:34	9	1225660.874	221491.342	X	X
BHPS-54	B	10/27/2020	15:35	9	1225650.408	221502.711	X	X
BHPS-54	C	10/27/2020	15:36	9	1225639.962	221517.085		
BHPS-55	A	10/27/2020	16:07	9	1225751.427	221501.46	X	X
BHPS-55	B	10/27/2020	16:08	9	1225752.923	221516.916	X	X
BHPS-55	C	10/27/2020	16:09	9	1225756.138	221531.443		
BHPS-56	A	10/27/2020	16:11	10	1225880.626	221519.635	X	X
BHPS-56	B	10/27/2020	16:13	10	1225896.904	221517.517	X	X
BHPS-56	C	10/27/2020	16:14	10	1225914.072	221522.062		
BHPS-57	A	10/27/2020	16:17	20	1226066.668	221533.491	X	X
BHPS-57	B	10/27/2020	16:18	19	1226060.421	221522.109	X	X
BHPS-57	C	10/27/2020	16:20	21	1226061.351	221549.821		
BHPS-58	A	10/27/2020	16:24	33	1226252.836	221480.235	X	X
BHPS-58	B	10/27/2020	16:25	34	1226243.539	221487.917	X	X
BHPS-58	C	10/27/2020	16:26	34	1226226.248	221497.949		
BHPS-59	A	10/27/2020	16:28	37	1226336.667	221498.561	X	X
BHPS-59	B	10/27/2020	16:29	38	1226351.474	221503.276	X	X
BHPS-59	C	10/27/2020	16:30	37	1226360.078	221516.191		
BHPS-60	A	10/28/2020	8:57	37	1226456.054	221598.83	X	X
BHPS-60	B	10/28/2020	8:58	37	1226459.684	221581.592	X	X
BHPS-60	C	10/28/2020	8:59	36	1226467.797	221561.777		
BHPS-61	A	10/28/2020	8:52	36	1226621.641	221506.074	X	X
BHPS-61	B	10/28/2020	8:53	36	1226634.171	221515.361	X	X
BHPS-61	C	10/28/2020	8:54	37	1226641.298	221525.527		
BHPS-62	A	10/27/2020	11:07	39	1226763.63	221607.277	X	X
BHPS-62	B	10/27/2020	11:08	39	1226768.17	221604.674	X	X
BHPS-62	C	10/27/2020	11:09	39	1226771.292	221596.891		
BHPS-63	A	10/27/2020	10:33	41	1226933.548	221588.642	X	X
BHPS-63	B	10/27/2020	10:34	41	1226934.315	221583.228	X	
BHPS-63	C	10/27/2020	10:35	41	1226931.236	221581.507		X

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-64	A	10/27/2020	10:52	41	1227046.718	221477.579	X	X
BHPS-64	B	10/27/2020	10:53	41	1227056.574	221474.184	X	X
BHPS-64	C	10/27/2020	10:54	41	1227061.89	221466.882		
BHPS-65	A	10/28/2020	8:46	44	1227267.192	221477.309	X	X
BHPS-65	B	10/28/2020	8:47	44	1227267.224	221491.284	X	X
BHPS-65	C	10/28/2020	8:48	45	1227271.599	221508.546		
BHPS-66	A	10/27/2020	15:46	7	1225369.948	221631.431	X	X
BHPS-66	B	10/27/2020	15:48	7	1225341.531	221649.441	X	X
BHPS-66	C	10/27/2020	15:49	7	1225330.234	221687.306		
BHPS-67	A	10/29/2020	8:37	4	1225441.012	221721.33		
BHPS-67	B	10/29/2020	8:39	3	1225429.401	221712.955	X	X
BHPS-67	C	10/29/2020	8:40	3	1225418.586	221701.172	X	X
BHPS-68	A	10/29/2020	8:42	5	1225628.229	221653.382	X	X
BHPS-68	B	10/29/2020	8:44	5	1225628.636	221665.182		
BHPS-68	C	10/29/2020	8:45	5	1225626.855	221682.573	X	X
BHPS-69	A	10/29/2020	8:47	5	1225718.373	221723.73	X	X
BHPS-69	B	10/29/2020	8:48	5	1225727.465	221709.685		
BHPS-69	C	10/29/2020	8:49	5	1225739.493	221697.659	X	X
BHPS-70	A	10/28/2020	10:35	10	1225870.408	221743.81	X	X
BHPS-70	B	10/28/2020	10:37	9	1225886.472	221731.095		
BHPS-70	C	10/28/2020	10:39	8	1225890.758	221715.391	X	X
BHPS-71	A	10/28/2020	9:58	31	1226112.692	221761.375	X	X
BHPS-71	B	10/28/2020	9:59	31	1226104.377	221750.564	X	X
BHPS-71	C	10/28/2020	10:01	30	1226088.658	221734.491		
BHPS-72	A	10/28/2020	9:13	33	1226192.346	221706.006	X	X
BHPS-72	B	10/28/2020	9:14	34	1226178.575	221692.907	X	X
BHPS-72	C	10/28/2020	9:17	34	1226200.255	221663.571		
BHPS-73	A	10/28/2020	9:07	35	1226322.897	221617.691		
BHPS-73	B	10/28/2020	9:08	36	1226332.109	221625.908	X	X
BHPS-73	C	10/28/2020	9:09	36	1226345.443	221634.6	X	X

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-74	A	10/28/2020	9:02	37	1226476.09	221640.44	X	X
BHPS-74	B	10/28/2020	9:03	37	1226491.654	221648.673	X	X
BHPS-74	C	10/28/2020	9:04	37	1226500.662	221659.01		
BHPS-75	A	10/27/2020	11:11	39	1226730.902	221616.305	X	X
BHPS-75	B	10/27/2020	11:12	39	1226729.172	221621.025	X	X
BHPS-75	C	10/27/2020	11:13	39	1226726.278	221625.521		
BHPS-76	A	10/27/2020	11:31	42	1226776.135	221702.995	X	X
BHPS-76	B	10/27/2020	11:32	42	1226779.923	221701.419		
BHPS-76	C	10/27/2020	11:33	42	1226786.543	221698.402	X	X
BHPS-77	A	10/27/2020	10:27	41	1226925.574	221656.207	X	X
BHPS-77	B	10/27/2020	10:29	41	1226929.072	221662.422	X	X
BHPS-77	C	10/27/2020	10:30	41	1226930.152	221665.569		
BHPS-78	A	10/27/2020	10:10	45	1227158.004	221640.165	X	X
BHPS-78	B	10/27/2020	10:11	45	1227152.917	221644.824		
BHPS-78	C	10/27/2020	10:12	45	1227149.144	221647.397	X	X
BHPS-79	A	10/27/2020	9:38	46	1227240.62	221675.619	X	X
BHPS-79	B	10/27/2020	9:39	45	1227233.107	221673.938	X	X
BHPS-79	C	10/27/2020	9:39	45	1227246.94	221674.188		
BHPS-80	A	10/29/2020	8:32	3	1225346.757	221767.526	X	X
BHPS-80	B	10/29/2020	8:34	3	1225358.084	221782.85	X	X
BHPS-80	C	10/29/2020	8:35	3	1225354.61	221801.076		
BHPS-81	A	10/28/2020	11:01	6	1225487.805	221913.37		
BHPS-81	B	10/28/2020	11:02	6	1225478.702	221903.016	X	X
BHPS-81	C	10/28/2020	11:03	6	1225483.312	221888.876	X	X
BHPS-81	D	10/29/2020	9:29	6	1225486.311	221861.412		
BHPS-81	E	10/29/2020	9:31	5	1225487.815	221814.114		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-82	A	10/28/2020	10:54	6	1225577.457	221837.245	X	X
BHPS-82	B	10/28/2020	10:56	6	1225597.183	221825.428		
BHPS-82	C	10/28/2020	10:57	6	1225587.429	221850.885		
BHPS-82	D	10/29/2020	9:35	6	1225579.36	221813.403	X	X
BHPS-82	E	10/29/2020	9:38	6	1225583.45	221795.915		
BHPS-83	A	10/28/2020	10:43	18	1225806.673	221826.936	X	X
BHPS-83	B	10/28/2020	10:44	19	1225803.008	221843.187	X	X
BHPS-83	C	10/28/2020	10:45	18	1225793.821	221856.349		
BHPS-84	A	10/28/2020	10:06	29	1225969.567	221810.324	X	X
BHPS-84	B	10/28/2020	10:07	26	1225951.565	221813.389	X	X
BHPS-84	C	10/28/2020	10:09	26	1225939.571	221816.117		
BHPS-85	A	10/28/2020	9:52	30	1226116.684	221823.355	X	X
BHPS-85	B	10/28/2020	9:53	31	1226105.381	221824.753		
BHPS-85	C	10/28/2020	9:55	30	1226089.452	221821.085	X	X
BHPS-86	A	10/28/2020	9:46	33	1226212.256	221799.892	X	X
BHPS-86	B	10/28/2020	9:47	33	1226211.09	221813.462	X	X
BHPS-86	C	10/28/2020	9:48	33	1226217.148	221825.229		
BHPS-87	A	10/28/2020	9:41	33	1226329.595	221846.101	X	X
BHPS-87	B	10/28/2020	9:42	34	1226334.902	221834.652	X	X
BHPS-87	C	10/28/2020	9:43	34	1226342.409	221821.3		
BHPS-88	A	10/28/2020	13:15	37	1226440.59	221887.49		
BHPS-88	B	10/28/2020	13:16	37	1226453.617	221880.268	X	X
BHPS-88	C	10/28/2020	13:18	38	1226458.809	221868.079	X	X
BHPS-89	A	10/28/2020	13:25	40	1226674.557	221904.805	X	X
BHPS-89	B	10/28/2020	13:27	41	1226672.246	221891.013		
BHPS-89	C	10/28/2020	13:28	43	1226670.818	221878.012	X	X
BHPS-90	A	10/27/2020	11:36	43	1226854.741	221828.893	X	X
BHPS-90	B	10/27/2020	11:38	43	1226851.727	221830.549	X	X
BHPS-90	C	10/27/2020	11:39	43	1226840.248	221838.158		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-91	A	10/27/2020	11:42	45	1226919.525	221862.384	X	X
BHPS-91	B	10/27/2020	11:43	45	1226926.271	221852.188	X	X
BHPS-91	C	10/27/2020	11:44	45	1226933.151	221847.311		
BHPS-92	A	10/27/2020	11:46	48	1227069.363	221871.107	X	X
BHPS-92	B	10/27/2020	11:48	48	1227074.347	221859.492	X	X
BHPS-92	C	10/27/2020	11:49	48	1227081.492	221846.135		
BHPS-93	A	10/27/2020	11:52	51	1227308.061	221795.123	X	X
BHPS-93	B	10/27/2020	11:53	51	1227291.675	221798.817	X	X
BHPS-93	C	10/27/2020	11:54	51	1227279.874	221807.889		
BHPS-94	A	10/28/2020	16:39	7	1225347.918	222032.534		
BHPS-94	B	10/28/2020	16:41	7	1225331.588	222027.81	X	X
BHPS-94	C	10/28/2020	16:41	8	1225318.019	222020.067	X	X
BHPS-95	A	10/28/2020	16:33	8	1225426.717	222056.968	X	X
BHPS-95	B	10/28/2020	16:35	9	1225432.68	222047.669		
BHPS-95	C	10/28/2020	16:36	10	1225446.503	222039.604	X	X
BHPS-96	A	10/28/2020	11:06	7	1225608.338	221938.27	X	X
BHPS-96	B	10/28/2020	11:07	7	1225607.322	221952.223	X	X
BHPS-96	C	10/28/2020	11:08	7	1225611.572	221966.773		
BHPS-97	A	10/28/2020	11:46	15	1225792.778	221954.438	X	X
BHPS-97	B	10/28/2020	11:48	15	1225792.712	221968.105		
BHPS-97	C	10/28/2020	11:49	15	1225797.236	221984.282	X	X
BHPS-98	A	10/28/2020	11:51	23	1225862.637	221975.39		
BHPS-98	B	10/28/2020	11:53	23	1225894.987	221987.061	X	X
BHPS-98	C	10/28/2020	11:54	24	1225879.671	221984.772		
BHPS-98	D	10/29/2020	9:49	22	1225857.914	221958.976	X	X
BHPS-98	E	10/29/2020	9:53	22	1225863.664	221932.042		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-99	A	10/28/2020	11:58	32	1225990.612	222013.226		
BHPS-99	B	10/28/2020	11:59	31	1225983.061	222001.246	X	X
BHPS-99	C	10/28/2020	12:01	32	1226004.644	222004.942		
BHPS-99	D	10/28/2020	12:02	32	1226008.628	221989.564		
BHPS-99	E	10/28/2020	13:00	34	1225995.636	222005.154		
BHPS-99	F	10/29/2020	9:58	28	1226013.026	222063.595	X	X
BHPS-99	G	10/29/2020	10:01	30	1226014.677	221967.771		
BHPS-100	A	10/28/2020	12:09	33	1226181.976	221922.879		
BHPS-100	B	10/28/2020	12:10	33	1226195.413	221938.786		
BHPS-100	C	10/28/2020	12:11	33	1226186.982	221954.513		
BHPS-100	D	10/28/2020	13:02	34	1226184.63	221944.656	X	X
BHPS-100	E	10/28/2020	13:04	35	1226195.476	221944.858	X	X
BHPS-101	A	10/28/2020	12:15	30	1226354.143	221999.551		
BHPS-101	B	10/28/2020	12:16	30	1226352.092	221984.983		
BHPS-101	C	10/28/2020	12:17	29	1226350.106	221972.997		
BHPS-101	D	10/28/2020	13:08	31	1226346.91	221996.129	X	X
BHPS-101	E	10/28/2020	13:09	32	1226367.078	221985.134	X	X
BHPS-102	A	10/28/2020	13:20	33	1226497.17	221957.135	X	X
BHPS-102	B	10/28/2020	13:21	33	1226496.508	221973.954	X	X
BHPS-102	C	10/28/2020	13:22	33	1226502.645	221987.885		
BHPS-103	A	10/28/2020	13:32	28	1226690.709	222050.604		X
BHPS-103	B	10/28/2020	13:32	30	1226687.098	222036.601	X	X
BHPS-103	C	10/28/2020	13:34	31	1226677.268	222029.599	X	
BHPS-104	A	10/28/2020	13:36	29	1226785.498	222052.826		
BHPS-104	B	10/28/2020	13:37	30	1226791.683	222045.541	X	X
BHPS-104	C	10/28/2020	13:38	30	1226799.115	222028.786	X	X
BHPS-105	A	10/28/2020	13:41	42	1226969.231	222008.134	X	X
BHPS-105	B	10/28/2020	13:42	42	1226956.935	222003.122	X	X
BHPS-105	C	10/28/2020	13:43	42	1226950.402	221994.051		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-106	A	10/27/2020	12:54	47	1227132.727	221950.617	X	X
BHPS-106	B	10/27/2020	12:55	47	1227120.847	221964.235	X	X
BHPS-106	C	10/27/2020	12:56	47	1227107.317	221976.918		
BHPS-107	A	10/27/2020	12:50	49	1227247.486	221969.191	X	X
BHPS-107	B	10/27/2020	12:51	49	1227255.033	221981.331		
BHPS-107	C	10/27/2020	12:52	49	1227240.961	221951.075	X	X
BHPS-108	A	10/28/2020	16:27	8	1225478.286	222152.436		
BHPS-108	B	10/28/2020	16:29	9	1225481.288	222136.239	X	X
BHPS-108	C	10/28/2020	16:30	8	1225474.61	222123.022	X	X
BHPS-109	A	10/28/2020	16:22	11	1225576.552	222110.599	X	X
BHPS-109	B	10/28/2020	16:24	10	1225590.041	222113.897	X	X
BHPS-109	C	10/28/2020	16:25	11	1225599.457	222111.517		
BHPS-110	A	10/28/2020	16:18	7	1225730.904	222189.649		
BHPS-110	B	10/28/2020	16:19	9	1225728.152	222158.406	X	X
BHPS-110	C	10/28/2020	16:20	11	1225727.377	222143.059	X	X
BHPS-111	A	10/28/2020	15:50	23	1225960.6	222101.429	X	X
BHPS-111	B	10/28/2020	15:51	20	1225949.993	222110.067	X	X
BHPS-111	C	10/28/2020	15:52	17	1225941.887	222122.932		
BHPS-112	A	10/28/2020	15:44	29	1226060.199	222081.593	X	X
BHPS-112	B	10/28/2020	15:45	20	1226062.555	222094.556		
BHPS-112	C	10/28/2020	15:46	14	1226064.5	222109.919		
BHPS-112	D	10/29/2020	10:07	25	1226030.629	222081.209	X	X
BHPS-112	E	10/29/2020	10:09	21	1226006.04	222081.583		
BHPS-113	A	10/28/2020	15:33	6	1226176.377	222120.439		
BHPS-113	B	10/28/2020	15:35	7	1226176.71	222113.572	X	X
BHPS-113	C	10/28/2020	15:37	8	1226178.996	222099.509	X	X
BHPS-114	A	10/28/2020	15:28	10	1226343.656	222135.17	X	
BHPS-114	B	10/28/2020	15:29	11	1226344.821	222122.831		X
BHPS-114	C	10/28/2020	15:30	11	1226341.195	222108.076	X	X

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-115	A	10/28/2020	15:24	10	1226510.32	222178.977	X	X
BHPS-115	B	10/28/2020	15:25	11	1226513.896	222168.419		
BHPS-115	C	10/28/2020	15:26	10	1226506.499	222158.055	X	X
BHPS-116	A	10/28/2020	14:40	19	1226595.29	222093.403	X	X
BHPS-116	B	10/28/2020	14:41	18	1226610.761	222102.838	X	X
BHPS-116	C	10/28/2020	14:43	16	1226620.768	222111.976		
BHPS-117	A	10/28/2020	14:34	10	1226846.196	222203.035	X	X
BHPS-117	B	10/28/2020	14:35	10	1226829.976	222200.348	X	X
BHPS-117	C	10/28/2020	14:37	10	1226820.563	222189.494		
BHPS-118	A	10/28/2020	14:26	17	1226941.084	222133.014	X	X
BHPS-118	B	10/28/2020	14:27	17	1226955.548	222133.616		
BHPS-118	C	10/28/2020	14:28	17	1226969.667	222135.51	X	X
BHPS-119	A	10/28/2020	14:20	16	1227174.621	222141.465	X	X
BHPS-119	B	10/28/2020	14:22	17	1227156.803	222147.372	X	X
BHPS-119	C	10/28/2020	14:23	16	1227142.017	222150.133		
BHPS-120	A	10/28/2020	14:15	13	1227308.837	222206.039	X	X
BHPS-120	B	10/28/2020	14:16	13	1227299.232	222200.131	X	X
BHPS-120	C	10/28/2020	14:17	13	1227284.159	222198.435		
BHPS-121	A	10/27/2020	12:45	48	1227369.781	221943.806	X	X
BHPS-121	B	10/27/2020	12:46	48	1227362.627	221955.201	X	X
BHPS-121	C	10/27/2020	12:47	48	1227370.902	221967.764		
BHPS-122	A	10/27/2020	11:58	51	1227417.475	221859.642	X	X
BHPS-122	B	10/27/2020	11:59	51	1227397.862	221860.339	X	X
BHPS-122	C	10/27/2020	12:00	51	1227380.469	221861.962		
BHPS-MP-123	A	10/13/2020	9:17	Surface	1225092.849	222363.2063	X	
BHPS-MP-123	B	10/13/2020	9:18	Surface	1225092.783	222362.3147		
BHPS-MP-123	C	10/13/2020	9:20	Surface	1225092.982	222361.7349	X	
BHPS-MP-124	A	10/13/2020	9:01	Surface	1225115.361	222241.4976	X	
BHPS-MP-124	B	10/13/2020	9:04	Surface	1225115.612	222243.0035	X	
BHPS-MP-124	C	10/13/2020	9:05	Surface	1225116.367	222244.8008		

Table 3-1. Station Coordinates for SPI and PV Locations with Images Analyzed

Station	Replicate	Image Collection Date	Image Collection Time (PST)	Image Depth (ft)	Easting (ft)	Northing (ft)	SPI Analyzed	PV Analyzed
BHPS-MP-125	A	10/13/2020	8:57	Surface	1225131.21	222075.4798		
BHPS-MP-125	B	10/13/2020	8:59	Surface	1225129.445	222075.4972	X	
BHPS-MP-125	C	10/13/2020	9:00	Surface	1225127.32	222079.6793	X	
BHPS-MP-126	A	10/13/2020	8:48	Surface	1225035.029	221904.2555	X	
BHPS-MP-126	B	10/13/2020	8:49	Surface	1225036.286	221903.8335	X	
BHPS-MP-126	C	10/13/2020	8:50	Surface	1225038.206	221903.8042		
BHPS-MP-127	A	10/13/2020	8:35	Surface	1224895.533	221955.2946		
BHPS-MP-127	B	10/13/2020	8:36	Surface	1224896.361	221955.4716	X	
BHPS-MP-127	C	10/13/2020	8:37	Surface	1224897.086	221955.6146	X	
BHPS-MP-129	A	10/13/2020	8:31	Surface	1224746.026	221920.4237	X	
BHPS-MP-129	B	10/13/2020	8:32	Surface	1224746.411	221918.2735	X	
BHPS-MP-129	C	10/13/2020	8:33	Surface	1224766.264	221929.5353		
BHPS-MP-130	A	10/13/2020	8:26	Surface	1224814.441	222117.0844	X	
BHPS-MP-130	B	10/13/2020	8:27	Surface	1224813.011	222116.281	X	
BHPS-MP-131	A	10/13/2020	8:14	Surface	1224920.952	222338.6499		
BHPS-MP-131	B	10/13/2020	8:15	Surface	1224855.854	222234.2597	X	
BHPS-MP-131	C	10/13/2020	8:15	Surface	1224857.241	222233.4979	X	
BHPS-MP-132	A	10/13/2020	9:44	Surface	1224920.952	222338.6499	X	
BHPS-MP-132	B	10/13/2020	9:45	Surface	1224921.99	222338.6014	X	
BHPS-MP-132	C	10/13/2020	9:46	Surface	1224923.017	222336.8837		
BHPS-MP-133	A	10/13/2020	9:13	Surface	1225137.497	222264.2898	X	
BHPS-MP-133	B	10/13/2020	9:15	Surface	1225135.714	222267.4153		
BHPS-MP-134	A	10/13/2020	9:49	Surface	1225135.714	222267.4152	X	

Notes:
BHPS = Blakely Harbor Park Site
MP = Mill Pond (SPI Images Only)
PST = Pacific Standard Time
PV = plan view
SPI = sediment profile imaging
Coordinate system is NAD83 2011, WA North, Feet

Table 3-2. SPI Image Analysis Results

Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-34	B	10/27/2020	8	4.5	Fine sand with silt subfraction, brown algae, metal screen debris.	0.4	B	2.5	3-2	1	>4	N	N	N	Ind
BHPS-34	C	10/27/2020	9	12.3	Very fine sand and silt mix, ulva on surface, brown algae, fine wood fragments.	1.2	B	1.8	4-3	1	>4	N	L	2	3
BHPS-35	A	10/29/2020	4	19.6	Fine sand and silt, wood fragments/ few chips, tiny methane filled voids.	1	B	2.8	3-2	1	>4	L	L	4	3
BHPS-35	C	10/29/2020	6	16.8	Fine sand with fine wood fragments, and some wood chips.	1.3	B	2.5	3-2	1	>4	N	LM	1	3
BHPS-36	A	10/27/2020	8	6.2	Uniform medium to fine sand, aRPD = Ind. Small scale sand ripples evident.	0.9	P	Ind	2-1	0	3	N	N	N	Ind
BHPS-36	B	10/27/2020	9	4.4	Uniform medium to fine sand, aRPD = Ind.	0.7	P	Ind	2-1	0	3	N	N	N	Ind
BHPS-37	A	10/27/2020	10	3.8	Medium sand. Ulva on sediment surface, aRPD = Ind.	0.4	B	Ind	2-1	0	3	N	N	N	Ind
BHPS-37	B	10/27/2020	10	2.7	Ulva drag down disturbed surface, brown detrital Eelgrass, brown algae, aRPD = Ind.	4	P	Ind	2-1	0	3	N	N	N	Ind
BHPS-38	B	10/27/2020	16	5.8	Fine sand over dark reduced silt very fine sand. Ulva on sediment surface and some drag down, brown detrital eelgrass	2.2	B	0.5	3-2/>4	1	>4	N	N	N	1 -> 2
BHPS-38	C	10/27/2020	16	12.8	Fine sand over silt. Brown algae on surface, detrital eelgrass at depth.	0.9	B	1.7	3-2/>4	1	>4	N	N	N	1 -> 2
BHPS-39	A	10/27/2020	28	5.2	Fine/medium sand, thin veneer of silt on surface. Ulva on surface.	0.9	P	1.5	2-1	0	>4	N	N	N	Ind
BHPS-39	B	10/27/2020	28	5.3	Medium sand with some silt, large polychaete tube at SWI. Ulva on surface and partially dragged down.	1.4	P	1.4	2-1	>4	0	N	N	N	2 -> 3
BHPS-40	A	10/27/2020	15	4.3	Thin veneer of silt on surface. Very fine sand and silt over medium sand. Ulva on sediment surface, Ulva drag down disturbed surface, multiple worms at depth, aRPD = Ind.	1.3	B	Ind	4-3/2-1	1	>4	N	N	N	2
BHPS-40	B	10/27/2020	15	5.1	Uniform medium to fine sand, Brown algae on surface. Small worm tubes along SWI.	1	B	0.5	2-1	1	>4	N	N	N	1
BHPS-41	B	10/27/2020	9.5	3.4	Thin veneer of flocculent material/silt on surface atop fine sand. Ulva on sediment surface, Ulva drag down disturbed RPD, aRPD = Ind.	1.2	B	Ind	3-2	1	>4	N	N	N	Ind
BHPS-41	C	10/27/2020	9.5	1	High concentration of Ulva on sediment surface, ulva drag down disturbed surface, aRPD = Ind. Minimal penetration.	2.9	B	Ind	3-2	1	3	N	N	N	Ind
BHPS-42	A	10/27/2020	5.4	7.7	poorly mixed sediment, pockets of dark silt, rust colored material on surface, and very coarse sand. toward bottom of image.	0.7	P	1	3-2	-1	>4	M	N	N	2 -> 3
BHPS-42	C	10/27/2020	7	16.4	Fine sand with some silt, very coarse sand towards bottom of image.	0.8	B	1.4	3-2	-2	>4	N	N	3	3
BHPS-43	A	10/27/2020	10	6.4	Medium to fine sand with few silt. Ulva on surface. Few shell fragments.	0.9	B	2	2-1	1	>4	N	N	N	1 -> 2
BHPS-43	B	10/27/2020	10	6.5	Medium to fine sand. Ulva on surface. Some tubes on surface.	0.3	B	1.6	2-1	1	>4	N	N	N	1
BHPS-44	A	10/27/2020	13	10	Very fine sand intermixed with some very coarse sand at depth and surface. Ulva on surface.	1.1	B	2.4	4-3	-2	>4	N	N	2	3
BHPS-44	B	10/27/2020	13	13.3	Fine sand with coarser particles towards the bottom of image. Some small wood fragments. RPD is Ind.	0.6	B	Ind	3-2	1	>4	N	L	N	1 -> 2
BHPS-45	A	10/27/2020	25	10.3	Fine sand with pockets of medium sand. Few small wood fragments. Small tubes on surface.	0.7	B	1.4	3-2	1	>4	N	L	N	1
BHPS-45	B	10/27/2020	25	9.3	Fine sand with medium sand in top two cm. Darker band of silt sand matrix at depth and medium sand below. Piece of detrital eelgrass.	1.2	B	1.3	3-2	1	>4	N	L	N	1
BHPS-46	A	10/27/2020	16	9.4	Medium sand over darker silt/ very fine sand. Larger polychaete and burrow at depth. Few wood fragments.	0.8	B	1.5	2-1/4-3	1	>4	N	L	N	2 -> 3
BHPS-46	B	10/27/2020	16	8.4	Thin veneer of silt on surface, medium sand over very fine sand and silt. Sand trending more coarse towards bottom of image. Very few wood fragments.	1.2	B	1.3	2-1/4-3	2	>4	N	L	N	2
BHPS-47	A	10/27/2020	24	5.4	Medium sand with few silts. Fragments of Ulva on surface. Few wood fragments.	0.7	B	1	2-1	1	>4	N	L	N	1 -> 2
BHPS-47	B	10/27/2020	23	4.6	Mixed fine/medium sand, aRPD = Ind. Large polychaete tubes on surface in background of image.	0.6	B	Ind	2-1	1	>4	N	N	N	2
BHPS-48	A	10/27/2020	27	4.4	Light colored fine/medium sand over dark fine/medium sand. Some fine flocculent material/silt on surface. Few very small tubes on surface.	0.5	B	0.7	2-1	1	>4	N	N	N	1
BHPS-48	B	10/27/2020	28	4.8	Light colored fine/medium sand over dark fine/medium sand. Some flocculent material/silt on surface. Few small tubes/worms along SWI.	1.9	B	0.6	2-1	1	2	N	N	N	1
BHPS-49	A	10/27/2020	33	7	Medium sand with silt throughout. Thin veneer of silt on surface. Very few small wood fragments. Few small worms/tubes on SWI.	0.5	B	1.1	2-1	1	>4	N	L	N	1 -> 2
BHPS-49	B	10/27/2020	33	9	Fine sand, with thin layer of coarser sand on surface. Ulva drag down partially obscures RPD. Large polychaete, bottom of image.	1.9	B	1.8	3-2	1	>4	N	N	N	2 -> 3
BHPS-50	A	10/27/2020	38	8.3	Fine sand with silt, medium sand towards bottom of image. Small and medium sized tubes on surface.	1.1	B	1.3	3-2	1	>4	N	N	N	1
BHPS-50	B	10/27/2020	38	7.6	Fine sand over very fine sand and silt with medium sand at bottom of image. Thin veneer of silt on surface. Sculpin on surface.	0.7	B	1.7	3-2/2-1	1	>4	N	L	N	1 -> 2

Table 3-2. SPI Image Analysis Results

Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-51	A	10/27/2020	41	6.9	Fine sand and silt, with coarser pocket in top two cm and again at bottom of image, few small wood fragments.	0.4	B	1.6	3-2/2-1	1	>4	N	L	N	1
BHPS-51	B	10/27/2020	41	6.5	Fine sand with medium sand towards bottom of image. Very few wood fragments. Tubes on surface.	0.6	B	1.4	3-2/2-1	1	>4	N	L	N	1
BHPS-52	A	10/28/2020	37	10.4	Fine sand in top layers and very fine sand and silt at depth. Small feeding voids, orange worm at surface, ulva drag down.	1.7	B	1.7	3-2/4-3	1	>4	N	L	2	3
BHPS-52	B	10/28/2020	39	10.1	Thin layer of light fine/medium sand over dark fine sand and silt.	0.8	B	1.9	3-2/4-3	1	>4	N	N	N	1 -> 2
BHPS-53	A	10/27/2020	8	15	Fine sand, with thin coarser fraction in surface. Many worms, large feeding void and bivalve.	1	B	2.6	3-2	1	>4	N	N	2	3
BHPS-53	B	10/27/2020	8	6.5	Very fine sand with silt. Very thin coarser sand fraction near SWI. Few worms	0.7	B	1.3	4-3	2	>4	N	N	N	2
BHPS-54	A	10/27/2020	8.8	9.9	Medium sand intermixed with silt. Many worm tubes along SWI, larger polychaete at depth.	0.4	B	1.9	2-1	1	>4	N	L	N	1 -> 2
BHPS-54	B	10/27/2020	9	4.5	Thin veneer of silt on top of medium sand. Tubes on surface and worms at depth. Very few wood fragments.	0.5	B	2.6	2-1	1	>4	N	L	N	1 -> 2
BHPS-55	A	10/27/2020	9	4.1	Medium sand, with some silt on surface, darker reduced silt/sand at depth.	0.7	B	2.8	2-1	1	>4	N	N	N	Ind
BHPS-55	B	10/27/2020	9	4.3	Medium sand, with darker reduced silt/sand at depth. Small worm tubes on surface.	0.5	P	2.8	2-1	1	>4	N	N	N	1
BHPS-56	A	10/27/2020	10	4.1	Medium sand and very few silts on surface. Ulva and several large polychaete tubes along SWI. RPD is Ind.	1.3	B	Ind	2-1	0	>4	N	N	N	2
BHPS-56	B	10/27/2020	10	4.3	Medium, with few silt. A large polychaete tube in background, some small tubes along SWI.	1.6	B	2.4	2-1	1	>4	N	N	N	1
BHPS-57	A	10/27/2020	20	9.2	Medium sand in top 2 cm, atop very fine sand and silt. Thin veneer of silt on surface. High concentration of Ulva on surface. Worm tubes along SWI.	1.1	B	1.9	2-1/4-3	1	>4	N	N	N	1
BHPS-57	B	10/27/2020	19	13	Very fine sand and silt, with a thin fine sand fraction in top two cm. Ulva drag down disturbed SWI, RPD is Ind.1cm fragment of wood along SWI.	1	B	Ind	4-3	1	>4	N	N	N	1
BHPS-58	A	10/27/2020	33	6.8	Thin veneer of silt atop fine sand, towards bottom of image medium sand. Small tubes and worms along SWI.	0.6	B	1.9	3-2/2-1	1	>4	N	L	N	1
BHPS-58	B	10/27/2020	34	11.1	Fine sand with pockets of medium sand with thin veneer of silt on surface. Small tubes on surface.	1.4	B	2.6	3-2	1	>4	N	L	N	1 -> 2
BHPS-59	A	10/27/2020	37	16.5	Medium sand with silt and fine sand. Numerous worms at depth, large polychaete. Very fine particles of wood.	1.9	B	2.7	2-1	1	>4	N	L	N	1 -> 2
BHPS-59	B	10/27/2020	38	16.9	Medium to fine sand with some silt. Large feeding void at bottom of image and some worms.	0.8	B	2.9	2-1	1	>4	N	L	1	3
BHPS-60	A	10/28/2020	37	8.5	Thin veneer of silt on surface with thin layer of medium sand over fine sand and silt. Coarser sand towards the bottom.	0.5	B	1.8	3-2	1	>4	N	N	N	1
BHPS-60	B	10/28/2020	37	6.8	Thin veneer of silt on surface over fine sand and silt, coarser sand towards bottom of image.	2.1	B	1.6	3-2	1	>4	N	N	N	1 -> 2
BHPS-61	A	10/28/2020	36	10.1	Fine sand, with a thin veneer of silt on top. Some pockets of medium sand. Few small worms and tubes along SWI. Few fine wood particles.	1.7	B	2.3	3-2	1	>4	N	L	N	1
BHPS-61	B	10/28/2020	36	8.7	Thin veneer of silt on top of fine sand. Medium sand towards bottom of image. Few fine wood particles.	1	B	1.6	3-2	2	>4	N	L	N	1
BHPS-62	A	10/27/2020	39	5.3	Thin veneer of silt on surface over medium sand.	1.6	B	2.4	2-1	1	>4	N	N	N	1 -> 2
BHPS-62	B	10/27/2020	39	7.5	Thin veneer of silt on surface over medium sand with some dark silt towards bottom and left side of image. Deciduous leaf matter on surface.	1.2	B	1.9	2-1	1	>4	N	N	N	1
BHPS-63	A	10/27/2020	41	5	Thin veneer of silt on surface atop fine sand. Polychaete tube in background of SWI	0.7	B	1.5	3-2	2	>4	N	N	N	1
BHPS-63	B	10/27/2020	41	7.2	Thin veneer of silt on surface atop medium sand. Thin layer of medium sand on surface. Some small tubes and worms on surface. Imprint in PV image is an artifact from the SPI frame, previous replicate.	0.7	P	1.3	3-2	2	>4	N	N	N	1 -> 2
BHPS-64	A	10/27/2020	41	8.7	Thin veneer of silt on surface atop fine sand. Thin layer of medium sand on surface <1cm. Very fine wood particles throughout.	1.3	B	1.7	3-2	1	>4	N	L	N	1 -> 2
BHPS-64	B	10/27/2020	41	6.1	Thin veneer of silt on surface atop fine sand. Some pockets of medium sand. Wood particles are very fine and are few.	1.2	B	1.6	3-2	0	>4	N	L	N	1
BHPS-65	A	10/28/2020	44	7.3	Thin veneer of silt on surface atop fine sand. Few small tubes on surface.	1.2	B	1.2	3-2	2	>4	N	N	N	1 -> 2
BHPS-65	B	10/28/2020	44	7.3	Thin veneer of silt on surface atop fine sand. Ulva on surface.	1	B	1.2	3-2	1	>4	N	N	N	1
BHPS-66	A	10/27/2020	7	6	Silt over fine sand. Wood debris primarily comprised of sticks along SWI.	0.7	B	2.9	3-2	1	>4	N	N	N	2
BHPS-66	B	10/27/2020	7	16.9	Very fine sand with silt. Large feeding void and burrows. Coarse sand and some fine pebbles in feeding void.	0.4	B	2.5	4-3	-2	>4	N	N	1	3
BHPS-67	B	10/29/2020	3	17.7	Ulva drag down disturbed RPD, RPD is Ind. Silt layer atop thin layer of medium sand. Primarily fine sand with silt. Many worms and feeding voids. Very fine particles of wood.	1.3	B	Ind	3-2	1	>4	N	L	3	3
BHPS-67	C	10/29/2020	3	13	Fine sand over medium to coarse sand. Distinct boundary at 8 cm. Wood fragments are fine. Layer of wood fragments at ~8 cm.	1.5	B	1.6	3-2/2-1	1	>4	N	LM	1	3

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Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-68	A	10/29/2020	5	14.5	Medium sand with thin surface layer of silt. Large feeding voids and multiple worms. Ulva on SWI and dragged down.	1.5	B	3.1	2-1	1	>4	N	N	2	3
BHPS-68	C	10/29/2020	5	12	Thin veneer of silt atop medium sand. Some fine wood fragments.	1.4	B	2.8	2-1	-1	>4	N	L	1	3
BHPS-69	A	10/29/2020	5	5.3	Thin veneer of silt atop medium sand. Tubes on surface. Wood fragments are vey fine, and few.	0.7	B	1.7	2-1	0	>4	N	L	N	1 -> 2
BHPS-69	C	10/29/2020	5	4.1	Thin veneer of silt atop medium sand. Few very small tubes along SWI.	0.5	B	1.6	2-1	1	>4	N	N	N	1
BHPS-70	A	10/28/2020	10	5.7	Thin veneer of silt on top of layer of medium sand over very fine sand/silt. Ulva on surface.	0.6	B	1.9	2-1/4-3	0	>4	N	N	N	1
BHPS-70	C	10/28/2020	8	14.8	Silt on top of thin layer of medium sand over very fine sand and silt. High conc. of Ulva on surface and dragged down by prism.	1.2	B	Ind	2-1/4-3	1	>4	N	N	N	Ind
BHPS-71	A	10/28/2020	31	9.4	Thin veneer of silt atop fine sand and silt. Wood particles are very fine and few.	0.9	B	1.9	3-2	1	>4	N	L	N	1 -> 2
BHPS-71	B	10/28/2020	31	12.9	Thin veneer of silt on surface at some medium sand over fine to very fine sand.	0.3	B	1.7	3-2	0	>4	N	N	N	1
BHPS-72	A	10/28/2020	33	10.2	Thin veneer of silt on top of fine sand.	0.6	B	1.6	3-2	1	>4	N	N	1	3
BHPS-72	B	10/28/2020	34	9.6	Thin veneer of silt on top of very fine sand and silt.	0.4	B	1.5	4-3	1	>4	N	L	N	1 -> 2
BHPS-73	B	10/28/2020	36	12.4	Thin veneer of silt on surface atop fine sand. Few wood particles, very fine.	1.4	B	1.4	3-2	1	>4	N	L	N	1 -> 2
BHPS-73	C	10/28/2020	36	10.9	Thin layer of silt on top of fine sand. Few wood particles, very fine.	1.7	B	2.5	3-2	1	>4	N	L	N	1 -> 2
BHPS-74	A	10/28/2020	37	9.1	Fine sand on top of very fine sand and silt.	1.4	B	1.6	3-2	1	>4	N	N	N	1 -> 2
BHPS-74	B	10/28/2020	37	11.7	Thin veneer of silt on surface on top of very fine sand and silt. Tubes on surface.	1	B	1.5	4-3	1	>4	N	N	N	1
BHPS-75	A	10/27/2020	39	4.7	Medium sand with some more coarse particles, shell fragments and polychaetes on SWI, aRPD = Ind.	1.8	B	Ind	2-1	-1	>4	N	N	N	1
BHPS-75	B	10/27/2020	39	4.9	Thin veneer of silt on top of medium sand with pockets of coarse sand. Pieces of wood fragments on SWI and in top 2 cm of sediment.	0.7	B	1.7	2-1	-1	3	N	L	N	1
BHPS-76	A	10/27/2020	42	5.9	Thin veneer of silt on top of medium sand. Some silt at depth, left side of image. Large polychaete tubes on surface.	0.9	B	1.3	2-1	1	>4	N	N	N	1 -> 2
BHPS-76	C	10/27/2020	42	5.9	Ulva, polychaetes on SWI.	1	B	1.7	2-1	1	4	N	N	N	1
BHPS-77	A	10/27/2020	41	7.1	Thin veneer of silt on surface over fine sand. Tubes on SWI.	2.1	B	1.3	3-2	1	>4	N	N	N	1
BHPS-77	B	10/27/2020	41	7.8	Thin veneer of silt on surface of fine sand. Deciduous leaf dragged down. Small tubes on surface.	0.7	B	2	3-2	1	>4	N	N	N	1
BHPS-78	A	10/27/2020	45	6.5	Thin veneer of silt on surface on top of fine sand. Numerous small tubes along SWI, large polychaete tube on SWI.	1.4	B	1.6	3-2	1	>4	N	N	N	1 -> 2
BHPS-78	C	10/27/2020	45	6.6	Thin veneer of silt on surface atop fine sand. Dark reduced silt at depth. Tubes on surface.	2.5	B	1.6	3-2	1	>4	N	N	N	1 -> 2
BHPS-79	A	10/27/2020	45.5	4.8	Thin veneer of silt on surface atop fine sand. Small tubes on surface. Larger polychaete tubes in background on surface.	1.3	B	1.4	3-2	1	>4	N	N	N	1 -> 2
BHPS-79	B	10/27/2020	45	4.3	Thin veneer of silt on surface atop fine sand. Crustacean shell fragments on surface. Many small tubes on surface.	1.7	B	1.8	3-2	1	>4	N	N	N	1
BHPS-80	A	10/29/2020	3	10	Layer of silt on surface, on top of very fine sand and silt. Numerous small tubes on surface.	0.6	B	2.7	4-3	1	>4	N	L	N	2
BHPS-80	B	10/29/2020	3	9.1	Thin layer of silt on surface over fine sand and silt. Numerous tubes on surface, from very small to moderate in size.	0.3	B	2.9	3-2	1	>4	N	N	N	2
BHPS-81	B	10/28/2020	6	19.1	SWI partially disturbed by Ulva drag down. Fine sand with many wood fragments/chips throughout sediment column.	1.6	B	2.9	3-2	1	>4	N	MH	2	3
BHPS-81	C	10/28/2020	6	17.6	Fine sand with some medium sand near surface. Many wood fragments/chips from surface to bottom of image. Ulva drag down obscured RPD. Large feeding voids.	1.5	B	Ind	3-2	0	>4	N	M	2	3
BHPS-82	A	10/28/2020	6	18.7	Very fine sand and silt, with some coarser fractions. Many wood fragments/chips from surface to bottom of image. Ulva and wood chip drag down obscuring RPD.	1.2	B	Ind	4-3	1	>4	N	MH	1	3
BHPS-82	D	10/29/2020	6	17.7	Fine sand with a coarser fraction near the surface. Many wood fragments/chips from surface to bottom of image.	0.8	B	2.4	3-2	0	>4	N	MH	2	3
BHPS-83	A	10/28/2020	18	10	Very fine sand and silt, distinct transition to fine sand near bottom of image. Many wood fragments and some chips.	1.2	B	2.1	4-3/3-2	1	>4	N	M	N	1
BHPS-83	B	10/28/2020	19	9.4	Surface covered in wood fragments/chips, and continues through to bottom of image. Very fine sand and silt.	0.7	B	2.5	4-3	1	>4	N	M	1	3
BHPS-84	A	10/28/2020	29	11.4	Moderate amount of wood fragments from surface to bottom of image. Fine sand and silt with some coarser fractions.	0.5	B	2.1	3-2	1	>4	N	LM	2	3
BHPS-84	B	10/28/2020	26	12.5	Fine sand with wood fragments from surface through bottom of image. Thin layer of medium sand and silt on surface, <1 cm thick.	1.7	B	1.9	3-2	1	>4	N	LM	N	2
BHPS-85	A	10/28/2020	30	10	Fine sand with silt. Thin veneer of silt on surface. Coarse sand towards bottom of image, right side. Possible portion of burrow.	2.3	B	1.8	3-2	1	>4	N	N	N	1 -> 2
BHPS-85	C	10/28/2020	30	8.7	Veneer of flocculent material/silt on surface. Fine sand with some medium sand fractions with silt.	1	B	1.8	3-2	1	>4	N	N	N	2

Table 3-2. SPI Image Analysis Results

Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-86	A	10/28/2020	33	8.1	Thin layer of flocculent material/silt on surface, fine sand with silt.	1.1	B	1.7	3-2	1	>4	N	N	N	1
BHPS-86	B	10/28/2020	33	7.6	Thin layer of medium sand atop fine sand with silt. Large polychaete tube on surface.	1	B	1.6	2-1/3-2	1	>4	N	N	N	2
BHPS-87	A	10/28/2020	33	6.9	Fine sand with some silt on surface. Large polychaete on SWI and penetrating SWI.	2	B	2.3	3-2	1	>4	N	N	N	2 -> 3
BHPS-87	B	10/28/2020	34	6.9	Thin veneer of silt on surface. Fine sand.	0.7	B	2.2	3-2	1	>4	N	N	N	Ind
BHPS-88	B	10/28/2020	37	5.6	Medium sand. Large shell fragment, brown algae on SWI, polychaete on SWI in background.	0.5	B	1.3	2-1	1	4	N	N	N	1 -> 2
BHPS-88	C	10/28/2020	38	4.7	Thin veneer of silt on top of medium sand. Few wood fragments. Two pebble pieces on surface. Polychaete tube on surface.	1.4	B	2.8	2-1	1	>4	N	L	N	2
BHPS-89	A	10/28/2020	40	8	Very fine sand and silt with numerous shell and wood fragments. Piece of wood on surface.	1.6	P	2.3	4-3	1	>4	N	M	N	Ind
BHPS-89	C	10/28/2020	43	6.9	Very fine sand and silt. Many shell fragments and moderate amount of fine wood fragments. Large polychaete tubes on surface.	1.3	B	1.8	4-3	1	>4	N	LM	N	1 -> 2
BHPS-90	A	10/27/2020	43	8	Medium sand with some silt. Large polychaete tubes on surface and numerous worms at depth.	1	B	1.3	2-1	1	>4	N	N	1	3
BHPS-90	B	10/27/2020	43	5.3	Medium sand. Tubes on surface. Ulva on surface dragged down, partially obscured RPD.	1.3	B	1.6	2-1	1	>44	N	N	N	1 -> 2
BHPS-91	A	10/27/2020	45	7	Fine sand with some medium sand fractions. Some tubes on surface.	1	B	1.2	3-2	1	>4	N	N	N	1
BHPS-91	B	10/27/2020	45	5.8	Fine sand with maple leaf obscuring RPD. Small tubes on surface. Thin veneer of silt on surface.	1.4	B	Ind	3-2	1	>4	N	N	N	1
BHPS-92	A	10/27/2020	48	7.4	Fine sand with silt. Thin veneer of silt on surface.	1.2	B	2.4	3-2	1	>4	N	N	N	1 -> 2
BHPS-92	B	10/27/2020	48	10.4	Fine sand with some medium sand. Thin veneer of silt on surface. Some small tubes along SWI.	1.6	B	1.7	3-2	1	>4	N	N	N	1 -> 2
BHPS-93	A	10/27/2020	51	6.2	Fine sand with some medium sand and silt. Thin veneer of silt on surface.	1	B	1.2	3-2	1	>4	N	N	N	1
BHPS-93	B	10/27/2020	51	8.5	Fine sand with a thin layer <1 cm of medium sand on surface. Thin veneer of silt on surface.	3	B	1.7	3-2	1	>4	N	N	N	1
BHPS-94	B	10/28/2020	7	0.3	Cobbles covered with barnacles on SWI, coarse sand, shell fragments, aRPD = Ind.	0.8	P	Ind	-2 to -3	-6	0	N	N	N	Ind
BHPS-94	C	10/28/2020	8	0.2	Gravel and some cobble covered with barnacles and brown algae on SWI, aRPD = Ind.	0.6	P	Ind	-1 to -2	-5	-2	N	N	N	Ind
BHPS-95	A	10/28/2020	8	Ind	Cobbles and gravel covered in barnacles, no penetration.	Ind	Ind	Ind	Ind	Ind	Ind	Ind	Ind	N	Ind
BHPS-95	C	10/28/2020	10	Ind	Cobble and gravel covered in barnacles, no penetration.	Ind	Ind	Ind	Ind	Ind	Ind	Ind	Ind	N	Ind
BHPS-96	A	10/28/2020	7	18.1	Fine sand with many wood fragments/chips. Ulva drag down disturbed RPD. RPD = Ind.	0.4	B	Ind	3-2	1	>4	N	MH	N	Ind
BHPS-96	B	10/28/2020	7	11.5	Fine sand with many wood fragments/chips. Ulva drag down disturbed RPD. RPD = Ind.	0.9	B	Ind	3-2	1	>4	N	H	N	Ind
BHPS-97	A	10/28/2020	15	12.7	Very fine sand and silt with a lot of wood fragments/wood chips from surface to bottom of image. Ulva drag down obscured RPD. RPD = Ind.	0.3	B	Ind	4-3	1	>4	N	MH	N	Ind
BHPS-97	C	10/28/2020	15	20.5	Very fine sand and silt with a lot of wood fragments/chips from surface to bottom of image. Ulva on surface drag down obscured RPD. RPD = Ind.	0.5	B	Ind	4-3	1	>4	N	MH	N	Ind
BHPS-98	B	10/28/2020	23	16.9	Very fine sand with silt. Many wood fragments/chips and shell fragments. Ulva drag down partially obscures RPD.	1.6	B	2.1	4-3	1	>4	N	MH	N	1 -> 2
BHPS-98	D	10/29/2020	22	9.4	Very fine sand and silt. Layer of wood fragments on surface and fragments/chips from surface to bottom of image. RPD is Ind.	0.8	P	Ind	4-3	1	>4	N	MH	N	Ind
BHPS-99	B	10/28/2020	31	16.3	Very fine sand with silt. Thin subfraction in <1 cm of medium sand.	1.6	B	2.6	4-3	1	>4	N	LM	3	3
BHPS-99	F	10/29/2020	28	8.9	Very fine sand and silt. Wood fragments/chips from surface to bottom of image. RPD is Ind.	1.3	B	3.6	4-3	1	>4	N	MH	N	2
BHPS-100	D	10/28/2020	34	7.9	Piece of Ulva on surface. Tube along SWI and two worms at depth. Trace wood fragments.	0.7	B	2.3	3-2	1	>4	N	L	N	2 -> 3
BHPS-100	E	10/28/2020	35	11.2	Medium sand at surface trending finer at depth. Some dark reduced silt. Worms at depth and evidence of bioturbation. Sticks and/or vegetative matter at depth.	1	B	1.8	3-2	1	>4	N	L	N	2 -> 3

Table 3-2. SPI Image Analysis Results

Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-101	D	10/28/2020	31	6.2	Fine pieces of wood particles along SWI. Piece of wood on right side of image. Shell fragments.	3.7	P	3.6	4-3	1	>4	N	M	1	3
BHPS-101	E	10/28/2020	32	11.1	Very fine sand with dark reduced silt, shell fragments, tubes on SWI. Very coarse sand few granules at depth. Wood fragments are very fine, from surface to bottom of image.	1	P	1.7	4-3	1	>4	N	M	2	3
BHPS-102	A	10/28/2020	33	10.1	Large tube (3.5 cm), some coarse pebbles, shell fragments on SWI, high amount of shell fragments throughout image. Crab on surface.	2.5	P	1.4	4-3	- 4	>4	N	L	1	3
BHPS-102	B	10/28/2020	33	12.7	Very large burrow from SWI to > penetration. Pebble on SWI and piece of wood.	1.3	P	3	4-3	-5	>4	N	LM	N	2 -> 3
BHPS-103	B	10/28/2020	30	18	Many wood fragments on SWI to 3 cm depth. Finer wood debris at depth and well mixed within sediment matrix. High concentration of shell fragments.	0.8	P	1.8	4-3	1	>4	N	MH	N	Ind
BHPS-103	C	10/28/2020	31	19.1	Moderate amount of fine wood particles, denser on SWI and evenly distributed from below SWI to at depth. High concentration of shell fragments. SS is Ind.	1.4	P	2.1	4-3	1	>4	N	MH	N	Ind
BHPS-104	B	10/28/2020	30	7.7	Very fine sand with silt. Moderate concentration of wood particles and shell fragments. Large worm tubes on SWI.	1	P	2.6	4-3	2	>4	N	M	N	2
BHPS-104	C	10/28/2020	30	15.5	Very fine sand mixed with silt, wood particles and shell fragments. Higher conc. of wood particles in surface sediments, much finer wood particles at depth. Worm tube on surface.	1.4	B	3.6	4-3	1	>4	N	M	2	3
BHPS-105	A	10/28/2020	42	13.4	Scattered pebbles on SWI, very fine sand with silt, fine wood particles and shell fragments. Small tubes on surface.	1.3	P	1.9	4-3	-3	>4	N	LM	N	1
BHPS-105	B	10/28/2020	42	15.5	Very fine sand with silt, some fine wood fragments from surface to bottom of image (decreasing at depth) and shell fragments. Very large worms at depth, Large piece of wood on SWI.	2.3	P	3.3	4-3	2	>4	N	LM	3	3
BHPS-106	A	10/27/2020	47	13.8	Fine light colored sand over silty dark sand, feeding void, worms. Very fine wood particles mainly in surface sediments.	0.9	B	2	3-2	2	>4	N	L	1	3
BHPS-106	B	10/27/2020	47	14.6	Fine light colored sand over silty dark sand, worm. Very few fine wood particles primarily in top sediments.	1.2	P	2.2	3-2	1	>4	N	L	N	2
BHPS-107	A	10/27/2020	49	13.6	Fine sand with dark silty streaks, small pockets of coarse sand. Piece of wood on surface, very few small particles in surface sediments.	1.4	P	1.6	3-2	-1	>4	N	L	1	1 on 3
BHPS-107	C	10/27/2020	49	9.8	Fine sand with silt at depth. Large burrow from surface to 9 cm.	0.7	B	2.4	3-2	1	>4	N	N	N	2
BHPS-108	B	10/28/2020	9	Ind	No penetration in very coarse pebbles to cobbles covered in barnacles and brown algae. SWI = Ind, aRPD = Ind.	Ind	P	Ind	-5 to -6	-6	-5	N	N	N	Ind
BHPS-108	C	10/28/2020	8	0.5	No penetration, single piece of gravel covered in barnacles and brown algae. SWI = Ind, aRPD = Ind. Thick mat of wood fibers on surface.	0.3	P	Ind	-2 to -3	-3	Ind	N	H	N	Ind
BHPS-109	A	10/28/2020	11	Ind	No penetration. Large wood debris covered in brown algae. SWI = Ind, aRPD = Ind.	Ind	P	Ind	Ind	Ind	Ind	N	H	N	Ind
BHPS-109	B	10/28/2020	10	Ind	No penetration. Wood debris covered in brown algae. SWI = Ind, aRPD = Ind.	Ind	Ind	Ind	Ind	Ind	Ind	N	H	N	Ind
BHPS-110	B	10/28/2020	9	Ind	Very coarse pebbles to cobbles covered in barnacles. SWI = Ind, aRPD = Ind.	Ind	P	Ind	-6 - -7	-7	-6	N	N	N	Ind
BHPS-110	C	10/28/2020	11	4	Fine to medium pebbles covered in barnacles and brown algae. aRPD = Ind. Wood particles intermixed with pebbles.	2.5	P	Ind	-2 - -3	-3	-2	N	MH	N	Ind
BHPS-111	A	10/28/2020	23	12.8	Large feeding void at 10 cm with accumulated small wood fragments, small pockets of medium/coarse sand.	2.1	B	2	3-2	0	>4	N	M	1	3
BHPS-111	B	10/28/2020	20	16.7	Coarser sand in surface sediments, trending finer at depth. Predominantly very fine sand. Medium high concentration of wood particles. RPD is Ind, no clear boundary between oxic and anoxic layers.	0.3	P	Ind	4-3	0	>4	N	MH	N	Ind
BHPS-112	A	10/28/2020	28.5	16.1	Ulva drag downs disturbed SWI, aRPD = Ind. Beggiatoa filaments in left side of image. Very few pieces of wood.	3.1	B	Ind	4-3	1	>4	N	M	N	Ind
BHPS-112	D	10/29/2020	25	10.8	Veneer of flocculent material on surface. Distinct layer of fine sand over very fine sand and silt. Fine wood fragments throughout profile. Void at bottom of image may be burrow but most likely drag down of object.	2.7	P	Ind	3-2/4-3	1	>4	N	MH	N	Ind
BHPS-113	B	10/28/2020	7	2.1	Minimal penetration into well-mixed gravels, aRPD = Ind.	1.9	P	Ind	-4 to -5	-5	-3	N	N	N	Ind
BHPS-113	C	10/28/2020	8	1.8	Minimal penetration in well-mixed fine to coarse pebbles, barnacles and brown algae, aRPD = Ind.	2.3	P	Ind	-4 to -5	-6	-2	N	N	N	Ind
BHPS-114	A	10/28/2020	10	2.8	Minimal penetration in well-mixed fine to coarse pebbles covered with brown algae and barnacles, Ulva, aRPD = Ind.	1.8	P	Ind	-5 to -6	-6	-3	N	N	N	Ind
BHPS-114	C	10/28/2020	11	Ind	No penetration into pebbles/cobbles. Ulva mostly obscured view of grain size, barnacles on pebbles. aRPD = Ind.	Ind	P	Ind	-5 to -6	-6	-5	N	N	N	Ind
BHPS-115	A	10/28/2020	10	1.7	Minimal penetration in medium to coarse pebbles covered in barnacles, ulva, aRPD = Ind.	2.4	P	Ind	-4 to -5	-5	-4	N	N	N	Ind
BHPS-115	C	10/28/2020	10	1.9	Minimal penetration in fine to coarse pebbles covered in barnacles, ulva, aRPD = Ind.	1.8	P	Ind	-4 to -5	-5	-1	N	N	N	Ind

Table 3-2. SPI Image Analysis Results

Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-116	A	10/28/2020	19	12.4	Very fine sand and silt. Ulva disturbed SWI, fine wood fragments, aRPD = Ind.	1.8	B	Ind	4-3	1	>4	N	M	N	Ind
BHPS-116	B	10/28/2020	18	3.4	Minimal penetration. Wood fragments are very fine. Ulva disturbed SWI, aRPD = Ind.	3.4	P	Ind	>4	4	>4	N	LM	N	Ind
BHPS-117	A	10/28/2020	10	Ind	No penetration in medium to coarse pebbles, barnacles, Ulva, aRPD = Ind.	Ind	P	Ind	-4 to -5	-5	-4	N	N	N	Ind
BHPS-117	B	10/28/2020	10	Ind	No penetration in medium to coarse pebbles, barnacles, Ulva, aRPD = Ind.	Ind	P	Ind	-4 to -5	-5	-4	N	N	N	Ind
BHPS-118	A	10/28/2020	17	18.5	Flocculent material atop fine sand, aRPD = Ind. Ulva on surface and dragged down and obscuring majority of substrate in image. Some wood particles and few chips visible.	2.4	P	Ind	3-2	2	>4	N	L	N	Ind
BHPS-118	C	10/28/2020	17	Ind	Ulva disturbed SWI, over penetration, dark fine sand, aRPD = Ind.	Ind	P	Ind	3-2	2	>4	N	LM	N	Ind
BHPS-119	A	10/28/2020	16	13.3	Ulva disturbed SWI, dark fine sand and silt, shell fragments throughout, aRPD = Ind.	1.2	B	Ind	3-2	1	>4	N	L	N	Ind
BHPS-119	B	10/28/2020	17	15.5	Ulva disturbed SWI, dark fine sand and silt, shell fragments throughout, aRPD = Ind. Some wood chips and fragments.	0.7	B	Ind	3-2	2	>4	N	L	N	Ind
BHPS-120	A	10/28/2020	13	2.7	Ulva disturbed SWI, minimal penetration, flocculent material atop dark very fine sand , aRPD = Ind.	0.6	B	Ind	4-3	2	>4	N	N	N	Ind
BHPS-120	B	10/28/2020	13	2.1	Ulva disturbed SWI, dark fine sand and silt, possible pebbles covered in barnacles, aRPD = Ind.	0.9	B	Ind	4-3	2	>4	N	N	N	Ind
BHPS-121	A	10/27/2020	48	10.7	Silt with some very fine sand, worm tubes on SWI and very coarse pebbles and large shell covered in barnacles on SWI.	1.4	B	2.4	>4	-5	>4	N	L	N	2 -> 3
BHPS-121	B	10/27/2020	48	8.7	Coarse pebbles on surface over silt mixed with shell fragments. Burrow leading to feeding void.	1.1	B	3.2	>4	-1	4	N	LM	1	3
BHPS-122	A	10/27/2020	51	7.5	Thin veneer of flocculent material/silt on top of fine sand. Small worm tubes on surface. Very few wood fragments.	0.7	B	1.5	3-2	1	>4	N	N	N	1 -> 2
BHPS-122	B	10/27/2020	51	8	Thin veneer of flocculent material/silt atop fine sand. Some shell fragments. Small worms and tubes on surface. Very few wood fragments.	1	B	1.7	3-2	1	>4	N	N	N	1
BHPS-MP-123	A	10/13/2020	Surface	20.1	Silt, feeding void. RPD is Ind.	1.2	B	Ind	>4	3	>4	L	N	3	3
BHPS-MP-123	C	10/13/2020	Surface	19.6	Silt, feeding void, methane pockets. RPD is Ind.	1	B	Ind	>4	3	>4	L	N	2	3
BHPS-MP-124	A	10/13/2020	Surface	16.1	Silt and very fine sand. Wood debris/fragments begin at ~10 cm below SWI. RPD is Ind.	1.3	B	Ind	>4	3	>4	L	LM	N	2 -> 3
BHPS-MP-124	B	10/13/2020	Surface	15.8	Silt with very fine sand. Some wood debris 8-11 cm below SWI. RPD is Ind.	1.6	B	Ind	>4	3	>4	L	L	3	3
BHPS-MP-125	B	10/13/2020	Surface	10.5	Silt with very fine sand. Wood debris begins at 7 cm through to bottom of image. RPD is Ind.	1.9	B	Ind	>4	3	>4	L	M	N	Ind
BHPS-MP-125	C	10/13/2020	Surface	15	Silt with very fine sand. Wood debris begin near surface to bottom of image. RPD is Ind.	1.8	B	Ind	>4	3	>4	L	LM	N	Ind
BHPS-MP-126	A	10/13/2020	Surface	Ind	Silt with very fine sand. Over penetration. RPD and SWI are Ind.	Ind	Ind	Ind	>4	2	>4	L	N	1	Ind
BHPS-MP-126	B	10/13/2020	Surface	Ind	Silt with very fine sand. Over penetration. SWI and RPD are Ind.	Ind	Ind	Ind	>4	3	>4	N	N	1	Ind
BHPS-MP-127	B	10/13/2020	Surface	16	Very fine sand with silt. Large worm at depth. Some fine wood fragments. RPD is Ind.	2	B	Ind	4-3	2	>4	N	L	N	2
BHPS-MP-127	C	10/13/2020	Surface	17.7	Silt with very fine sand. Very fine wood fragments from surface to bottom of image. RPD is Ind.	0.7	B	Ind	>4	2	>4	L	LM	N	1
BHPS-MP-129	A	10/13/2020	Surface	16.5	Silt with very fine sand. RPD is Ind, due to Ulva drag down. Very few wood fragments.	1.1	B	Ind	>4	2	>4	N	L	N	2 -> 3
BHPS-MP-129	B	10/13/2020	Surface	18.3	Very fine sand and silt. Ulva drag down obscured RPD. RPD is Ind.	0.9	B	Ind	4-3	3	>4	N	N	N	2 -> 3
BHPS-MP-130	A	10/13/2020	Surface	19.7	Silt with very fine sand. Bivalve near bottom of image. RPD is Ind due to SWI disturbance.	2.3	P	Ind	>4	2	>4	L	N	1	3
BHPS-MP-130	B	10/13/2020	Surface	18.1	Silt with very fine sand. Wood debris in surface sediments and towards bottom of image.	0.7	P	Ind	>4	2	>4	L	L	N	1 -> 2
BHPS-MP-131	B	10/13/2020	Surface	18.8	Very fine sand and silt. Wood fragments from top to bottom of sediment column. Very fine fragments.	0.4	P	Ind	4-3	1	>4	N	M	N	1
BHPS-MP-131	C	10/13/2020	Surface	18.8	Silt with very fine sand. RPD is Ind. Wood fragments are very fine, occur from surface to bottom of image.	1.4	P	Ind	4-3	1	>4	L	M	1	3

Table 3-2. SPI Image Analysis Results

Station	Replicate	Image Date	Water Depth (ft)	Penetration Depth (cm)	Texture and Other Observations	Surface Boundary Roughness (cm)	Surface Boundary Roughness Origin	RPD Depth (cm)	Grain Size Major Mode (phi units)	Grain Size Maximum (phi units)	Grain Size Minimum (phi units)	Methane	Wood Debris	Feeding Voids (Count)	Successional Stage
BHPS-MP-132	A	10/13/2020	Surface	19.4	Silt with very fine sand. RPD is Ind. Wood fragments are very fine, from surface to bottom of image.	2.4	P	Ind	>4	2	>4	L	L	2	3
BHPS-MP-132	B	10/13/2020	Surface	19	Very fine sand and silt. Very fine wood fragments, primarily starting at ~8 cm to bottom of image.	1.9	P	Ind	4-3	2	>4	N	L	N	Ind
BHPS-MP-133	A	10/13/2020	Surface	9.7	Silt with very fine sand. Large piece of wood at 6-9 cm below SWI. RPD is Ind.	6.2	P	Ind	>4	1	>4	N	LM	N	Ind
BHPS-MP-134	A	10/13/2020	Surface	16.2	Silt with some very fine sand. Fine wood fragments primarily begin ~6 cm below SWI to bottom of image.	1	P	2.7	>4	2	>4	M	LM	N	1

Summary Statistics for Some Numerical Parameters

	Penetration Depth (cm)	Surface Boundary Roughness (cm)	RPD Depth (cm)
N	186	186	128
Average	9.8	1.3	1.9
Median	9.1	1.1	1.8
Minimum	0.2	0.3	0.5
Maximum	20.5	6.2	3.6

Notes:

aRPD = apparent redox potential discontinuity
B = biogenic
Ind = indeterminate
N = no
P = physical
SPI = sediment profile imaging
SWI = sediment-water interface
Y = yes

Methane
N = none
L = low (1–20%)
M = medium (21–50%)
H = high (>50%)

Wood Debris
N = none
L = low (1–20%)
LM = low medium (21–40%)
M = medium (41–60%)
MH = medium high (61–80%)
H = high (>80%)

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-34	B	Sand, silt, macroalgae, and debris	N	N	N	N	N	NA	Y	Ulva, brown algae	N	N	N	Most of the seafloor in the image is covered by a large piece of anthropogenic debris (metal fencing or similar). Ulva and filamentous brown algae present around the edges.
BHPS-34	C	Sand, silt, and macroalgae	N	Y	N	Y	N	NA	Y	Green, red/brown algae	N	N	N	Fine sand with some silt and a thin veneer of algae on surface. Image partially obscured by bubbles. No laser points visible.
BHPS-35	A	Sand and silt	N	Y	Y	Y	Y	Sculpin (1)	Y	Ulva, red/brown algae	N	N	N	Thin veneer of attached red/brown algae atop sand. Numerous burrows and some tubes. No laser points visible.
BHPS-35	C	Sand, silt, and algae	N	Y	Y	Y	N	NA	Y	Red/brown algae	N	N	N	Image slightly obscured by suspended sediment. Thin veneer of attached red/brown algae. No laser points visible.
BHPS-36	A	Sand	Y	Y	Y	Y	N	NA	N	NA	N	N	N	Stray pieces of ulva; look suspended in water column. Red/brown algae present in the troughs of the bedform waves. Few tubes.
BHPS-36	B	Sand and macroalgae	Y	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Stray piece of ulva; looks suspended in water column. Numerous tracks and trails. Red/brown algae present in the troughs of the bedform waves. Few tubes.
BHPS-37	A	Sand and macroalgae	N	Y	N	N	N	NA	Y	Ulva, red/brown algae	N	N	N	Majority of surface is covered in ulva; there's also a thin veneer of attached red/brown algae, as well as some filamentous brown algae.
BHPS-37	C	Sand and Macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Sparse ulva; thin veneer of attached red/brown algae (approx. 50% coverage).
BHPS-38	B	Sand and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Ulva, as well as filamentous brown algae and a thin layer of attached red/brown algae. Shell fragments and shell hash in sediment matrix. Few tubes.
BHPS-38	C	Sand, silt, and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Ulva, as well as filamentous brown algae and a thin layer of attached red/brown algae. Shell fragments and shell hash in sediment matrix. Few tubes.
BHPS-39	A	Sand, silt, and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Ulva, plus a thin layer of attached red/brown algae over medium sand.
BHPS-40	A	Sand, silt, and macroalgae	N	Y	Y	Y	Y	Snail (1)	Y	Ulva, red/brown algae	N	N	N	Ulva, with a thin layer of attached red/brown algae and some filamentous brown algae. Only one laser point visible.
BHPS-41	A	Macroalgae	N	N	N	N	N	NA	Y	Ulva	N	N	N	Entire seafloor in image covered in Ulva.
BHPS-41	B	Macroalgae and sand	N	N	N	N	N	NA	Y	Ulva	N	N	N	Ulva covers the seafloor in almost the entire image.
BHPS-42	A	Sand, silt, and macroalgae	N	N	Y	Y	Y	Barnacles (15+)	Y	Ulva, red/brown algae	N	N	N	Sand with some silt and granules. Barnacles associated with cobbles. Small amount of ulva, with larger area of attached red/brown algae. Also, several clumps of long filamentous material. Only one laser point visible.
BHPS-42	C	Sand, macroalgae, and silt	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Medium sand with few silt. Some ulva, along with several clumps of long filamentous algae. One laser visible.
BHPS-43	A	Sand, silt, and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Scattered ulva; also, a thin layer of attached red/brown algae. Numerous burrows and tracks.
BHPS-43	B	Sand with silt	Y	Y	Y	Y	N	NA	Y	Ulva	N	N	N	Image partially obscured by material in the water column. Occasional shell fragments, shell hash. No lasers visible.
BHPS-44	A	Sand, algae, macroalgae, and wood	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	L	N	Some ulva with widespread, thick layer of attached red/brown algae. Stick wood fragments. No laser points visible.
BHPS-44	B	Sand and macroalgae	N	Y	Y	Y	Y	Snails (2)	Y	Ulva, red/brown algae	N	N	N	Some ulva, and a veneer layer of attached red/brown algae (varying degrees of thickness). Some filamentous material. No laser points visible.
BHPS-45	A	Sand with silt	N	Y	Y	Y	Y	Snail (1)	N	NA	N	L	N	Image partially obscured by suspended material. Trace of wood debris, sticks.
BHPS-45	B	Sand with silt	N	Y	Y	Y	Y	Tubes; Shrimp (1)	Y	Red/brown algae	N	N	N	Thin layer of attached red/brown algae of varying thickness. One laser point visible.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-46	A	Sand, silt, and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algal mat	N	L	N	Sand and few silt with some ulva, and a widespread thin layer of attached red/brown algae (varying thickness). Few small wood fragments. One laser point visible.
BHPS-46	B	Sand and silt	N	Y	N	Y	N	NA	Y	Red/brown algae	N	N	N	Image somewhat obscured by suspended material. Thin layer of red/brown algae; some ulva. Filamentous algae present in clumps.
BHPS-47	A	Sand, silt, and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva	N	N	N	Some ulva. Seafloor in image almost completely covered by a thin layer of flocculent material.
BHPS-47	B	Sand, silt, and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva	N	L	N	Single stick wood fragment. Thin layer of flocculent/silt material (approx. 50% cover).
BHPS-48	A	Sand and silt and macroalgae	N	Y	Y	Y	Y	Gastropod (2); Worm (1)	Y	Ulva, red/brown algal mat	N	N	N	Veneer of attached red/brown algae (approx. 50% cover), varying thickness over fine sand. Few stray pieces of ulva. Some distinct tracks and biogenic depressions. Few tubes and burrows, one recently excavated.
BHPS-48	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algal mat	N	L	N	Veneer red/brown algal mat (approx. 50% cover) with silt over fine to very fine sand. Isolated, stray wood fragments (sticks). Some broken shell fragments. Few tubes, burrows and abundance of tracks.
BHPS-49	A	Sand with silt and macroalgae	N	Y	N	Y	N	NA	Y	Ulva, red/brown algal mat	N	N	N	Seafloor in image almost completely covered by a veneer of red/brown algae. Stray ulva. Many burrows and tracks. No laser points visible.
BHPS-49	B	Sand and silt and macroalgae	N	Y	Y	Y	Y	Shrimp (1); Worm (1)	Y	Ulva	N	L	N	Silt and detrital, organic material over fine to very fine sand. Few wood and shell fragments. Abundance of ulva left side of frame. Few tubes and burrows, many tracks. Image partially obscured by suspended sediment. No lasers visible.
BHPS-50	A	Sand with silt and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, Rhodophyta	N	N	N	Veneer of organic debris and silt over very fine sand. Some filamentous material and shell fragments. Some tubes, tracks and burrows. No laser points visible.
BHPS-50	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algae	N	L	N	Thin layer of organic material and silt over fine to medium sand. Image partially obscured by suspended material. Few tubes, some burrows and tracks. Few small wood fragments. No laser points visible.
BHPS-51	A	Sand with silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Veneer of silt and detrital material atop very fine sand. Few tubes and many burrows. Some ulva.
BHPS-51	B	Sand with silt and macroalgae	N	N	Y	Y	Y	Snail (1)	Y	Ulva	N	N	N	Silt and organic material over fine to very fine sand. Few shell fragments, one terrestrial leaf present. Few tubes and many tracks.
BHPS-52	A	Sand with silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Silt and organic material over very fine sand. Image partially obscured by suspended sediment. Scattered ulva. Many burrows and few tubes. Presence of tracks and biogenic depressions. No lasers visible.
BHPS-52	B	Sand with silt	N	Y	N	Y	N	NA	Y	Ulva	N	N	N	Sand with silt and few shell particles. Image partially obscured by suspended sediment. Scattered ulva, few possible burrows and an abundance of distinct tracks. No lasers visible.
BHPS-53	A	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algal mat	N	N	N	Red/brown algal mat atop very fine sand and silt. Sparse ulva, few shell fragments, and one stick. Abundance of burrows, few recently excavated. Few tracks and tubes. One laser visible.
BHPS-53	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algal mat	N	N	N	Very fine sand and silt. Layer of attached red/brown algae covering much of surface, few pieces of ulva. Many burrows, few tubes and tracks. No lasers visible.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-54	A	Sand with silt and macroalgae	N	Y	Y	Y	Y	Worm (2)	Y	Ulva, red/brown algal mat	N	N	N	Red/brown algal mat and silt over fine to very fine sand. Few pieces of ulva, many tubes. Few burrows and many tracks and biogenic depressions. Only one laser visible.
BHPS-54	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algal mat, Codium	N	N	N	Veneer of attached red/brown algae (60+% cover) over very fine sand and silt. Few shell fragments, sparse ulva. Several clumps of filamentous material present. Many tubes and burrows, one recently excavated. Presence of tracks and trails. Only one laser visible.
BHPS-55	A	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algal mat	N	N	N	Red/brown algal mat and silt over fine sand. Few pieces of ulva and tubes, some large burrows. No lasers visible.
BHPS-55	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Thin layer of detrital material and silt over fine sand with few shell fragments. Few burrows and tubes, some small distinct tracks. No laser points visible.
BHPS-56	A	Sand with macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, red/brown algae	N	N	N	Veneer of attached red/brown algae (60+% cover) over medium to fine sand. Handful of granules, broken shells, and shell hash. Few tubes, burrows and tracks. No laser points visible.
BHPS-56	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes; Jellyfish	Y	Ulva, Rhodophyta, red/brown algal mat	N	N	N	Veneer of attached red/brown algae and silt over fine sand. Abundance of ulva, as well as Rhodophyta (red seaweed). One terrestrial leaf on seafloor. Few tubes, burrows and tracks. Possible jellyfish. No lasers visible.
BHPS-57	A	Sand with silt and macroalgae	N	N	N	N	N	NA	Y	Ulva	N	N	N	Seafloor in image covered almost entirely by ulva. Sediment type inferred from paired SPI image. One laser visible.
BHPS-57	B	Sand with silt and macroalgae	N	N	N	N	N	NA	Y	Ulva	N	L	N	Seafloor in image covered almost entirely by ulva. Sediment type inferred from paired SPI image. One laser visible.
BHPS-58	A	Sand with silt and macroalgae	N	Y	Y	Y	Y	Worm (1); Tubes	Y	Red/brown algae	N	L	N	Veneer layer of red/brown algae over fine sand. Some detached plant debris. Few burrows and tubes, some tracks.
BHPS-58	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Snail (2); Fin Fish (1); Tubes	Y	Ulva, red/brown algae	N	L	N	Veneer layer of attached red/brown algae and silt over fine sand. Few pieces of ulva, many distinct tracks. Trace of wood debris. Few tubes and burrows.
BHPS-59	A	Sand with silt	Y	Y	Y	Y	Y	Snail (1)	Y	Ulva	N	N	N	Veneer of detrital material and silt over fine to very fine sand. Two areas of rippled sediment (short wavelengths). Many burrows, tracks, and biogenic depressions. Few tubes and few pieces of ulva.
BHPS-59	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Thin layer of silt and organic material over fine to very fine sand. Few pieces of ulva, one large. Many burrows and tracks, few tubes.
BHPS-60	A	Silt	N	Y	N	Y	N	NA	Y	Red/brown algae	N	L	N	Veneer of detrital material and silt over fine to very fine sand, few shell particles. Image partially obscured by suspended material. Many burrows and tracks. One wood fragment.
BHPS-60	B	Sand with silt	N	Y	N	Y	N	NA	Y	Ulva	N	N	N	Veneer of organic material with silt atop very fine sand. One granule and few shell particles. A clump of filamentous material, few pieces of ulva. High concentration of tracks and biogenic depressions, some burrows. Only one laser point visible.
BHPS-61	A	Sand with silt	N	Y	N	Y	Y	Shrimp (1)	Y	Ulva	N	N	N	Veneer of detrital material and silt over very fine sand. Few clumps of ulva. Many burrows, one recently excavated. Abundance of tracks and trails. Only one laser visible.
BHPS-61	B	Sand with silt	N	Y	N	Y	N	NA	Y	Ulva	N	N	N	Veneer layer of detrital, organic material over very fine sand and silt. Two small pieces of ulva. Many burrows and few tracks. Only one laser visible.
BHPS-62	A	Sand with silt and wood	N	Y	Y	Y	Y	Rock crab (1); Tubes	Y	Ulva	N	L	N	Silt and detrital material atop medium to fine sand. Few burrows and tubes. Scattered wood fragments, varying sizes. One rock crab and few pieces of ulva.
BHPS-62	B	Sand with silt and wood	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	L	N	Veneer of detrital, organic material and silt atop fine to medium sand. Some very fine granules and shell fragments. Few burrows and tubes. Scattered small wood fragments. Few subtle tracks. Only one laser visible.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-63	A	Sand with silt and wood	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	L	N	Scattered wood fragments of varying sizes. Some broken shells, shell hash. Presence of tubes. Few burrows and tracks. No lasers visible.
BHPS-63	C	Sand with silt and wood	N	Y	Y	Y	Y	Tubes	Y	Ulva	Y	L	N	Imprint of SPI frame from prior drop visible; mud clasts associated with this footprint. Scattered wood fragments of varying sizes. Some broken shells, shell hash. Few tubes and burrows. No lasers visible.
BHPS-64	A	Sand and Silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Thin silt layer atop fine to very fine sand with few shell fragments. Traces of ulva; unclear if they're rooted. Few tubes, many tracks and some burrows. Only one laser visible.
BHPS-64	B	Sandy silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	L	N	Image partially obscured by suspended material in water column. Scattered wood fragments and shell fragments. Some detrital organic material atop fine sand with some shell debris. Some detached plant matter. Presence of burrows, tubes and tracks. Only one laser visible.
BHPS-65	A	Sand with silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Silt and detrital material atop fine to very fine sand with few shell fragments. Few pieces of ulva, some detached plant matter. Some burrows and tracks. Only one laser visible.
BHPS-65	B	Sand and silt and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva	N	N	N	Veneer of silt atop fine to very fine sand and few shell fragments. Few large pieces of green algae. Some tracks and burrows, few tubes. Only one laser point visible.
BHPS-66	A	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Red/brown algae, Ulva	N	N	N	Veneer of attached red/brown algae. Stray ulva; unclear if rooted. Filamentous material in clumps. Many burrows, few tubes. One laser is obscured.
BHPS-66	B	Sand with silt and burrows	N	Y	Y	Y	Y	Tubes	Y	Red/Brown algae	N	N	N	Veneer of attached red/brown algae and silt atop medium to fine sand. Few shell fragments. Stray bits of ulva; don't appear rooted. Many burrows and few tubes. One laser is obscured.
BHPS-67	B	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algae	N	N	N	Seafloor covered in ulva for most of the image (70+%). Veneer layer of attached red/brown algae over medium sand. Few burrows and tracks. No lasers visible.
BHPS-67	C	Sand with silt and macroalgae	N	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algae	N	N	N	Veneer layer of attached red/brown algae over medium to fine sand. One large piece of ulva. Some large burrows. Few tracks and trails. No lasers visible.
BHPS-68	A	Sand with silt and burrows	Y	Y	Y	Y	Y	Snail (1); Tubes	Y	Red/Brown algae	N	N	N	Veneer of red/brown algae over medium to fine sand. One clump of filamentous material present. Abundance of burrows. No laser points visible.
BHPS-68	C	Sand with silt and burrows	Y	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algae	N	N	N	Ulva covers much of the seafloor in the image (50+%). Veneer layer of attached red/brown algae over medium sand. Few tubes and burrows. No lasers visible.
BHPS-69	A	Sand with silt and wood	Y	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algae	N	L	N	Scattered ulva, as well as a veneer of attached red/brown algae. Trace of wood debris. Some burrows and tracks. No lasers visible.
BHPS-69	C	Sand with silt and macroalgae	Y	Y	Y	Y	Y	Tubes	Y	Ulva, red/brown algae	N	N	N	Veneer of attached red/brown algae atop coarse sand with scattered shell hash. Few tubes and burrows, many tracks. No visible laser points.
BHPS-70	A	Sand with silt and macroalgae	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. One clump of filamentous material. One terrestrial leaf visible. Sediment type inferred from paired SPI image. No laser points visible.
BHPS-70	C	Sand with silt and macroalgae	N	N	N	N	N	NA	Y	Ulva	N	N	N	Surface completely covered with ulva. Sediment type inferred from paired SPI image. No lasers visible.
BHPS-71	A	Sand with silt and tubes	N	Y	Y	Y	Y	Tubes; Worm (2)	Y	Ulva	N	N	N	Thin layer of detrital matter over fine sand and few shell particles. Few tubes and worms. Some burrows, many distinct tracks. Few clumps of ulva.
BHPS-71	B	Sand with silt and tubes	N	Y	Y	Y	Y	Fish (2); Hermit crab (1)	Y	Ulva	N	N	N	Thin detrital silt layer over fine sand with few shell fragments. Many burrows and few tubes. Presence of tracks and depressions. Few stray pieces of ulva; unclear if rooted. One small demersal fish and one unidentifiable fish partially in frame.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-72	A	Sand with silt and tracks	N	Y	Y	Y	Y	Tubes; Isopod (1)	Y	Ulva	N	N	N	Thin silt layer over fine sand. Many tracks and trails. Some burrows, one recently excavated. Possible isopod. Few small clumps of ulva; unclear if rooted.
BHPS-72	B	Sand with silt and tracks	N	Y	Y	Y	Y	Tubes	N	NA	N	N	N	Thin layer of silt over fine sand. Few tubes and borrows. Abundance of tracks and depressions.
BHPS-73	B	Sand and Silt	N	Y	Y	Y	Y	Tubes	N	NA	N	N	N	Sand with silt and few shell particles. Moderate amount of burrows and few tube structures. Some tracks and trails.
BHPS-73	C	Sand and Silt	N	Y	N	Y	Y	Juvenile Fish (1)	Y	Ulva	N	N	N	Sand and silt with few shell particles and trace of ulva. Moderate amount of burrows and an abundance of tracks and biogenic depressions. One juvenile fish.
BHPS-74	A	Sand and Silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Sand with silt. Few shell particles and trace of ulva. Abundance of burrows and distinct tracks. Few possible tubes. Image partially obscured from suspended sediment.
BHPS-74	B	Sand and Silt	N	Y	Y	Y	Y	Snail (2)	Y	Ulva	N	N	N	Sand with silt. Numerous tracks and trails. Moderate amount of burrows and few tubes. Few pieces of ulva.
BHPS-74	C	Sand and Silt	Y	Y	N	Y	N	NA	Y	Ulva	N	N	N	Sand with silt and few shell particles. Many burrows, tracks and biogenic depressions. Possible relic bedforms. Unable to discern image field of view; no lasers visible.
BHPS-75	A	Sand and Silt	N	N	Y	Y	Y	Tubes; Snail (3)	Y	Ulva	N	N	N	Sand and silt with few granules and shell fragments. Few fecal cast aggregates. Many diverse tube structures and a piece of ulva. Few tracks and biogenic depressions. Unable to determine image field of view; one laser visible.
BHPS-75	B	Sand and Silt	N	N	Y	Y	Y	Tubes	N	NA	N	L	N	Sand and silt with few granules, shell fragments, and a trace of wood debris. Image partially obscured by turbidity (from previous replicate drop) in the water column; unable to determine image field of view.
BHPS-76	A	Sand and Silt	N	Y	Y	Y	Y	Tubes; Snail (3)	Y	Ulva	N	N	N	Layer of silt atop medium to fine sand. Some shell fragments and trace of ulva. Moderate amount of tubes and few burrows. Some tracks and trails.
BHPS-76	C	Sand and Silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Veneer layer of silt atop sand matrix with silt subfraction. Few shell fragments and few pieces of ulva. Many tube structures and burrows. Image partially obscured by marine snow in water column. No lasers visible; unable to discern image field of view.
BHPS-77	A	Sand and Silt	N	Y	Y	Y	Y	Tubes	Y	Ulva	N	N	N	Sand with silt and few shell particles. Many diverse tube structures and some burrows. One piece of detached, brown eelgrass and a piece of ulva. Moderate amount of distinct tracks and trails. Unable to discern image field of view; no lasers visible.
BHPS-77	B	Sand and Silt	N	Y	Y	N	Y	Tubes	N	NA	N	N	N	Sand with silt and tubes. Few burrows and possible fecal casts. Image partially obscured by turbidity in water column (SPI frame from previous replicate), partially analyzable. Unable to discern image field of view; no lasers visible.
BHPS-78	A	Sand and Silt	N	Y	Y	Y	Y	Tubes, Snail (1)	Y	Ulva	N	L	N	Sand with veneer of silt overlaying and few shell fragments. Many diverse tube structures. Moderate amount of burrows, few pieces of ulva and a piece of detrital, brown eelgrass. Few pieces of wood debris.
BHPS-78	C	Sand and Silt	--	--	--	--	--	--	--	--	--	--	--	Turbidity in water column obscuring surface sediment. Image not analyzable. Substrate type inferred from SPI image.
BHPS-79	A	Sand and Silt	N	Y	Y	Y	Y	Tubes; Worms; Snail (3)	Y	Ulva, Rhodophyta	N	N	N	Thin veneer of detrital organic material atop sand with silt and few shell fragments. Abundance of diverse tube structures, few possible worms, and some burrows. Many distinct tracks and trails.
BHPS-79	B	Sand and Silt	N	Y	Y	Y	Y	Tubes; Snail (3)	Y	Ulva	N	L	N	Sand with silt and few shell fragments. One piece of wood debris, few pieces of ulva. Many burrows and tubes.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-80	A	Sand and Silt	N	Y	Y	Y	Y	Tubes; Worm	Y	Ulva, Codium	N	L	N	Sand and silt with a trace of shell fragments and wood debris. Some ulva and branchy plant structures. Many tubes and few burrows. Few subtle tracks and depressions. Unable to discern image field of view; no lasers visible.
BHPS-80	B	Sand and Silt	N	Y	Y	Y	Y	Tubes; Worms; Hydroid	Y	Ulva	N	N	N	Sand and silt with overlaying branchy plant structure and ulva. Few tubes and moderate amount of burrows, one recently excavated. Few tracks and trails. Unable to discern image field of view; one laser visible.
BHPS-81	B	Sand with silt and macroalgae	N	Y	N	Y	N	NA	Y	Ulva, brown algae	N	LM	N	Brown algal mat and ulva atop sand with silt. Some wood debris. Many burrows, few recently excavated burrows. Unable to discern image field of view; no lasers visible. Turbidity in water column.
BHPS-81	C	Sand with silt and macroalgae	N	Y	N	N	Y	Hydroids	Y	Ulva, brown algae	N	N	N	Brown algal mat and an abundance of ulva atop sand and silt matrix. Possible hydroids and few burrows. Unable to discern image field of view; only one laser visible.
BHPS-82	A	Sand with silt and macroalgae	N	Y	Y	Y	N	NA	Y	Ulva, brown algae	N	LM	N	Brown algal mat atop sand and silt mix with some wood debris. Possible hydroids and burrows. Unable to discern image field of view; only one laser visible. Some tracks and biogenic depressions.
BHPS-82	D	Sand with silt and macroalgae	N	Y	N	N	Y	Hydroids	Y	Ulva, Rhodophyta, and brown algae	N	LM	N	Brown algal mat atop sand and silt matrix. Piece of eelgrass and vibrant red algae. Many burrows and some wood debris.
BHPS-83	A	Sand and silt with macroalgae	N	Y	N	Y	N	NA	Y	Ulva, brown algae	N	L	N	Brown algal mat atop sand with silt subfraction. Abundance of ulva, possible hydroids. Possible burrows, trace of wood debris and few tracks.
BHPS-83	B	Sand and silt with wood and macroalgae	N	Y	Y	Y	Y	Juvenile Fish (1); Tubes	Y	Ulva, Red/Brown Algae	N	M	N	Reddish brown algal mat and layer of wood debris atop fine sand with silt. One shell fragment and few pieces of ulva. One large burrow and one tube. Few tracks and biogenic depressions.
BHPS-84	A	Sand with Silt and Macroalgae	N	Y	Y	Y	Y	Tubes; Worm (1)	Y	Brown algae	N	N	N	Brown algal mat atop sand with silt subfraction. Few burrows and tubes. Moderate amount of distinct tracks and trails.
BHPS-84	B	Sand and Silt with Macroalgae	N	Y	Y	Y	Y	Tubes; Worms	Y	Ulva, brown algae	N	N	N	Thin veneer of brown algal mat atop sand with silt subfraction. Few shell fragments and a piece of ulva. Many burrows, few tubes. Possible worms or fecal casts.
BHPS-85	A	Sand with silt	N	Y	Y	Y	Y	Tubes; Snail (3)	Y	Ulva, brown algae	N	N	N	Sand with silt, thin veneer of brown algae and few shell fragments. Some tubes and many distinct tracks and trails. Few biogenic depressions and divots.
BHPS-85	C	Sand with silt	N	Y	Y	Y	Y	Rock Crab (1); Flat Fish (1); Snail (1)	Y	Ulva, brown algae	N	N	N	Sand and silt matrix with veneer layer of brown algae and few shell fragments overlaying. Few large pieces of ulva and possible piece of red algae or bryozoan. Moderate amount of burrows.
BHPS-86	A	Sand with silt	N	Y	Y	Y	Y	Tubes; Snail (3); Juvenile Fish (1)	Y	Ulva	N	N	N	Sand matrix with silt subfraction and few shell particles. Few tubes and burrows. Moderate amount of tracks and biogenic depressions.
BHPS-86	B	Sand with silt	N	Y	Y	Y	Y	Tubes; Worm (1); Snail (1); Flat Fish (1)	Y	Ulva	N	N	N	Sand with silt and few shell fragments. Few pieces of ulva and one leaf. Some tubes and burrows. Many tracks and biogenic depressions. One flat fish, possibly Rock Sole.
BHPS-87	A	Sand and Silt with Macroalgae	N	Y	Y	Y	Y	Tubes; Worms (2)	Y	Ulva	N	L	N	Large piece of ulva atop sand matrix with silt subfraction. Detrital material on surface. Few shell fragments and burrows, some tubes. Trace of wood debris.
BHPS-87	B	Sand and silt with Macroalgae	N	Y	Y	Y	Y	Tubes; Snail (2)	Y	Ulva, brown algae	N	N	N	Sand substrate with some silt and detrital material overlaying. Few pieces of macroalgae and minimal shell fragments. Moderate amount of tubes and tracks. Few burrows.
BHPS-88	B	Sand and Silt	N	Y	Y	Y	Y	Tubes; Chiton (1); Snail (1);	Y	Ulva	N	L	N	Sand with silt, some shell fragments and macroalgae. Many tubes and few burrows, trace of wood debris.
BHPS-88	C	Sand and silt with shell and macroalgae	N	N	Y	Y	Y	Tubes; Snail; Worms	Y	Ulva, brown algae	N	L	N	Sand with silt subfraction and thin veneer of brown algae overlaying. Few pieces of ulva, one cobble. Some shell fragments and few larger shell pieces, possibly exoskeletal remains. Many tubes.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-89	A	Silt with pebbles and wood	N	N	Y	N	Y	Tubes	Y	Brown algae	N	LM	N	Silt with few pebbles and moderate density of wood. Large piece of debris, possibly slag or wood with attached barnacles. Possible tubes.
BHPS-89	C	Silt and pebbles with shell	N	N	Y	Y	Y	Tubes; Barnacles	N	NA	N	L	N	Pebbles and a cobble atop silt with shell hash. Many tubes, attached barnacles on pebbles. Few tracks and trails.
BHPS-90	A	Sand with silt	N	Y	Y	Y	Y	Tubes; Dungeness Crab (1)	Y	Ulva	N	N	N	Sand with silt and few shell particles. Many tubes and some burrows, one recently excavated. Abundance of distinct tracks and biogenic depressions. Trace of ulva and one crab. Unable to discern image field of view; only one laser visible.
BHPS-90	B	Sand and Silt	N	Y	Y	Y	Y	Tubes; Snail (1)	Y	Ulva	N	N	N	Silt with sand and a few shell fragments. Many tubes and some burrows. Abundance of distinct tracks and biogenic depressions. Unable to discern image field of view; one laser apparent.
BHPS-91	A	Sand with silt	N	Y	Y	Y	Y	Tubes; Worms	Y	Ulva	N	L	N	Sand with silt and a few shell particles. Trace amount of ulva. Many tubes and some burrows, one recently excavated. Few worms or fecal casts. Few sticks.
BHPS-91	B	Sand and Silt	N	N	Y	Y	N	NA	N	NA	N	N	N	Sand and silt with few shell particles. Image obscured by marine snow in water column. Evidence of worm tubes and structures. Presence of tracks and trails.
BHPS-92	A	Sand and Silt	N	Y	Y	Y	Y	Snail (3); Worm (1)	Y	Ulva	N	N	N	Sand and silt with few shell particles. Moderate amount of tubes and burrows. Many tracks and depressions, possible relic bedforms.
BHPS-92	B	Sand and Silt	N	Y	Y	Y	Y	Tubes; Worm (1); Snail (1)	Y	Ulva	N	N	N	Sand and silt with trace of shell debris. Possible relic bedforms. Many tracks and trails. Few pieces of ulva. Moderate amount of burrows and some tubes.
BHPS-93	A	Sand with silt	Y	Y	Y	Y	Y	Arthropod (2); Juvenile Fish (1)	Y	Ulva	N	N	N	Rippled sand with silt. Moderate amount of burrows and tubes. Abundance of tracks and biogenic depressions, one divot middle of frame. Few pieces of ulva and shell particles. Clump of fecal casts and a juvenile fish.
BHPS-93	B	Sand and Silt	Y	Y	Y	Y	Y	Snail (4); Juvenile Fish (1)	Y	Ulva	N	N	N	Ulva atop rippled fine to very fine sand with silt and a few shell particles. Some burrows, few tubes. Abundance of tracks and biogenic depressions.
BHPS-94	B	Pebble and cobble	N	N	N	N	Y	Barnacles (200+)	Y	Ulva, brown algae	N	N	N	Many pebbles and granules, some shell hash and few cobbles atop sand. High density of barnacles attached to larger rock substrate. Few pieces of ulva and brown algae. Unable to discern image field of view; only one laser visible.
BHPS-94	C	Pebbles, cobbles, and shell	N	N	N	N	Y	Barnacles (100+)	Y	Ulva, brown algae	N	L	N	Surface substrate primarily composed of pebbles/cobbles with attached barnacles. Abundance of shell hash and debris. Some ulva and brown algae, trace of wood debris. One laser visible.
BHPS-95	A	Cobbles with macroalgae	N	N	N	N	Y	Barnacles (200+); Snail (1)	Y	Ulva, Rhodophyta	N	N	N	Cobbles with abundance of attached barnacles and macroalgae. Unable to discern image field of view; only one laser visible.
BHPS-95	C	Silt and pebbles with macroalgae and shell	N	N	N	N	Y	Barnacles (30+); Snail (3)	Y	Ulva, Rhodophyta, and brown algae	N	L	N	Pebbles with attached barnacles atop silt, some wood and shell debris. Brown algae and ulva covering surface substrate, piece of red algae.
BHPS-96	A	Silt and macroalgae	N	N	N	N	N	NA	Y	Ulva, Rhodophyta	N	N	N	Ulva and Rhodophyta atop silt. Algae obstructing view of surface substrate and lasers; unable to discern field of view. Wood debris is apparent in SPI image.
BHPS-96	B	Macroalgae	N	N	N	N	N	NA	Y	Ulva, Rhodophyta	N	N	N	Ulva and red macroalgae atop silt. Algae obstructing view of surface substrate and lasers; unable to discern field of view. Wood debris is evident in SPI image.
BHPS-97	A	Silt and sand with macroalgae	N	N	N	N	N	NA	Y	Ulva	N	N	N	Ulva atop sand and silt. Ulva obstructing view of surface substrate and lasers; unable to discern field of view. Trace of wood debris is apparent in SPI image.
BHPS-97	C	Silt and macroalgae	N	N	N	N	N	NA	Y	Ulva	N	N	N	Ulva atop silt. Ulva obstructing view of surface substrate and lasers; unable to discern field of view. Wood debris is apparent in SPI image.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-98	B	Wood and silt with macroalgae	N	N	Y	Y	Y	Tubes (10+)	Y	Ulva, brown algae	N	LM	N	Brown algal mat and ulva atop wood debris. Sand and silt. Some shell debris and few tubes.
BHPS-98	D	Silt with wood and macroalgae	N	N	Y	Y	Y	Barnacles	Y	Ulva	Y	H	N	Abundance of wood debris and ulva atop silt matrix with subfraction of sand. Few barnacles attached to wood and few possible tubes. One mud clast top right side of image, possibly artifact from SPI frame. Unable to discern PV field of view; no lasers visible.
BHPS-99	B	Sand and Silt	Y	Y	N	Y	Y	Juvenile Fish (1); Worm (1)	Y	Ulva	N	N	N	Rippled medium to fine sand with silt overlaying. Ripples are very subtle, possible relic bedforms. Few shell fragments and few large pieces of ulva. Some burrows, few recently excavated. Moderate amount of tracks and biogenic depressions.
BHPS-99	F	Sand and Silt	Y	Y	N	Y	Y	Snail (2); Shrimp (2)	Y	Ulva	N	L	N	Rippled fine sand with overlaying silt and trace of wood debris. Few pieces of ulva and few shell fragments. Unable to discern PV field of view; no lasers visible. Presence of tracks and biogenic depressions.
BHPS-100	D	Sand with silt	N	Y	Y	Y	N	NA	Y	Ulva	N	N	N	Sand and silt. Moderate amount of tracks, few worm tubes and burrows. Detrital eelgrass. Large pieces of ulva.
BHPS-100	E	Sand with silt	N	Y	Y	Y	N	NA	Y	Ulva	N	N	N	Silt with sand subfraction. Abundance of tracks and biogenic depressions. Few tubes and burrows, and a piece of ulva.
BHPS-101	D	Silt with sand and wood	N	Y	Y	Y	Y	Fish (1)	Y	Ulva, Red/Brown Algae	N	M	N	Silt with very fine sand subfraction. Wood debris, ulva and thin veneer of red/brown algae on surface. Partial fish in image, unidentifiable. Few tubes and burrows, shell fragments and some tracks.
BHPS-101	E	Silt with sand, wood, and cobble	N	Y	Y	Y	N	NA	Y	Ulva, Red/Brown Algae	N	LM	N	Silt with sand subfraction. Some wood debris and ulva, thin layer of red/brown algae. Tubes and possible fecal casts. Shell fragments and some tracks. Few burrows.
BHPS-102	A	Silt with sand and wood	N	N	Y	Y	N	NA	N	NA	N	M	N	Silt with subfraction of very fine sand. Some wood debris and broken glass bottle. Few tubes, coarse pebbles, and shell fragments.
BHPS-102	B	Silt with sand and wood	N	N	Y	Y	N	NA	Y	Brown algae	N	M	N	Silt with subfraction of very fine sand, shell hash, and moderate amount of wood debris. Large worm tube and fecal cast cluster. Possible crab exoskeletal remains. Single brown algae filament; unclear if rooted or dead.
BHPS-103	A	Silt with sand and wood	N	N	Y	Y	N	NA	Y	Red/Brown Algae	N	LM	N	Silt with subfraction of very fine sand, veneer layer of attached red/brown algae. Low amount of wood debris, coarse pebble bottom right of frame. Shell hash and clam shell. Large polychaete tubes, one polychaete emerging from tube.
BHPS-103	B	Silt with sand and wood	N	N	Y	Y	N	NA	Y	Red/Brown Algae	N	L	N	Image obscured by suspended sediment. Silt with very fine sand subfraction, some wood debris and shell hash. Possible crab exoskeleton.
BHPS-104	B	Silt with sand and wood	N	N	Y	N	N	NA	Y	Ulva, Rhodophyta, and brown algae	N	LM	N	Silt and very fine sand subfraction, thin veneer of brown algae and wood debris. Few pieces of ulva and Rhodophyta. Few shell fragments.
BHPS-104	C	Silt with sand and wood	N	N	Y	Y	N	NA	Y	Ulva, brown algae	N	L	N	Silt with subfraction of very fine sand, thin veneer of brown algae and some shell hash. Low amount of wood debris, large piece of ulva, and few tubes. Few tracks and trails.
BHPS-105	A	Silt with sand and wood	N	Y	Y	N	N	NA	Y	Ulva, Red/Brown Algae	N	M	N	Silt with very fine sand. Veneer layer of red/brown algae, few pieces of ulva and shell hash on surface. Low to moderate amount of wood debris. Moderate amount of polychaete tubes and few small burrows.
BHPS-105	B	Silt with sand and wood	N	N	Y	Y	N	NA	Y	Ulva, Red/Brown Algae	N	M	N	Silt with subfraction of very fine sand, veneer layer of red/brown algae and piece of ulva. Some wood debris and shell fragments.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-106	A	Silt with sand and wood	N	Y	N	Y	N	NA	N	NA	N	L	N	Silt with sand subfraction. Large piece of wood debris and a stick. Few shell particles and burrows. Abundance of tracks and trails.
BHPS-106	B	Silt with sand and wood	N	Y	N	Y	N	NA	Y	Ulva	N	L	N	Silt with sand subfraction. Some wood debris and shell hash. Moderate amount of tracks and abundance of biogenic depressions. Possible crab exoskeletal remains. Pieces of brick.
BHPS-107	A	Silt with sand and wood	N	N	Y	Y	N	NA	Y	Ulva	N	LM	N	Silt with sand subfraction. Some wood debris and ulva, moderate amount of tracks. Few polychaete tubes.
BHPS-107	C	Silt with wood and sand	N	N	Y	Y	N	NA	Y	Ulva	N	L	N	Silt with sand subfraction. Some ulva and piece of wood debris. Few large polychaete tubes. Many tracks and biogenic depressions.
BHPS-108	B	Cobbles and wood	N	N	N	N	Y	Barnacles (100+)	Y	Ulva	N	LM	N	Cobbles with attached barnacles atop silt and shell hash. Some wood debris and granules.
BHPS-108	C	Wood and silt	N	N	N	N	Y	Barnacles (50+); Sponge (1)	Y	Ulva, Rhodophyta	N	H	N	Fine wood fragments abundant throughout image. Coarse pebbles to cobbles with attached barnacles, some shell hash. Ulva and Rhodophyta.
BHPS-109	A	Silt, wood, and macroalgae	N	N	N	N	Y	Barnacles (50+)	Y	Ulva	N	MH	N	High abundance of diverse wood fragments over silt with some macroalgae. Barnacles and shell fragments atop surface sediment.
BHPS-109	B	Silt, wood, and macroalgae	N	N	N	N	N	NA	Y	Ulva, brown algae	N	MH	N	High concentration of wood with silt. Some shell fragments. Abundance of ulva and brown algae.
BHPS-110	B	Pebble/cobbles and wood	N	N	N	N	Y	Barnacles (100+); Crab (1)	Y	Ulva, Rhodophyta	N	LM	N	Wood and pebbles of varying sizes and few cobbles with attached barnacles. Ulva and red algae on surface. Unidentifiable debris in frame, possibly garbage.
BHPS-110	C	Silt with cobbles and macroalgae	N	N	N	N	Y	Barnacles (10+)	Y	Ulva, Rhodophyta, brown algae	N	L	N	Pebbles and granules with few attached barnacles atop silt. Abundance of ulva. Fin fish bottom left. One laser point apparent; unable to determine image field of view.
BHPS-111	A	Silt and sand with wood	N	Y	N	Y	N	NA	Y	Brown algae, ulva	N	M	N	Some wood debris atop silt and sand mixture with thin veneer of brown algae and few pieces of ulva. Few burrows, one recently excavated.
BHPS-111	B	Sand/silt and macroalgae	N	Y	N	Y	Y	Shrimp (1)	Y	Brown algal mat, ulva	N	L	N	Silt and sand mix with brown algae mat on surface sediment. Few pieces of ulva and subtle wood debris. Fin fish, on surface.
BHPS-112	A	Silt and macroalgae	N	N	N	Y	Y	Dungeness Crab (1); Fin fish (1)	Y	Ulva, brown algae	N	N	N	Very abundant ulva obscuring most of the seabed; a small amount of brown algae. No apparent wood debris. No laser points visible.
BHPS-112	D	Silt, wood, and macroalgae	N	Y	Y	Y	Y	Fin Fish(1)	Y	Ulva, red/brown algae	N	L	N	Silt with scattered pieces of wood. Low presence of ulva; small area with veneer layer of attached red/brown algae.
BHPS-113	B	Granules and pebbles	N	N	N	N	Y	Barnacles (75+)	Y	Red/Brown Algae	N	N	N	Pebbles completely covering seafloor. Small clumps of red/brown algae present in scattered locations. Only one laser point visible.
BHPS-113	C	Granules and pebbles	N	N	N	N	Y	Barnacles (100+)	Y	Ulva	N	N	N	Granules and pebbles completely covering seafloor. Some ulva across image.
BHPS-114	B	Pebbles	N	N	N	N	N	NA	Y	Ulva	N	N	N	Thick ulva coverage; sediment type inferred from paired SPI image. Finer details obscured by the macroalgae. No laser points visible.
BHPS-114	C	Granules, pebbles, and cobbles	N	N	N	N	Y	Barnacles (50+)	Y	Ulva	N	N	N	Bottom almost completely obscured by ulva. Some barnacle-covered pebbles and cobbles visible. One laser point visible.
BHPS-115	A	Granules, pebbles, and cobbles	N	N	N	N	Y	Barnacles (100+)	Y	Ulva	N	N	N	Pebbles completely covering seafloor. Few patches of ulva and detached piece of eelgrass. Only one laser point visible.
BHPS-115	C	Granules, pebbles, cobbles, and sand	N	N	N	N	Y	Barnacles (50+)	Y	Ulva	N	N	N	Pebbles and cobbles covering majority of surface. Many shell fragments. Some areas of sand with shell hash. Abundant ulva (approx. 50% cover).
BHPS-116	A	Macroalgae and silt	N	N	Y	Y	N	NA	Y	Ulva	N	L	N	Surface mostly covered with ulva (50–60%), silt, and some wood fragments. Few tubes.
BHPS-116	B	Macroalgae and silt	N	N	N	N	N	NA	Y	Ulva	N	N	N	Surface obscured by ulva, some silt visible. No laser points visible.

Table 3-3. PV Image Analysis Results

Station	Replicate	Sediment Type	Bedforms	*Lebensspuren*			Epifauna/Infauna	Epifauna/Infauna Type (Count)	Macroalgae	Macroalgae Type	Mud Clasts	Wood Debris (Percent Cover)	*Beggiatoa*	Comments
				Burrows	Tubes	Tracks								
BHPS-117	A	Macroalgae and pebbles	N	N	N	N	Y	Barnacles (25+)	Y	Ulva	N	N	N	Seafloor almost completely obscured by ulva. Sediment type inferred from paired SPI image. One laser points visible.
BHPS-117	B	Macroalgae and pebbles	N	N	N	N	Y	Barnacles (50+)	Y	Ulva	N	N	N	Seafloor almost entirely obscured by ulva. Pebbles and granules encrusted with barnacles.
BHPS-118	A	Macroalgae and silt	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. Sediment type inferred from paired SPI image. Only one laser point visible.
BHPS-118	C	Macroalgae and sand	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. Sediment type inferred from paired SPI image. Only one laser point visible.
BHPS-119	A	Macroalgae and silt	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. Sediment type inferred from paired SPI image. No laser points visible.
BHPS-119	B	Macroalgae with silt and sand	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. Sediment type inferred from paired SPI image. No laser points visible.
BHPS-120	A	Macroalgae with silt and sand	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. Sediment type inferred from paired SPI image. Only one laser point visible.
BHPS-120	B	Macroalgae with silt and sand	N	N	N	N	N	NA	Y	Ulva	N	N	N	Image completely filled with ulva. Sediment type inferred from paired SPI image. Pebbles or cobbles with barnacles visible in the paired SPI image. No laser points visible.
BHPS-121	A	Sand, silt, and cobble	N	Y	Y	Y	Y	Barnacles (30+)	Y	Ulva	N	L	N	Scattered cobbles, shell fragments, and shell hash. Barnacles attached to cobbles. Scattered wood fragments across image. Low ulva density.
BHPS-121	B	Silt, sand, cobble, shells, and wood	N	N	Y	Y	Y	Barnacles (30+)	Y	Ulva	N	M	N	Scattered cobbles, shell fragments, and shell hash. Barnacles attached to cobbles. Scattered small wood fragments across image. Sparse ulva presence.
BHPS-122	A	Silt and sand	N	Y	Y	Y	Y	Barnacles (20+)	Y	Ulva	N	L	N	Barnacles attached to large cobble on left of image. Few wood fragments. Low ulva presence. Few burrows. Sparse shell fragments, hash.
BHPS-122	B	Silt and sand	N	Y	Y	Y	N	NA	Y	Ulva	N	L	N	Silt and sand. Two wood fragments. Low ulva presence. Numerous tracks.

Notes:
Shaded rows indicate replicate not analyzable due to turbidity.
-- = not analyzed
Lebensspuren = biologically formed sedimentary structures
H = high (>80%)
L = low (0–20%)
LM = low medium (20–40%)
M = medium (40–60%)
MH = medium high (60–80%)
N = no/none
NA = not applicable
PV = plan view
SPI = sediment profile imaging
Y = yes

Appendix A

SPI–PV Image Collection Log

integral ecology

SPI and PV IMAGING COLLECTION FORM

Project Name: Bkkely Harbor
Date: 10/27/20 **Boat:** R/V Carolyn Dow
Project No.: C3085 **Crew:** SW, SB

Station ID	Replicate (A,B,C)	PST Time (hh:mm)	Water Depth ~~(m)~~ Ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
D ~~041079~~	A	0937	45.5		13	1	3SPI, 2PV (Sand)
	B	0938	45		↓	↓	24" Trigger
	C	0939	45		13	1	13" peak on SPI
D 078	A	1010	45		16	4	3SPJ, 1PV 26" trigger
	B	1012	↓		↓	↓	12.5" peak
	C	1013			16	4	
D 77	A	1028	41		16	5	3SPJ, 1PV
	B	1029	↓		↓	↓	1PV, 1PV analyzable
	C	1030			↓	↓	
D 63	A	1033	41		16	5	2SPJ, 2PV
	B	1034	↓		↓	↓	
	C	1035			↓	↓	
51	A	1046	41		16	5	2PV, 3SPJ
	B	1049	↓		↓	↓	
	C	1050	41		↓	↓	
64	A	1052	41		16	5	2PV, 3SPJ
	B	1053	41		↓	↓	
	C	1054	↓		↓	↓	
50	A	1058	38		16	5	3PV 3SPJ
	B	1059	↓		↓	↓	
	C	1100	↓		↓	↓	
49	A	1103	33		16	5	3PV, 3SPJ
	B	1104	↓		↓	↓	
	C	1105	33		↓	↓	

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/27/2020 Boat: R/V Cadigan Dow

Project No.: C3089
Crew: SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
62	A	1108	39		16	5	2 PV, 3 SPI
	B	1109	39		↓	↓	
	C	1110	39		↓	↓	
75 (abandoned ☆)	A	1111	39		16	5	(13" pave) 1 PV
	B	1112	39		↓	↓	3 SPI
	C	1113	39		↓	↓	
76	A	1131	42		16	5	3 SPI 2 PV
	B	1132	↓		↓	↓	
	C	1134	42		↓	↓	
90	A	1137	43		↓	↓	3 SPI 2 PV
	B	1138	↓		↓	↓	
	C	1135	43		↓	↓	
91	A	1142	45		↓	↓	3 SPI 1 PV
	B	1143	↓		↓	↓	
	C	1144	↓		↓	↓	
92	A	1147	48		↓	↓	3 SPI 3 PV
	B	1148	↓		↓	↓	
	C	1145	↓		↓	↓	
93	A	1153	51		↓	↓	3 SPI 2 PV
	B	1154	↓		↓	↓	
	C	1155	↓		↓	↓	
122 (abandoned ☆)	A	1158	51		16	5	3 SPI 3 PV (2.5" pave)
	B	1159	↓		↓	↓	
	C	1200	↓		16	5	

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral consulting

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/27/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
121	A	~~1244~~ 1220	48		16	5	3 SPI, 3 PV
	B	1246	↓		↓	↓	
	C	1247	↓		↓	↓	
107	A	1250	49		↓	↓	3 SPI 3 PV
	B	1251	↓		↓	↓	
	C	1252	↓		↓	↓	
106	A	1255	~~47~~		↓	↓	3 SPI, 2 PV
	B	1256	47		↓	↓	
	C	1257	47		↓	↓	
41	A	1303	9.5 ft		↓	↓	~~3 SPI~~ 2 PV ~~Kelp~~ 2 SPI
	B	1305	↓		↓	↓	Just ~~Brown~~ Macroalgae
	C	1306	↓		↓	↓	
40	A	1311	15		↓	↓	3 SPI 1 PV ~~Kelp~~
	B	1312	↓		↓	↓	Green Macroalgae
	C	1313	15		↓	↓	
Download 39	A	1317	28		↓	↓	3 SPI, 1 PV ~~Kelp~~ 13" Rope
	B	1318	↓		↓	↓	Green Macroalgae
	C	1319	↓		↓	↓	
38	A	1345	16		↓	↓	steep slope 3 PV
	B	1349	16		↓	↓	3 SPI
	C	1350	16		↓	↓	
37	A	1355	10		↓	↓	(1 missing coord.)
	B	1358	↓		↓	↓	2nd rep coords. in spreadsheet.
	C	1400	↓		16	5	3 PV 3 SPI

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/27/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
48	A	1407	27		16	5	may be extra PV between 400-1407
	B	1408	28				3PV, 3SPI
	C	1409	29				
36	A	1412	8				3PV, 3SPI
	B	1413	9				
	C	1414	9				
47	A	1417	24 ~~23~~				3PV, 3SPI
	B	1418	23				
	C	1419	23				
46	A	1422	16				2PV, 3SPI
	B	1423	16				
	C	1425	17				Client came by in boat.
45	A	1449	25				3PV, 3SPI
	B	1451	↓				
	C	1452	25		↓	↓	"14" on penetrometer = PV trigger sticking, need lubrication, bringings on deck.
34	A	1455	7		16	5	
	B	1458	8				
	C	1501	9				1PV (Nd) 3SPI
44	A	1517	13				3PV, 3SPI
	B	1519	↓				
	C	1520	↓				
43	A	1523	10				2PV, 3SPI
	B	1525	↓				
	C	1526	↓		↓	↓	

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/27/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
42	A	1529	5.4		16	5	3PV, 3SPI
	B	1530	6.5		↓	↓	
	C	1531	7				
54	A	1534	8.8				3PV, 3SPI
	B	1535	9				
	C	1536	9				
53	A	1540	8				3PV, 3SPI
	B	1542	8				
	C	1543	7				
66	A	1547	7				(15" max penetration)
	B	1548	7				3PV 2SPI
	C	1550	7		16	5	
55	A	1607	9				3PV, 2SPI
	B	1608	↓				
	C	1609	9				
56	A	1612	10				2PV 3SPI
	B	1613	10				
	C	1614	10				
57	A	1618	20				3PV, 3SPI
	B	1619	19				
	C	1620	21				
58	A	1624	33				3SPI
	B	1625	34				
	C	1626	34		16	5	

Downlead

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/27/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SB, SW

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth (m) ~~ft~~	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
59	A	1628	37		16	5	3PV, 3SPI
	B	1629	38		↓	↓	
	C	1630	37		↓	↓	
52	A	0827	38		16	5	3PV, 3SPI
	B	0829	39		↓	↓	0800 13" on penetrometer
	C	0830	39		↓	↓	"put new strobe battery in"
65	A	0846	44		↓	↓	3SPI 3PV
	B	0847	44		↓	↓	
	C	0848	45		↓	↓	
61	A	0852	36		↓	↓	3SPI, 3PV
	B	0853	36		↓	↓	
	C	0855	37		↓	↓	
60	A	0857	37		↓	↓	3SPI, 3PV
	B	0858	37		↓	↓	
	C	0900	36		↓	↓	
74	A	0902	37		↓	↓	3SPI, 3PV
	B	0903	37		↓	↓	
	C	0904	37		↓	↓	
73	A	0907	35		↓	↓	3SPI, 3PV
	B	0908	36		↓	↓	
	C	0910	36		↓	↓	
72	A	0913	33		↓	↓	"6" on penetrometer 3SPI
	B	0915	34		↓	↓	2PV
	C	0917	34		↓	↓	

10/28 Downhand

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/28/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SB, SW

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
87	A	0941	33		16	5	3 SPI 3 PV
	B	0942	34				
	C	0943	34				
86	A	0946	33				3SPI 3 PV
	B	0947	33				
	C	0948	33				
85	A	0952	30				3SPI 3 PV
	B	0954	31				
	C	0955	30				
71	A	0958	31				3SPI 3 PV
	B	1000	31				
	C	1001	30				
84	A	1007	29				3SPI 3 PV
	B	1008	26				
	C	1009	26				
70	A	1036	10				3SPI 3PV (MA)
	B	1038	~~09~~				MA=macroalgae 2↑PV
	C	1039	8				
83	A	1043	18				2SPI (1 OP)
	B	1045	19				~~1PV (2 MA)~~
	C	1046	18				3 PV
~~84~~ 82	A	1055	6				2 SPI (1 OP)
	B	1056	6				3 ~~PV~~
	C	1058	6		16	5	

Down line

(3 WBS) 1 South 1 North

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/28/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth (m)	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
81	A	1102	6		16	5	2 SPI (1 OP)
	B	1103	6				3 PV (MA)
	C	1104	6				
96	A	1106	7				3 SPI
	B	1107	7				3 PV (MA)
	C	1108	7				
97	A	1147	15				2 SPI
	B	1148	15				
	C	1149	15				
98	A	1151	23				3 SPI
	B	1153	23				
	C	1155	24				
99	A	1159	32				OP ~~3 SPI~~ 1 SPI
	B	1200	31				Disregard in grid to West *
	C	1201	32				OP
	D	1202	32				1 SPI ✓ 2 PV
100	A	1209	33				3 SPI & PV
	B	1210	33				Strobe battery died
	C	1212	33				
101	A	1215	30				3 SPI & PV
	B	1216	30				Strobe battery died
	C	1218	29		16	5	changing strobe battery
99	D	1300	34		16	4	OP, 1 PV
100	D	1303	34		16	4	Needed to avoid 2 SPI
100	E	1304	35		16	4	mooring from sailboat. 2 PV

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/28/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
101	D	1308	31		16	4	2 SPI, 2 PV
	E	1309	32		16	4	
88	A	1316	37		16	5	3 SPI 3 PV
	B	1317	37		↓		
	C	1318	38				
102	A	1320	33				3 SPI 3 PV
	B	1321	33				
	C	1323	33				
89	A	1326	40				3 SPI, 2 PV
	B	1327	40				
	C	1329	43				
103	A	1332	28				2 SPI, 2 PV
	B	1333	30				(Wood) Landed on log
	C	1334	31				
NO 104	A	1337	29				3 SPI 3 PV
	B	1338	30				
download	C	1339	30				
105	A	1342	42				3 SPI 3 PV
	B	1343	42		↓	↓	
	C	1344	42		16	5	
120	A	1415	13		16	5	3 SPI 3 PV
	B	1417	13		↓	↓	Ulva mall 3, image
	C	1418	13		16	5	
					↓		

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor **Project No.:** C3089
Date: 10/28/20 **Boat:** R/V Carolyn Dow **Crew:** SW, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth ~~(m)~~ Ft	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
119	A	1421	16		16	5	3SPI, 3PV ULVA
	B	1422	17				
	C	1423	16				
118	A	1426	17				3SPI, 3PV
	B	1427	17				
	C	1428	17				
117	A	1434	10				3SPI, 3PV
	B	1435	10				cobble
	C	1437	10				
116	A	1440	19				3SPI 3PV
	B	1441	18				
	C	1443	16		16	5	16" max prev on pedicurata ULVA
115	A	1524	9		16	4	3 SPI 3PV
	B	1525	10				
	C	1526	11				
114	A	529	10				14" prev 3SPI
	B	1530	11				3PV
	C	1531	11				
113	A	1533	6				13" prev 3SPI
	B	1536	7				3PV
	C	1537	8		16	4	
112	A	1544	28.5		16	5	3SPI 3PV
	B	1545	20				
	C	1546	19				

Downloaded

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral consulting

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor
Date: 10/28/20 **Boat:** R/V Carolyn Dow
Project No.: C3089
Crew: SV, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth (~~m~~)	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
111	A	1550	23		16	5	3SPI, 3PV
	B	1551	20				
	C	1552	17				
110	A	1618	6.6				3SPI, 3PV
	B	1619	9				
	C	1620	11				
109	A	1623	11				3SPI 3PV
	B	1624	10				
	C	1625	11				
108	A	1628	8				3SPI
	B	1629	9				
	C	1630	8				
95	A	1634	8				
	B	1635	9				
	C	1636	10				
94	A	1640	7				
	B	1641	7		↓	↓	
	C	1642	8		16	5	

Download 1st East

Note: Number of lead weights on each side x 53 lb = total weight on both racks

integral consulting

SPI and PV IMAGING COLLECTION FORM

Project Name: Blakely Harbor Park Site
Project No.: C3089
Date: 10/29/2020 **Boat:** R/V Carolyn Dow
Crew: SU, SB

Station ID	Replicate (A,B,C)	Time (hh:mm)	Water Depth (m)	Frame Count (#)	Stop Height (in.)	Lead Weight (each side)	Comments
35	A	0814	4		16	5	2 SPI, 3PV
	B	0815	5				1SPI OP
	C	0816	6				
80	A	0833	3				3 SPI
	B	0834	3				3PV
	C	0835	3				
67	A	0838	4				3SPI 3PV
	B	0839	3				
	C	0840	3				
68	A	0843	5				3SPI 3PV
	B	0844	5				
	C	0845	5				
69	A	0848	5				3SPI 3PV
	B	0849	5				
	C	0850	5		16	5	
81	D	0929	6		16	3	2 SPI, 2PV
	E	0932	5				
82	D	0936	6				2 SPI 2PV
	E	0939	6		16	3	
98	D	0950	22		16	Ø	2 SPI 2PV
	E	0953	22		16	Ø	
99	F	0958	28		16	Ø	2 SPI 2PV
	G	1002	30		16	Ø	
112	D	1007	25		16	Ø	2 SPI, 2PV
	E	1010	21		16	Ø	

35A on target location coordinate not collected

Note: Number of lead weights on each side x 53 lb = total weight on both racks

APPENDIX G
Shoreline and Habitat Survey Field Report

Geosyntec consultants

engineers | scientists | innovators

APPENDIX G
SHORELINE AND HABITAT SURVEY FIELD REPORT

DRAFT REMEDIAL INVESTIGATION REPORT

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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Attachment G-2 Shoreline Inspection Data

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	Feasibility Study
Geosyntec	Geosyntec Consultants, Inc.
GIS	geographic information systems
mm	millimeter
Port Blakely	Port Blakely Tree Farms
ppt	parts per trillion
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the Shoreline and Habitat Survey conducted at Blakely Harbor during Phase 1 of the RI. Field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP; Geosyntec Consultants, Inc. [Geosyntec], 2022).

The total Site area is approximately 61 acres; the "Survey Area" for this Shoreline Survey encompassed the Site and some surrounding area for a total of approximately 102 acres (Figure D-1). The inspection summarized herein was focused on a visual survey of specific physical and biological characteristics including the type and distribution of shoreline substrate, the vegetation coverage, and the presence of avian, terrestrial, and aquatic fauna.

2. HABITAT CLASSIFICATION AND SUBSTRATE INVENTORY

The Shoreline and Habitat Survey was comprised of three parts: (i) a Desktop Review; (ii) a Habitat Characterization and Substrate Inventory; and (iii) a Shoreline Type Classification. These three activities are described below.

2.1 Desktop Review

Prior to the Site visit, Geosyntec conducted a geographic information systems (GIS) desktop review of the Survey Area. The GIS desktop assessment was conducted to gain an understanding of the general landscape features and ecology of the Survey Area and to identify potential shoreline types present.

Using Environmental Systems Research Institute ArcGIS Desktop, Geosyntec overlaid the Survey Area with available high-resolution current/historical aerial imagery, United States Geological Survey 1:24,000 Topographical Quadrangle maps for Bremerton East and Duwamish Head, soils data from the United States Department of Agricultural Natural Resources Conservation Service, National Wetlands Inventory mapping from the United States Fish and Wildlife Service, National Hydrography Datasets flowline and waterbodies datasets, Washington State Department of Natural Resources ShoreZone Inventory unit features, and available LiDAR-derived digital elevational model datasets.

2.2 Habitat Classification and Substrate Inventory

The Habitat Characterization and Substrate Inventory was conducted to record slopes along each transect, substrate types, and vegetation coverage and to provide avian, terrestrial, and aquatic fauna observations. The pedestrian field survey was collected using the guidelines specifically created for intertidal shore surveys as outlined in Bailey et al., 1993.

The field team walked transects that extended perpendicularly to the water line at lower low tide levels,[1] and data points comprising 15-meter diameter circular plots (referred to herein as "data points") were sampled at representative locations to classify areas of different shoreline types where characteristics such as slope, substrate, or vegetation coverage change.

The following characteristics were noted at each data point:

- Slope along each transect.
- Substrate type and size. A shoreline type rarely has one uniform grain size and rarely falls within a single substrate classification (see details below). To decrease subjectivity in substrate classifications, the field team visually estimated the percentage of surface area comprised by each grain size (e.g., cobble, gravel, sand) at each data point. These ranges of percentages were recorded on the inspection data forms as one of the following cover classes: <1 %, 1-5%, 6-25%, 26-50%, 51-75%, 76-99%, and 100%. The grain size (i.e., substrate) with the highest cover class percentage was expressed as the primary substrate for that shoreline type.
- Vegetation coverage.
- Avian, terrestrial, and aquatic fauna observations.

Representative photographs of the habitat conditions and species observations during the Shoreline Survey are included in the Attachment D-1. A field log of the shoreline data recorded is included as Attachment D-2. Results are discussed in Section 3.

2.3 Shoreline Type Classification

Classification of the shoreline into types was completed using (i) Cowardin's Classification of Wetlands and Deepwater Habitats of the United States and (ii) Dethier's Marine and Estuarine Habitat Classification System for Washington State, which was further refined in the 2001 ShoreZone Inventory as a guide for characterizing intertidal habitats using data collected in the field. The ShoreZone classification system is the primary classification system used for shoreline habitat mapping by the Washington Department of Natural Resources Nearshore Habitat Program.

These systems differ from each other, and as such, they are presented below to explain how each was used in this Shoreline and Habitat Survey. Field results are also provided below.

2.3.1 Cowardin (1979) Classification

In the Cowardin classification, each shoreline type is assigned a Cowardin code that classifies its habitat type. The code is hierarchical in its description and is concatenated as follows: System + Subsystem + Class + Subclass + a modifier that describes the water regime of the shoreline type.

[1] Field surveys were scheduled to coincide with a lowest practicable daytime lower tide, having a midafternoon -1.73-foot and -2.03-foot low tide occurring on August 19 and 20, 2021, respectively, according to the National Oceanic and Atmospheric Administration's Port Blakely Washington tidal station (Station Identification 9445913). The observed low tide line was also recorded and is shown on Figure D-2 as the lowest extent of the intertidal shoreline polygons.

An example of one of the common shoreline types classified within the Survey Area is E2US1N. This code includes the Estuarine (E) system + Intertidal subsystem (2) + Unconsolidated Shore (US) class + Cobble-Gravel subclass (1) + Regularly Flooded modifier (N).

Below are full interpretations for the Cowardin codes identified during the field surveys (E2RS1N, E2US1N, E2US2N, E2US3N, and E2EM1P):

- System—ESTUARINE: The Estuarine System consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. There is appreciable dilution of sea water along some low-energy coastlines.
- Subsystem—2, INTERTIDAL: The substrate in these habitats is flooded and exposed by tides; this includes the associated splash zone.
- Class—RS, ROCKY SHORE: These are high energy shoreline environments characterized by bedrock, stones, or boulders that singly or in combination have an areal cover of 75% or more and less than 30% vegetative cover by area.
    - Subclass—1, Bedrock: These are bottoms in which bedrock covers 75% or more of the surface.
- Class—US, UNCONSOLIDATED SHORE: This includes all wetland habitats having two characteristics: (i) unconsolidated substrates with less than 75% areal cover of stones, boulders or bedrock, and (ii) less than 30% areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.
    - Subclass—1, Cobble-Gravel: The unconsolidated particles smaller than stones are predominantly cobble and gravel, although finer sediments may be intermixed.
    - Subclass—2, Sand: The unconsolidated particles smaller than stones are predominantly sand, although finer or coarser sediments may be intermixed.
    - Subclass—3, Mud: The unconsolidated particles smaller than stones are predominantly silt and clay, although coarser sediments or organic material may be intermixed.
- Class—EM, EMERGENT: This class is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
    - Subclass—1, Persistent: Dominated by species that normally remain standing at least until the beginning of the next growing season. This subclass is found only in the Estuarine and Palustrine systems.
- Water Regime—N, Regularly Flooded: Tides alternately flood and expose the substrate at least once daily.
- Water Regime—P, Irregularly Flooded: Tides flood the substrate less often than daily.

2.3.2 Dethier (1990) / ShoreZone (2001) Classification

Similar to the Cowardin classification, the hybrid Dethier / ShoreZone classifications are hierarchal and use nomenclature based on: System + Subsystem + Substrata + Energy + optional modifiers such as Water Regime (Depth), Water Chemistry, or other "Special Modifiers."

An example of one of the common shoreline types classified within the Survey Area is "Estuarine, Intertidal, Mixed Coarse, Partly enclosed, Eulittoral." This code includes the Estuarine system + Intertidal subsystem + Mixed Coarse substrata + Partly enclosed wave energy + Eulittoral water depth. This classification is also assigned a unique numeric ShoreZone code of 66 for mapping purposes.

Below are full interpretations taken from Dethier (1990) and Bailey et al. (1993) for the Dethier/ShoreZone shore types identified during the field surveys (ShoreZone Codes: 58, 66, 74, 75, 78, and 82):

- System—ESTUARINE: The Estuarine System generally consists of waters that are semi-enclosed by land but have open, partly obstructed, or sporadic access to the ocean, and in which seawater is at least occasionally diluted by freshwater runoff from land. It extends upstream and landward to where ocean-derived salts near the water surface measure approximately 0.5 parts per trillion (ppt) during the period of average annual low flow, and downstream or out to sea to where freshwater dilution is minimal (salinities seldom falling below 30 ppt). Or, all waters south and east of Admiralty Head (and south of Point Wilson on the Quimper Peninsula) which are considered in the Puget Sound proper.

- Subsystem—INTERTIDAL: The Intertidal subsystem includes the substratum from extreme low water of spring tides to the upper limit of spray or influence of ocean-derived salts. It includes all land that is sometimes submerged but sometimes exposed to the air: mud and sand flats, rocky shores, salt marshes, and even terrestrial areas where salt influence is still seen. Alternatively, the intertidal/subtidal boundary can be determined by elevation: minus 4.5 feet is the generally accepted elevation for equinoctial low water spring tide in Puget Sound.

- Substrata—HARDPAN: Consolidated clays forming a substratum firm enough to support an epibenthos and too firm to support a normal infauna (dams, worms, etc.), but with an unstable surface which sloughs frequently. Hardpan is described as a resistant basal till, composed of poorly sorted but well compacted glacial deposits often including clays. This substratum is like a bedrock made of hard-packed clay with pebbles often worked in but is much softer than solid rock and can be scraped with the toe of one's boot.

- Substrata—MIXED COARSE: Substrata consisting of cobbles, gravel, shell, and sand. Mixed Coarse beaches are composed of a clear mix of various substrata with no single substratum occupying more than 75% of the surface cover.

- Substrata—SAND: Sand includes particles no larger than 0.06-4 millimeter (mm). Sand beaches show some variation, mostly related to the energy level on the beach. High energy beaches tend to have sand that is coarse, pure, and free of silt and organic material.

- Substrata—MIXED FINE: A mixture of sand and mud, with little gravel, likely to change seasonally. This is another category composed of a mix of various substrata. Sand, mud, and gravel are the most commonly found substratum types, with shells and wood debris often present. The category encompasses a broad range of substrata, from a pure mixture of sand and mud to a coarser sand, shell, and gravel mix.
- Substrata—MUD: Fine substrata <0.06 mm, usually mixed with organics. Mud habitats are found in calm areas, especially the heads of bays and inlets, where wave action is low enough to deposit fine silt and sediment. Mud is composed of a mixture of silt and clay and is quite smooth and has a low viscosity. Mud differs from Mixed Fine in lacking gravel or a significant amount of sand, and it more clearly exhibits the fine substratum characteristics.
- Energy—PARTLY ENCLOSED: Bays or river mouths partially enclosed by headlands, bars, spits, or artificial obstructions reducing circulation. Minimal wave action or currents. Drift algae and seagrass often concentrate here.
- Energy—LAGOON: Protected, largely enclosed pond or embayment, flushed regularly or irregularly because tidal influence is partially blocked by a spit.
- Water Regime (Depth)—EULITTORAL: Areas between mean high water line of spring tide and Extremely Low Water Spring tide (ELWS), regularly inundated and uncovered by the tides.
- Special Modifier—MARSH-SPIT/BERM COMMUNITY: This is a transitional backshore spit or berm area. These areas are not regularly inundated but receive some salt influence from spray or extreme high tides. The substrate is usually a mixture of sand and gravel, and drift logs are often present. The substrate is also relatively unstable, with movement caused by wind and wave energy from storms. Nearly solid vegetative cover of pickleweed (*Salicornia virginica*) with gumweed (*Grindelia integrifolia*) are common plants found in these areas.

3. SUMMARY OF OBSERVATIONS

Six representative shoreline types were identified during the Shoreline and Habitat Survey. These shoreline types are identified in Table G-1 and depicted on Figure G-2. The six representative shoreline types and associated habitats are discussed in this section.

Table G-1. Intertidal Shoreline Type Summary

Representative Shoreline Type	Data Points	Cowardin (1979) Classification	Cowardin Code	Dethier (1990) / ShoreZone Inventory (2001) Classification	Dethier/ ShoreZone Code	Primary Substrate	Acres
Hardpan	DP-04	Estuarine, Intertidal, Rocky Shore, Bedrock, Regularly Flooded	E2RS1N	Estuarine, Intertidal, Hardpan, Partly enclosed, Eulittoral	58	Hardpan	0.49
Mixed Coarse	DP-09, DP-10, DP-11, DP-12, DP-13, DP-14, DP-15, DP-17	Estuarine, Intertidal, Unconsolidated Shore, Cobble-gravel, Regularly Flooded	E2US1N	Estuarine, Intertidal, Mixed Coarse, Partly enclosed, Eulittoral	66	Gravel	7.95
Sandflat	DP-01, DP-02, DP-05, DP-16	Estuarine, Intertidal, Unconsolidated Shore, Sand, Regularly Flooded	E2US2N	Estuarine, Intertidal, Sand, Partly enclosed, Eulittoral	74	Sand	8.95
Mud/Sandflat (Mixed Fine)	DP-03, DP-08	Estuarine, Intertidal, Unconsolidated Shore, Sand, Regularly Flooded	E2US2N	Estuarine, Intertidal, Mixed Fine, Partly enclosed, Eulittoral	78	Sand	3.43
Mudflat	DP-06, DP-07	Estuarine, Intertidal, Unconsolidated Shore, Mud, Regularly Flooded	E2US3N	Estuarine, Intertidal, Mud, Partly enclosed, Eulittoral	82	Mud	7.55
Marsh–Spit/Berm Community	DP-18, DP-19	Estuarine, Intertidal, Emergent, Persistent, Irregularly Flooded	E2EM1P	Estuarine, Intertidal, Sand, Lagoon, Eulittoral, Marsh–"Spit/Berm"	75	Sand	1.94

3.1 Hardpan Shoreline

The hardpan shoreline type was identified along the upper reaches of the mean high tide along the south shore of the Survey Area. Data Point DP-04 was recorded within this area that makes up only 0.49 acres of shore. Primary substrate consists of exposed consolidated detrital material that underlies a sparse mixed coarse/cobble and gravelly sand cover. The upgradient edge of the shore type extends to a wave-formed ledge approximately 6–8 feet in height. As the exposed hardpan extends deeper into the shoreline surface, the shore type transitions to a gently-sloped Mud/Sandflat (Mixed Fine) type. Slope at the data point is approximately 10%, The shore is mostly unvegetated with patchy green algae, such as sea lettuce (*Ulvaria sp.*), present.

3.2 Mixed Coarse Shoreline—(Cowardin: E2US1N and Dethier/ShoreZone: 66)

Along the northern shoreline of the Survey Area, east of the former mill, a mixed coarse shoreline type makes up the longest continuous segment. A smaller separate segment of the type exists along the upper reach of the southern shoreline. This shore type extends into the open harbor and is more exposed to wave energy where small rocks and gravel make up the dominate substrate type. Data Points (DP-09 through DP-15, and DP-17) were recorded that detail the characteristics of the shore that makes up 7.95 acres within the Survey Area. Near the site of the former mill piles of scattered man-made debris that includes brick, wooden planks, pilings, and other artificial features are present along the shore extending from the high tide line into the subtidal zone. However, since these features did not appear to modify the natural landform or serve as constructed armoring of the shore, this segment of the shore was not delineated or classified separately. Slope is much steeper in this area and ranges from 4% to over 15%. Most of the shore is largely unvegetated with only patchy areas of green, red, and brown algae occurring near the multiple seeps observed flowing near the lower tide line. With the exception of occasional shorebirds present, only aquatic wildlife was observed, including barnacles along larger stones, subsurface bivalves, and several red rock crabs (*Cancer productus*).

3.3 Sandflat—(Cowardin: E2US2N and Dethier/ShoreZone: 74)

At 8.95 acres, the largest area of shoreline within the Survey Area is the sand-dominated flats found along the southern shoreline. This area is characterized by firm sand substrate and a gentle slope that does not exceed 3%. Data Points (DP-01, DP-02, DP-05, and DP-16) were recorded within this shoreline area. Numerous clam shows were common along the shore with western gulls (*Larus occidentalis*) and Canada geese (*Branta canadensis*) observed using the area for foraging and resting during low tides. A live moon snail (*Euspira lewisii*) was observed along the edge of low water in a tidal creek north of Data Point DP-05.

3.4 Mud/Sandflat (Mixed Fine)—(Cowardin: E2US2N and Dethier/ShoreZone: 78)

The mud/sandflat (mixed fine) type is transitional shoreline that exists along the southern shore between two sandflats and is characterized by the combination of multiple fine substrate types. Unlike the more protected mudflats within the former Mill Pond, this shoreline type generally has a lower organic content present in the substrate. A small shore unit is present within the former

Mill Pond area which has a large number of relic pilings and artificial debris throughout. Total area for the two separate shoreline units covers 3.43 acres. Vegetation cover is primarily unvegetated, but patchy green and red algae are present. Slopes range from 2% to 3%, and high concentrations of aquatic fauna were present in both data points in this shoreline type (Data Points DP-03 and DP-08). A diversity of aquatic fauna is present with small yellow shore crabs (*Hemigrapsus oregonensis*) and burrows present, sunken large and small bivalve shows; many aggregating anemone (*Anthopleura elegantissima*) exposed during the low tide, and acorn barnacles attached to larger aggregates.

3.5 Mudflat—(Cowardin: E2US3N and Dethier/ShoreZone: 82)

The mudflats within the Survey Area occur exclusively within the former Mill Pond area and cover 7.55 acres. This partially-enclosed area is protected by two spits that separate the area from the open harbor. A pedestrian bridge spans the two man-made spits. The area is nearly completely exposed during low tide events. Substrate is primarily mud with a proportion of organic/muck present within the Data Points (DP-06 and DP-07). The area is mostly unvegetated. Many small yellow shore crabs and burrows are present throughout. Clams are present, and aggregating anemone are exposed during low tide. Slopes are gentle and range from 2% to 6%.

3.6 Marsh–Spit/Berm Community—(Cowardin: E2EM1P and Dethier/ShoreZone: 75)

The fringe marsh–spit/berm community is unique compared to the other shoreline types in that it is irregularly flooded and is predominately vegetated. The 1.94-acre total areas are concentrated near the site of the former mill or upper reaches of other shoreline types. This type occurs at or just above the mean high tide where it is offered more protection from wave energy than the other shoreline types. The primary substrate is sand and includes a mixture of mixed coarse/fines and relic artificial debris as recorded in Data Points (DP-18 and DP-19). Though likely inundated only during the highest spring tides, this marsh community is densely vegetated with pickleweed and patchy areas of gumweed. It occurs on nearly level lands that do not exceed 2% slopes. Multiple yellow shore crabs along the edge of the marsh were the only fauna documented.

4. CONCLUSIONS

Geosyntec observed and identified six representative shoreline types within the Survey Area; distribution varied within the Mill Pond, the Inner Harbor, and the Outer Harbor. Shoreline along the Mill Pond area was mainly classified as mudflat and mud/sand flat. The northern shoreline was classified as sand flat along the Inner Harbor and mixed/coarse moving towards the Outer Harbor. The southern shoreline was classified as sand flat, hardpan and mud/sand flat within the Inner Harbor, and mixed coarse or sand flat as moving towards the Outer Harbor.

5. REFERENCES

Bailey, A., K. Ward, and T. Manning. 1993. *A Field Guide for Characterizing Habitats using A Marine and Estuarine Habitat Classification System for Washington State*. Washington Department of Natural Resources Division of Aquatic Lands.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States.* U.S. Fish and Wildlife Service. FWS/OBS-79/31. Washington, DC

Dethier, M.N. 1990. *A Marine and Estuarine Habitat Classification System for Washington State.* Washington Natural Heritage Program, Dept. Natural Resources, Olympia, Washington. 56 pp.

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Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

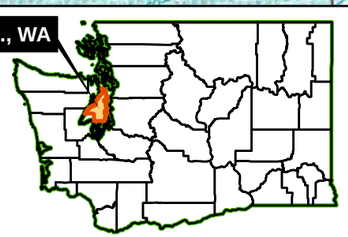
FIGURES



Legend

Study Area

Kitsap Co., WA



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Datasource:
- 1:24,000 USGS Topographical Quadrangles for Bremerton East and Duwamish Head.

Site Overview

Blakely Harbor RI Report
Appendix D
Bainbridge Island, Washington

Geosyntec consultants

PNG0900/03/3.7A | September 2023

Figure G-1

(Titusville-01)D:\Blakley Harbor WA\M - GIS\Projects_MXD\BlakelyHarbor_11x17_Shoreline_Figure 1_Overview_rev1.mxd 12/8/2021 10:29:01 AM NC



Legend

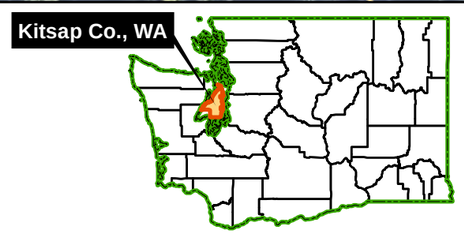
- Shoreline Habitat Survey Data Point (15-meter diameter)
- Streets

Intertidal Shoreline Type

- Hardpan
- Mixed Coarse
- Sandflat
- Mud/Sandflat (Mixed Fine)
- Mudflat
- Marsh - Spit/Berm Community

Subtidal Shoreline Zone

- Shallow Subtidal



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Datasource:
- Imagery obtained from Nearmap.
- Date of imagery: 09/21/2021.

Shoreline Classification Type

Blakely Harbor RI Report
Appendix D
Bainbridge Island, Washington

Geosyntec consultants

PNG0900/03/3.7A | September 2023

Figure G-2

(Titusville-01)D:\Blakley Harbor WA\M - GIS\Projects_MXD\BlakelyHarbor_11x17_Shoreline_Figure 2_FieldResults_rev1.mxd 6/6/2023 5:12:31 PM NC

ATTACHMENT G-1
Photographic Record

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 1	
Date: 8/20/2021	
Direction: Southwest	
Comments: Photograph of the north shore of the Study Area at the Blakely Harbor Park with the former mill site in the background.	

Photograph 2	
Date: 8/20/2021	
Direction: West	
Comments: General representative photograph of the north shore at low tide that consists of a mixed coarse substrate.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 3 **Date:** 8/20/2021 **Direction:** East **Comments:** Photograph of the representative sandflat shoreline along the southern shore.	

Photograph 4 **Date:** 8/20/2021 **Direction:** East **Comments:** Representative photograph of the interface of mixed fine substrate-dominated shoreline with a shallow consolidated hardpan shoreline type along the south shore.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 5 **Date:** 8/19/2021 **Direction:** North **Comments:** Representative photograph of the mixed fine shoreline type with a dense mat of green and brown algae along the southern shore.	

Photograph 6 **Date:** 8/19/2021 **Direction:** Northwest **Comments:** Representative photograph of a sandflat that is dominated with a sand substrate with a light cover of gravel on the surface.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 7 **Date:** 8/20/2021 **Direction:** North **Comments:** Photograph of pedestrian bridge that separates the former Mill Pond with the open harbor. Note, the difference in substrate type between the two shoreline types: a sand-dominated substrate outside of the former Mill Pond (photograph right) and mud-dominated within the former Mill Pond (photograph left).	
Photograph 8 **Date:** 8/19/2021 **Direction:** Northeast **Comments:** Representative photograph of the mudflat shoreline type within the former Mill Pond area.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 9 **Date:** 8/19/2021 **Direction:** Northwest **Comments:** Photograph of the mudflats within the interior of the former Mill Pond area. An irregularly flooded pickleweed (*Salicornia virginica*) and gumweed (*Grindelia integrifolia*) dominated spit/berm marsh community occurs near/above the mean high water line.	
Photograph 10 **Date:** 8/20/2021 **Direction:** Southeast **Comments:** Representative photograph of the pickleweed-dominated marsh adjacent to the former mill site.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 11 **Date:** 8/19/2021 **Direction:** South **Comments:** Photograph of a flowing seep above the low water line as it flows into the harbor. Note, debris from the former mill along the shore.	

Photograph 12 **Date:** 8/19/2021 **Direction:** Northeast **Comments:** Photograph of a flowing seep across the sandflat along the south shoreline.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 13 **Date:** 8/19/2021 **Direction:** N/A **Comments:** Photograph of a red rock crab (*Cancer productus*) observed within the Study Area.	

Photograph 14 **Date:** 8/19/2021 **Direction:** N/A **Comments:** Photograph of a moon snail within the discharge creek from the former Mill Pond into the harbor (*Euspira lewisii*).	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 15 **Date:** 8/20/2021 **Direction:** N/A **Comments:** Photograph of moon snail egg sac found along the shoreline within the former Mill Pond.	
Photograph 16 **Date:** 8/19/2021 **Direction:** N/A **Comments:** Representative photograph of numerous bivalve shows along the sandflat on the south shoreline of the Study Area.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 17 **Date:** 8/19/2021 **Direction:** N/A **Comments:** Photograph of a relic bivalve shell found along the sandflat on the south shoreline of the harbor.	

Photograph 18 **Date:** 8/19/2021 **Direction:** N/A **Comments:** Representative photograph of a lowtide exposed cluster of aggregating anemone (*Anthopleura elegantissima*) found along the mixed-fine shoreline type on the south shore of the Study Area.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 19	
Date: 8/19/2021	
Direction: Southeast	
Comments: Photograph of two western gull (*Larus occidentalis*) avian species along the mixed fine shoreline type.	

Photograph 20	
Date: 8/20/2021	
Direction: East	
Comments: Photograph of great blue heron (*Ardea herodias*) the cobble-gravel shoreline along the north shore of the Study Area.	

GEOSYNTEC CONSULTANTS Photographic Record	Geosyntec consultants
Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 21 **Date:** 8/20/2021 **Direction:** Northeast **Comments:** Photograph of Canada goose (*Branta canadensis*) along the sandflat of the south shoreline.	

Photograph 22 **Date:** 8/19/2021 **Direction:** N/A **Comments:** Representative photograph of a rockweed (*Fucus* sp.) brown algae.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Ecological Survey	**Site Location: Bainbridge Island, WA**

Photograph 23

Date: 8/20/2021

Direction: East

Comments:
Photograph of shoreline dominated with the green algae sea lettuce (*Ulvaria* sp.) and green hair (*Urospora* sp.).



Photograph 24

Date: 8/20/2021

Direction: Northwest

Comments:
Photograph of patchy green algae along the sandflat on the south shore of the Study Area. Several floating, unattached eel grass specimens were found along the waters' edge.



ATTACHMENT G-2
Shoreline Inspection Data

Shoreline Inspection Data Form	Data Sheet No.: **DP-01**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59486263333333, -122.51324768333332
Habitat Type: Intertidal: Sandflat	
Remarks: Data point in large debris field. Shoreline would be naturally sandy gravel. A large, linear seephead exists just south of data point. Slope is approximately 2%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Brown Algae, Green Algae	sea lettuce (Ulvaria sp.), green hair (Urospora sp.), rockweed (Fucus sp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, numerous clam shows present, aggregating anemone (Anthopleura elegantissima)
Terrestrial Fauna Species	
Avian Species	Western gull

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Data Form Info Cont'd	Data Sheet No.: **DP-01**

SOILS
Substrate 1
51-75% Sand - (< 4mm - > 0.06mm)
Substrate 2
6-25% Mud (Fines: <0.06mm; mix w/organics)
Substrate 3
1-5% Gravel - (Small rocks: < 64mm - > 4mm)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-01**

Data Point - Habitat Photos	
	
	

Geosyntec consultants

Data Form Info Cont'd	Data Sheet No.: **DP-01**

Data Point - Soil Photos









Shoreline Inspection Data Form	Data Sheet No.: **DP-02**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59527128333334, -122.51383285
Habitat Type: Intertidal: Sandflat	
Remarks: On edge of mud flat to west. Very firm substrate. Same as previous data point 01 but no gravel in substrate. Slope is approximately 2%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Largely unvegetated, Red Algae, Green Algae	sea lettuce (Ulvaria sp.), green hair (Urospora sp.), nori (Porphyra spp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, bivalve shows present, individual aggregating anemone (Anthopleura elegantissima) clusters exposed from low tide.
Terrestrial Fauna Species	
Avian Species	Western gull floating on water surface.

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Data Form Info Cont'd	Data Sheet No.: **DP-02**

SOILS
Substrate 1
51-75% Sand - (< 4mm - > 0.06mm)
Substrate 2
6-25% Mud (Fines: <0.06mm; mix w/organics)
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-02**

Data Point - Habitat Photos	
	
	

Geosyntec consultants

Data Form Info Cont'd	Data Sheet No.: **DP-02**

Data Point - Soil Photos









Shoreline Inspection Data Form	Data Sheet No.: **DP-03**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.594891800000006, -122.515216
Habitat Type: Intertidal: Mudflat (Mixed fine)	
Remarks: Broad mudflat soft to walk through. Patchy red and green algae throughout. Individual floating, unattached eelgrass observed along waters' edge. Several seeps noted east and upgradient along shore. Slope is approximately 3%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Patchy Green Algae, Red Algae	Primarily unvegetated with sea lettuce (Ulvaria sp.), green hair (Urospora sp.), nori (Porphyra spp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Small Yellow shore crabs and burrows present; Sunken large and small bivalve shows; many aggregating anemone (Anthopleura elegantissima) exposed from low tide; acorn barnacles on cobble stones
Terrestrial Fauna Species	Small blow flies present on surface
Avian Species	Western Gull and American crows (2)

Geosyntec consultants

Data Form Info Cont'd	Data Sheet No.: **DP-03**

SOILS
Substrate 1
76-99% Mixed Fines - (Mix of sand / mud)
Substrate 2
1-5% Sand - (< 4mm - > 0.06mm)
Substrate 3
Substrate 4

Data Form Info Cont'd	Data Sheet No.: **DP-03**

Data Point - Habitat Photos	
	
	

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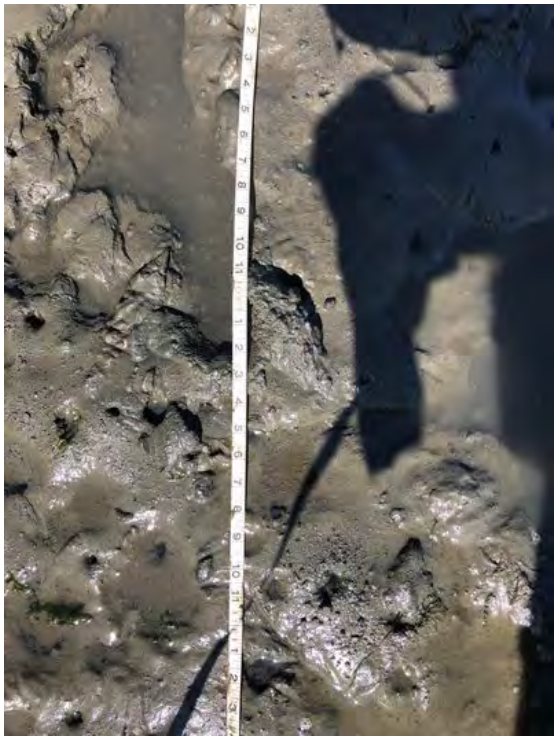
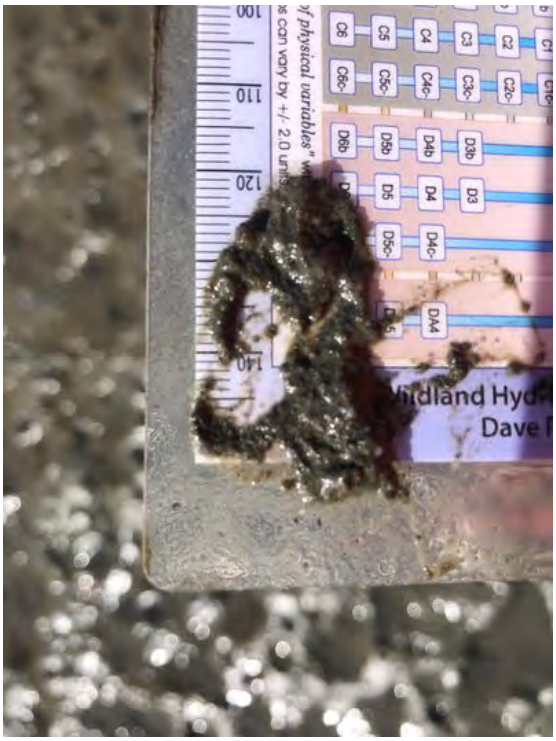
Data Form Info Cont'd	Data Sheet No.: **DP-03**

Data Point - Soil Photos









Shoreline Inspection Data Form	Data Sheet No.: **DP-04**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59473918333333, -122.51539096666664
Habitat Type: Hardpan	
Remarks: Exposed Clay hardpan outcrop with sparse mixed coarse/cobble cover. Slope is approximately 10%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Green Algae	Patchy sea lettuce (Ulvaria sp.) primarily

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Small red rock crab; acorn barnacles on rocks. No subsurface due to shallow hardpan. Relic bivalve shells present. Aggregating anemone (Anthopleura elegantissima) exposed from low tide.
Terrestrial Fauna Species	
Avian Species	

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Data Form Info Cont'd	Data Sheet No.: **DP-04**

SOILS
Substrate 1
26-50% Hardpan - (Consol. Clays)
Substrate 2
6-25% Gravel - (Small rocks: < 64mm - > 4mm)
Substrate 3
6-25% Sand - (< 4mm - > 0.06mm)
Substrate 4
1-5% Cobble - (Rocks: < 256mm - > 64mm)

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Data Form Info Cont'd	Data Sheet No.: **DP-04**

Data Point - Habitat Photos	
	
	

Geosyntec consultants

Data Form Info Cont'd	Data Sheet No.: **DP-04**

Data Point - Soil Photos









Shoreline Inspection Data Form	Data Sheet No.: **DP-05**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.595659116666674, -122.51610046666669
Habitat Type: Sandflat	
Remarks: Data point located on the western edge of mudflat and is primarily a sand flat. Transitions to tidal creek edge to north with strong sand substrate. Slope is approximately 3%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Green Algae	Mostly unvegetated. Sparse green hair (*Urospora* sp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Clams shows on surface. Shad in shallow waters edge, live moon snail (*Euspira lewisii*) observed along waters' edge of low water tidal creek north of data point. Aggregating anemone (Anthopleura elegantissima) exposed from low tide.
Terrestrial Fauna Species	
Avian Species	Canada goose

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Data Form Info Cont'd	Data Sheet No.: **DP-05**

SOILS
Substrate 1
51-75% Sand - (< 4mm - > 0.06mm)
Substrate 2
6-25% Mud (Fines: <0.06mm; mix w/organics)
Substrate 3
Substrate 4

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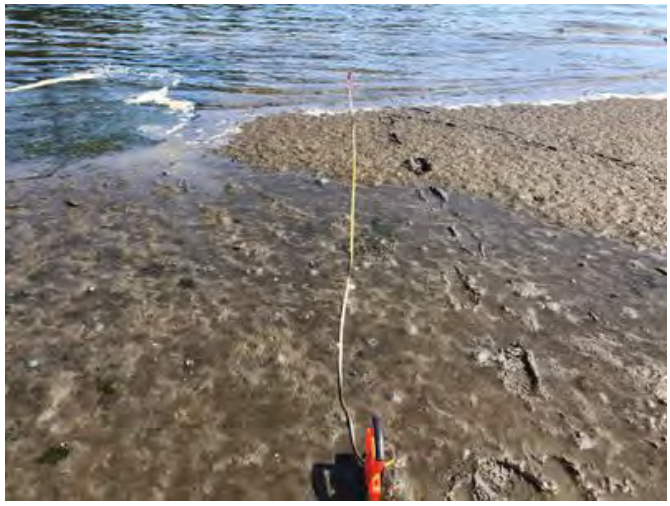
Data Form Info Cont'd	Data Sheet No.: **DP-05**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-05**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-06**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59563906666668, -122.5179303
Habitat Type: Intertidal: Mudflat	
Remarks: Semi-Firm mud substrate with slight muck top layer. Slope is approximately 2%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Red Algae	Mostly unvegetated but light cover of nori (Porphyra spp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Dense small yellow shore crab population and burrows thru out. Clam shows present. Aggregating anemone (Anthopleura elegantissima) exposed from low tide.
Terrestrial Fauna Species	Many small Blow Flies present
Avian Species	Auditory Kingfisher call heard in adjacent trees.

Data Form Info Cont'd	Data Sheet No.: **DP-06**

SOILS
Substrate 1
76-99% Mud (Fines: <0.06mm; mix w/organics)
Substrate 2
<1% Organic (black OM: leaf litter, wood chips)
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-06**

Data Point - Habitat Photos	
	
	

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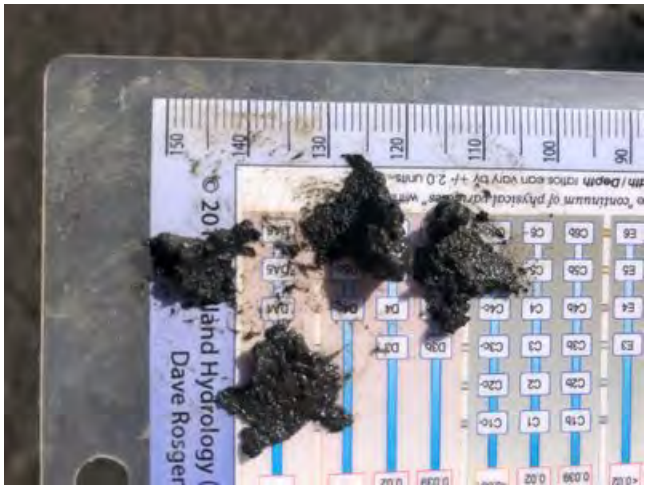
Data Form Info Cont'd	Data Sheet No.: **DP-06**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-07**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.596731866666666, -122.51832426666668
Habitat Type: Intertidal: Mudflat	
Remarks: Firm mudflat with thin muck layer; dense layer of shells and rocks with barnacles. Slope is approximately 6%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Unvegetated	Unvegetated

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, many small Yellow shore crabs and burrows present
Terrestrial Fauna Species	
Avian Species	

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Data Form Info Cont'd	Data Sheet No.: **DP-07**

SOILS
Substrate 1
76-99% Mud (Fines: <0.06mm; mix w/organics)
Substrate 2
1-5% Organic (black OM: leaf litter, wood chips)
Substrate 3
1-5% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-07**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-07**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-08**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/19/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59669005000001, -122.51662108333332
Habitat Type: Mud/Sandflat (Mixed Fine)	
Remarks: A Mixed fine mudflat that has been previously disturbed with relic debris present. Slope is approximately 2%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Unvegetated	Unvegetated

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Many small Yellow shore crabs and burrows present
Terrestrial Fauna Species	
Avian Species	

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Data Form Info Cont'd	Data Sheet No.: **DP-08**

SOILS
Substrate 1
76-99% Mixed Fines - (Mix of sand / mud)
Substrate 2
6-25% Artificial - RipRap, Structure, Concrete, Debris, etc
Substrate 3
1-5% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-08**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-08**

Data Point - Soil Photos	
	
	

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Shoreline Inspection Data Form	Data Sheet No.: **DP-09**

GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59661655, -122.51525365

Habitat Type:

Mixed Coarse

Remarks:

Data point in large debris field with relic wooden piling present. Shoreline is naturally sandy gravel, mixed coarse. No armoring of shoreline appears to have occurred. A large seephead exists just south of Data Point. Slope is approximately 4%.

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Brown Algae, Green Algae	Mostly unvegetated; sea lettuce (Ulvaria sp.), rockweed (Fucus sp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, acorn barnacle, red rock crabs hiding under larger rocks
Terrestrial Fauna Species	
Avian Species	Western gull; American crow; Great blue heron flying overhead

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Data Form Info Cont'd	Data Sheet No.: **DP-09**

SOILS
Substrate 1
51-75% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 2
6-25% Artificial - RipRap, Structure, Concrete, Debris, etc
Substrate 3
1-5% Sand - (< 4mm - > 0.06mm)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-09**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-09**

Data Point - Soil Photos









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Shoreline Inspection Data Form	Data Sheet No.: **DP-10**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.596622999999994, -122.51387571666667
Habitat Type: Mixed Coarse	
Remarks: Data point located along a sandy, gravelly, mixed coarse shoreline with cobble/boulders and debris. Slope is approximately 10%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Brown Algae, Green Algae	Mainly unvegetated but sparse sea lettuce (Ulvaria sp.), green hair (Urospora sp.), rockweed (Fucus sp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Infrequent acorn barnacles on large rocks, red rock crabs, Relic bivalve shells
Terrestrial Fauna Species	
Avian Species	

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Data Form Info Cont'd	Data Sheet No.: **DP-10**

SOILS
Substrate 1
51-75% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 2
6-25% Cobble - (Rocks: < 256mm - > 64mm)
Substrate 3
6-25% Boulders - (Rocks > 256mm)
Substrate 4
1-5% Artificial - RipRap, Structure, Concrete, Debris, etc

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Data Form Info Cont'd	Data Sheet No.: **DP-10**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-10**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-11**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59673421666666, -122.51308718333333
Habitat Type: Mixed Coarse	
Remarks: Homogeneous mixed coarse gravel shoreline with a flowing seephead on SW edge of data point. Slope is approximately 9%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Green Algae	Sparse sea lettuce (Ulvaria sp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells
Terrestrial Fauna Species	
Avian Species	Western gull in water adjacent to data point.

Data Form Info Cont'd	Data Sheet No.: **DP-11**

SOILS
Substrate 1
100% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 2
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-11**

Data Point - Habitat Photos	
	
	

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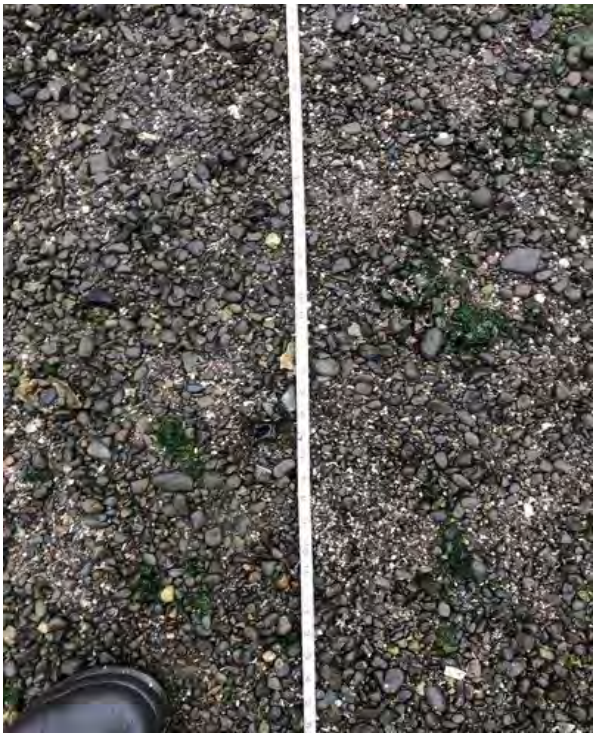
Data Form Info Cont'd	Data Sheet No.: **DP-11**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-12**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.596606166666675, -122.51192435
Habitat Type: Mixed Coarse	
Remarks: Data point located along a mixed coarse substrate dominated shoreline. A flowing seep is within the data point. Sparse cobble present. Slope is approximately 15%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Green Algae	sea lettuce (Ulvaria sp.), green hair (Urospora sp.) associated with seephead within data point

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	acorn barnacle, dead red rock crabs, relic bivalve shells
Terrestrial Fauna Species	
Avian Species	great blue heron hunting along shoreline; western gulls flying over

Data Form Info Cont'd	Data Sheet No.: **DP-12**

SOILS
Substrate 1
51-75% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 2
26-50% Cobble - (Rocks: < 256mm - > 64mm)
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-12**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-12**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-13**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59684915, -122.50987981666668
Habitat Type: Mixed Coarse	
Remarks: Partially exposed cobble gravelly shoreline due to increased exposure to wave action. Slope is approximately 13%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly Unvegetated, Brown Algae, Green Algae	sea lettuce (Ulvaria sp.), green hair (Urospora sp.), rockweed (Fucus sp.) at MLWL

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, red rock crab, acorn barnacle on larger rocks
Terrestrial Fauna Species	
Avian Species	Western Gull; bald eagle flew over project site

Data Form Info Cont'd	Data Sheet No.: **DP-13**

SOILS
Substrate 1
51-75% Cobble - (Rocks: < 256mm - > 64mm)
Substrate 2
26-50% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-13**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-13**

Data Point - Soil Photos









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Shoreline Inspection Data Form	Data Sheet No.: **DP-14**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59696556666666, -122.50862965
Habitat Type: Mixed Coarse	
Remarks: Shoreline becoming increasingly more exposed with larger substrate present. A shallow clay hardpan outcrop bisects the Data Point. Slope is approximately 10%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly Unvegetated, Brown Algae, Green Algae	Patchy sea lettuce (Ulvaria sp.), green hair (Urospora sp.), rockweed (Fucus sp.) on clay hardpan outcrop

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, acorn barnacle, red rock crab carcass in Data Point
Terrestrial Fauna Species	
Avian Species	Western gull

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Data Form Info Cont'd	Data Sheet No.: **DP-14**

SOILS
Substrate 1
26-50% Cobble - (Rocks: < 256mm - > 64mm)
Substrate 2
6-25% Gravel - (Small rocks: < 64mm - > 4mm)
Substrate 3
6-25% Hardpan - (Consol. Clays)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-14**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-14**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-15**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59702568333334, -122.50700138333336
Habitat Type: Mixed Coarse	
Remarks: Flat partially exposed shoreline with mixed coats/fine substrate and isolated cobbles. A drainage path of a dry stream immediately north of Data Point and discharges to harbor. Slope is approximately 6%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Red Algae, Green Algae	sea lettuce (Ulvaria sp.), green hair (Urospora sp.), nori (Porphyra spp.) throughout

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	red rock crab
Terrestrial Fauna Species	
Avian Species	Western gulls resting on shoreline

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Data Form Info Cont'd	Data Sheet No.: **DP-15**

SOILS
Substrate 1
51-75% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 2
6-25% Mixed Fines - (Mix of sand / mud)
Substrate 3
<1% Cobble - (Rocks: < 256mm - > 64mm)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-15**

Data Point - Habitat Photos	
	
	

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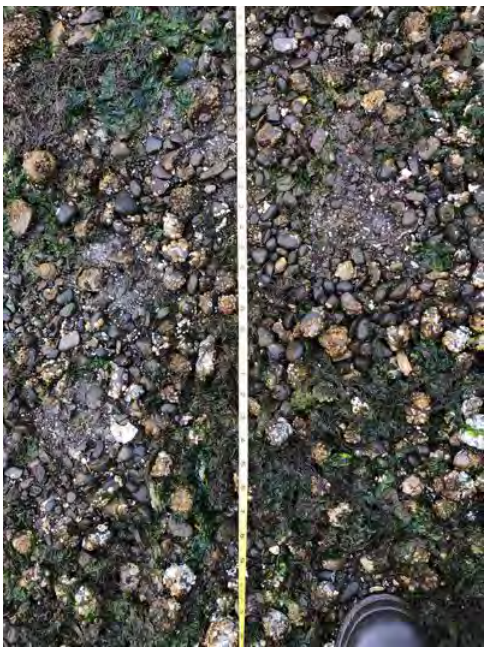
Data Form Info Cont'd	Data Sheet No.: **DP-15**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-16**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59414075, -122.51095575
Habitat Type: Intertidal: Sandflat	
Remarks: Data point located on a broad Sand flat that extends beyond into Subtidal zone. Individual unattached, floating eel grass (*Zostera marina*) present near waters' edge.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Green Algae	Sparse green hair (*Urospora* sp.)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Relic bivalve shells, numerous clam shows present
Terrestrial Fauna Species	
Avian Species	Canada geese; multiple species of gulls

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Data Form Info Cont'd	Data Sheet No.: **DP-16**

SOILS
Substrate 1
76-99% Sand - (< 4mm - > 0.06mm)
Substrate 2
1-5% Mixed Fines - (Mix of sand / mud)
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-16**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-16**

Data Point - Soil Photos









Shoreline Inspection Data Form	Data Sheet No.: **DP-17**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59385808333333, -122.51185266666668
Habitat Type: Mixed Coarse	
Remarks: Gravelly sandy shoreline with isolated clay hardpan exposed. Slope is approximately 11%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Mostly unvegetated, Green Algae	Only some green algae downgradient as transitions to muddy sandflat

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Acorn barnacles on rocks
Terrestrial Fauna Species	
Avian Species	

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Data Form Info Cont'd	Data Sheet No.: **DP-17**

SOILS
Substrate 1
51-75% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 2
6-25% Hardpan - (Consol. Clays)
Substrate 3
<1% Cobble - (Rocks: < 256mm - > 64mm)
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-17**

Data Point - Habitat Photos	
	
	

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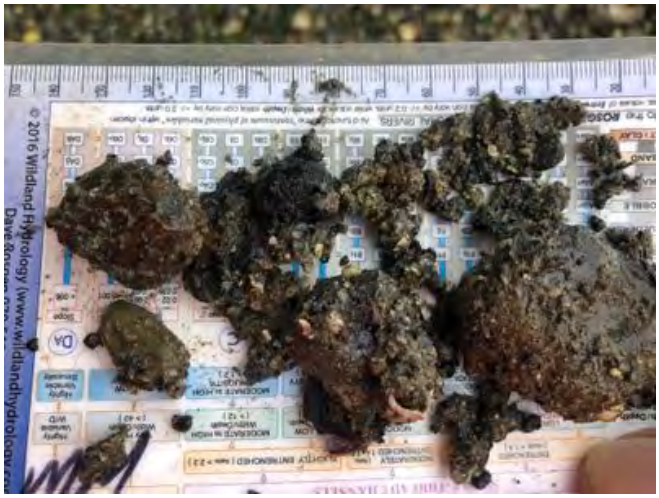
Data Form Info Cont'd	Data Sheet No.: **DP-17**

Data Point - Soil Photos	
	
	

Shoreline Inspection Data Form	Data Sheet No.: **DP-18**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.59708659666, -122.516161114785
Habitat Type: Marsh - Spit/Berm Community	
Remarks: Data point located within an irregularly flooded spit/berm marsh that is dominated almost exclusively with pickleweed (*Salicornia virginica*), gumweed (*Grindelia integrifolia*). Several relic pilings present in data point. Slope is approximately flat or <1%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Marsh Halophytes	pickleweed (Salicornia virginica), gumweed (Grindelia integrifolia)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	Yellow shore crab along margin of marsh.
Terrestrial Fauna Species	
Avian Species	

Data Form Info Cont'd	Data Sheet No.: **DP-18**

SOILS
Substrate 1
76-99% Mixed Fines - (Mix of sand / mud)
Substrate 2
6-25% Artificial - RipRap, Structure, Concrete, Debris, etc
Substrate 3
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-18**

Data Point - Habitat Photos









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Data Form Info Cont'd	Data Sheet No.: **DP-18**

Data Point - Soil Photos	
	

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Shoreline Inspection Data Form	Data Sheet No.: **DP-19**
GENERAL INFORMATION	
Project Name: Blakely Harbor Date: 08/20/2021 Surveyors: Alexander Mathes	Bainbridge Island, WA Lat/Long: 47.5967985522361, -122.515430546655
Habitat Type: Marsh - Spit/Berm Community	
Remarks: Data point located within an irregularly flooded spit/berm marsh that is dominated almost exclusively with pickleweed (*Salicornia virginica*), gumweed (*Grindelia integrifolia*). Wracklines from large drift logs and former artificial debris present. Slope is approximately 2%.	

VEGETATION	
Dominant Vegetation	**Flora Species**
Marsh Halophytes	pickleweed (Salicornia virginica), gumweed (Grindelia integrifolia)

WILDLIFE	
Type	**Observed Species**
Aquatic Fauna Species	
Terrestrial Fauna Species	
Avian Species	

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Data Form Info Cont'd	Data Sheet No.: **DP-19**

SOILS
Substrate 1
51-75% Sand - (< 4mm - > 0.06mm)
Substrate 2
6-25% Mixed Coarse - (cobbles / gravels / shells/ and sand)
Substrate 3
1-5% Artificial - RipRap, Structure, Concrete, Debris, etc
Substrate 4

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Data Form Info Cont'd	Data Sheet No.: **DP-19**

Data Point - Habitat Photos	
	
	

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Data Form Info Cont'd	Data Sheet No.: **DP-19**

Data Point - Soil Photos	
	

APPENDIX H
Shoreline Seeps and Structures Survey

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APPENDIX H
SHORELINE SEEPS AND STRUCTURES SURVEY

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

Geosyntec consultants

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Figure H-2	Seep Locations
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LIST OF ATTACHMENTS

Attachment H-1	Photographic Record - Seeps
Attachment H-2	Photographic Record - Harbor North Shore Area
Attachment H-3	Photographic Record - Inner Harbor
Attachment H-4	Photographic Record - Upland Area

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	Feasibility Study
Geosyntec	Geosyntec Consultants, Inc.
MLLW	Mean Lower Low Water
Port Blakely	Port Blakely Tree Farms
RI	Remedial Investigation
the Site	the Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the shoreline inspection survey conducted by a Washington-licensed Professional Engineer (Geosyntec Consultants, Inc. [Geosyntec]) during Phase 1 of the RI. The survey was conducted to inspect and record locations of seeps and structures around the Site. Except where noted, field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, Sampling and Analysis Plan and Quality Assurance Project Plan (Geosyntec, 2022), and the Work Plan Addendum (Geosyntec, 2023).

2. SURVEY METHODOLOGY

AGO Land Surveying established location control by installing a series of three control points on the morning of Thursday, August 19, 2021, prior to the beginning of the survey. The locations and a description of these control points are shown on Figure H-1.

The shoreline inspection survey was performed from August 19 to August 21, 2021. The survey was conducted by visually inspecting and documenting shoreline characteristics while walking and/or wading along the shoreline and beach at low tide. Target features included seeps, existing structures or remnants of buildings, and associated foundations. Features were photographed, and locations of the features (including corners or edges of structures) were recorded using a hand-held global positioning system (GPS) with a maximum accuracy of +/- 0.5 feet (Table H-1). A brief description of observed features was recorded in the field notes.

During the survey, low tide ranged from approximately -1.7 to -2.1 feet mean lower low water (MLLW), as shown on Table H-2.

In general, shoreline survey observations were sequenced to follow the ebb and flood tides along the shorelines of the Site. Most beach and shoreline areas were inundated at waterline elevations greater than approximately 4 feet MLLW.

Accessible features were photographed, and upstream and downstream views of the shoreline were also photographed to document typical shoreline conditions and potential access constraints for future sampling, remedial design, and construction. The location where each photograph was taken was recorded together with notes indicating the direction in which the photograph was taken and a brief photograph description. These photographs are provided in the attachments.

3. SUMMARY OF OBSERVATIONS

Field observations are discussed below. While this survey was intended to identify seeps and structures, slag, timber pilings, and woody debris were also observed. Photographs and field

observations are provided in referenced attachments. Location coordinates are reported in Table H-1.

3.1 Seeps

Ten seeps were observed during the shoreline inspection survey (Figure H-2). Four seeps located within the Inner Harbor (BH_SEEP_01 through BH_SEEP_04) were selected for water quality measurement using a hand-held water quality probe based on Site access (Table H-3). Photographs and additional field observations are summarized in Attachment H-1.

One outfall was observed, and one additional pipe was observed that appeared to be debris rather than an outfall (Attachment H-3).

3.2 Structures

One small group of former concrete strips that appear to be associated with the foundations of a historical structure was observed along the north shore between the Inner and Outer Harbor (Figure H-3; Attachment H-2).

Remnant structures and associated debris were observed in the Inner Harbor nearshore area associated with former Mill operations (e.g., brick fragments, metal debris, ash/charcoal; Figures H-4a and H-4b; Attachment H-3). A riprap shoreline revetement was also observed in this area.

The former powerhouse, remnants of concrete foundations, metal debris, and several debris piles were observed in the upland area (Figures H-5a through H-5c; Attachment H-4).

Private docks and piers were not documented in detail due to time constraints.

3.3 Other Observations

Other features were also observed during the shoreline inspection survey:

- Slag debris was observed in the Inner Harbor nearshore area (Figures H-4a and H-4b; Attachment H-3).
- One group of pilings was observed in the northern shoreline of the Outer Harbor (Figure H-3 and Attachment H-2). These pilings were often covered with barnacles and biota.
- Eroded wood pilings were observed sticking up from the sediment in the Inner Harbor nearshore area (Figure H-4a; Attachment H-3).
- Additional eroded pilings were observed in intertidal areas of the Mill Pond. These pilings were often covered with barnacles.
- Wood debris was observed in the Inner Harbor nearshore area (Figures H-4a and H-4b; Attachment H-3) and in the upland area (Figures H-5a through H-5c; Attachment H-4).

Slag, pilings, and wood debris are discussed in additional appendices.

4. REFERENCES

Geosyntec Consultants, Inc. (Geosyntec). 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site.* Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 31 January.

Geosyntec. 2023. *Final Remedial Investigation/Feasibility Study Work Plan/ Sampling and Analysis Plan Addendum Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 19 April.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

TABLES

Geosyntec consultants

Table H-1 Seeps and Photograph Locations Coordinates

Area of Investigation	Location ID	Easting (feet)	Northing (feet)
Seep	BH_SEEP_01	1225722	222116
Seep	BH_SEEP_02	1225480	222143
Seep	BH_SEEP_03	1225590	222087
Seep	BH_SEEP_04	1225609	222123
Seep	BH_SEEP_05	1226302	222144
Seep	BH_SEEP_07	1225056	221772
Seep	BH_SEEP_08	1225789	221437
Seep	BH_SEEP_09	1225816	221416
Seep	BH_SEEP_10	1225632	221408
Harbor North Shore	BH_HNSA_01	1227197	222278
Harbor North Shore	BH_HNSA_02	1227168	222293
Harbor North Shore	BH_HNSA_03	1227170	222256
Harbor North Shore	BH_HNSA_04	1226259	222118
Harbor North Shore	BH_HNSA_05	1226258	222172
Harbor North Shore	BH_HNSA_06	1226116	222123
Harbor North Shore	BH_HNSA_07	1226061	222169
Inner Harbor	BH_IH_02	1225970	222181
Inner Harbor	BH_IH_15	1225924	222191
Inner Harbor	BH_IH_04	1225999	222276
Inner Harbor	BH_IH_05	1225999	222276
Inner Harbor	BH_IH_03	1225999	222276
Inner Harbor	BH_IH_01	1225956	222268
Inner Harbor	BH_IH_06	1225860	222266
Inner Harbor	BH_IH_07	1225860	222266
Inner Harbor	BH_IH_08	1225860	222266
Inner Harbor	BH_IH_09	1225854	222141
Inner Harbor	BH_IH_10	1225817	222151
Inner Harbor	BH_IH_11	1225773	222132
Inner Harbor	BH_IH_13	1225806	222107
Inner Harbor	BH_IH_12	1225806	222107
Inner Harbor	BH_IH_14	1225804	222096
Inner Harbor	BH_IH_16	1225676	222223
Inner Harbor	BH_IH_18	1225626	222233
Inner Harbor	BH_IH_17	1225609	222241
Inner Harbor	BH_IH_19	1225618	222231
Inner Harbor	BH_IH_20	1225606	222228
Inner Harbor	BH_IH_21	1225593	222232

Geosyntec consultants

Table H-1 Seeps and Photograph Locations Coordinates

Area of Investigation	Location ID	Easting (feet)	Northing (feet)
Inner Harbor	BH_IH_22	1225597	222238
Inner Harbor	BH_IH_23	1225580	222238
Inner Harbor	BH_IH_24	1225491	222229
Inner Harbor	BH_IH_28	1225415	222050
Inner Harbor	BH_IH_26	1225415	222050
Inner Harbor	BH_IH_29	1225415	222050
Inner Harbor	BH_IH_30	1225316	222067
Inner Harbor	BH_IH_32	1225316	222067
Inner Harbor	BH_IH_31	1225316	222067
Inner Harbor	BH_IH_34	1225192	221993
Inner Harbor	BH_IH_18	1225099	221820
Inner Harbor	BH_IH_17	1225099	221820
Inner Harbor	BH_IH_35/BH_IH_36	1225138	221871
Upland	BH_UPLND_01	1225337	222121
Upland	BH_UPLND_02	1225330	222128
Upland	BH_UPLND_03	1225305	222136
Upland	BH_UPLND_04	1225289	222138
Upland	BH_UPLND_05	1225273	222128
Upland	BH_UPLND_06	1225300	222235
Upland	BH_UPLND_07	1225300	222235
Upland	BH_UPLND_08	1225307	222282
Upland	BH_UPLND_09	1225307	222282
Upland	BH_UPLND_10	1225307	222282
Upland	BH_UPLND_11	1225431	222286
Upland	BH_UPLND_12	1225429	222294
Upland	BH_UPLND_13	1225440	222321
Upland	BH_UPLND_14	1225463	222322
Upland	BH_UPLND_15	1225445	222329
Upland	BH_UPLND_16	1225466	222340
Upland	BH_UPLND_19	1225834	222491
Upland	BH_UPLND_20	1225848	222572
Upland	BH_UPLND_21	1225534	222389
Upland	BH_UPLND_22	1225510	222313

Notes:
1. Location IDs correspond to locations where seeps were identified and photographs were taken.
2. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum.

Geosyntec consultants

Table H-2 Shoreline Inspection Low Tide Elevation

Date	Predicted Low Tide (ft MLLW)	Time of Predicted of Lowest Tide Elevation	Approximate Time of Shoreline Inspection
8/19/2021	-1.74	8:54	10:00 to 16:45
8/20/2021	-2.05	9:54	07:20 to 17:00
8/21/2021	-2.08	10:42	08:00 to 14:30

Note:
Predicted Low Tide was retrieved from the National Oceanic and Atmospheric Administration website for the station 9445913 Port Blakely, WA.

Acronyms:
ft = feet
MLLW = Mean Lower Low Water

Geosyntec consultants

Table H-3 Seeps Water Quality Measurements

Seep	Date & Time	Discharge Velocity (ft/second)	Temperature (C)	Electrical Conductivity (mS/cm)	DO (mg/L)	pH
BH_SEEP_01	8/21/2021 10:30	0.4	14.5	40,182	1.16	7.0
BH_SEEP_02	8/21/2021 8:25	0.6	15.4	44,898	4.7	6.7
BH_SEEP_03	8/21/2021 10:10	0.4	16.1	44,354	0.97	7.0
BH_SEEP_04	8/21/2021 9:33	0.4	15.2	43,738	1.13	7.0

Note:
Water quality field parameters were measured in seeps showing visible flow based on best professional judgement of field personnel.

Acronyms:
C = degrees Celsius
DO = dissolved oxygen
ft/sec = feet per second
mg/L = milligram per liter
mS/cm = microSiemens per centimeter

FIGURES









Power House

Point ID	Short Name	Placed by Surveyor (Y/N)	By Whom	Survey Date	Northing (WA SPC North Zone in ft)	Easting (WA SPC North zone in ft)	Elevation (ft NAVD88)	Elevation (ft MLLW)	Decription of Survey Marker
401	Parking Lot	Y	AGO land surveying	8/31/2021	222561.41	1225842.13	30.3997	32.9197	In north parking lot; steel rod with flagging
402	Power-house	Y	AGO land surveying	8/31/2021	222180.11	1225362.23	10.2957	12.8157	2 ft East of NE corner of powerhouse building, steel rod with flagging
403	Beach	Y	AGO land surveying	8/31/2021	222087.29	1225248.17	10.9889	13.5089	Beach, 50 ft NE of North side of pedestrian bridge, steel rod with flagging
4672	North	Y	WDOT	1/12/2013	222283.634	1226704.62	15.991	18.511	Brass Disk set into top of Round Concrete Monument

Legend

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Historical Wharf Structure
- Structures from 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
Survey control coordinates courtesy of AGO Land Surveying LLC, August 21, 2021.
Coordinates: Washington State Plane, North Zone coordinate system, using the North American Datum of 1983, 1991 adjustment, based on High Accuracy Reference Network (HARN).

N

0 200 Feet

Survey Control Point Locations
Remedial Investigation Report

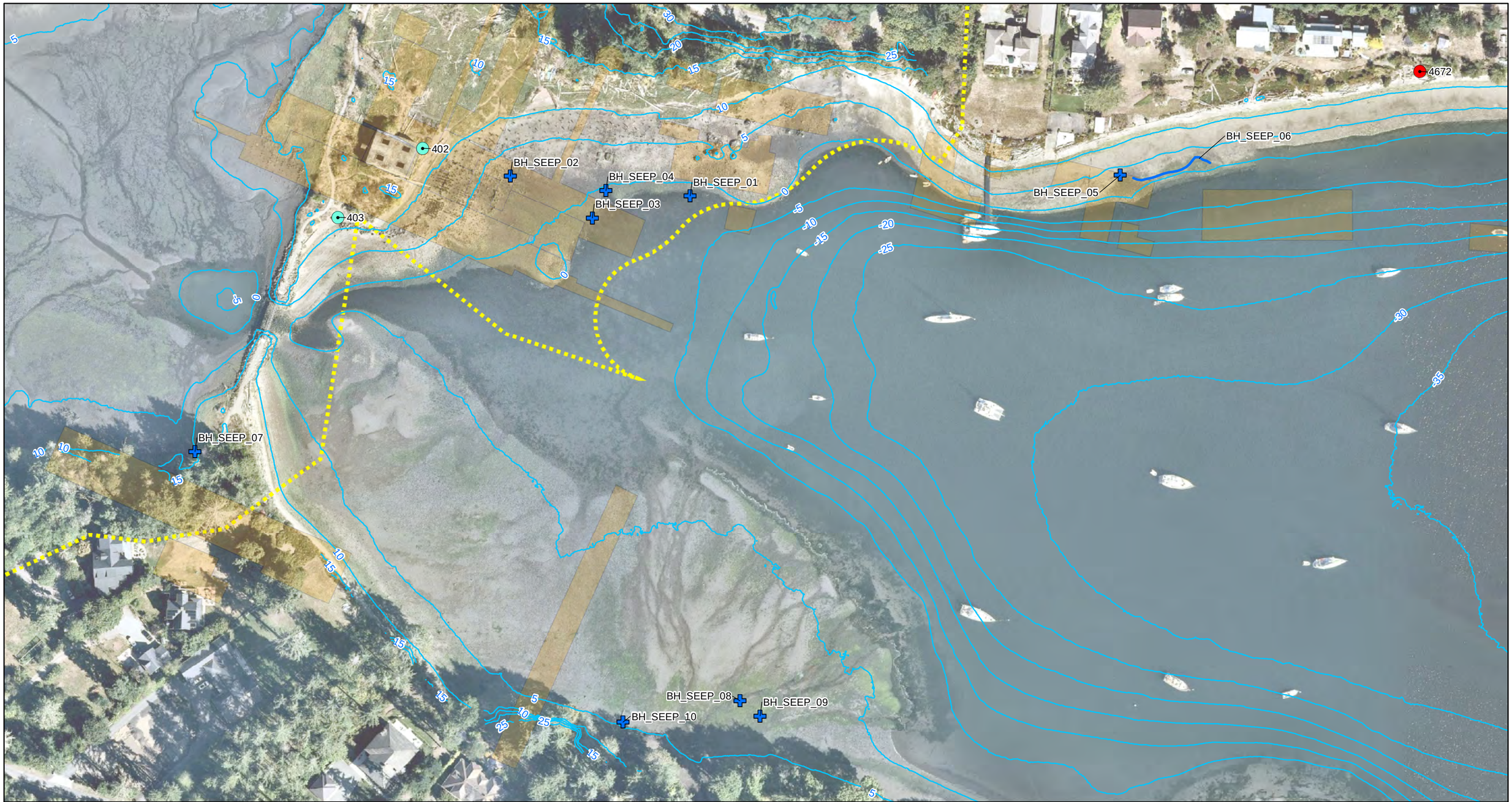
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | August 2023

Figure H-1

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-1 Survey Control Locations.mxd 8/16/2023 7:53:20 AM



Legend

- Seep Location
- Linear Seep Location
- Bainbridge Island Parks (BI Parks) Parcel Boundary

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 100 Feet

Seep Locations
Remedial Investigation Report

Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

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Figure H-2

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-2 Seep Locations.mxd 8/16/2023 7:54:18 AM



Legend

- Location of Harbor North Shore Area Photographs

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Historical Wharf Structure
- Harbor Boundary
- Contour (5 foot MLLW)
- Assumed Cable Crossing Alignment
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019
- Overwater Structure

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.
4. The assumed cable crossing alignment based on field observation. Actual location and ownership has not been verified.

N

0 120 Feet

Physical Observations in Harbor North Shore Area
Remedial Investigation Report

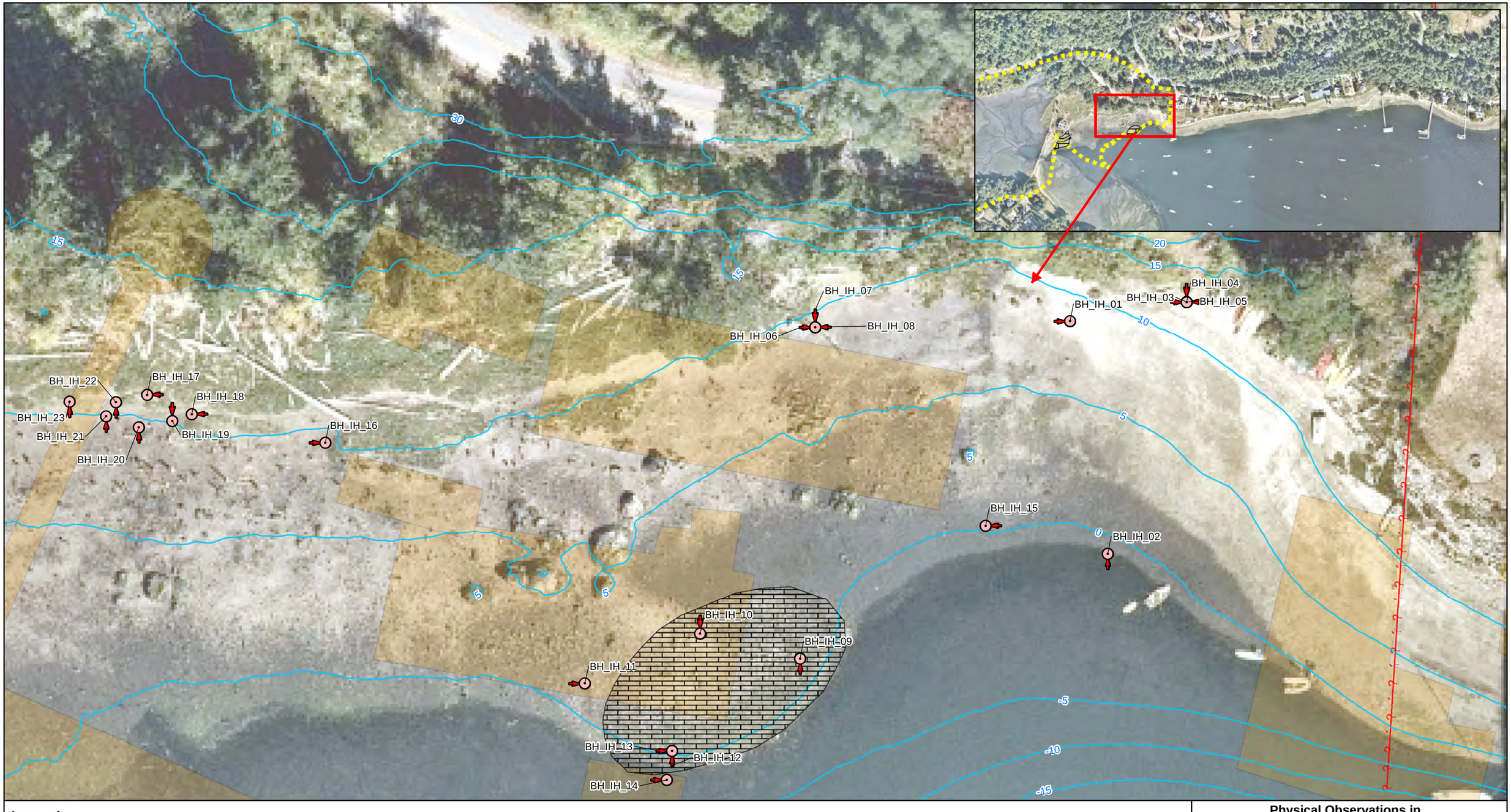
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | August 2023

Figure H-3

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-3 Physical Observations in Harbor North Shore Area.mxd 8/16/2023 7:55:54 AM



Legend

- Location of Harbor Inner Harbor Area Photographs
- Contour (5 foot MLLW)
- Assumed Cable Crossing Alignment
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019
- Approximate Extent of Observed Bricks

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.
4. The assumed cable crossing alignment based on field observation. Actual location and ownership has not been verified.

N

0 100 Feet

Physical Observations in Inner Harbor - East Side
Remedial Investigation Report

Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

Figure H-4a

MVI/Sea | August 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-4a Physical Observations in Inner Harbor.mxd 8/16/2023 5:34:28 AM



Legend

- Location of Harbor Inner Harbor Area Photographs

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Approximate Extent of Debris Pile
- Rectangular Concrete Block
- Approximate Extent of Riprap
- Approximate Extent of Wood Planks Overlain by Rocks
- Approximate Extent of Observed Scattered Bricks
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 100 Feet

Physical Observations in Inner Harbor - West Side
Remedial Investigation Report

Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

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Figure H-4b

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-4b Physical Observations in Inner Harbor.mxd 8/16/2023 8:04:55 AM



Legend

- Location of Upland Area Photographs

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Approximate Extent of Debris Pile
- Approximate Extent of Wood Planks Overlain by Rocks
- Approximate Extent of Observed Scattered Bricks
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 100 Feet

Physical Observations in Upland Area - North Side
Remedial Investigation Report

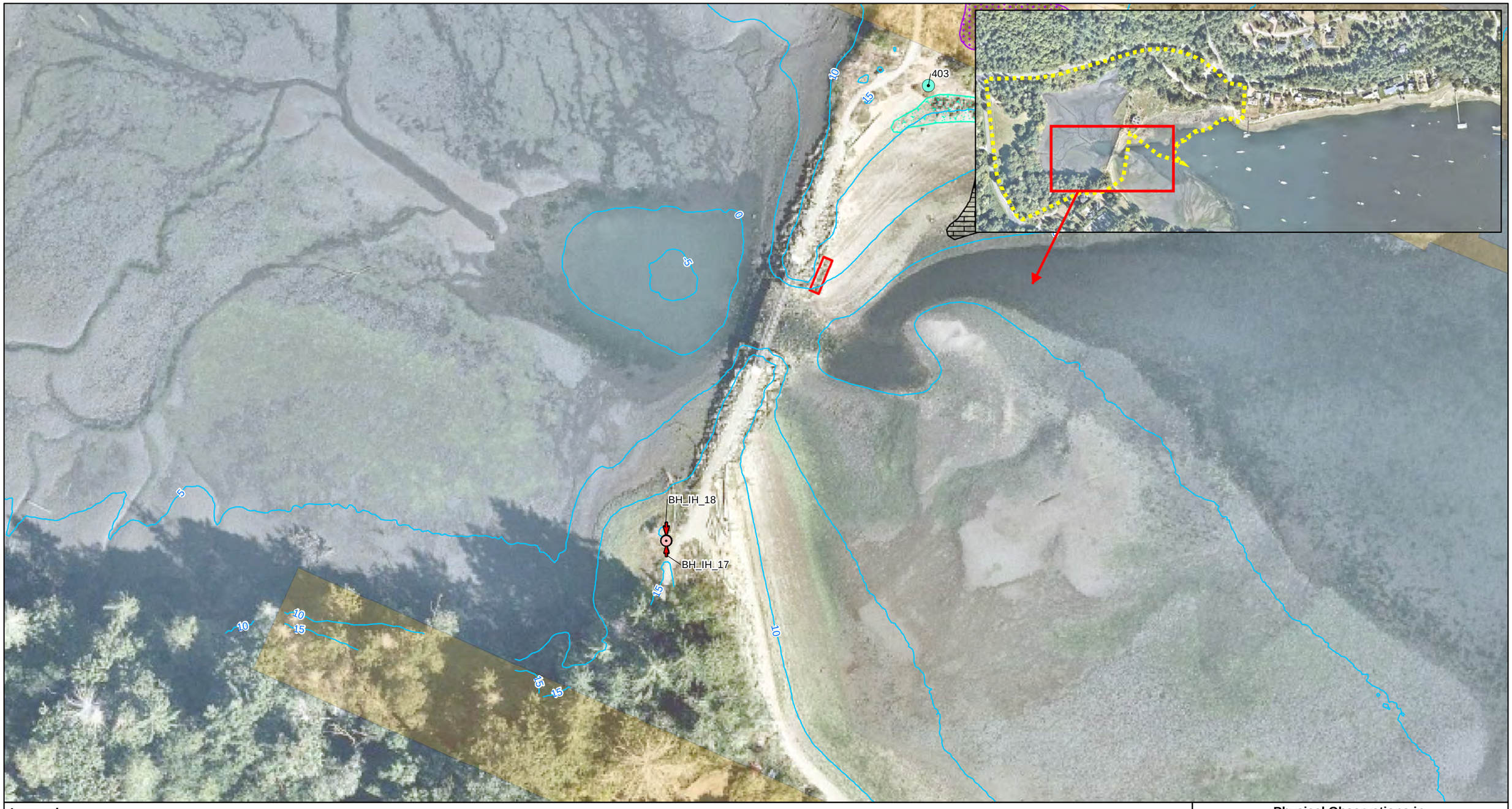
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | August 2023

Figure H-5a

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-5a Physical Observations in Upland Area.mxd 8/16/2023 8:05:31 AM



Legend

- Location of Upland Area Photographs

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Approximate Extent of Debris Pile
- Rectangular Concrete Block
- Approximate Extent of Riprap
- Approximate Extent of Wood Planks Overlain by Rocks
- Approximate Extent of Observed Scattered Bricks
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 50 Feet

Physical Observations in Upland Area - South Side
Remedial Investigation Report

Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | August 2023

Figure H-5b

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-5b Physical Observations in Upland Area.mxd 8/16/2023 8:06:53 AM



Legend

- Location of Upland Area Photographs
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Assumed Cable Crossing Alignment
- Approximate Extent of Debris Pile

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.
4. The assumed cable crossing alignment based on field observation. Actual location and ownership has not been verified.

N

0 100 Feet

Physical Observations in Upland Area - Northeast Side
Remedial Investigation Report

Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | August 2023

Figure H-5c

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix E\Figure E-5c Physical Observations in Upland Area.mxd 8/16/2023 8:07:40 AM

ATTACHMENT H-1
Photographic Record - Seeps

GEOSYNTEC CONSULTANTS
Photographic Record - Seeps

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_SEEP_01 **Date: 8/19/2021 8:59 AM** **Direction: South** **Comments:** BH_SEEP_01 Diffuse seep emerging from the norther shoreline of the Inner Harbor. Observed abundant wood debris and aquatic plants.	
BH_SEEP_02 **Date: 8/20/2021 7:34 AM** **Direction: Southeast** **Comments:** BH_SEEP_02 Diffuse seep emerging from the norther shoreline of the Inner Harbor in proximity of the former powerhouse. Observed abundant wood debris, brick fragments, and white filamentous growth on debris in and around this seep.	

GEOSYNTEC CONSULTANTS
Photographic Record - Seeps

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_SEEP_03	
Date: 8/21/2021 10:13 AM	
Direction: East	
Comments: BH_SEEP_03 Diffuse seep emerging from the northern shoreline of the Inner Harbor located approximately 120 feet offshore of BH_SEEP_02. Observed abundant wood debris, aquatic plants, and white filamentous growth on debris in and around this seep.	

BH_SEEP_04	
Date: 8/19/2021 9:12 AM	
Direction: Southeast	
Comments: BH_SEEP_04 Diffuse seep emerging from the northern shoreline of the Inner Harbor. Abundant wood debris and aquatic plants observed.	

GEOSYNTEC CONSULTANTS
Photographic Record - Seeps

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_SEEP_05	
Date: 8/20/2021 8:43 AM	
Direction:	
Comments: BH_SEEP_05 Diffuse seep emerging from the east side of the northern shoreline towards the Outer Harbor. Head of the seep is shown at the lower center of the photo. Abundant brick fragments and aquatic plants observed.	

BH_SEEP_06	
Date: 8/20/2021 8:56 AM	
Direction:	
Comments: BH_SEEP_06 Slightly focused seep emerging from the east side of the northern shoreline towards the Outer Harbor (east of BH_SEEP_05). Abundant brick fragments and aquatic plants observed. Seeps were observed in a generally linear path in this area. See figure A2-5.	

GEOSYNTEC CONSULTANTS
Photographic Record - Seeps

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_SEEP_07	
Date: 8/19/2021 12:20 PM	
Direction: South	
Comments: BH_SEEP_07 Slightly focused seep emerging from the southwest shoreline in the Mill Pond. Seep obscured by brush.	

BH_SEEP_08	
Date: 8/19/2021 10:02 AM	
Direction:	
Comments: BH_SEEP_08 Slightly focused seep emerging from the southern shoreline of the Inner Harbor.	

GEOSYNTEC CONSULTANTS
Photographic Record - Seeps

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_SEEP_09	
Date: 8/19/2021 10:03 AM	
Direction:	
Comments: BH_SEEP_09 Diffuse seep emerging from the southern shoreline of the Inner Harbor (east of BH_SEEP_08). Head of the seep is located within the shaded area at the top of the photo.	

Photograph	
Date: 8/19/2021 11:00 AM	
Direction: BH_SEEP_10	
Comments: BH_SEEP_10 Diffuse seep emerging from the southern shoreline of the Inner Harbor (west of BH_SEEP_08). Head of seep is obscured in this photo by brush and algal growth.	

ATTACHMENT H-2

Photographic Record - Harbor North Shore Area

GEOSYNTEC CONSULTANTS
Photographic Record – Harbor North Shore Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_HNSA_01	
Date: 8/20/2021 9:29 AM	
Direction: Northwest	
Comments: Small group of approximately 20 pilings (about 16 inches in diameter and 12 inches tall). Pilings are weathered/rotted and have attached marine growth.	

BH_HNSA_02	
Date: 8/20/2021 9:28 AM	
Direction: Southeast	
Comments: BH_HNSA_01 piling group, view looking southeast.	

GEOSYNTEC CONSULTANTS
Photographic Record – Harbor North Shore Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_HNSA_03	
Date: 8/20/2021 9:29 AM	
Direction: South	
Comments: Closeup of individual pilings showing attached barnacles.	

BH_HNSA_04	
Date: 8/20/2021 8:40 AM	
Direction: North	
Comments: Narrow concrete strip. Appears to be a strip foundation for a past structure. Observed exposed, vertical metal reinforcement in several locations.	

GEOSYNTEC CONSULTANTS Photographic Record – Harbor North Shore Area	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_HNSA_05 **Date: 8/20/2021 8:41 AM** **Direction: South** **Comments:** BH_HNSA_04 concrete strip, offset view.	
BH_HNSA_06 **Date: 8/20/2021 8:45 AM** **Direction: Southeast** **Comments:** Private floating dock located on the northern shoreline of the Inner Harbor.	

GEOSYNTEC CONSULTANTS
Photographic Record – Harbor North Shore Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_HNSA_07

Date: 8/20/2021 11:11 AM

Direction: North

Comments:
Cable crossing near the boundary between the Inner and the Outer Harbor. Alignment and ownership have not been verified.



ATTACHMENT H-3

Photographic Record - Inner Harbor

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_01	
Date: 8/20/2021 7:59 AM	
Direction: East	
Comments: Pedestrian access, stairway, and kayak storage. Small pile of bricks in foreground.	

BH_IH_02	
Date: 8/20/2021 7:58 AM	
Direction: North	
Comments: Pedestrian access, stairway, and kayak storage. Small pile of bricks in foreground.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_03	
Date: 8/19/2021 8:50 AM	
Direction: East	
Comments: Looking toward the northeastern boundary of the Inner Harbor. Photo shows park, kayak storage, and private floating dock.	

BH_IH_04	
Date: 8/19/2021 8:50 AM	
Direction: South	
Comments: View from location BH_IH_03, looking south.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_05 **Date: 8/19/2021 8:50 AM** **Direction: West** **Comments:** View from location BH_IH_03, looking west toward slag piles and former powerhouse in distance. At the right hand side of the photo (north side), there is a short line of pilings running perpendicular to drainage. There is an outfall associated with drainage, but very overgrown with blackberries (no photo).	
BH_IH_06 **Date: 8/20/2021 9:57 AM** **Direction: East** **Comments:** Looking east toward kayak storage at the northeastern end of Inner Harbor.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_07	
Date: 8/20/2021 9:57 AM	
Direction:	
Comments: View from location BH_IH_06, looking south. Cobble sized slag and slag piles on the beach.	

BH_IH_08	
Date: 8/20/2021 9:57 AM	
Direction: Southwest	
Comments: View from location BH_IH_06, looking southwest. Cobble-sized slag and slag piles on the beach.	

GEOSYNTEC CONSULTANTS Photographic Record – Inner Harbor	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_09 **Date: 8/20/2021 8:19 AM** **Direction: South** **Comments:** Closeup of an old oyster bag that is anchored in this location.	
BH_IH_10a **Date: 8/20/2021 8:25 AM** **Direction: South** **Comments:** Large mound of scattered bricks. Boulder-sized pieces of slag and rocks in the foreground.	

GEOSYNTEC CONSULTANTS Photographic Record – Inner Harbor	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_10b **Date: 8/20/2021 8:26 AM** **Direction: Southwest** **Comments:** View from location BH_IH_10a, looking farther southwest. Scattered bricks in the foreground.	
BH_IH_11a **Date: 8/20/2021 8:26 AM** **Direction: East** **Comments:** View from location BH_IH_10, looking farther east. Scattered bricks in the foreground.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_11b	
Date: 8/20/2021 8:27 AM	
Direction: East	
Comments: View from location BH_IH_10, looking east. Scattered bricks in the foreground.	

BH_IH_12a	
Date: 8/20/2021 8:29 AM	
Direction: North	
Comments: View from location BH_IH_10, looking northward to an area where there are large slag piles on the beach. Scattered bricks in the foreground.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_12b	
Date: 8/20/2021 8:29 AM	
Direction: North	
Comments: View from location BH_IH_10, looking farther northward to an area where there are large slag piles on the beach. Scattered bricks in the foreground.	

BH_IH_13	
Date: 8/20/2021 8:29 AM	
Direction: Northeast	
Comments: View from location BH_IH_10, looking northeast to an area where there are large slag piles on beach. Scattered bricks in the foreground.	

GEOSYNTEC CONSULTANTS Photographic Record – Inner Harbor	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_14 **Date: 8/20/2021 9:00 AM** **Direction: East** **Comments:** Metal debris, which is very rusty and has marine growth, but appears to be a former I-beam or rail from a track.	
BH_IH_15 **Date: 8/20/2021 11:24 AM** **Direction: West** **Comments:** View of location BH_IH_10 from farther away to show the higher elevation of the brick pile compared to the surrounding beach.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_16	
Date: 8/21/2021 8:18 AM	
Direction: East	
Comments: View looking east showing the north edge of the beach.	

BH_IH_17	
Date: 8/20/2021 9:59 AM	
Direction: West	
Comments: View from location BH_IH_16 looking west. Edge of the beach area and adjacent piling field. Former powerhouse in the distance.	

GEOSYNTEC CONSULTANTS Photographic Record – Inner Harbor	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_18 **Date: 8/20/2021 3:40 PM** **Direction: West** **Comments:** Small pile of brick fragments near the edge of the beach.	
BH_IH_19 **Date: 8/20/2021 3:37 PM** **Direction: South** **Comments:** Rusted iron pipe extending out of the beach surface. Appears to be debris as opposed to some sort of outfall. No water flowing from the end of the pipe.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_20	
Date: 8/20/2021 3:36 PM	
Direction: North	
Comments: Intermittent pockets of sawdust and brick fragments.	

BH_IH_21	
Date: 8/20/2021 3:33 PM	
Direction: North	
Comments: At the top of the photo, there is sawdust and ash/charcoal at the edge of the beach, where vegetation begins. Cementous material and brick fragments in the foreground.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_22a **Date: 8/20/2021 3:35 PM** **Direction: North** **Comments:** Ash/charcoal at the northern edge of the beach, just before the line where vegetation begins.	
BH_IH_22b **Date: 8/20/2021 3:34 PM** **Direction: North** **Comments:** View from location BH_IH_22a with slightly different perspective. Photo showing combination of sawdust and ash/charcoal at the northern edge of the beach, just before a line where vegetation begins. Cementitious material and brick fragments observed.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_22c	
Date: 8/20/2021 3:35 PM	
Direction: North	
Comments: View from location BH_IH_22a with slightly different perspective.	

BH_IH_23	
Date: 8/20/2021 3:32 PM	
Direction: North	
Comments: Continuation of sawdust, ash/charcoal, and brick fragments within the beach substrate. Cementitious material to the right.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_24 **Date: 8/21/2021 8:12 AM** **Direction: East** **Comments:** Northern edge of the beach on the northern shoreline of the Inner Harbor. In the foreground, black material on the beach surface appears to be a combination of ash/charcoal and sawdust.	
BH_IH_25a **Date: 8/20/2021 12:21 PM** **Direction: North** **Comments:** Wood debris consisting of boards/planks and partially covered by rocks ranging in diameter from 6 inches to 2 feet. Appears to be a partially buried structure, possibly an old vessel.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_25b	
Date: 8/20/2021 12:23 PM	
Direction: North	
Comments: View of location BH_IH_26a, from slightly different perspective. Wood pieces organized into rows oriented north to south. Large timber in the foreground oriented lengthwise east to west.	

BH_IH_25c	
Date: 8/20/2021 12:23 PM	
Direction: North	
Comments: View of location BH_IH_26a, from slightly different perspective. A couple of large rocks (>2 feet in diameter) to the left.	

GEOSYNTEC CONSULTANTS Photographic Record – Inner Harbor	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_26 **Date: 8/20/2021 12:22 PM** **Direction: Northwest** **Comments:** Beach substrate ranging in diameter from 6 inches to 2 feet with sparse wood debris consisting of boards/planks. Appears to be a partially buried structure, possibly an old vessel.	
BH_IH_27 **Date: 8/20/2021 12:22 PM** **Direction:** **Comments:** View from location BH_IH-25, looking east.	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_28	
Date: 8/20/2021 10:01 AM	
Direction: North	
Comments: Top edge of riprap along the northern shoreline. Area with scattered brick (< 20 percent of total surface area) directly north of the riprap. Intermittent pockets where bricks are denser.	

BH_IH_29	
Date: 8/20/2021 10:01 AM	
Direction: South	
Comments: View of location BH_IH_28, standing on top of riprap shoreline protection, looking south. Scattered bricks at the surface of the beach (approximately 20 to 40 percent of the total surface area).	

GEOSYNTEC CONSULTANTS
Photographic Record – Inner Harbor

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_30	
Date: 8/20/2021 2:00 PM	
Direction: Northeast	
Comments: Riprap along the northern shoreline, front view.	

BH_IH_31	
Date: 8/20/2021 2:05 PM	
Direction: South	
Comments: Large portion of a former concrete foundation structure located at the edge of the pedestrian bridge.	

GEOSYNTEC CONSULTANTS Photographic Record – Inner Harbor	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_IH_32a **Date: 8/20/2021 2:05 PM** **Direction: North** **Comments:** Pedestrian bridge, view from the southern shore of the Inner Harbor looking north.	
BH_IH_32b **Date: 8/19/2021 12:11 PM** **Direction: North** **Comments:** Pedestrian path and bridge. View from the southern shore of the Inner Harbor looking north.	

ATTACHMENT H-4

Photographic Record - Upland Area

GEOSYNTEC CONSULTANTS
Photographic Record – Upland Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_01	
Date: 8/21/2021 12:24 PM	
Direction: West	
Comments: Soil pile eroded and exposed. Remainder of the pile has vegetative cover. Observed bricks and wood debris within and adjacent to the pile.	

BH_UPLND_02	
Date: 8/21/2021 12:24 PM	
Direction: South	
Comments: View of location BH_UPLND_01 looking south.	

GEOSYNTEC CONSULTANTS Photographic Record – Upland Area	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_03 **Date: 8/21/2021 12:24 PM** **Direction: South** **Comments:** View of location BH_UPLND_01 looking southwest.	
BH_UPLND_04 **Date: 8/21/2021 12:25 PM** **Direction: South** **Comments:** View of location BH_UPLND_01 looking west.	

GEOSYNTEC CONSULTANTS Photographic Record – Upland Area	Geosyntec consultants
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_06 **Date: 8/21/2021 12:25 PM** **Direction: East** **Comments:** View of location BH_UPLND_01 looking east.	
BH_UPLND_06 **Date: 8/21/2021 1:32 PM** **Direction: Northwest** **Comments:** Former concrete and brick building foundation.	

GEOSYNTEC CONSULTANTS Photographic Record – Upland Area	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_07	
Date: 8/21/2021 1:32 PM	
Direction: West	
Comments: View of location BH_UPLND_06 looking west.	

BH_UPLND_08	
Date: 8/21/2021 1:22 PM	
Direction: North	
Comments: Concrete foundation with metal strap/ reinforcement.	

GEOSYNTEC CONSULTANTS Photographic Record – Upland Area	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_09 **Date: 8/21/2021 1:23 PM** **Direction: West** **Comments:** View of location BH_UPLND_08 looking west.	
BH_UPLND_10 **Date: 8/21/2021 1:25 PM** **Direction: Southwest** **Comments:** Concrete portion of a foundation at location BH_UPLND_08 underlain by stacked rocks.	

GEOSYNTEC CONSULTANTS
Photographic Record – Upland Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_11	
Date: 8/21/2021 1:49 PM	
Direction: West	
Comments: Concrete debris in the Northern Upland.	

BH_UPLND_12	
Date: 8/21/2021 1:49 PM	
Direction: South	
Comments: View of location BH_UPLND_11 looking south.	

GEOSYNTEC CONSULTANTS
Photographic Record – Upland Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_13	
Date: 8/21/2021 1:39 PM	
Direction: North	
Comments: Debris pile with metal, concrete, and brick debris.	

BH_UPLND_14	
Date: 8/21/2021 1:39 PM	
Direction: North	
Comments: View of location BH_UPLND_13 showing a pile of mostly bricks.	

GEOSYNTEC CONSULTANTS
Photographic Record – Upland Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_15	
Date: 8/21/2021 1:40 PM	
Direction: East	
Comments: View of the debris pile at location BH_UPLND_13 showing concrete, wood, and metal debris.	

BH_UPLND_16	
Date: 8/21/2021 1:40 PM	
Direction: North	
Comments: View of the debris pile at location BH_UPLND_13 showing a portion of pile that is mostly bricks.	

GEOSYNTEC CONSULTANTS
Photographic Record – Upland Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_17 **Date: 8/20/2021 4:08 PM** **Direction: North** **Comments:** Metal (iron) pipe located in the southern upland in the proximity of a location of an inadvertent discovery of asbestos-containing materials.	
BH_UPLND_18 **Date: 8/20/2021 4:09 PM** **Direction: South** **Comments:** View of iron pipe at location BH_UPLND_17 looking south. Metal is very rusty and flaking.	

GEOSYNTEC CONSULTANTS
Photographic Record – Upland Area

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_19	
Date: 8/19/2021 8:07 AM	
Direction: West	
Comments: View of the parking lot.	

BH_UPLND_20	
Date: 8/19/2021 8:10 AM	
Direction: South	
Comments: Survey control point in the foreground. View of the parking lot in the back.	

GEOSYNTEC CONSULTANTS Photographic Record – Upland Area	Geosyntec consultants
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_UPLND_21 **Date: 8/20/2021 12:44 PM** **Direction: South** **Comments:** Visitor's entrance of the park and sign.	
BH_UPLND_22 **Date: 8/20/2021 12:45 PM** **Direction: South** **Comments:** Pedestrian path towards the former powerhouse.	

APPENDIX I
Slag Survey Summary

Geosyntec consultants

engineers | scientists | innovators

APPENDIX I
SLAG SURVEY SUMMARY

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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Attachment I-3 Phase 2 Shoreline Slag Survey Field Logs

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	feasibility study
ft	feet/foot
Geosyntec	Geosyntec Consultants, Inc.
Port Blakely	Port Blakely Tree Farms
RI	remedial investigation
SOP	Standard Operating Procedure
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the slag assessments conducted at Blakely Harbor during Phase 1 and Phase 2 of the RI conducted to identify locations and assess distributions of foundry slag piles and slag debris across the Site. Except where noted, field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, the Sampling and Analysis Plan and Quality Assurance Project Plan (Geosyntec Consultants, Inc. [Geosyntec], 2022), and the Work Plan Addendum (Geosyntec, 2023).

2. SEMIQUANTITATIVE ASSESSMENT OF SLAG

The results of field surveys and sampling are described below.

2.1 Initial Slag Identification

Numerous piles of slag were observed along the northern shoreline of the Inner Harbor during a Shoreline Seeps and Structures Survey (discussed in Appendix H).[1] Throughout the area where large piles of slag were observed, additional cobble and gravel-sized fragments of slag were observed at the sediment surface. The relative proportion of slag to beach sediment was not evaluated. Coordinates of observed slag photograph locations are provided in Table I-1 and shown in Figure I-1. A representative photographic record is included as Attachment I-1.

2.2 Shoreline Slag Survey

A shoreline slag survey was designed and conducted as part of the Phase 2 RI to assess abundance (documented as percent coverages)[2] of slag embedded in the beach substrate along the northern shoreline that had been observed during the initial slag identification activities. On September 23, 2022, the Geosyntec field team surveyed the Inner Harbor northern shoreline from the northeastern side of the powerhouse to the northeastern boundary of Blakely Harbor Park, the area around the pedestrian bridge, and the riprap extending for about 100 feet (ft) from the pedestrian bridge towards the northeastern shoreline.

[1] Slag identification was not an objective of the Shoreline Seeps and Structures Survey, but observations were made when slag was encountered.

[2] Slag Visual Assessment – Standard Operating Procedure (SOP) #107 is provided in Appendix A to the RI/FS Work Plan Addendum (Geosyntec, 2022). SOP #107 describes the steps to visually describe and estimate slag percent coverage (using a groundcover surface area method and a sample screening method). Field personnel used the field form attached to SOP #107 to record their observations. The percent coverage indicates the fraction of surface area on evaluated on the shoreline or the beach that appears to be covered by slag, slag fragments or debris.

The survey was conducted by walking along the shoreline in transects parallel to shore at varying elevation contours (one at about +8 ft high tide elevation and +2 ft low tide elevation). Surveyed stations were identified in the field and spaced approximately 50 to 100 ft apart along each transect. Two locations were surveyed along the northeastern shore of the Mill Pond, and 20 locations were surveyed along the shoreline of the Inner Harbor.

Field personnel assessed the presence/absence of slag debris at each survey location, and where present, visually described and evaluated the percent coverage of slag, as follows:

- Survey locations were defined as approximate 7-ft by 7-ft areas.
- Each location was subdivided into four 3.5-ft by 3.5-ft quadrants.
- The shoreline substrate was inspected, and each of the four quadrants was photographed.
- Where slag was observed, slag characteristics were recorded.
- The percent of slag present in each quadrant was estimated (this was performed in at least three separate replicates).
- Locations were recorded using a hand-held global positioning system (GPS) device.

Surveyed locations are shown in Figure I-2, and observations are summarized in Table I-2. A photographic record of representative survey stations is included as Attachment I-2. Field logs are included in Attachment I-3.

2.3 Discrete Sampling Slag Assessment

Soil and sediment samples collected during the Phase 2 RI field activities were evaluated for presence and quantity of slag as described in SOP#107 of the RI/FS Work Plan Addendum (Geosyntec, 2023). An aliquot of the homogenized samples was placed in a rectangular frame to evaluate presence/absence of slag per surface coverage. The frame was subdivided into four quadrants, and the presence of slag debris was evaluated by inspecting the sample, photographing the four quadrants, and recording descriptions, attributes, and conditions of the slag. The percent of slag in each quadrant was estimated separately in at least three replicates. Sample locations are shown in Figure I-3.

3. SUMMARY OF OBSERVATIONS

Percent surface coverage of slag was generally below 10% across the Site. There were two primary areas where slag was observed on-site:

1. Slag was observed near the former blacksmith and machine shops (on the eastern portion of the Inner Harbor shoreline).
2. Slag was observed adjacent to the pedestrian bridge and riprap area (on the western portion of the Inner Harbor shoreline).

The slag observed in these two areas had distinctive features that may indicate different origins.

Former Blacksmith and Machine Shops: Slag debris observed in this area was abundant and embedded in the beach substrate. Observed slag percent coverage ranged from 5% to 48%. Slag sizes ranged from pebbles to cobbles, and slag in this area was described as asphaltic-like fragments that were black and vesicular with glassy inclusions. Slag with these characteristics is typically produced during cooling of high temperature metal residuals (e.g., during foundry operations).

Pedestrian Bridge and Riprap Area: Slag debris was embedded in the beach substrate and riprap. Observed slag percent coverage ranged from 5% to 34%. Slag near the pedestrian bridge area was described as gray amorphous cobble and bolder-sized pieces, likely oxidized (red in color). Slag near the riprap area was described as large bolder-size, which was either gray and asphaltic-like or amorphous and oxidized. Slag has historically been used in coastal engineering as backfill material in coastal structures such as riprap; this slag material may have eroded and contributed slag fragments to the beach substrate. Slag in this area may be the result of such backfilling operations and subsequent weathering.

4. REFERENCES

Geosyntec Consultants, Inc. (Geosyntec). 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 31 January.

Geosyntec. 2023. *Final Remedial Investigation/Feasibility Study Work Plan/ Sampling and Analysis Plan Addendum Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 19 April.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

TABLES

Geosyntec consultants

Table I-1 Locations of Slag Observations

RI Investigation	Survey Event	Location ID	Easting (feet)	Northing (feet)
Phase 1	Shoreline Inspection	BH_Slag_01	1225948	222203
Phase 1	Shoreline Inspection	BH_Slag_02	1225940	222207
Phase 1	Shoreline Inspection	BH_Slag_03	1225939	222210
Phase 1	Shoreline Inspection	BH_Slag_04	1225917	222217
Phase 1	Shoreline Inspection	BH_Slag_05	1225910	222211
Phase 1	Shoreline Inspection	BH_Slag_06	1225897	222239
Phase 1	Shoreline Inspection	BH_Slag_07	1225897	222234
Phase 1	Shoreline Inspection	BH_Slag_08	1225886	222233
Phase 1	Shoreline Inspection	BH_Slag_09	1225859	222226
Phase 1	Shoreline Inspection	BH_Slag_10	1225870	222201
Phase 1	Shoreline Inspection	BH_Slag_11	1225855	222203
Phase 1	Shoreline Inspection	BH_Slag_12	1225798	222214
Phase 1	Shoreline Inspection	BH_Slag_13	1225788	222218
Phase 1	Shoreline Inspection	BH_Slag_14	1225786	222210
Phase 1	Shoreline Inspection	BH_Slag_15	1225792	222202
Phase 1	Shoreline Inspection	BH_Slag_16	1225782	222187
Phase 1	Shoreline Inspection	BH_Slag_17	1225780	222170
Phase 1	Shoreline Inspection	BH_Slag_18	1225785	222148
Phase 1	Shoreline Inspection	BH_Slag_19	1225757	222168
Phase 1	Shoreline Inspection	BH_Slag_20	1225761	222189
Phase 1	Shoreline Inspection	BH_Slag_21	1225756	222195
Phase 1	Shoreline Inspection	BH_Slag_22	1225751	222196
Phase 1	Shoreline Inspection	BH_Slag_23	1225732	222165
Phase 1	Shoreline Inspection	BH_Slag_24	1225733	222181
Phase 1	Shoreline Inspection	BH_Slag_25	1225724	222206
Phase 1	Shoreline Inspection	BH_Slag_26	1225701	222197
Phase 1	Shoreline Inspection	BH_Slag_27	1225674	222189
Phase 1	Shoreline Inspection	BH_Slag_28	1225666	222186
Phase 1	Shoreline Inspection	BH_Slag_29	1225615	222167
Phase 1	Shoreline Inspection	BH_Slag_30	1225601	222173
Phase 1	Shoreline Inspection	BH_Slag_31	1225599	222165
Phase 1	Shoreline Inspection	Debris1	1225464	222119
Phase 2	Slag Survey	BH-SS-01	1225171	222042
Phase 2	Slag Survey	BH-SS-02	1225189	222104
Phase 2	Slag Survey	BH-SS-03	1225171	221957
Phase 2	Slag Survey	BH-SS-04	1225240	222001
Phase 2	Slag Survey	BH-SS-05	1225441	222051
Phase 2	Slag Survey	BH-SS-06	1225816	222123

Geosyntec consultants

Table I-1 Locations of Slag Observations

RI Investigation	Survey Event	Location ID	Easting (feet)	Northing (feet)
Phase 2	Slag Survey	BH-SS-07	1225719	222158
Phase 2	Slag Survey	BH-SS-08	1225913	222208
Phase 2	Slag Survey	BH-SS-09	1225552	222155
Phase 2	Slag Survey	BH-SS-10	1225299	222040
Phase 2	Slag Survey	BH-SS-11	1225381	222066
Phase 2	Slag Survey	BH-SS-12	1225435	222154
Phase 2	Slag Survey	BH-SS-13	1225537	222217
Phase 2	Slag Survey	BH-SS-14	1225707	222205
Phase 2	Slag Survey	BH-SS-15	1225794	222230
Phase 2	Slag Survey	BH-SS-16	1225899	222271
Phase 2	Slag Survey	BH-SS-17	1226025	222219
Phase 2	Slag Survey	BH-SS-18	1225843	222277
Phase 2	Slag Survey	BH-SS-19	1225736	222240
Phase 2	Slag Survey	BH-SS-20	1225634	222229
Phase 2	Slag Survey	BH-SS-21	1225538	222250
Phase 2	Slag Survey	BH-SS-22	1225397	222091
Phase 2	Surface Sediment	SG-10	1225209	222017
Phase 2	Surface Sediment	SG-11	1225303	222053
Phase 2	Surface Sediment	SG-43	1224283	222425
Phase 2	Surface Sediment	SG-44	1224358	222410
Phase 2	Surface Sediment	SG-45	1224456	222406
Phase 2	Surface Sediment	SG-46	1224903	222254
Phase 2	Surface Sediment	SG-47	1225029	222255
Phase 2	Surface Sediment	SG-48	1224961	222187
Phase 2	Surface Sediment	SG-49	1225324	221906
Phase 2	Surface Sediment	SG-53	1227507	222176
Phase 2	Surface Sediment	SG-54	1227685	221999
Phase 2	Surface Sediment	SG-55	1227774	222189
Phase 2	Surface Soil	HA-31	1224850	222609
Phase 2	Surface Soil	HA-32	1225101	222683
Phase 2	Surface Soil	HA-33	1225564	222757
Phase 2	Surface Soil	HA-34	1225850	222661
Phase 2	Surface Soil	HA-35	1226077	222425
Phase 2	Surface Soil	HA-36	1224871	221741
Phase 2	Surface Soil	HA-37	1225109	221720
Phase 2	Surface Soil	HA-38	1224709	223002
Phase 2	Surface Soil	HA-39	1225161	223009
Phase 2	Surface Soil	HA-40	1225493	222978

Geosyntec consultants

Table I-1 Locations of Slag Observations

RI Investigation	Survey Event	Location ID	Easting (feet)	Northing (feet)
Phase 2	Surface Soil	HA-41	1225723	222949
Phase 2	Surface Soil	HA-42	1224585	221757
Phase 2	Surface Soil	HA-43	1224765	221693
Phase 2	Surface Soil	HA-48	1224513	222234
Phase 2	Subsurface Soil	SB-25	1225227	222155
Phase 2	Subsurface Soil	SB-28	1225308	222469
Phase 2	Subsurface Soil	SB-30	1225612	222252
Phase 2	Subsurface Soil	SB-38	1225127	221838
Phase 2	Subsurface Soil	SB/GW-24	1225313	222379
Phase 2	Subsurface Soil	SB/GW-26	1225397	222227
Phase 2	Subsurface Soil	SB/GW-27	1225730	222253
Phase 2	Subsurface Soil	SB/GW-29	1225439	222432
Phase 2	Subsurface Sediment	SC-10	1225210	222027
Phase 2	Subsurface Sediment	SC-11	1225302	222056
Phase 2	Subsurface Sediment	SC-17	1225760	222221
Phase 2	Subsurface Sediment	SC-49	1225325	221903
Phase 2	Subsurface Sediment	SC-51	1225927	221988
Phase 2	Subsurface Sediment	SC-52	1226107	222088
Phase 2	Subsurface Sediment	SC-53	1227510	222180
Phase 2	Subsurface Sediment	SC-54	1227685	221999

Notes:
1. Phase 1 location IDs correspond to locations where slag was observed and photographs were taken.
2. Phase 2 location IDs correspond to either sampling or survey locations where slag visual assessment was performed.
3. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum.

Table I-2 Summary of Shoreline Slag Survey Field Observations

Survey Station ID	Tide Height (ft MLLW)	Beach Substrate Description	Slag Visual Assessment	
			Average %	Visual Description (type and physical attributes)
BH-SS-01	2.0	Amorphous rocks were covered by sediment (mud) and biota (barnacles)	33.8	Amorphous rocks more than 1 foot long, chunky and blocky; black and gray; discoloring (likely red/orange) observed after scoping the surface.
BH-SS-02	1.1	Fine surface sediment (muddy) where suspect material was observed, highly decomposed wood fragments and bricks	<10	Cobble site, black and gray; blocky and massive; appear reddish when surface sediment is removed
BH-SS-03	1.0	Abundant shell fragments and algae; wood fragments (~30% surface coverage) were black, 6-12 inches long, fairly weathered	10.0	Boulder size, gray (covered in mod and algae); massive, bulky, asphaltic-like, and north inclusions
BH-SS-04	0.8	Cobbles to boulder (mostly boulder) covered in barnacles, wood fragments, bricks, algae, and shells	12.8	Boulder and cobble site, gray and black; massive, asphaltic-like, and heavy
BH-SS-05	0.7	Cobbles and boulders, abundant shell fragments; wood fragments(up to 6 inches long), black and weathered; algae	<10	Few boulders appear to be anthropogenic but those may be byproduct of another type of anthropogenic activities and could be slag debris; blocky, smooth, and gray
BH-SS-06	0.4	Bricks, pebbles, and trace wood. Algae and small crabs observed	<5	None
BH-SS-07	0.8	Sand, gravel and cobbles; wood fragments (up to 2 feet long), and trace bricks	23.8	Two cobbles but overall boulder chunky and amorphous, dense; gray; mostly one color; few big piles of slag show reddish coloring.
BH-SS-08	1.0	Gravel and cobbles, shell fragments; wood fragments (up to 6 in long, black and fairly weathered)	21.8	Amorphous boulder site slag on the surface (partially covered in cobbles); few cobble site fragments; gray and reddish, vesicular and partially oxidized; dense and ropy.
BH-SS-09	1.3	Gravel and cobbles; shell fragments, a few brick fragments	5.8	Cobble size, gray and black; subangular and blocky; dense; some smooth, some vesicular.
BH-SS-10	3.0	Shoreline sediment substrate consisted of cobbles, gravel, and sand. Trace bricks, algae, and shell fragments. One piece of wood (6x2 inches)	<5	Gray colored, oxidized on surface (reddish)
BH-SS-11	3.4	Sand, gravel with cobbles; moderate bricks and wood fragments.	<5	One vesicular, angular cobble; a few black and gray pebbles; angular and bulky, dense, with voids.
BH-SS-12	4.0	Sand and gravel, moderate bricks, wood fragments (12-6 inches), shell fragments	6.8	Cobble size; black and gray, some with oxidized layers (reddish); angular, bulky, and dense. Observed voids and vesicles.

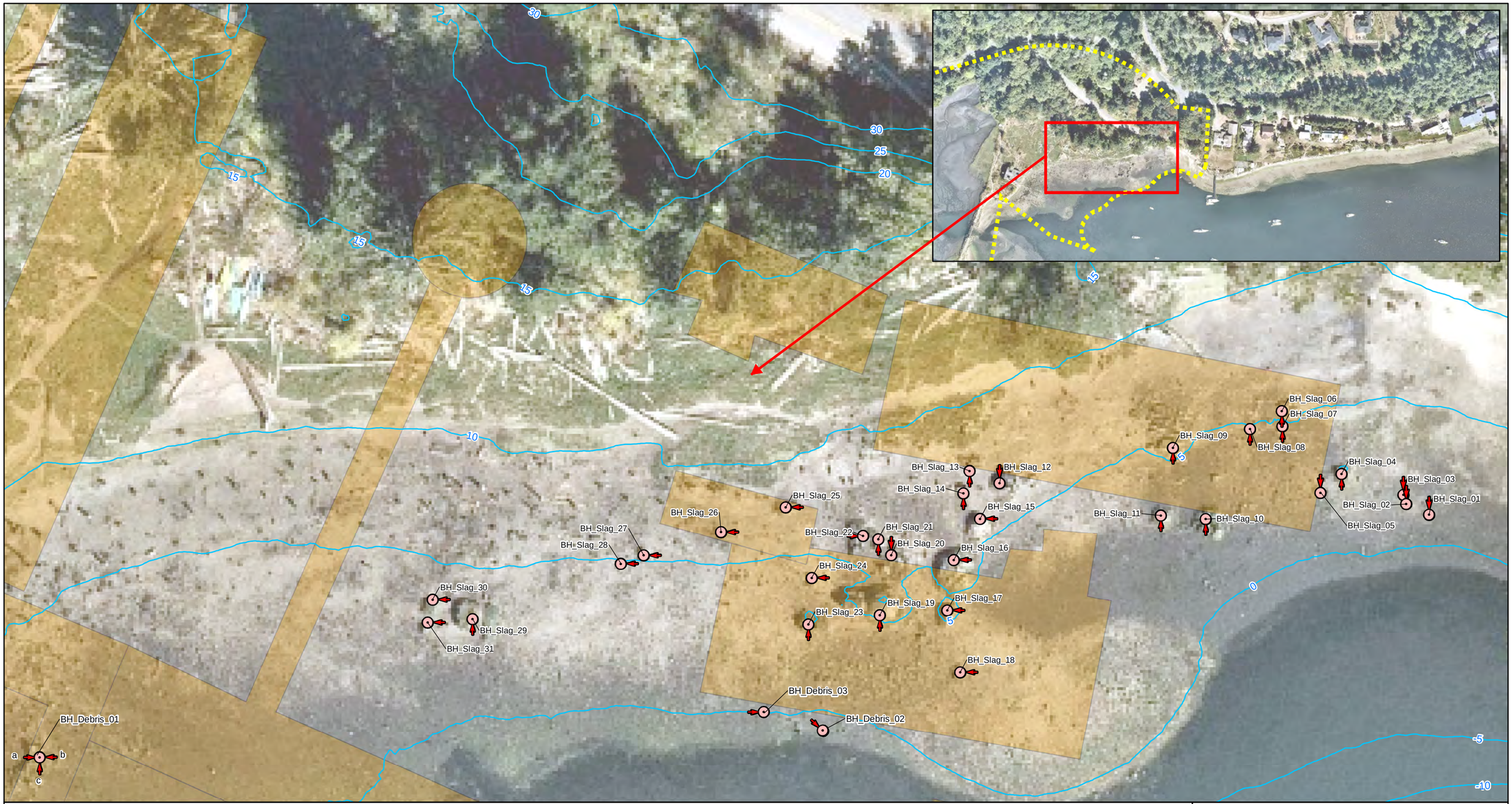
Table I-2 Summary of Shoreline Slag Survey Field Observations

Survey Station	Tide Height	Beach Substrate Description	Slag Visual Assessment	
BH-SS-13	4.5	Sand and gravel: trace bricks	13.0	Angular gravel and cobble size; black with multicolored and iridescent glassy inclusions, ropy and dense with vesicles and intrusions
BH-SS-14	5.0	Sand and gravel; one long wood fragment	36.3	Pebble and cobble size; black, multicolored. Angular and ropy, dense with voids, and vesicular with glassy/nitric inclusions.
BH-SS-15	0.0	Sand and gravel; one piling cut at mud line and trace wood	41.5	Gravel and cobble size; gray, multicolored and iridescent; angular, dense, vesicular with glassy/vitric inclusions.
BH-SS-16	6.0	Gravel and sand; abundant shell fragments; trace wood	<5	Gravel size (very few observed); black and multicolor red.
BH-SS-17	6.4	Sand and gravel; abundant shell fragments	<5	Pebble site, black with some oxidized layer; dense angular
BH-SS-18	7.7	A sea glass mat was covering part of the substrate and was removed for the survey	6.3	Mostly pebbles (site), black and multicolored; angular, dense, and vesicular with glassy inclusions.
BH-SS-19	8.0	Sand and gravel; 2 pilings cut at mud line	30.3	Cobble site, black and multicolored, some oxidized (reddish) layering; angular and asphaltic-like, dense and massive with glassy inclusions.
BH-SS-20	9.0	Abundant shell fragments, some pickleweed, one timber pilling cut at mudline	47.5	Pebble to cobble size, black with glassy intrusions, and brown with reddish oxidized layering; some amorphous, some subangular, asphaltic-like, vesicular with glassy inclusions.
BH-SS-21	5.3	Sand and gravel; shell fragments and algae	5.3	One two cobbles, but mostly gravel to sand site; black and multicolored, some oxidized (reddish) layering; angular dense asphaltic-like and vesicular, some glassy.
BH-SS-22	<5	Sand and gravel; shell fragments and algae	<5	Few pebble site, black and multicolored; angular, dense, asphaltic-like and vesicular, some glassy.

Notes:
1. Tide elevation was retrieved from the National Oceanic and Atmospheric Administration website for the station 9445913 Port Blakely, WA.
2. The quantitative appraisals performed during the slag visual assessment are reported as averages of quadruplicates.

Acronyms:
% = percentages; ft = feet; MLLW = mean lower low water

FIGURES



Legend

- Slag Pile Location and Photo Direction
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019
- Bainbridge Island Parks (BI Parks) Parcel Boundary

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 20 Feet

Observed Slag During Phase 1 Shoreline Inspection

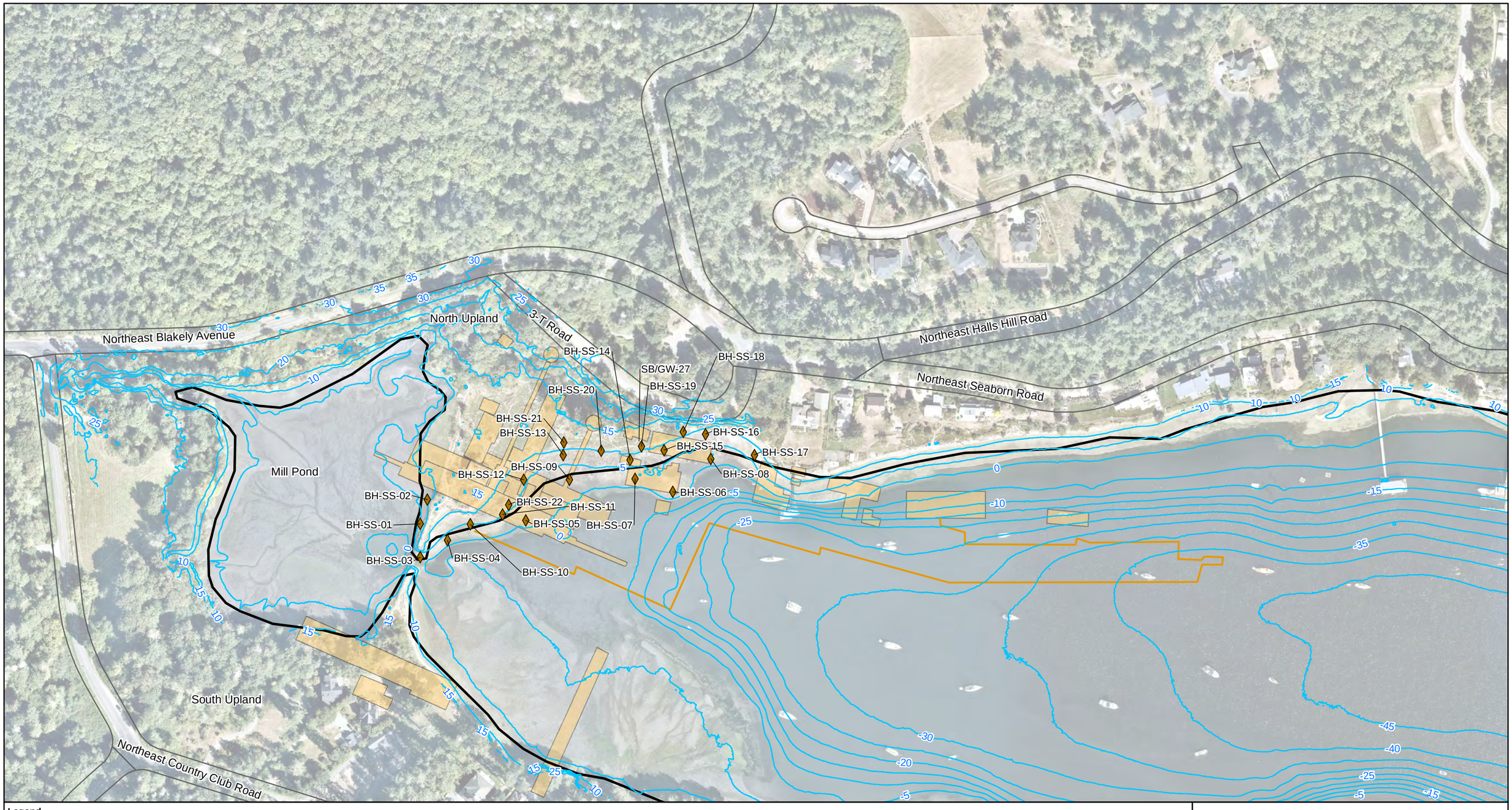
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | September 2023

Figure I-I

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix F\Figure F-1 Observed Slag Piles.mxd 8/28/2023 3:57:13 AM



Legend

Slag Sample Type

- Slag Survey
- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 240 Feet

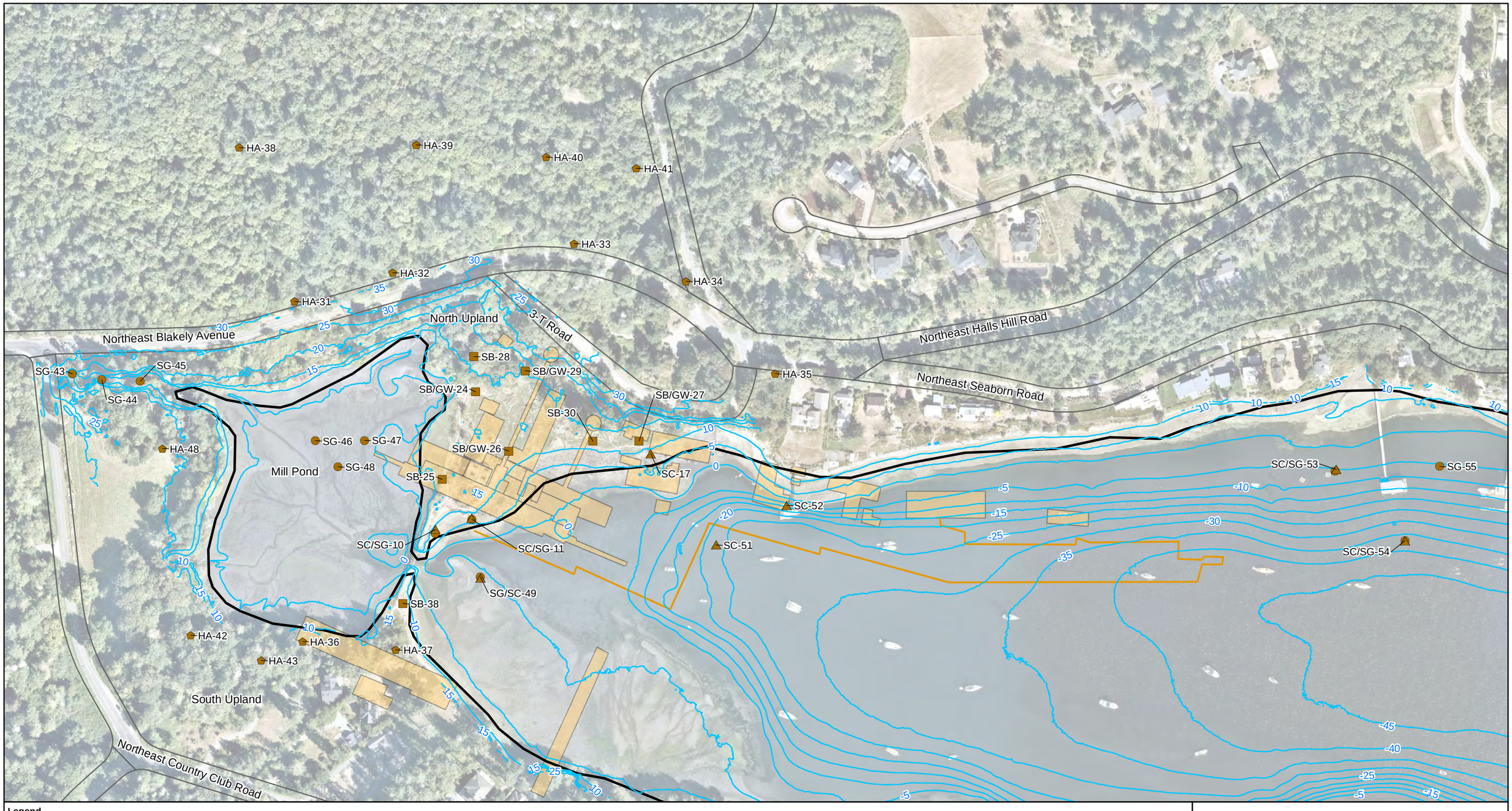
Shoreline Slag Survey Locations
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

Figure I-2

MVI/Sea | September 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix F\Figure F-2 Shoreline Slag Survey.mxd 8/28/2023 3:49:45 AM



Legend

Slag Sample Type

- Surface Sediment
- Subsurface Sediment
- Surface Soil
- Subsurface Soil
- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 240 Feet

Discrete Sampling Locations
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | September 2023

Figure I-3

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix F\Figure F-3 Discrete Sample Locations.mxd 8/28/2023 3:55:35 AM

ATTACHMENT I-1

Photograph Log of Observed Slag During Phase 1 Shoreline Inspection

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_01

Date: 8/21/2021 9:04 AM

Direction: South

Comments:
Approximate dimensions (length, width, height in feet): 3, 1.6, 1.6



BH_Slag_02

Date: 8/21/2021 9:05 AM

Direction: South

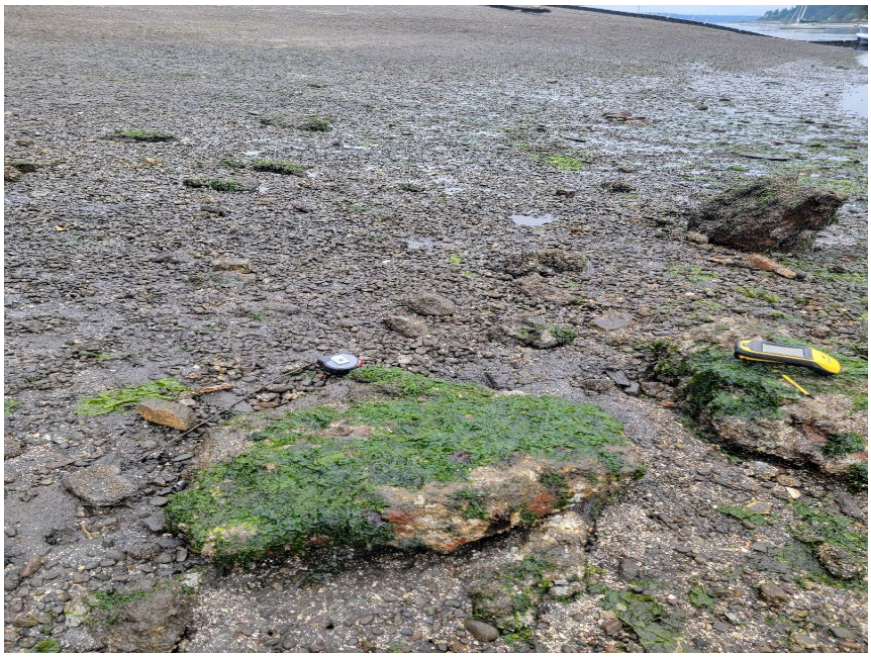
Comments:
Approximate dimensions (length, width, height in feet): 2.7, 2.5, 0.8



GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_03 **Date: 8/21/2021 9:05 AM** **Direction: Southeast** **Comments:** Approximate dimensions (length, width, height in feet): 3, 2.6, 0.7	
BH_Slag_04 **Date: 8/21/2021 9:12 AM** **Direction: North** **Comments:** Approximate dimensions (length, width, height in feet): 6.5, 5.3, 2.5	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_05	
Date: 8/21/2021 9:13 AM	
Direction: South	
Comments: Approximate dimensions (length, width, height in feet): 5.8, 4, 1	

BH_Slag_06	
Date: 8/21/2021 9:16 AM	
Direction: North	
Comments: Four slag piles located close together, measured as a single pile. Approximate dimensions (length, width, height in feet): 8, 5, 2.2	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_07 **Date: 8/21/2021 9:16 AM** **Direction: North** **Comments:** Approximate dimensions (length, width, height in feet): 3.5, 2.3, 0.8	
BH_Slag_08 **Date: 8/21/2021 9:17 AM** **Direction: North** **Comments:** Approximate dimensions (length, width, height in feet): 5.3, 3.0, 1.6	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_09	
Date: 8/21/2021 9:18 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 24, 17, 2.2	

BH_Slag_10	
Date: 8/21/2021 9:23 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 11, 10, 3	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_11	
Date: 8/21/2021 9:26 AM	
Direction: North	
Comments: Conical shape with diameter of approximately 7 feet. Approximate dimensions (length, width, height in feet): 7, 7, 4	

BH_Slag_12	
Date: 8/21/2021 9:30 AM	
Direction: South	
Comments: Approximate dimensions (length, width, height in feet): 8, 7, 4	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_13	
Date: 8/21/2021 10:51 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 8, 5, 2	

BH_Slag_14	
Date: 8/21/2021 10:51 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 4.3, 1, 1.7	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_15	
Date: 8/21/2021 10:52 AM	
Direction: Northwest	
Comments: Approximate dimensions (length, width, height in feet): 9, 9, 4	

BH_Slag_16	
Date: 8/21/2021 10:55 AM	
Direction: Northwest	
Comments: Approximate dimensions (length, width, height in feet): 15, 14, 4	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_17	
Date: 8/21/2021 11:02 AM	
Direction: Northwest	
Comments: Approximate dimensions (length, width, height in feet): 8, 7, 5.3	

BH_Slag_18	
Date: 8/21/2021 11:03 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet):6, 4, 2	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_19	
Date: 8/21/2021 11:12 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 25, 18, 11	

BH_Slag_20	
Date: 8/21/2021 11:13 AM	
Direction: Southwest	
Comments: Approximate dimensions (length, width, height in feet): 12, 10, 2	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_21	
Date: 8/21/2021 11:16 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 4, 2.7, 2	

BH_Slag_22	
Date: 8/21/2021 11:19 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 9, 10, 3	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_23	
Date: 8/21/2021 11:21 AM	
Direction: North	
Comments: Approximate dimensions (length, width, height in feet): 12, 8, 4.3	

BH_Slag_24	
Date: 8/21/2021 11:25 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 4.4, 2.5, 1.3	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_25	
Date: 8/21/2021 11:25 AM	
Direction: West	
Comments: Two slag piles located close together, measured as a single pile. Approximate dimensions (length, width, height in feet): 7, 6.7, 1.3	

BH_Slag_26	
Date: 8/21/2021 11:30 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 6.7, 2.7, 1.8	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_27	
Date: 8/21/2021 11:31 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 7, 5.6, 2	

BH_Slag_28	
Date: 8/21/2021 11:34 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 3.7, 2, 1.5	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_29	
Date: 8/21/2021 11:36 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 17, 10, 5	

BH_Slag_30	
Date: 8/21/2021 11:40 AM	
Direction: West	
Comments: Approximate dimensions (length, width, height in feet): 6, 4, 2	

GEOSYNTEC CONSULTANTS

Photolog of Observed Slag During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

BH_Slag_31

Date: 8/21/2021 11:44 AM

Direction: West

Comments:
Approximate dimensions (length, width, height in feet): 4.7, 4.0, 1.8



ATTACHMENT I-2

Phase 2 Shoreline Slag Survey Photograph Log

GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-01 **Date: 9/23/2022 08:25 AM** **Direction: East** **Comments:** Tripod and slag survey grid positioned at survey station on the East shore of the Mill Pond. Amorphous rocks more than one foot long reported as likely slag.	
Location:BH-SS-03 **Date: 9/23/2022 09:15 AM** **Direction: South-West** **Comments:** Tripod and slag survey grid positioned at survey station under the pedestrian bridge. Bulky asphaltic -like boulders reported as likely slag.	

GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-05

Date: 9/23/2022 09:55 AM

Direction: Southeast

Comments:
Tripod and slag survey grid positioned at survey station on the edge of the walkable northern shoreline at 0.7 feet tide. Few boulders within the beach substrate appeared to be anthropogenic and could be slag debris.



Location:BH-SS-06

Date: 9/23/2022 10:20 AM

Direction: Southeast

Comments:
Tripod and slag survey grid positioned at survey station along the walkable northern shoreline at 0.7 feet tide. The beach substrate consisted of bricks, brick fragments, rounded pebbles, and trace wood debris. No slag observed.



GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

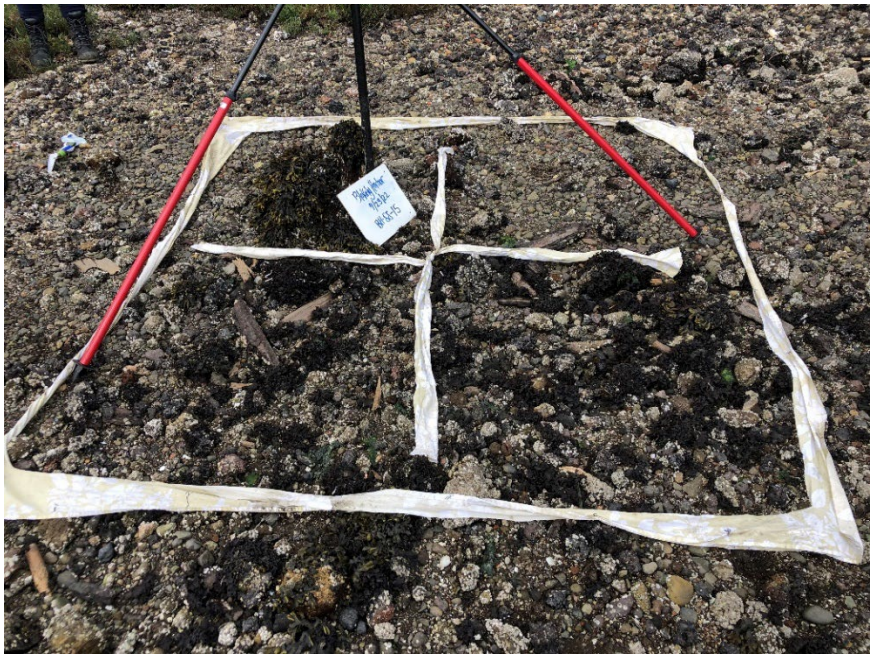
Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-08

Date: 9/23/2022 10:55 AM

Direction: North

Comments:
Tripod and slag survey grid positioned at survey station along the walkable northern shoreline at 1 feet tide. The beach substrate consisted of cobbles, gravel, shell and wood debris. Amorphous boulder reported as slag.



Location:BH-SS-08

Date: 9/23/2022 10:55 AM

Direction: North

Comments:
Detail of survey grid at location BH-SS-08.
Dark gray vesicular amorphous slag debris on the top right of the picture.



GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-14

Date: 9/23/2022 01:20 PM

Direction: Northwest

Comments:
Tripod and slag survey grid positioned at survey station along the northern shoreline at ~5 feet tide. Pebble and cobble-size slag observed in the beach substrate.



Location:BH-SS-14

Date: 9/23/2022 01:20 PM

Direction: Northwest

Comments:
Detail of survey grid at location BH-SS-14.
Black and iridescent slag observed. Debris were dense with voids and glassy inclusions.



GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

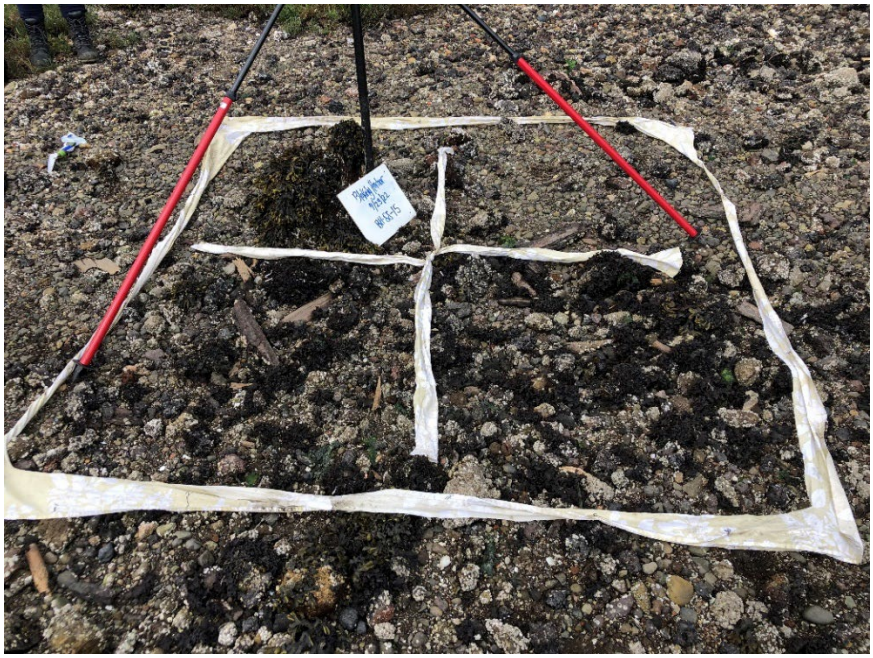
Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-15

Date: 9/23/2022 01:30 PM

Direction: Northwest

Comments:
Tripod and slag survey grid positioned at survey station along the northern shoreline at ~5 feet tide. Cobble and gravel-size slag observed in the beach substrate.



Location:BH-SS-15

Date: 9/23/2022 01:30 PM

Direction: Northwest

Comments:
Detail of survey grid at location BH-SS-15.
Dark gray and iridescent slag observed. Debris were dense with voids and glassy inclusions.



GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-17

Date: 9/23/2022 01:50 PM

Direction: Northwest

Comments:
Tripod and slag survey grid positioned at survey station along the northern shoreline at ~6 feet tide. The beach substrate consisted of sand, gravel, and abundant shell debris.



Location:BH-SS-17

Date: 9/23/2022 01:50 PM

Direction: Northwest

Comments:
Detail of survey grid at location BH-SS-17.
Very few slag debris were observed.



GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

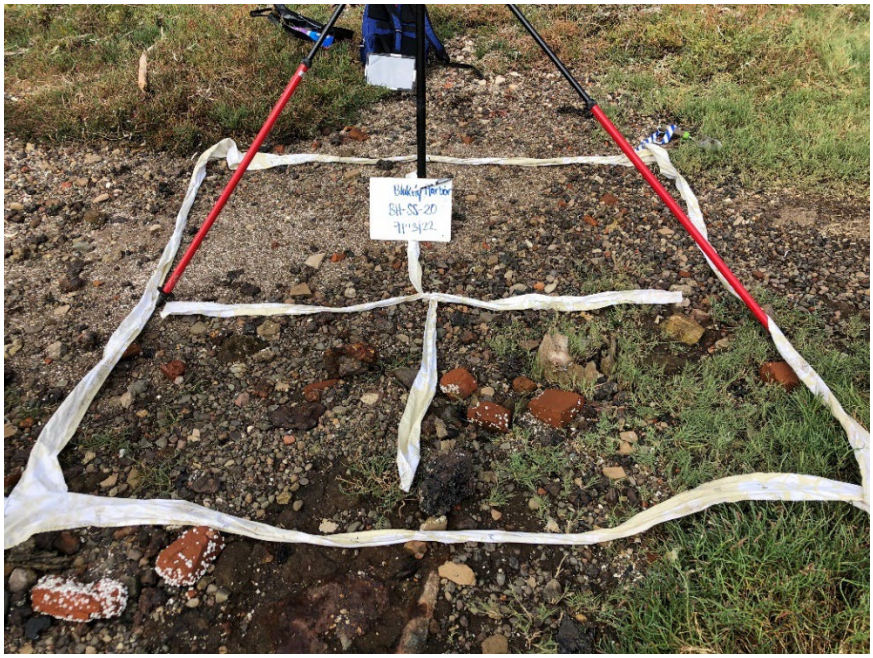
Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-20

Date: 9/23/2022 04:10PM

Direction: Northwest

Comments:
Tripod and slag survey grid positioned at survey station along the northern shoreline at ~9 feet tide. Cobble and pebble-size slag observed in the beach substrate.



Location:BH-SS-20

Date: 9/23/2022 04:10 PM

Direction: Northwest

Comments:
Detail of survey grid at location BH-SS-20.
Black and iridescent slag observed. Debris were asphaltic-like with vesicles and glassy inclusions.



GEOSYNTEC CONSULTANTS Phase 2 Shoreline Slag Survey Photolog	
Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Location:BH-SS-22 **Date: 9/23/2022 04:30 PM** **Direction: Northwest** **Comments:** Slag survey grid positioned at survey station on the northern shoreline beside the former powerhouse. The beach substrate consisted of sand, gravel, shell fragments, and algae.	
Location:BH-SS-22 **Date: 9/23/2022 04:30 PM** **Direction: Northwest** **Comments:** Detail of survey grid at location BH-SS-22. Few pebble-size slag observed. Slag debris were angular and asphaltic-like.	

GEOSYNTEC CONSULTANTS Phase 2 Shoreline Slag Survey Photolog	Geosyntec consultants
Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Rip rap **Date: 9/23/2022** **Direction: North** **Comments:** Large boulder-size slag debris observed at the western end of the riprap extending about 100 feet from the pedestrian bridge towards the Inner Harbor.	
Rip rap **Date: 9/23/2022** **Direction: North** **Comments:** Eastern end of the riprap. Large boulder-size slag debris observed in the center of the photo.	

GEOSYNTEC CONSULTANTS
Phase 2 Shoreline Slag Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900**
Site Name: Blakely Harbor Park Site	**Site Location: Bainbridge Island, WA**

Rip rap

Date: 9/23/2022

Direction: North

Comments:
Large boulder-size gray slag debris, with asphaltic like features. Pen placed on top of the boulder for size comparison.



Rip rap

Date: 9/23/2022

Direction: North

Comments:
Large boulder-size slag debris, appearing to be amorphous and oxidized (reddish). Pen placed on top of the boulder for size comparison.



ATTACHMENT I-3
Phase 2 Shoreline Slag Survey Field Logs

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

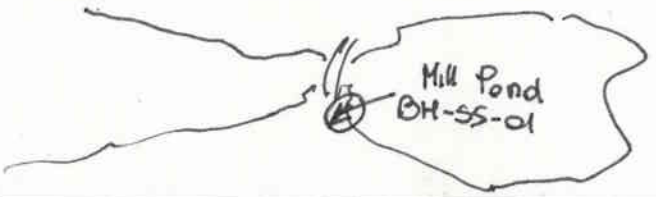
Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-01
Location Coordinates (ft)
Northing: 47.5962 (Lat) GP 92322 **Easting:** -122.5164 (Long) 239
Datum:
Accuracy: PDOP=1, HRMS 9# **satellites:** 29
Approximate Ground Elevation:
Tide (ft): 2 ft

Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Lunderbourger
Date: 09/23/2022
Time: 08:25 (24h)

Sampling Tools:
Quadrant Size: 7 ft x 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	20	15	20	10	29	GP	Additional slag may be present below
2	↓	↓	<50	22	40	30	26	DM	the sediment surface
3	↓	↓	20	25	25	40	40	GP	
4	↓	↓	<50	15	25	30	30	DM	

Visual Description

Type (dimensions, size, color)	amorphous rocks above 1 foot long, chuncky and blocky; black and gray
Physical Attributes (structure or layering, marks)	discoloring (likely red/orange) was observed after scraping the surface
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	amorphous rocks were covered by sediment (mud) and biota (barnicles)

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-02
Location Coordinates (ft)
Northing: 47.596440 **Easting:** -122.516371
Datum: ~~Lat~~ Long
Accuracy: HDOP, 0.6 ~~# sat.~~ **# satellites:** 25
Approximate Ground Elevation:
Tide (ft): 1.42 ft

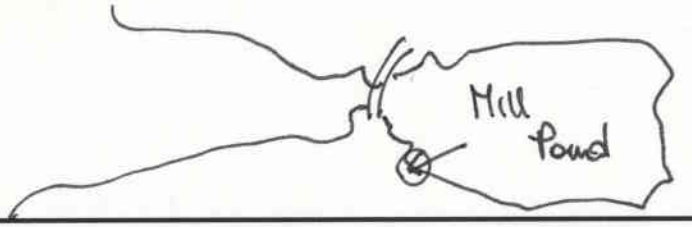
Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi
Dottie Metcalf-Linderburger

Date: 09/23/2022
Time: 08:50 (24h)

Sampling Tools:
Quadrant Size: 7ft x 7ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	<5	10	<5	<5	~~<5~~ <10	DM	One piece of wood (highly decomposed)
2	↓	↓	<5	10	<5	<5	<10	GP	One brick 10cm long
3	↓	↓	<5	10	<5	<5	<10	DM	
4	↓	↓	<5	10	<5	<5	<10	GP	

Visual Description

Type (dimensions, size, color)	Cobble size, black and gray Blocky and massive
Physical Attributes (structure or layering, marks)	Appear reddish when surface sediment are removed
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Slag was surveyed by moving the surface sediment where suspect material was observed

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, (blocky) voids, concoidal fractures
Particle size – sand, gravel, (cobble) (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – (black) (gray), multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, (massive), asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-03
Location Coordinates (ft)
Northing: 47.596036 **Easting (Long):** -122.516432
Datum (Lat):
Accuracy: HDOP=0.6, # satellites: 24
Approximate Ground Elevation:
Tide (ft): 1 ft

Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderburger
Date: 09/23/2022
Time: 09:15 (24h)

Sampling Tools:
Quadrant Size: 7 ft x 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7 ft	7 ft	—	—	—	—	10%	DM	Barnacles covered rocks and observed
2	↓	↓	—	—	—	—	10%	GP	slag creating a layer about 2 cm thick
3	↓	↓	—	—	—	—	10%	DM	Biota observed includes crabs (small and a
4	↓	↓	—	—	—	—	10%	GP	big one) and shells (up to 10 cm long)

Visual Description

Type (dimensions, size, color)	Boulder size, gray (covered in mud and algae)
Physical Attributes (structure or layering, marks)	massive, bulky, asphaltic-like with inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sediment substrate covered of abundant shells fragments and algae. Wood fragments (~30%) are observed (black, 6-12 inches long, fairly weathered)

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-04
Location Coordinates (ft)
Northing: 47.596160 (Lat) **Easting:** -122.516156 (Long)
Datum:
Accuracy: HDOP 0.5 PDOP 0.9 **# satellites:** 21
Approximate Ground Elevation:
Tide (ft): 0.8

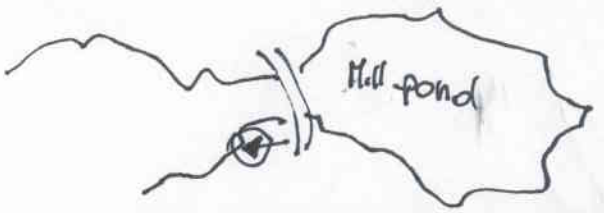
Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi
Dottie MetCalf-Linderburger

Date: 09/23/2022
Time: 09:35 (24h)

Sampling Tools:
Quadrant Size: 7ft x 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	10	5	10	30	11	GP	
2	↓	↓					15	DM	
3							15	GP	
4	↓	↓					10	DM	

Visual Description

Type (dimensions, size, color)	boulder and cobble size, gray and black
Physical Attributes (structure or layering, marks)	massive, asphaltic-like and heavy
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sediment substrate consisted of cobbles to boulder (mostly boulder) covered in barnacles. Wood fragments, bricks, algae and shells

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-05
Location Coordinates (ft)
Northing (Lat): 47.596310 **Easting (Long):** -122.515384
Datum:
Accuracy: HDOP: 0.5, PDOP: 1.9 **# satellites:** 19
Approximate Ground Elevation:
Tide (ft): 0.7

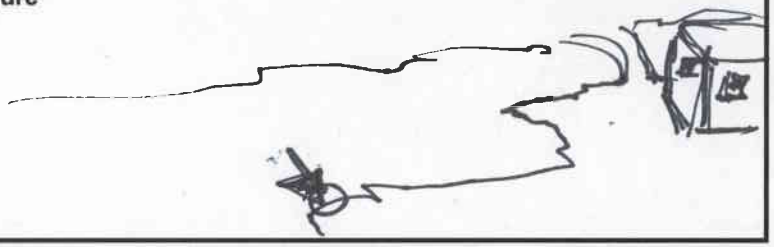
Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Bognozzi
Dottie Metcalf-Linderburger

Date: 09/23/2022
Time: 09:55 (24h)

Sampling Tools:
Quadrant Size: 7ft x 7ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7 ft	7 ft					<10	GP	Sandstone boulders covered in barnacles
2	"	"					<10	DM	may be appear as slag. Those cover
3	"	"					<10	GP	most of the shoreline sediment
4	"	"					<10	DM	substrate

Visual Description

Type (dimensions, size, color)	few boulders appear to be anthropogenic (but those may be byproduct of other type of anthropogenic activities) and could be slag debris
Physical Attributes (structure or layering, marks)	blocky, smooth and gray
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sediment substrate consisted of cobbles and boulders, abondant shell fragments wood fragments (up to 6 inches long) blac and weathered) crabs (small) & algae

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions

Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

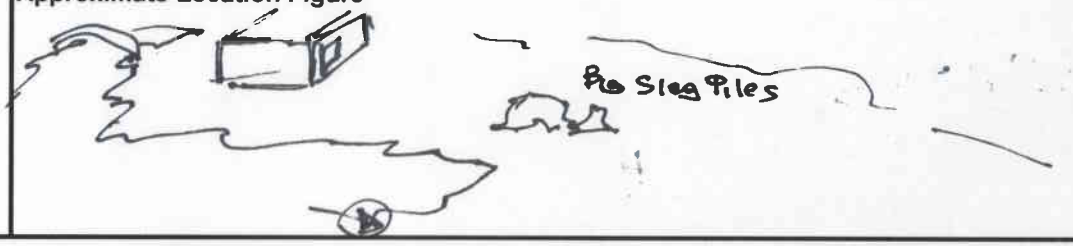
Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-06
Location Coordinates (ft)
Northing (Lat): 47.596530 **Easting (Long):** -122.513835
Datum:
Accuracy: ±0.5 **# satellites:** (9
Approximate Ground Elevation:
Tide (ft): 0.9

Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi
Dothe Metcalf-Linderburger
Date: 09/23/2022
Time: 10:20 (24h)

Sampling Tools:
Quadrant Size: 7ft x 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	—	—	—	—	<5	DM	No slag observed but abondoant bricks
2	↓	↓	—	—	—	—	<5	GP	
3	↓	↓	—	—	—	—	<5	DM	
4	↓	↓	—	—	—	—	<5	GP	

Visual Description

Type (dimensions, size, color)	
Physical Attributes (structure or layering, marks)	
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Shoreline sediment substrate consisted of bricks, with rounded pebbles and trace woods. Algae and crabbs (small) observed

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions

Weight and Density -- slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

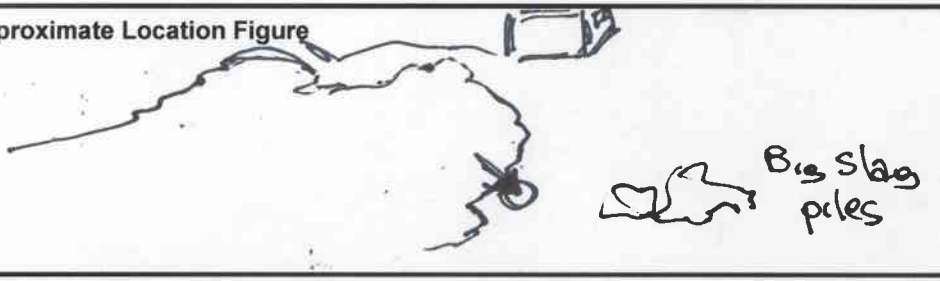
Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-07
Location Coordinates (ft)
Northing (Lat): 47.596619 Easting (Long): -122.514229
Datum:
Accuracy: ~~HDOP=0.5 PDOP=0~~ **# satellites:** 18
Approximate Ground Elevation:
Tide (ft): 0.8

Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderburger
Date: 09/23/2022
Time: 10:35 (24h)

Sampling Tools:
Quadrant Size: 7 ft x 7ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	20	30	25	5	22	DM	Big chunks of wood (4ft x 2ft)
2			30	30	20	10	23	GP	
3	↓	↓					25	DM	One brick
4	↓	↓					25	GP	

Visual Description

Type (dimensions, size, color)	a couple of cobbles but overall boulder chunky and amorphous, dense
Physical Attributes (structure or layering, marks)	gray mostly in colour, few big piles of slag show reddish coloring (oxidized)
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	substrate consists of sand, gravel and cobbles; wood fragments and pilings cut at mudline; trace brics

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number :PNG0900
Location ID: BH.SS.08
Location Coordinates (ft)
Northing: 47.596768 **Easting:** -122.513449
Datum:
Accuracy: HDOP=0.5, PDOP=1.0 **# satellites:** 17
Approximate Ground Elevation:
Tide (ft): 4

Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderburger
Date: 09/23/2022
Time: 10:55 (24h)

Sampling Tools:
Quadrant Size: 7ft x 7ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	<5	<5	25	20	12	DM	
2	↓	↓	<5	<5	40	20	18	GP	
3	↓	↓	—	—	—	—	25	DM	
4	↓	↓	—	—	—	—	30	GP	

Visual Description

Type (dimensions, size, color)	amorphous boulder size slag on the surface (also partially covered in cobbles) few cobble size fragment
Physical Attributes (structure or layering, marks)	gray and reddish, vesicular and partially oxidized; dense and ropy
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Shoreline sediment substrate consisted of gravel and cobbles, shell fragments Wood fragments (up to 6 inches long, black and fairly weathered)

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-04
Location Coordinates (ft)
Northing: 47536609 **Easting:** -122.514908
Datum:
Accuracy: 10ft 9.5 / 10ft 9 **# satellites:** 21
Approximate Ground Elevation:
Tide (ft): 1.3

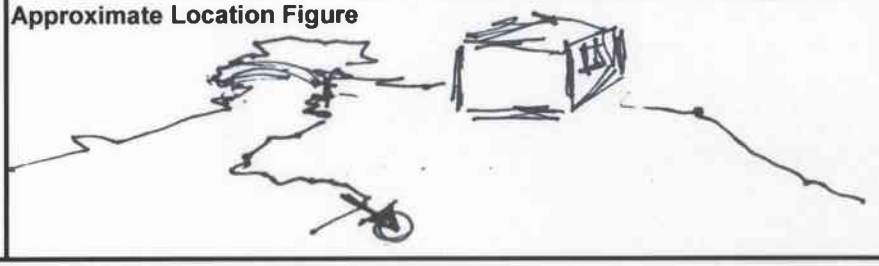
Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi
Dottie Metcalf-Linderburger

Date: 09/13/2022
Time: 11:15 (24h)

Sampling Tools:
Quadrant Size: 7 ft × 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft	7.5	7.5	<5	5	6	DM	Smaller (cobble size) fragments observed
2	↓	↓	5	5	5	5	5	GP	
3	↓	↓	—	—	—	—	<5	DM	
4	↓	↓	—	—	—	—	<5	GP	

Visual Description

Type (dimensions, size, color)	cobble size, gray and black
Physical Attributes (structure or layering, marks)	subangular and blocky; dense; some smooth, some vesicular
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	shoreline sediment substrate consisted of gravel and cobbles, one big piece cut at midline, shell fragments, few brick fragments

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-10
Location Coordinates (ft)
Northing: 47.596272 **Easting:** -122.515721
Datum: NAD83 Lat Long
Accuracy: ±0.5 PDOP=0.8 **# satellites:** 24
Approximate Ground Elevation:
Tide (ft): 3

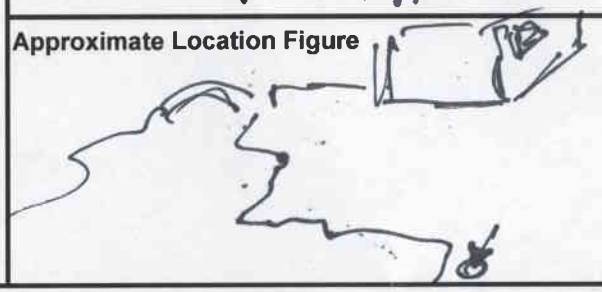
Sample Type Soil
√ Sediment

Sampling Personnel: Giovanna Pagnozzi
Dottie McCalf - Linderburger

Date: 05/23/2022
Time: 12:30 (24h)

Sampling Tools:
Quadrant Size: 7 ft × 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft					<5	DM	
2	↓	↓					<5	GP	
3	↓	↓					<5	DM	
4	↓	↓					<5	GP	

Visual Description

Type (dimensions, size, color)	One cobble size and few smaller Gray colored, oxidized on surface (reddish)
Physical Attributes (structure or layering, marks)	vesicular, with voids and intrusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Shoreline sediment substrate consisted of cobbles and gravel and sand. Trace bricks, slag and shell fragments. One piece of wood (6 inches x 2 inches)

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-11
Location Coordinates (ft)
Northing: 47.596348 (Lat) **Easting:** 122.515591 (Long)
Datum:
Accuracy: HDOP=0.5 PDOP=0.9 **# satellites:** 20
Approximate Ground Elevation:
Tide (ft): 3.4

Sample Type Soil
Sediment ✓

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderburger
Date: 09/23/2022
Time: 12:30 (24h)

Sampling Tools:
Quadrant Size: 7ft x 7ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7ft	7ft					<5	DM	
2	↓	↓					<5	GP	
3	↓	↓					<5	DM	
4	↓	↓					<5	GP	

Visual Description

Type (dimensions, size, color)	One cobble size angular and vesicular. few pebble size black and gray
Physical Attributes (structure or layering, marks)	Angular and bulky, dense, with vesicles/voids
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Shoreline sediment substrate consisted of sand, gravel with cobbles, moderate bricks and wood fragments. One Piling cut at the mudline

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Geosyntec consultants

Ground Slag Visual Assessment Field Form

520 Pike Street, Suite 2600
Seattle, WA 98101

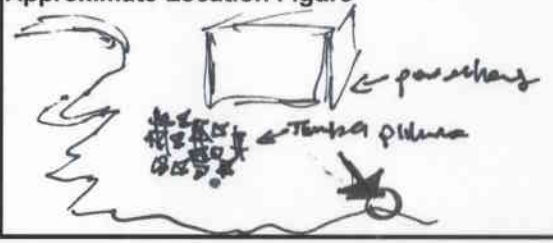
Project Name: Blakely Harbor Park Site
Project Number : PNG0900
Location ID: BH-SS-12
Location Coordinates (ft)
Northing: 47.596593 (Lat) **Easting:** -122.515381 (Long)
Datum: ~~NAD 83~~ WGS 84
Accuracy: ~~HDOP 0.5 VDOP 0.7~~ **# satellites:** 17
Approximate Ground Elevation:
Tide (ft): 4 ft

Sample Type Soil
Sediment ✓

Sampling Personnel: Geovanna Pagnon; Lottie Metcalf-Linderborger
Date: 09/23/2022
Time: 12:50 (24h)

Sampling Tools:
Quadrant Size: 7x7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate #	Quad Size		Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4	Average	Initials	Notes:
1	7 ft	7 ft	8	<5	<5	<5	<5	DM	
2	↓	↓	10	<5	<5	10	7	GP	
3							8	DM	
4	↓	↓					7	GP	

Visual Description

Type (dimensions, size, color)	cobble size; black and gray; some with oxidized layers (reddish)
Physical Attributes (structure or layering, marks)	angular, bulky, and dense. Observed voids and vesicles
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sand and gravel, moderate brick and wood fragments (12 x 6 inches) shell fragments

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, asphaltic-like, glassy or vitric, weathered, oxidized, magnetic, describe any inclusions
Weight and Density – slag is typically heavy, dense, medium dense

Blakely Harbor Park Site
PNG0900
Location ID: B4-SS-13

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 13:00 (24h)

Sampling Personnel: Giovanna Pagnozz, Dottie Metcalf-Linderburger

Location Coordinates (ft)
Northing: 47.596772 Easting: -122.514975
Datum:

Accuracy: HDOP=0.5 # satellites: 17
PDOP=0.9

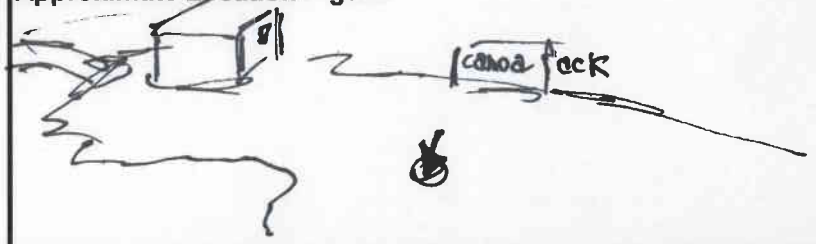
Weather Conditions:

Tide (ft): 4.5

Sample Type Soil
Sediment
Ground Cover ✓

Sampling Tools:
Pan Size ↓ Quadrant Size 7ft x 7ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate	Volume (soil/sed)		Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	7x7ft	cup__mL__	DM	4	10	12	13.5	11	
2	↓	cup__mL__	GP	10	10	20	15	14	
3		cup__mL__	DM					12	
4	↓	cup__mL__	GP					16	

Visual Assessment of Percent Cover

Sample Description	
Type (dimensions, size, color)	Angular gravel and cobble size. black with vitreous/glassy inclusion multicolored and iridescent.
Physical Attributes (structure or layering, marks)	ropy and dense, with voids; vesicular with inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sand, gravel, Trace of bricks

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

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SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-14

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 13:20 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Londerborger

Location Coordinates (ft)
Northing: 47.596748 Easting: -122.514283
Datum: ~~LAT~~ Long

Accuracy: HDOP=0.5 # satellites: 18
PDOP = 1.0

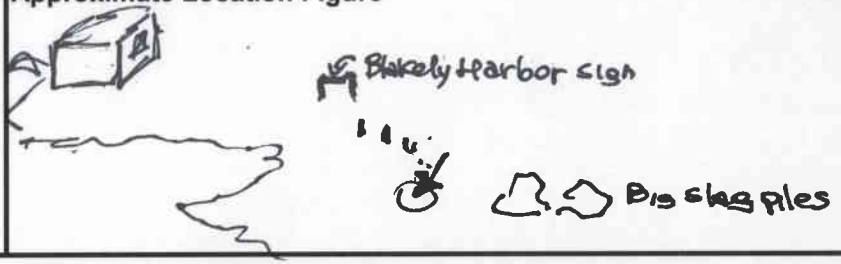
Weather Conditions:

Tide (ft): 5.1

Sample Type Soil
Sediment
Ground Cover ✓

Sampling Tools:
Pan Size ✓ Quadrant Size 7×7 feet

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate	Volume (soil/sed)	Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	cup__mL__	GP	30	25	25	40	30	
2	cup__mL__	DM	50	30	50	30	40	
3	cup__mL__	GP					35	
4	cup__mL__						40	

Sample Description

Type (dimensions, size, color)	Pebble and cobble size; black, multicolored and iridescent
Physical Attributes (structure or layering, marks)	Angular and ropy, dense with voids, and vesicular with glassy/vitric inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sand and gravel. One long wood

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____(initials) Date:__/__/2022

SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-15

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 13:30 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Lindenburger

Location Coordinates (ft)
Northing: 47.596822 Easting: -122.513935
Datum:

Sampling Tools:
Pan Size Quadrant Size 7 x 7 ft

Accuracy: HDOP > 0.6 # satellites: 18
PDOP = 1.1
Weather Conditions:
Tide (ft):

Sample Type Soil
Sediment
Ground Cover

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate	Volume (soil/sed)	Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	cup__mL__	GP	80	80	20	20	50	
2	cup__mL__	DM	60	60	18	10	36	
3	cup__mL__	GP					40	
4	cup__mL__	DM					40-35	

Sample Description

Type (dimensions, size, color)	gravel and cobble size; gray, multicolored and iridescent
Physical Attributes (structure or layering, marks)	angular, dense, vesicular with glassy/vitric inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sand and gravel One piling cut at mudline and few wood

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____(initials) Date:___/___/2022

SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-16

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 13:40 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie MacCalf-Linderberger

Location Coordinates (ft)
Northing: 47.596940 Easting: -122.513509 (Long)
Datum: (Lat)

Accuracy: HDOP = 0.6 PDOP = ~~1.0~~ 1.2 # satellites: 17

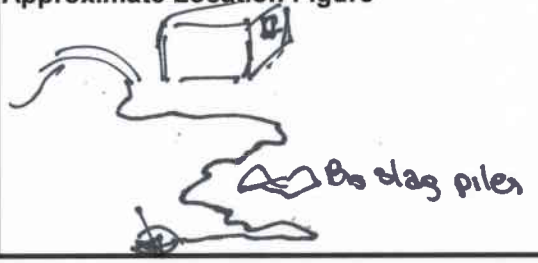
Weather Conditions:

Tide (ft): 6

Sample Type: Soil / Sediment / Ground Cover √

Sampling Tools:
Pan Size √ Quadrant Size 1 x 1 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate	Volume (soil/sed)	Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	cup__mL__	DM					<5	
2	cup__mL__	GP					<5	
3	cup__mL__	DM					<5	
4	cup__mL__	GP					<5	

Sample Description

Type (dimensions, size, color)	gravel size (very few observed x quadrant); black and multicolored
Physical Attributes (structure or layering, marks)	angular, dense and vesicular
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Abondant shell fragments, gravel and sand, few pieces of wood

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

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SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-17

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 **Time:** 13:50 (24h)

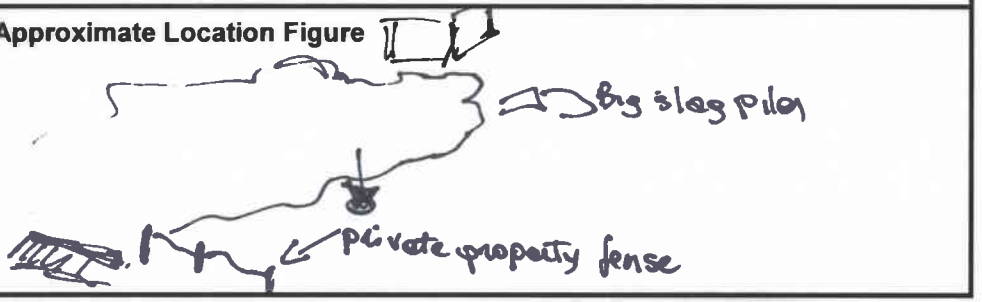
Sampling Personnel: Giovanna Paguozzi, Dottie Metcalf-Linderlaub

Location Coordinates (ft)
Northing: 47.596804 **Easting:** -122.512997
Datum: WGS84 Long

Sampling Tools:
Pan Size **Quadrant Size** 7 x 7 feet

Accuracy: HDOP = 0.5 **# satellites:** 19
PDOP = 1.1

Approximate Location Figure



Weather Conditions:

Tide (ft): 6.4

Sample Type Soil
Sediment
Ground Cover ✓

Visual Assessment of Percent Cover — **Visual Assessment of Percent Cover**

Replicate	Volume (soil/sed)	Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	cup__mL__	GP					<5	only 1 observed ~ per quadrant
2	cup__mL__	DM					<5	
3	cup__mL__	GP					<5	
4	cup__mL__	DM					<5	

Sample Description

Type (dimensions, size, color)	Pebble size, black with some oxidized layer
Physical Attributes (structure or layering, marks)	dense angular
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Abundant shell fragments, sand and gravel

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – (angular), subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, (gravel), cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – (black), gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, (oxidized) (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____**(initials) Date:**__/__/2022

SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-18

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 **Time:** 14:20 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderberger

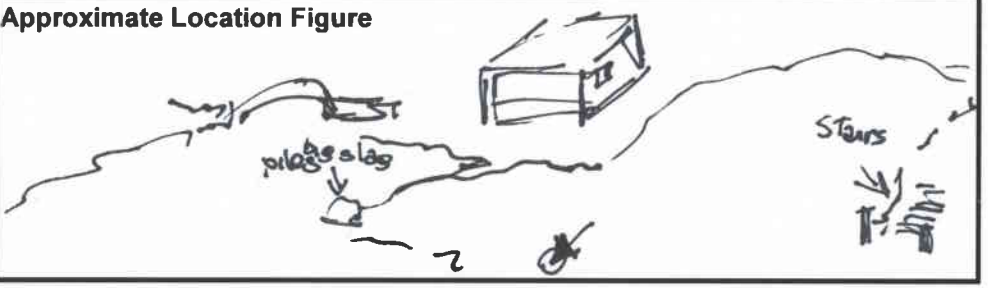
Location Coordinates (ft)
Northing: 48.596953 **Easting:** -122.513741
Datum: Lat Long

Accuracy: HDOP = 0.5 **# satellites:** 17
PDOP = 1.1
Weather Conditions:
Tide (ft): 7.7

Sample Type Soil
Sediment
Ground Cover ✓

Sampling Tools:
Pan Size ✓ **Quadrant Size** 1 x 1 ft

Approximate Location Figure



Visual Assessment of Percent Cover — **Visual Assessment of Percent Cover**

Replicate	Volume (soil/sed)		Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1		cup__mL__	GP	2	5	5	5	6	
		cup__mL__							
2		cup__mL__	GP					5	
3		cup__mL__	DM					8	

Sample Description

Type (dimensions, size, color)	Mostly pebbles (Avg), black and multicolored
Physical Attributes (structure or layering, marks)	angular, dense, and vesicular with glassy inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Seagrass mat was covering part of the substrate and was removed for the survey

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored, streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic
Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____(initials) **Date:**___/___/2022

SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-19

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 14:35 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderburger

Location Coordinates (ft)
Northing (Lat): 47.596845 Easting (Long): -122.514168
Datum:

Accuracy: HDOP = 0.5 # satellites: 21
PDOP = 1
Weather Conditions:
Tide (ft): 8

Sample Type: Soil / Sediment / Ground Cover ✓

Sampling Tools:
Pan Size ✓ Quadrant Size 7 x 7 ft

Approximate Location Figure



Visual Assessment of Percent Cover

Replicate	Volume (soil/sed)	Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	cup__mL__	GP	30	30	50	20	33	Slag extends upshore underneath
2	cup__mL__	DM	25	25	30	50	33	the picklewood and it may
3	cup__mL__	DM	—	—	—	—	25	extend below the surface soil
4	cup__mL__	GP	—	—	—	—	30	

Sample Description

Type (dimensions, size, color)	Cobble size, black and multicolored, some oxidized (reddish) layering
Physical Attributes (structure or layering, marks)	angular and asphaltic-like, dense and massive, with vitric or glassy inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Substrate consists of sand and gravel, 2 pilings cut at mudline or above(?)

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures
Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)
Color – black, gray, multi-colored, streaks, iridescent
Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic
Weight and Density – slag is typically heavy, dense, medium dense

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SOP#106 Attachment A

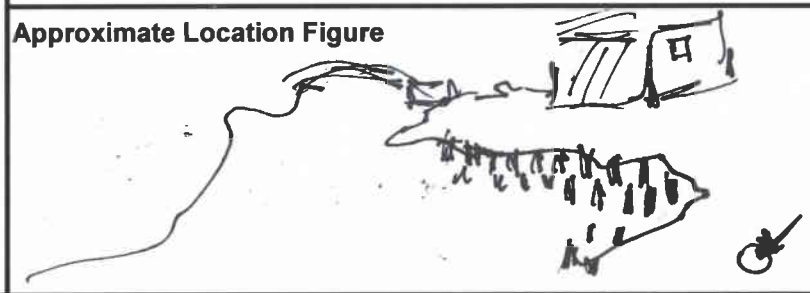
* GPS battery died required location by using GP phone

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-20

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09 / 23 /2022 **Time:** 15 : 10 (24h)	**Sampling Personnel:** Giovanna Pagnozzi, Dottie Metcalf-Lindenburger
Location Coordinates (ft) ☆ to be collected **Northing:** ~~[illegible]~~ **Easting:** ~~[illegible]~~ **Datum:** GP 47.3543 Long -122.3039	**Sampling Tools:** Pan Size √ Quadrant Size 7 x 7 ft
Accuracy: * **# satellites:**	**Approximate Location Figure**
Weather Conditions: **Tide (ft):** 9	
Sample Type Soil Sediment Ground Cover √	



Visual Assessment of Percent Cover — **Visual Assessment of Percent Cover**

Replicate	Volume (soil/sed)	Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1	/ cup__mL__	DM	40	20	55	65	45	the pipe offshore of sampling location may be covered in slag
2	/ cup__mL__	GP	60	20	40	60	45	
3	/ cup__mL__	GP	—	—	—	—	>50	
4	/ cup__mL__	DM	—	—	—	—	750	

Sample Description	
Type (dimensions, size, color)	pebble to cobble size, black with glassy intrusions and brown with reddish oxidized layering
Physical Attributes (structure or layering, marks)	some amorphous, some subangular, aphanitic-like, vesicular with glassy inclusions
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Abondant shell fragments, some pickle weed, one Timber piling cut at mudline, few bricks
Notes: if less than < 5%; no visual estimate is needed but complete the description.	

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____**(initials) Date:**___/___/2022

SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-21

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 15:20 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linder observer

Location Coordinates (ft)
Northing: 47.35487 Easting: -122.30559
Datum:

Accuracy: coordinates aquired by cellphone # satellites:

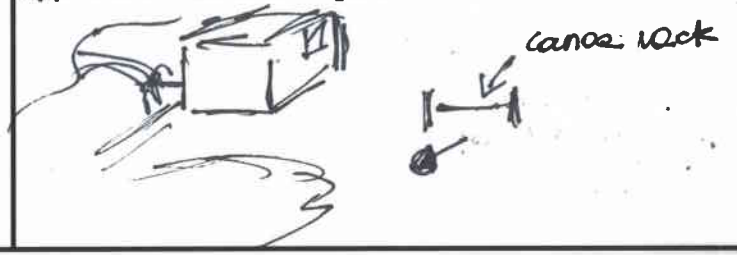
Weather Conditions:

Tide (ft): 9.4

Sample Type Soil
Sediment
Ground Cover √

Sampling Tools:
Pan Size √ Quadrant Size 7x7 ft

Approximate Location Figure



Visual Assessment of Percent Cover — **Visual Assessment of Percent Cover**

Replicate	Volume (soil/sed)		Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1		cup__mL__	DM	8	<5	<5	<5	<5	
2		cup__mL__	GP	10	5	5	5	6.3	
3		cup__mL__	GP					5	
4		cup__mL__	DM					5	

Sample Description

Type (dimensions, size, color)	one (two cobbles, but mostly gravel to sand size; black and multicolored, some oxidized (reddish) layering
Physical Attributes (structure or layering, marks)	Angular dense asphaltic-like and vesicular, some glassy
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sand, gravel, shell fragments and algae mat towards the shore (bottom of the 90 quadrant)

Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____(initials) Date:___/___/2022

SOP#106 Attachment A

Blakely Harbor Park Site
PNG0900
Location ID: BH-SS-22

Slag Visual Assessment Field Form

Geosyntec consultants

Date: 09/23/2022 Time: 15:30 (24h)

Sampling Personnel: Giovanna Pagnozzi, Dottie Metcalf-Linderlager

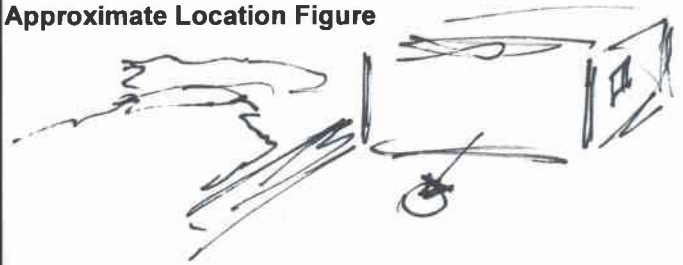
Location Coordinates (ft)
Northing: 47° 35'47" Easting: 122° 23'36"
Datum:

Accuracy: Coordinates aquired by cellphone # satellites:
Weather Conditions:
Tide (ft): 9.75

Sample Type Soil
Sediment
Ground Cover √

Sampling Tools:
Pan Size √ Quadrant Size 7x7 ft

Approximate Location Figure



Visual Assessment of Percent Cover								Visual Assessment of Percent Cover	
Replicate	Volume (soil/sed)		Initials	Q1	Q2	Q3	Q4	Average	Notes:
#1		cup__mL__	DM					<5	
2		cup__mL__	GP					<5	
3		cup__mL__	DM					<5	
4		cup__mL__	GP					<5	

Sample Description	
Type (dimensions, size, color)	few pebble size, black and multicolored
Physical Attributes (structure or layering, marks)	Angular, dense, asphaltic-like and vesicular, some glassy
Description of Soil/Sediment Matrix (note if slag debris > 50% of the matrix)	Sand and gravel, shell fragments and algae mat towards the upland (Top of the quadrant)
	Notes: if less than < 5%; no visual estimate is needed but complete the description.

Common Descriptors

Structure/Shape – angular, subangular, bulky, ropy, chunky, blocky, voids, concoidal fractures

Particle size – sand, gravel, cobble (> 3 inches), boulder (> 12 inches) (see ASTM visual-manual classification D2487-93)

Color – black, gray, multi-colored streaks, iridescent

Apperance and Texture – vesicular, smooth, ragged, brittle, massive, describe any inclusions, asphaltic-like, glassy, or vitric, weathered, oxidized (rusty parts), magnetic

Weight and Density – slag is typically heavy, dense, medium dense

Revised by_____(initials) Date:___/___/2022

SOP#106 Attachment A

APPENDIX J
Probing and Wood Debris Evaluation

Geosyntec consultants

engineers | scientists | innovators

APPENDIX J
PROBING AND WOOD DEBRIS EVALUATION

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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Attachment J-2 Diver Survey Photograph Log

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	Feasibility Study
ft	feet
Geosyntec	Geosyntec Consultants, Inc.
Port Blakely	Port Blakely Tree Farms
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
the Site	Blakely Harbor Park Site
VWWA	visual wood waste assessment

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the probing and wood debris evaluations conducted at the Site during Phase 1 and Phase 2 of the RI. The evaluations were conducted to identify locations and assess distributions of accumulated wood debris across the Site. Except where noted, field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP; Geosyntec Consultants, Inc. [Geosyntec], 2022), and the Work Plan Addendum (Geosyntec, 2023).

2. INITIAL WOOD DEBRIS IDENTIFICATION

Wood debris has been identified throughout prior Site investigation activities. A 2008 diver survey was conducted by Anchor Environmental LLC to estimate the extent of woody debris. More recently, elevated percentages of surficial wood debris were documented in the Inner Harbor area during the Sediment Profile Imaging and Plan View Survey (Appendix F).

During the Shoreline Seeps and Structures Survey, large wood debris was observed below an approximate elevation of 3.5 feet (ft) mean lower low water along the northern shoreline of the Inner Harbor. The material mostly consisted of milled planks and boards oriented in a regular pattern that resembled wharf or pier decking. At the northern edge of this area, the material was more dispersed and consisted of smaller wood pieces intermixed with bark debris. Coordinates of observed wood debris photo locations are provided in Table J-1 and shown in Figure J-1. A representative photographic record is included as Attachment J-1.

3. PROBING SURVEY FOR SOFT SEDIMENT AND WOOD DEBRIS

From August 31 to September 2, 2021, Geosyntec, Gravity, and Global Diving conducted a transect probing survey to evaluate the presence of soft sediment and the extent of wood debris. Submerged wood structures such as pilings were noted if encountered.

Three transects were surveyed across the Mill Pond (BH-T01 through BH-T03), and five transects perpendicular to the northern shoreline were surveyed between the Inner Harbor and Outer Harbor (BH-T04 through BH-T08). One additional transect not in the originally planned scope of work was added to the survey that ran parallel to the northern shoreline (BH-T00).[1] Transects in the Mill Pond were probed from a small rowboat vessel, and the six transects in the Inner and Outer Harbor

[1] This additional transect represented a deviation from the RI/FS Work Plan and was included to collect additional information on the extent of wood debris along the northern shoreline.

were probed by divers. For each transect, the field team followed the procedure in Section 2.7 of the SAP/QAPP, Appendix A of the RI/FS Work Plan (Geosyntec, 2022).

Transects are shown in Figure J-2; coordinates of surveyed locations and information recorded are reported in Table J-2. A selection of photographs is provided in Attachment J-2.

3.1 Mill Pond Transects

A small rowboat vessel was used to access the Mill Pond, and measurements were collected from within the vessel. Transects were spaced approximately 200 ft apart. Discrete locations were sampled approximately every 20 ft along the transects.

The field team surveyed each transect by using a 10-ft rod to measure the thickness of unconsolidated (soft) sediments. The probe was wiped clean upon retrieval, and field observations were collected at each probing location (penetration depth, substrate density, and potential presence of woody debris, if noted). Results of probing are provided in Table J-2.

3.2 Inner and Outer Harbor Transects

Global Diving conducted the transects along the Inner and Outer Harbor with vessel support provided by Gravity. The Geosyntec field team documented the survey from within the vessel by observing field activities recorded with the camera carried by the divers.

Transects in the Inner Harbor were spaced approximately 200 ft apart and transects in the Outer Harbor were spaced up to 500 ft apart. Discrete locations were sampled every 25 to 50 ft along the transects.

Divers followed each transect and used a 5-ft rod to measure the thickness of unconsolidated (soft) sediments. The probe was wiped cleaned upon retrieval, and field observations were collected at each probing location (penetration depth, surface coverage of woody debris, depth to 100% wood debris, and presence of pilings or distinguishable wood structures). Measured penetration depth and field observations were radio-communicated to the vessel crew and documented in the field log by Geosyntec personnel. Information recorded during the probing surveys is summarized in Table J-2.

4. SOFT SEDIMENT EVALUATION

Soft sediment thickness was highest in the northern portion of the Mill Pond (thickness of more than 3 ft) and was higher in general in the Mill Pond compared to the Inner Harbor (thickness of 1 to 2 ft). Soft sediment thickness was lower along the shoreline and increased in deeper portions of the Outer Harbor (maximum thickness observed of 2 to 3 ft). The thickness of soft sediment at each station surveyed is shown in Figure J-3.

Soft sediment thickness observed during along the Inner Harbor and reported in Table J-2 is believed to indicate the depth of soft sediment accumulated on top of hard wood debris that may represent submerged former overwater mill structures.

5. WOOD DEBRIS IDENTIFIED DURING SAMPLING ACTIVITIES

A visual wood waste assessment (VWWA) was performed on each soil and sediment sample collected during the sampling activities according to Standard Operating Procedure 104 described in Attachment C to the SAP/QAPP, Appendix A of the RI/FS Work Plan (Geosyntec, 2022).

The extent of wood debris in surface soil and sediment is shown in Figure J-4 and the observed percentage of wood debris in subsurface soil and sediment is shown in Figure J-5. Table J-3 summarizes maximum percentages of wood debris observed in each depth interval analyzed in each sampling matrix.

In general, wood debris was observed at the sediment surface in subtidal and intertidal areas of the Mill Pond and Inner Harbor, corresponding to the footprint of former overwater Mill structures and the former wharf. Abundant wood debris was observed at depth in the northern upland area within the footprint of former Mill structures. Very little wood debris was observed in discrete sampling locations along the southern shoreline or in the southern upland area. This indicates that the presence of wood debris in soil and sediment at the Site is associated with historical structures.

Wood debris was noted in 75% of the discrete samples examined for wood presence (see Appendix D for sample descriptions). Wood debris was noted up to depths of 15 ft below ground surface in soil samples, and up to depths of 10 ft below mudline in sediment samples. Table J-3 summarizes maximum percentages of wood debris observed per each depth interval analyzed in each sampling matrix investigated. Soil and sediment sampling procedures and field logs (including results of the VWWA) are summarized in the Field Sampling Report Appendix D.

6. REFERENCES

Geosyntec Consultants, Inc. (Geosyntec). 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 31 January.

Geosyntec. 2023. *Final Remedial Investigation/Feasibility Study Work Plan/ Sampling and Analysis Plan Addendum Blakely Harbor Park Site*. Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 19 April.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

TABLES

Geosyntec consultants

Table J-1 Locations of Wood Debris Photographs

Area of Investigation	Location ID	Easting (feet)	Northing (feet)
Inner Harbor North Shore	BH_WW_01	1225764.8	222160.2
Inner Harbor North Shore	BH_WW_02	1225757.6	222110.2
Inner Harbor North Shore	BH_WW_03	1225757.6	222110.2
Inner Harbor North Shore	BH_WW_04	1225722.2	222116.0
Inner Harbor North Shore	BH_WW_05	1225722.2	222116.0
Inner Harbor North Shore	BH_WW_06	1225715.1	222108.6
Inner Harbor North Shore	BH_WW_07	1225715.1	222108.6
Inner Harbor North Shore	BH_WW_08	1225633.4	222111.5
Inner Harbor North Shore	BH_WW_09	1225601.9	222092.6
Inner Harbor North Shore	BH_WW_10	1225526.7	222052.8
Inner Harbor North Shore	BH_WW_11	1225443.2	222092.0
Inner Harbor North Shore	BH_WW_12	1225513.6	222149.0
Inner Harbor North Shore	BH_WW_13	1225607.2	222150.3

Notes:
1. Location IDs correspond to locations where wood debris were observed and photographs were taken.
2. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum.

Geosyntec consultants

Table J-2 Diver Survey Field Observations

Area of Investigation	Transect ID	Location ID	Coordinates		Water Depth	Tide	Mudline Elevation	Distance from shore	Surface Extent Wood	Total Penetration	Description	Other Contents
			northing	Easting	ft	ft	ft. MLLW	ft	%	ft		
Mill Pond	BH-TO1	BH-TO1-1	222410	1225025	N/A	N/A	N/A	20	N/A	0.4	soft sand down to 3", then compact sand. Hard surface (wood-like) at 5"	N/A
Mill Pond	BH-TO1	BH-TO1-2	222402	1225021	N/A	N/A	N/A	40	N/A	0	hard wood at surface	N/A
Mill Pond	BH-TO1	BH-TO1-3	222383	1225014	N/A	N/A	N/A	60	N/A	3	very soft first 6"	N/A
Mill Pond	BH-TO1	BH-TO1-4	222369	1225001	N/A	N/A	N/A	80	N/A	2.5	soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-5	222355	1224993	N/A	N/A	N/A	100	N/A	3	soft surface, glanced off wood debris at 1'	N/A
Mill Pond	BH-TO1	BH-TO1-6	222341	1224979	N/A	N/A	N/A	120	N/A	2.5	soft surface, wood at 2.5'	N/A
Mill Pond	BH-TO1	BH-TO1-7	222322	1224971	N/A	N/A	N/A	140	N/A	3	hard wood on surface, then soft	N/A
Mill Pond	BH-TO1	BH-TO1-8	222302	1224961	N/A	N/A	N/A	160	N/A	2	soft surface, firm at 6"	N/A
Mill Pond	BH-TO1	BH-TO1-9	222285	1224954	N/A	N/A	N/A	180	N/A	1.5	very soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-10	222266	1224938	N/A	N/A	N/A	200	N/A	2.5	very soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-11	222244	1224922	N/A	N/A	N/A	220	N/A	2.3	very soft surface. Debris at 1', hard debris at 1.5', refusal at wood like debris at 2.3'	N/A
Mill Pond	BH-TO1	BH-TO1-12	222216	1224896	N/A	N/A	N/A	240	N/A	1	soft with small gravel sand, firm at 1'/refusal	N/A
Mill Pond	BH-TO1	BH-TO1-13	222193	1224864	N/A	N/A	N/A	260	N/A	2	fine gravel and sand mix	N/A
Mill Pond	BH-TO1	BH-TO1-14	222175	1224874	N/A	N/A	N/A	280	N/A	2	gravelly silt surface	N/A
Mill Pond	BH-TO1	BH-TO1-15	222161	1224886	N/A	N/A	N/A	300	N/A	1.5	soft silty surface with mixed coarse gravel and sand then dense gravel	N/A
Mill Pond	BH-TO1	BH-TO1-16	222143	1224854	N/A	N/A	N/A	320	N/A	2	hard debris on surface. Thin soft layer on top then coarse gravel sand mix	N/A
Mill Pond	BH-TO1	BH-TO1-17	222128	1224841	N/A	N/A	N/A	340	N/A	2	soft silty surface	N/A
Mill Pond	BH-TO1	BH-TO1-18	222110	1224833	N/A	N/A	N/A	360	N/A	1.5	soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-19	222092	1224824	N/A	N/A	N/A	380	N/A	2	soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-20	222078	1224808	N/A	N/A	N/A	400	N/A	2	very soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-21	222057	1224790	N/A	N/A	N/A	420	N/A	1.5	soft surface. Debris at 1.5'	N/A
Mill Pond	BH-TO1	BH-TO1-22	222036	1224780	N/A	N/A	N/A	440	N/A	2	soft surface. Hard layer at 2' feels organic-like	N/A
Mill Pond	BH-TO1	BH-TO1-23	222019	1224771	N/A	N/A	N/A	460	N/A	2	soft surface. Hard wood-like debris at 1.5'	N/A
Mill Pond	BH-TO1	BH-TO1-24	221999	1224764	N/A	N/A	N/A	480	N/A	2	very soft surface to 1' then gravelly	N/A
Mill Pond	BH-TO1	BH-TO1-25	221980	1224750	N/A	N/A	N/A	500	N/A	2	very soft silty top	N/A
Mill Pond	BH-TO1	BH-TO1-26	221964	1224738	N/A	N/A	N/A	520	N/A	1.5	soft surface, firm at 1'	N/A
Mill Pond	BH-TO1	BH-TO1-27	221945	1224727	N/A	N/A	N/A	540	N/A	2	soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-28	221931	1224712	N/A	N/A	N/A	560	N/A	1.5	mixed gravel sand, semi soft. Rock debris. wood visually observed. Wood-like debris at 1.5'	N/A
Mill Pond	BH-TO1	BH-TO1-29	221914	1224705	N/A	N/A	N/A	580	N/A	2	soft, mixed coarse sand. Hard refusal at 2'	N/A
Mill Pond	BH-TO1	BH-TO1-30	221902	1224691	N/A	N/A	N/A	600	N/A	1.5	soft surface	N/A
Mill Pond	BH-TO1	BH-TO1-31	221886	1224679	N/A	N/A	N/A	620	N/A	0.75	soft surface, firm at 0.5' feels like rocks	N/A
Mill Pond	BH-TO1	BH-TO1-32	221876	1224670	N/A	N/A	N/A	640	N/A	0.5	soft surface, hard layer at 0.3', fees wood-like	N/A
Mill Pond	BH-TO1	BH-TO1-33	221861	1224658	N/A	N/A	N/A	660	N/A	0.5	soft surface, refusal at 6"	N/A
Mill Pond	BH-TO2	BH-TO2-1	N/A	N/A	5.5	9	3.5	20	N/A	1.5	soft silt and sand, mixed organic layer on surface	N/A
Mill Pond	BH-TO2	BH-TO2-2	N/A	N/A	5	9	4	40	N/A	1	soft to medium soft surface	N/A
Mill Pond	BH-TO2	BH-TO2-3	N/A	N/A	5	9	4	60	N/A	1	medium firm surface	N/A
Mill Pond	BH-TO2	BH-TO2-4	N/A	N/A	5.8	9	3.2	80	N/A	2	soft to medium firm surface, feels like an organic mat (algae), soft beneath surface	N/A
Mill Pond	BH-TO2	BH-TO2-5	N/A	N/A	6	9	3	100	N/A	2	soft to medium surface, soft below	N/A
Mill Pond	BH-TO2	BH-TO2-6	N/A	N/A	7	9	2	120	N/A	2	very soft surface and same below surface	N/A
Mill Pond	BH-TO2	BH-TO2-7	N/A	N/A	6.8	9	2.2	140	N/A	2	soft surface and same below surface	N/A
Mill Pond	BH-TO2	BH-TO2-8	N/A	N/A	7	9	2	160	N/A	2	soft surface, some sand, same below surface	N/A
Mill Pond	BH-TO2	BH-TO2-9	N/A	N/A	6.8	9	2.2	180	N/A	2	semi-firm surface, soft below	N/A
Mill Pond	BH-TO2	BH-TO2-10	N/A	N/A	7	9	2	200	N/A	1	hit something hard at 6", then pushed further	N/A
Mill Pond	BH-TO2	BH-TO2-11	N/A	N/A	7	9	2	220	N/A	2	soft on surface, very soft below surface	N/A
Mill Pond	BH-TO2	BH-TO2-12	N/A	N/A	6.5	8.5	2	240	N/A	3	very soft on surface and below surface	N/A
Mill Pond	BH-TO2	BH-TO2-13	N/A	N/A	6.5	8.5	2	260	N/A	3	very soft on surface and below surface	N/A
Mill Pond	BH-TO2	BH-TO2-14	N/A	N/A	6.5	8.5	2	280	N/A	3.2	very soft throughout	N/A
Mill Pond	BH-TO2	BH-TO2-15	N/A	N/A	6	8.5	2.5	300	N/A	1.8	soft to semi soft	N/A
Mill Pond	BH-TO2	BH-TO2-16	N/A	N/A	7	8.5	1.5	320	N/A	1.5	soft on surface, wood debris felt on surface	N/A
Mill Pond	BH-TO2	BH-TO2-17	N/A	N/A	4	8.5	4.5	340	N/A	2.5	large fallen tree in water, soft to medium surface, them softer below	N/A
Mill Pond	BH-TO2	BH-TO2-18	N/A	N/A	3.5	8.5	5	360	N/A	2	soft on surface, some wood debris and shells visibly observed	N/A
Mill Pond	BH-TO2	BH-TO2-19	N/A	N/A	4	8.5	4.5	380	N/A	1.8	soft on surface, hit a hard layer (maybe wood or clay) at 1.8'	N/A
Mill Pond	BH-TO2	BH-TO2-20	N/A	N/A	5.5	8.5	3	400	N/A	1.5	soft on surface, hitting wood-like debris just below surface	N/A
Mill Pond	BH-TO2	BH-TO2-21	N/A	N/A	6	8.5	2.5	420	N/A	3	soft on surface and throughout	N/A
Mill Pond	BH-TO2	BH-TO2-22	N/A	N/A	5.5	8.5	3	440	N/A	3	soft wood debris on surface down to 6"	N/A
Mill Pond	BH-TO2	BH-TO2-23	N/A	N/A	5.5	8.5	3	460	N/A	1.5	wood on surface felt to 1.5'	N/A
Mill Pond	BH-TO2	BH-TO2-24	N/A	N/A	5	8.5	3.5	480	N/A	4	rock and gravel on surface, soft below	N/A
Mill Pond	BH-TO3	BH-TO3-1	221849	1225023	N/A	N/A	N/A	20	N/A	2	soft surface, firm layer at 6"	N/A
Mill Pond	BH-TO3	BH-TO3-2	221880	1225024	N/A	N/A	N/A	40	N/A	1	soft surface, firm layer at 6", wood-like debris	N/A

Table J-2 Diver Survey Field Observations

Area of Investigation	Transect ID	Location ID	Coordinates		Water Depth	Tide	Mudline Elevation	Distance from shore	Surface Extent Wood	Total Penetration	Description	Other Contents
			northing	Easting	ft	ft	ft. MLLW	ft	%	ft		
Mill Pond	BH-TO3	BH-TO3-3	221904	1225042	N/A	N/A	N/A	60	N/A	1.5	soft surface, firm layer at 0.25'	N/A
Mill Pond	BH-TO3	BH-TO3-4	221930	1225051	N/A	N/A	N/A	80	N/A	1	semi soft surface, wood on surface, firm layer just below surface.	N/A
Mill Pond	BH-TO3	BH-TO3-5	221953	1225062	N/A	N/A	N/A	100	N/A	1.5	gravel at 1.5'	N/A
Mill Pond	BH-TO3	BH-TO3-6	221990	1225084	N/A	N/A	N/A	120	N/A	water too deep	firm surface	N/A
Mill Pond	BH-TO3	BH-TO3-7	222021	1225084	N/A	N/A	N/A	140	N/A	2.5	very soft surface	N/A
Mill Pond	BH-TO3	BH-TO3-8	222045	1225104	N/A	N/A	N/A	160	N/A	1.5	soft surface	N/A
Mill Pond	BH-TO3	BH-TO3-9	222071	1225118	N/A	N/A	N/A	180	N/A	1	soft surface, rock and sand mix at 6", hard layer.	N/A
Mill Pond	BH-TO3	BH-TO3-10	222096	1225126	N/A	N/A	N/A	200	N/A	2	crunchy' gravelly silty surface	N/A
Mill Pond	BH-TO3	BH-TO3-11	222118	1225137	N/A	N/A	N/A	220	N/A	<6"	gravel surface	N/A
Inner Harbor	BH-TO4	BH-TO4-1	221719	1225540	9	6	-3	400	30	2	silty muddy surface with 1/4" size woodchips, sawdust and woodchips (40% coverage) from 0-3" below surface	seaweed, crabs, fish on surface, shells 0-3"
Inner Harbor	BH-TO4	BH-TO4-2	N/A	N/A	7	6	-1	350	30	1.5	SAND with some silt on surface with 1" woodchips, sandy from 0-3" below surface with 20% woodchip cover	some shells and seaweed on surface, shells 0-3"
Inner Harbor	BH-TO4	BH-TO4-3	N/A	N/A	7	6	-1	325	40	0.5	SANDY surface with some silt and small woodchips, small amounts of rocks and 40% sawdust coverage from 0-3" below surface	seaweed and fish on surface
Inner Harbor	BH-TO4	BH-TO4-4	N/A	N/A	7	6	-1	300	0	1	muddy surface, sandy/silty from 0-3", no wood observed	seaweed on surface, shells from 0-3" below surface
Inner Harbor	BH-TO4	BH-TO4-5	N/A	N/A	9	6	-3	275	0	1	silty/muddy, no wood observed	seaweed on surface, shells below surface
Inner Harbor	BH-TO4	BH-TO4-6	N/A	N/A	8	6	-2	250	0	1.5	silty/muddy, no wood observed on surface, but 40% wood coverage (wood less than 1/4") observed from 0-3" below surface	seaweed on surface, shells below surface
Inner Harbor	BH-TO4	BH-TO4-7	N/A	N/A	10	6	-4	225	20	1.7	silty/muddy, small amount of wood debris on surface only (5"x1/4" size)	crabs, fish, seaweed on surface
Inner Harbor	BH-TO4	BH-TO4-8	N/A	N/A	9	6	-3	200	0	2	soft muddy/silty surface. No wood observed on surface, but woodchips 1/4"-1/2" observed from 0-3" below surface at 40% coverage	seaweed, fish, crab on surface, shells below surface
Inner Harbor	BH-TO4	BH-TO4-9	N/A	N/A	9.5	6	-3.5	175	0	2	sandy and silty/muddy. No wood observed.	crab, fish, seaweed, shells on surface. Shells below surface
Inner Harbor	BH-TO4	BH-TO4-10	N/A	N/A	9	6.5	-2.5	150	0	1.8	sandy and silty surface, no wood observed on surface, 50% cover of woodchips (1/4" to 4" in length) from 0-3" below surface	seaweed and crabs on surface
Inner Harbor	BH-TO4	BH-TO4-11	N/A	N/A	9	6.5	-2.5	125	50	1.7	sand and silt surface with 4x3" size woody debris, 60% wood cover from 0-3" below surface (6"x3" size of wood)	seaweed and shells on surface
Inner Harbor	BH-TO4	BH-TO4-12	N/A	N/A	7	6.5	-0.5	100	50	2	soft silty and muddy surface with some sand and wood (2"x4"), 100% cover of woody debris (2"x4" in size) from 0-3" below surface, wood was tan in color. Upon digging further, wood was present to at least 6" below surface.	seaweed and shells on surface
Inner Harbor	BH-TO4	BH-TO4-13	222061	1225489	6.5	6.5	0	75	100	0.7	wood debris 2"x4" with silty/muddy sand. From 3-6" below surface was 100% coverage of compact brick and wood	seaweed, shells, and 40% coverage of large brick chunks (about the size of half a brick on surface). 50% coverage of bricks from 0-3" below surface (1" brick pieces)
Inner Harbor	BH-HT02	BH-HT02-1	221854	1225888	26	5.5	-20.5	350	10	20	silty/muddy, natural looking tree branch on surface and sawdust (<1/4"). No wood observed 0-3" below surface	N/A
Inner Harbor	BH-HT02	BH-HT02-2	N/A	N/A	26	5.5	-20.5	325	40	16	small wood chunks and fibers (3") on surface. 100% wood waste coverage at 3" below surface, 1 solid piece of wood at this location. *Note: row of pile stubs observed at mudline going east-west on way to next point.	algae on surface
Inner Harbor	BH-HT02	BH-HT02-3	N/A	N/A	25	5.5	-19.5	300	25	24	2 pilings, wood fibers on surface, sawdust at 3" below surface (25% coverage)	N/A
Inner Harbor	BH-HT02	BH-HT02-4	N/A	N/A	N/A	5.5	N/A	275	25	N/A	3" wood pieces on surface, a piling observed on way to next point.	N/A
Inner Harbor	BH-HT02	BH-HT02-5	N/A	N/A	N/A	5.5	N/A	250	25	N/A	pile stub at mudline, sawdust or chips, piles going eastward	N/A
Inner Harbor	BH-HT02	BH-HT02-6	N/A	N/A	N/A	5.5	N/A	225	25	N/A	more pile stubs at mudline along transect line and lots of pile stubs to the west of the transect line in a cluster 36" apart running east-west	N/A
Inner Harbor	BH-HT02	BH-HT02-7	222003	1225745	N/A	5.5	N/A	200	40	N/A	pipe observed on way to this point. Some 2"x4" wood pieces, wood no longer than 6", more pile stubs at mudline.	N/A
Inner Harbor	BH-HT02	BH-HT02-8	N/A	N/A	N/A	5.5	N/A	175	40	N/A	possible piling to the east of the transect line, wood observed no longer than 6"	N/A
Inner Harbor	BH-HT02	BH-HT02-9	N/A	N/A	N/A	5.5	N/A	150	40	N/A	pile stubs (2) along transect line, wood getting smaller (chips and sawdust)	N/A
Inner Harbor	BH-HT02	BH-HT02-10	N/A	N/A	N/A	5.5	N/A	125	40	N/A	several pilings 5' off transect running east-west at mudline. Scattered wood chunks (1") and sawdust	N/A
Inner Harbor	BH-HT02	BH-HT02-11	N/A	N/A	N/A	5.5	N/A	100	20	N/A	wood chunks (1") and sawdust, several pile stubs at or below mudline in the area, possibly in a circular arrangement	N/A
Inner Harbor	BH-HT02	BH-HT02-12	N/A	N/A	12	5.5	-6.5	75	10	N/A	one 1' piece of wood, some woodchips, and pile stubs around transect	10% brick coverage (3" pieces and whole bricks)
Inner Harbor	BH-HT02	BH-HT02-13	N/A	N/A	N/A	5.5	N/A	50	100	N/A	larger 1' wood pieces, woodchips, and sawdust	more bricks and 5% slag (5"x10" and 20"x15" pieces)
Inner Harbor	BH-HT02	BH-HT02-14	N/A	N/A	N/A	5.5	N/A	25	100	N/A	wood coverage includes planks, pieces of pile, and slivers of wood	5% slag cover, slag piece 24" diameter
Inner Harbor	BH-HT02	BH-HT02-15	222125	1225645	N/A	N/A	N/A	0	100	N/A	wood coverage includes planks, chunks, slivers, and sawdust	one brick up to 3 inches
Inner Harbor	BH-HT01	BH-HT01-1	221854	1226045	30	4.5	-25.5	410	0	3	muddy/silty, no wood	algae, minimal sea life

Table J-2 Diver Survey Field Observations

Area of Investigation	Transect ID	Location ID	Coordinates		Water Depth	Tide	Mudline Elevation	Distance from shore	Surface Extent Wood	Total Penetration	Description	Other Contents
			northing	Easting	ft	ft	ft. MLLW	ft	%	ft		
Inner Harbor	BH-HT01	BH-HT01-2	N/A	N/A	30	4.5	-25.5	385	0	2	tree branch, no other wood on surface or from 0-3" below surface, sandy and muddy	N/A
Inner Harbor	BH-HT01	BH-HT01-3	N/A	N/A	N/A	4.5	N/A	360	10	1.5	sawdust-like wood in spots on surface, silty sand/mud	brown and green algae
Inner Harbor	BH-HT01	BH-HT01-4	N/A	N/A	N/A	4.5	N/A	340	10	N/A	scattered woody debris, larger planks (2') and smaller pieces (2"x3" and 4"x18")	N/A
Inner Harbor	BH-HT01	BH-HT01-5	N/A	N/A	N/A	4.5	N/A	290	10	N/A	larger wood pieces (1'x6") covered in barnacles	barnacles
Inner Harbor	BH-HT01	BH-HT01-6	N/A	N/A	N/A	4.5	N/A	265	25	N/A	scattered wood 4"x1' up to 8"x2', and a piece of piling	anemones on wood pieces
Inner Harbor	BH-HT01	BH-HT01-7	221987	1225903	N/A	4.5	N/A	240	75	N/A	chips with some larger wood debris (up to 3' in length), woody debris is observed in a pile	N/A
Inner Harbor	BH-HT01	BH-HT01-8	N/A	N/A	N/A	4.5	N/A	215	75	N/A	a 20' log observed	2" brick fragment
Inner Harbor	BH-HT01	BH-HT01-9	N/A	N/A	N/A	4.5	N/A	190	75	N/A	woodchips and larger wood pieces (up to 2' in length), possible pile remnants (2'), some man made planks (3'x8")	50-75% brick cover, 3" brick fragments
Inner Harbor	BH-HT01	BH-HT01-10	N/A	N/A	N/A	4.5	N/A	165	20	N/A	20+ foot log, larger broken pieces of wood (1-2'), 4-5 piling stubs west of the transect line	a tire, lots of 3" brick pieces (50-75% cover)
Inner Harbor	BH-HT01	BH-HT01-11	N/A	N/A	N/A	4.5	N/A	140	20	N/A	2 piling stubs, woodchips	bricks (50-75% cover)
Inner Harbor	BH-HT01	BH-HT01-12	N/A	N/A	N/A	4.5	N/A	115	20	N/A	one piling stub, small wood fibers	bricks (80% cover)
Inner Harbor	BH-HT01	BH-HT01-13	N/A	N/A	N/A	4.5	N/A	90	10	N/A	woodchips (3") and sawdust	75% brick cover, slag 2.5"
Inner Harbor	BH-HT01	BH-HT01-14	222099	1225786	N/A	4.5	N/A	65	10	N/A	no wood observed, very dense surface	almost 100% brick cover, section of railroad (36"), 20% slag cover
Harbor	BH-TO5	BH-TO5-1	221908	1226196	28	1	-27	400	10	1.2	silty/muddy surface with 1/4" wood waste, silty/muddy with no wood waste observed from 0-3" below surface	some shells on surface
Harbor	BH-TO5	BH-TO5-2	N/A	N/A	27	1	-26	375	10	1	silty/muddy with 1/4" woodchips on surface, silty/muddy with no wood observed from 0-3" below surface	N/A
Harbor	BH-TO5	BH-TO5-3	N/A	N/A	26.5	1	-25.5	350	10	1	silty/muddy with 1/4" woodchips on surface, 1 large chunk of pile or log observed between 0-3" below surface	N/A
Harbor	BH-TO5	BH-TO5-4	N/A	N/A	26	1	-25	325	10	1.5	some woodchips, 1 chunk of wood measuring 12"x2" on surface, sandy/silty with no wood observed from 0-3" below surface, some gravel or wood at 18"	N/A
Harbor	BH-TO5	BH-TO5-5	N/A	N/A	26	1	-25	300	0	1.5	silty sand and mud. No wood observed	N/A
Harbor	BH-TO5	BH-TO5-6	N/A	N/A	26	1	-25	275	10	1.2	bark-like wood (4"x1") and woodchips on surface. No wood observed from 0-3"	crabs and flounder on surface, 10% shell fragments from 0-3" below surface
Harbor	BH-TO5	BH-TO5-7	N/A	N/A	26	1	-25	250	1 branch (natural)	1	branch (natural, from a tree). Muddy, silty, sandy	Tree branch
Harbor	BH-TO5	BH-TO5-8	N/A	N/A	26	1	-25	225	0	2.5	soft sediment, very silty, no wood observed	clam holes
Harbor	BH-TO5	BH-TO5-9	N/A	N/A	25	1	-24	200	0	2	no wood on surface, suspected gravel at 2' below surface	appears to be a clam bed, some kelp
Harbor	BH-TO5	BH-TO5-10	N/A	N/A	25	1	-24	175	50	2	1'x2" wood pieces and smaller wood chips on surface. 50% cover of 3" wood pieces and rocks from 0-3" below surface. Several pieces of solid wood at 6" from woodchip size up to 10"x4". Potential location of a historical wood structure	sea anemones and kelp on surface
Harbor	BH-TO5	BH-TO5-11	N/A	N/A	20	1	-19	150	75	0.5	worm eaten wood observed on surface. 80% wood coverage (wood pile) at 3" below surface wood pieces were dark to light brown and 3" in length	kelp bed and sea animals on surface
Harbor	BH-TO5	BH-TO5-12	N/A	N/A	16	1	-15	125	80	1.5	wood on surface 4"x1" pieces, dark brown in color on surface, 1/4" dark brown wood pieces (50% coverage) from 0-3" below surface. Sandy and Silty.	clam holes, concrete, and steel on surface
Harbor	BH-TO5	BH-TO5-13	N/A	N/A	12	1	-11	100	80	2	3" wood chips and a piece of wood 4"x8" on surface, muddy/silty below surface with wood pulp coverage 60% from 0-3" below surface	brown and green algae and shells on surface, shells also from 0-3" below surface
Harbor	BH-TO5	BH-TO5-14	222158	1225900	11	1	-10	75	80	2	substantial wood debris up to 10" x4" on surface, possibly part of a historical structure, 100% wood coverage from 0-3" below surface, bark-like light to dark brown 2" to 10" in length. Note: 3 pilings observed along transect between BH-TO5-13 and BH-TO5-14.	seaweed, shells, and rocks on surface
Harbor	BH-TO5	BH-TO5-15	N/A	N/A	8	1	-7	50	80	3	wood fragments, piles, larger wood fragments (up to 1 foot) and mushy rotted wood chips from 0-3" below surface	brown and green algae
Harbor	BH-TO5	BH-TO5-16	N/A	N/A	8	1	-7	25	80	0.5	wood fragments, planks, wood fragments (up to 1 foot) and wood chips from 0-3" below surface	brown and green algae, brick or cement, maybe slag
Harbor	BH-TO6	BH-TO6-1	221903	1226381	31	5.5	-25.5	300	10	0.67	1" woodchips on surface, minimal sawdust (10% coverage) from 0-3" below surface	shells, crab, rocks with barnacles on surface, shells below surface
Harbor	BH-TO6	BH-TO6-2	N/A	N/A	31	5.5	-25.5	250	30	0.75	1" woodchips on surface, silty surface, dark brown sawdust (30% coverage) from 0-3" below surface	crab and shells on surface, shells below surface
Harbor	BH-TO6	BH-TO6-3	N/A	N/A	30	5.5	-24.5	225	40	0.67	wood pieces varying in length from 1/2" to 1' on surface, silty surface, 40% wood coverage (small wood, 1/4" length) from 0-3" below surface	shells on surface and below surface

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Area of Investigation	Transect ID	Location ID	Coordinates		Water Depth	Tide	Mudline Elevation	Distance from shore	Surface Extent Wood	Total Penetration	Description	Other Contents
			northing	Easting	ft	ft	ft. MLLW	ft	%	ft		
Harbor	BH-TO6	BH-TO6-4	N/A	N/A	29	5.5	-23.5	200	50	2.5	silty/muddy surface with large wood pieces (2" to 2' in length), silty below surface with small wood fragments (less than 1/4") 30% coverage from 0-3" below surface	shells below surface
Harbor	BH-TO6	BH-TO6-5	N/A	N/A	26	5.5	-20.5	175	50	1.5	large wood piece (1') and woodchips (1"), silty/muddy. 20% coverage of sawdust from 0-3" below surface	crab on surface, shells below surface
Harbor	BH-TO6	BH-TO6-6	N/A	N/A	26	5.5	-20.5	150	0	2.5	silty/muddy with no wood observed	some shell fragments (10%) on surface and below surface. Seaweed on surface
Harbor	BH-TO6	BH-TO6-7	N/A	N/A	22	5.5	-16.5	125	0	2.5	cobble, gravel. No wood observed	barnacles on bricks (3" bricks), seaweed and shells on surface. Shells also below surface.
Harbor	BH-TO6	BH-TO6-8	N/A	N/A	20	5.5	-14.5	100	0	1.5	cobble, gravel, sandy and silty. No wood observed.	seaweed and barnacles on surface, shells below surface
Harbor	BH-TO6	BH-TO6-9	N/A	N/A	14	5.5	-8.5	75	0	0.5	silty and sand. No wood observed	seaweed, shells, cobble with barnacles (3" cobble), shells below surface as well
Harbor	BH-TO6	BH-TO6-10	N/A	N/A	10	5.5	-4.5	50	0	0.5	cobble (3"), gravel, sand, and some silt on surface, cobble and shells observed from 0-3" below surface. No wood observed.	shells and seaweed on surface, shells below surface
Harbor	BH-TO6	BH-TO6-11	222113	1226196	3.5	5.5	2	25	0	0.17	No wood observed, very dense below surface.	shells, kelp, and cobble (3") with barnacles on surface, shells and rocks below surface
Harbor	BH-TO7	BH-TO7-1	221812	1226743	42	8	-34	410	25	1.5	sand and muddy silt with some gravel on surface and 1-3" in length wood debris, some dark brownish/black wood debris less than 1" in length observed 3" below surface	shells on surface
Harbor	BH-TO7	BH-TO7-2	N/A	N/A	40	8	-32	360	25	0.67	small rocks and wood pulp on surface, 10-15% wood pulp observed 3" below surface	shell fragments, fish, crab, anemone, some floating seaweed
Harbor	BH-TO7	BH-TO7-3	N/A	N/A	39	8	-31	310	0	1	soft silt and sand, no wood observed on surface, but brownish/black woodchips (25% coverage) less than 1" in length observed 3" below surface	algae, crabs, and shells
Harbor	BH-TO7	BH-TO7-4	N/A	N/A	39	8	-31	285	30	2	woody debris 1-2" in length, sandy and silty, sawdust and small woodchips (40% coverage) observed 3" below surface	shells, barnacles on wood
Harbor	BH-TO7	BH-TO7-5	N/A	N/A	26	8	-18	260	25	1.5	silty, wood chips and chunks measuring 1" to 2' in length on the surface. Bark (3/4") 50% coverage from 0-3" below surface	crab, fish, algae, shell fragments. 1/2" brick fragments from 0-3" below surface
Harbor	BH-TO7	BH-TO7-6	N/A	N/A	26	8	-18	235	25	1.5	silty/muddy with 3/4" bark pieces on surface, 1" bark pieces (25% coverage from 0-3" below surface	shells, crab, anemones on surface, shells below surface
Harbor	BH-TO7	BH-TO7-7	N/A	N/A	24	8	-16	210	50	2	silty/muddy, 2" wood pieces on surface. 2" dark wood debris/bark (40-50% coverage) from 0-3" below surface	shells on surface, brick, glass, and wood below surface
Harbor	BH-TO7	BH-TO7-8	N/A	N/A	22	8	-14	185	60	2	silty/muddy with 2" bark pieces on surface. 1" wood debris 55% coverage from 0-3" below surface. 100% wood debris (solid layer of wood) at 6" below surface.	shells on surface and 0-3" below surface. Algae on surface
Harbor	BH-TO7	BH-TO7-9	N/A	N/A	19	8	-11	160	60	2	thick mud, 2" bark pieces on surface. 1" wood pieces from 0-3" below surface. 1" wood pieces and larger below 3"	shells on surface and below surface
Harbor	BH-TO7	BH-TO7-10	N/A	N/A	16	8	-8	135	40	3.5	mud and softer silt, wood chips on surface. More pulpy wood (60% coverage of wood 1/4" or less) from 0-3" below surface. 40% sawdust below 3". *1' south of transect a 12-14" diameter piling in addition to a log were observed*	shells on surface and below surface
Harbor	BH-TO7	BH-TO7-11	N/A	N/A	12	8	-4	110	30	1" to 2'	muddy silt and 2.5" wood pieces on surface. 50% coverage of 2" wood pieces from 0-3" below surface. Larger wood chips (6") 50% coverage below 3"	seaweed and shells on surface
Harbor	BH-TO7	BH-TO7-12	N/A	N/A	10	8.5	-1.5	85	25	2	mud/silt and dark brown 1" wood chips on surface. 6"x6" wood/bark 100% coverage from 0-3" below surface. 100% wood coverage below 3" (brown/black bark)	shells and seaweed on surface
Harbor	BH-TO7	BH-TO7-13	N/A	N/A	8	8.5	0.5	60	0	1.5	silty/muddy surface (no wood on surface). Small woodchips (1") 25% coverage from 0-3" below surface. 40% wood chip coverage (1/2" chips) below 3"	seaweed covering surface shell fragments on surface and below
Harbor	BH-TO7	BH-TO7-14	N/A	N/A	5	8.5	3.5	35	0	1	dense surface with gravel and sand, rocks from 0-3" below surface. No wood observed.	seaweed on surface, shells below
Harbor	BH-TO7	BH-TO7-15	222188	1226610	3	8.5	5.5	10	0	0.5	cobble on surface, sand and gravel from 0-3" below surface. No wood observed.	seaweed on surface and a crab and barnacles
Harbor	BH-TO8	BH-TO8-1	222234	1226953	3.5	4	0.5	25	0	0.1	medium gravel with some cobbles on surface, sandy below	10% floating aquatic plants and some barnacles on surface rocks
Harbor	BH-TO8	BH-TO8-2	N/A	N/A	6	4	-2	50	0	0.1	no wood observed, gravel with some cobbles and sand	50% coverage of green algae, barnacles , shell fragments
Harbor	BH-TO8	BH-TO8-3	N/A	N/A	8	4	-4	75	0	0.33	gravel, cobble, and sand on surface, softer sand below surface	shells , barnacles, and green floating seaweed
Harbor	BH-TO8	BH-TO8-4	N/A	N/A	10	4	-6	100	0	1	sand and crushed shells. No wood observed.	floating seaweed, crushed shells
Harbor	BH-TO8	BH-TO8-5	N/A	N/A	11	4	-7	125	0	1	cobble and sand on surface. No wood on surface but, 100% coverage of brownish black wood waste observed 3" below surface (1'x2")	floating seaweed and a crab on surface

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			northing	Easting	ft	ft	ft. MLLW	ft	%	ft		
Harbor	BH-TO8	BH-TO8-6	N/A	N/A	13	4	-9	150	0	2.5	sandy silty mud on surface. No wood observed on surface, but 100% coverage of wood debris (3-4") observed at 3" below surface. Dense gravel-like layer at 2.5ft below surface.	floating seaweed on surface
Harbor	BH-TO8	BH-TO8-7	N/A	N/A	18	4	-14	175	0	2	no surface wood observed. Thicker mud, 10% cobble, bark type wood 3" below surface 80% coverage	100% seaweed coverage floating on surface
Harbor	BH-TO8	BH-TO8-8	N/A	N/A	20	4	-16	200	40	2	1/8" slivers of wood on surface, silty sand. Barky substrate (80% wood coverage) at 3" below surface measuring 2-3" in length, the woody layer is approximately 4" thick. *note: a 12"x24" piling was observed between BH-TO8-8 and BH-TO8-9 (about 10 feet east of the transect line), another 7 pile stubs were observed at mudline about 10' west of the transect*	shell fragments on surface
Harbor	BH-TO8	BH-TO8-9	N/A	N/A	25	4.5	-20.5	225	60	3	small wood fragments (3") and sawdust like (1/8") wood debris observed on surface. Smaller wood pieces observed 3" below surface at 60% coverage. Muddy/silty sand. *3' from BH-TO8-9 (on way to BH-TO-10) 3 piling stubs observed and 30' long log and steel pipe*	sea life observed on way to BH-TO8-10
Harbor	BH-TO8	BH-TO8-10	N/A	N/A	31	4.5	-26.5	250	80	2.5	substrate getting softer/siltier. Lots of small woody debris on surface, sawdust and 1/2" to 1" woodchips observed at 3" below surface	N/A
Harbor	BH-TO8	BH-TO8-11	N/A	N/A	36	4.5	-31.5	275	80	2	silty substrate, wood chips on surface (1.5"), 1/2" to 1" pieces of light tan to brown wood at 3" below surface (50% coverage below surface)	N/A
Harbor	BH-TO8	BH-TO8-12	N/A	N/A	40	4.5	-35.5	300	100	0.5	3" wood pieces on surface, piling observed 10' southwest of transect (25' length), wood and sawdust beneath surface then gravel and rock	Crab on surface
Harbor	BH-TO8	BH-TO8-13	N/A	N/A	43	4.5	-38.5	325	100	1.2	2-4" wood pieces on surface, slightly less wood below surface (90% coverage) woodchips	shrimps and crab on surface, 3/4" or less chunks of brick below surface
Harbor	BH-TO8	BH-TO8-14	N/A	N/A	46	4.5	-41.5	350	40	2.5	large chunks of piling 2-3' and woodchips on surface. No wood observed at 4" below surface.	large crab on surface
Harbor	BH-TO8	BH-TO8-15	N/A	N/A	48	4.5	-43.5	375	20	3	woodchips on surface, very muddy and silty, piece of pile (10'x3"). No wood or brick observed 4" below surface	N/A
Harbor	BH-TO8	BH-TO8-16	221894	1227112	48	4.5	-43.5	400	10	1.3	wood piece on surface measuring 3'x6", remaining wood on surface consisted of slivers. Silty mud down to 3" below surface, no wood observed at this depth. *note: a log was observed 15' northwest of transect, a second log observed slightly further west*	N/A
Inner Harbor	BH-T00	BH-T00-1	221819	1227105	36	N/A	N/A	0'	0	N/A	36 ft water depth	N/A
Inner Harbor	BH-T00	BH-T00-2	N/A	N/A	N/A	N/A	N/A	25'	N/A	N/A	wood debris (1') with possible burnt edge	N/A
Inner Harbor	BH-T00	BH-T00-3	N/A	N/A	N/A	N/A	N/A	50'	0	N/A	no surface wood observed	N/A
Inner Harbor	BH-T00	BH-T00-4	N/A	N/A	N/A	N/A	N/A	75'	N/A	N/A	5" length rotted wood debris on surface	N/A
Inner Harbor	BH-T00	BH-T00-5	N/A	N/A	N/A	N/A	N/A	100'	N/A	N/A	sliver of a pile	N/A
Inner Harbor	BH-T00	BH-T00-6	N/A	N/A	N/A	N/A	N/A	125'	N/A	N/A	18' log with anemones	N/A
Inner Harbor	BH-T00	BH-T00-7	N/A	N/A	N/A	N/A	N/A	150'	0	N/A	no surface wood observed	N/A
Inner Harbor	BH-T00	BH-T00-8	N/A	N/A	N/A	N/A	N/A	175'	10	N/A	10' piling (log) and 5' piling (log) towards beach located 10' off transect. Some smaller wood along transect scattered up to 12" in length	N/A
Inner Harbor	BH-T00	BH-T00-9	N/A	N/A	N/A	N/A	N/A	200'	10	N/A	scattered wood (12" length), possible piece of piling	N/A
Inner Harbor	BH-T00	BH-T00-10	N/A	N/A	N/A	N/A	N/A	225'	10	N/A	log 25' long, 14" diameter, 2' bark pieces, 1' wood pieces scattered	N/A
Inner Harbor	BH-T00	BH-T00-11	N/A	N/A	N/A	N/A	N/A	250'	10	N/A	lots of scattered wood debris, slivers of piling	N/A
Inner Harbor	BH-T00	BH-T00-12	N/A	N/A	N/A	N/A	N/A	275'	62	N/A	50-75% surface wood coverage, scattered wood 6"x6' and 6"x4", possible slivers from pilings, 4' hollowed out half round of log, lots of woodchip debris	N/A
Inner Harbor	BH-T00	BH-T00-13	N/A	N/A	N/A	N/A	N/A	300'	100	N/A	100% wood cover, thicker wood debris, piling (log) 45', and bark and woodchips	N/A
Inner Harbor	BH-T00	BH-T00-14	N/A	N/A	N/A	N/A	N/A	325'	100	N/A	100% wood cover, pile just off transect line	N/A
Inner Harbor	BH-T00	BH-T00-15	N/A	N/A	N/A	N/A	N/A	350'	100	N/A	30' water depth, consistent 100% wood cover	N/A
Inner Harbor	BH-T00	BH-T00-16	N/A	N/A	N/A	N/A	N/A	375'	100	N/A	consistent 100% wood cover. 5.5"x2.5". No pile stubs. Slag 12"x9" just in-shore of transect line (in front of house with solar panels)	N/A
Inner Harbor	BH-T00	BH-T00-17	N/A	N/A	N/A	N/A	N/A	400'	100	N/A	30' water depth, 100% wood cover, chips, fibers, and larger pieces (2'x1")	N/A
Inner Harbor	BH-T00	BH-T00-18	N/A	N/A	N/A	N/A	N/A	425'	100	N/A	same 100% wood cover	N/A
Inner Harbor	BH-T00	BH-T00-19	N/A	N/A	N/A	N/A	N/A	450'	100	N/A	same 100% wood cover, more pulp/fibers. Soccer ball size piece of slag (8"x9") round	N/A
Inner Harbor	BH-T00	BH-T00-20	N/A	N/A	N/A	N/A	N/A	475'	100	N/A	same 100% wood cover, chips and fibers, soft silt under the chips	N/A
Inner Harbor	BH-T00	BH-T00-21	N/A	N/A	N/A	N/A	N/A	500'	100	N/A	same 100% wood surface cover	N/A
Inner Harbor	BH-T00	BH-T00-22	N/A	N/A	N/A	N/A	N/A	525'	100	N/A	pipe with barnacles, a piece of metal, same 100% wood surface cover, 2.5"x8: wood strips, possible piling slivers in a clump, some larger chunks and chips, some clay material found (maybe a plate)	N/A
Inner Harbor	BH-T00	BH-T00-23	N/A	N/A	N/A	N/A	N/A	550'	N/A	N/A	some larger pieces 15"x6"	N/A

Table J-2 Diver Survey Field Observations

Area of Investigation	Transect ID	Location ID	Coordinates		Water Depth	Tide	Mudline Elevation	Distance from shore	Surface Extent Wood	Total Penetration	Description	Other Contents
			northing	Easting	ft	ft	ft. MLLW	ft	%	ft		
Inner Harbor	BH-T00	BH-T00-24	N/A	N/A	N/A	N/A	N/A	575'	75	N/A	down to 75% wood cover. Slag piece 4"x2"	N/A
Inner Harbor	BH-T00	BH-T00-25	N/A	N/A	N/A	N/A	N/A	600'	75	N/A	75% wood, no piling stubs observed	N/A
Inner Harbor	BH-T00	BH-T00-26	N/A	N/A	N/A	N/A	N/A	625'	N/A	N/A	slag observed 10' north of transect line measuring 10"x6", brick observed 5' north of transect line	N/A
Inner Harbor	BH-T00	BH-T00-27	N/A	N/A	N/A	N/A	N/A	650'	40	N/A	40% wood cover (more chips and fibers, some scattered larger pieces), more shells and small cobble	N/A
Inner Harbor	BH-T00	BH-T00-28	N/A	N/A	N/A	N/A	N/A	675'	10	N/A	12"x24" piece of wood, scattered large pieces 10% surface cover	N/A
Inner Harbor	BH-T00	BH-T00-29	N/A	N/A	N/A	N/A	N/A	700'	10	N/A	more larger pieces (6"x1.5"), some possible pile slivers observed 4' off transect line	N/A
Inner Harbor	BH-T00	BH-T00-30	N/A	N/A	N/A	N/A	N/A	725'	30	N/A	30% wood surface cover, brick, shell, cobble	N/A
Inner Harbor	BH-T00	BH-T00-31	N/A	N/A	N/A	N/A	N/A	750'	30	N/A	similar to last point, lots of golf balls	N/A
Inner Harbor	BH-T00	BH-T00-32	N/A	N/A	N/A	N/A	N/A	775'	N/A	N/A	2'x1" sliver of wood, piling stub 12" above mudline	N/A
Inner Harbor	BH-T00	BH-T00-33	N/A	N/A	N/A	N/A	N/A	800'	10	N/A	29' water depth. Piling right at transect. Small fibers (10% surface cover). A log observed 15' north of transect line	N/A
Inner Harbor	BH-T00	BH-T00-34	N/A	N/A	N/A	N/A	N/A	825'	10	N/A	28' water depth. No-to-small amounts of wood fibers (10% surface cover)	N/A
Inner Harbor	BH-T00	BH-T00-35	N/A	N/A	N/A	N/A	N/A	850'	10	N/A	10% wood fibers on surface	N/A
Inner Harbor	BH-T00	BH-T00-36	N/A	N/A	N/A	N/A	N/A	875'	N/A	N/A	piling (log) around 860' measuring 10' long and brown to dark brown in color	N/A
Inner Harbor	BH-T00	BH-T00-37	N/A	N/A	N/A	N/A	N/A	900'	N/A	N/A	low visibility, wood observed measuring 6"x4"	N/A
Inner Harbor	BH-T00	BH-T00-38	N/A	N/A	N/A	N/A	N/A	925'	30	N/A	wood debris moderate	N/A
Inner Harbor	BH-T00	BH-T00-39	N/A	N/A	N/A	N/A	N/A	950'	75	N/A	lot of wood debris (75% surface cover)	N/A
Inner Harbor	BH-T00	BH-T00-40	N/A	N/A	N/A	N/A	N/A	975'	100	N/A	100% wood surface coverage, some chips, some 1' wood pieces. Also some (5%) brick fragments (3").	N/A
Inner Harbor	BH-T00	BH-T00-41	N/A	N/A	N/A	N/A	N/A	1000'	95	N/A	more brick, less woodchips (95% surface cover). Piling observed at 1015' mark. Slag observed measuring 12"x12"	N/A
Inner Harbor	BH-T00	BH-T00-42	N/A	N/A	N/A	N/A	N/A	1025'	100	N/A	100% woodchip coverage, wood covered in silt and algae	N/A
Inner Harbor	BH-T00	BH-T00-43	N/A	N/A	N/A	N/A	N/A	1050'	N/A	N/A	apparent shipwreck, fiberglass sailboat 35' long right under transect line. 2 piling stubs at mudline	N/A
Inner Harbor	BH-T00	BH-T00-44	N/A	N/A	N/A	N/A	N/A	1075'	N/A	N/A	bigger pieces of wood (1'), 3 piling stubs at mudline, another on south side of transect line, and 3 more in a line heading south towards the beach	N/A
Inner Harbor	BH-T00	BH-T00-45	N/A	N/A	N/A	N/A	N/A	1100'	N/A	N/A	piling stub along transect line, several others observed going south in a line. All 14" in diameter and at mudline	N/A
Inner Harbor	BH-T00	BH-T00-46	N/A	N/A	N/A	N/A	N/A	1125'	N/A	N/A	pile stubs along transect line and 5' south of line. Slag measuring 1'x1'/ several more pilings in the vicinity at mudline. Fine sawdust on surface.	N/A
Inner Harbor	BH-T00	BH-T00-47	N/A	N/A	N/A	N/A	N/A	1150'	N/A	N/A	piling stub along transect line (14" diameter and at mudline). Larger pieces of lumber under vegetation and at least 5 other piling stubs	N/A
Inner Harbor	BH-T00	BH-T00-48	N/A	N/A	N/A	N/A	N/A	1175'	75	N/A	piling stubs continue in a line formation, slag 4"x4", lots of woody debris, lots of cobble	N/A
Inner Harbor	BH-T00	BH-T00-49	222053	1225687	N/A	N/A	N/A	2000'	10	N/A	lots of vegetation, low visibility. No pile stubs observed, however woody debris was observed.	N/A

Acronyms
MLLW = Mean Lower Low Water
ft = feet
BH = Blakely Harbor
N/A= Datum not recorded
ID = Identification

Geosyntec consultants

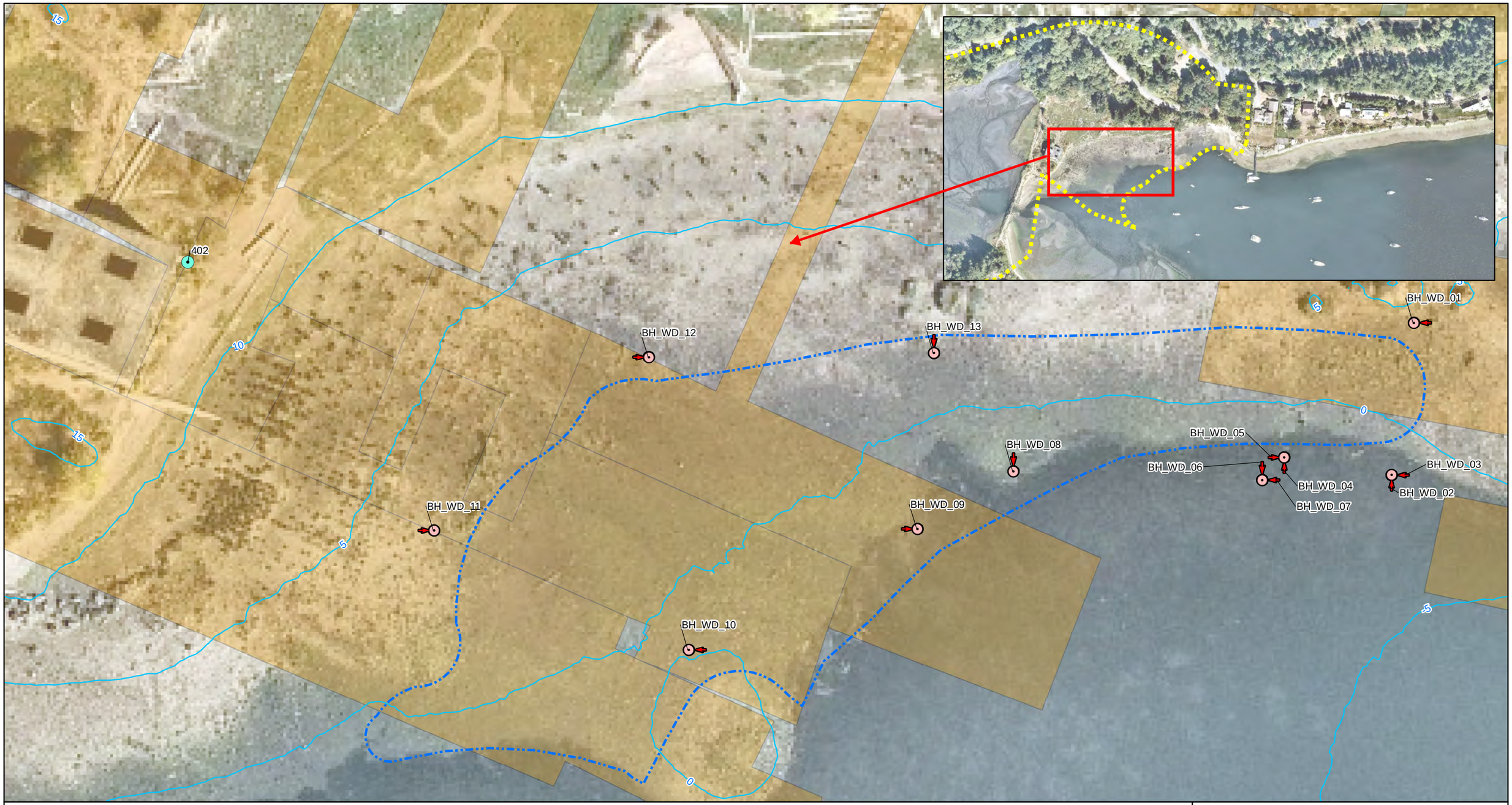
Table J-3 Maximum Observed Wood Debris in Discrete Samples

Area of Investigation	Location ID with Max Wood Debris	Depth Interval (ft)	Max Wood Debris (%)
Surface Soil			
North Upland	HA-14	0 to 1	85
South Upland	HA-43	1 to 2	11
Soil Borings			
North Upland	SB-26	0 to 2	95
North Upland	SB-19	2 to 6	100
North Upland	SB-17	4 to 6	100
North Upland	SB-17, SB-19, SB-22	6 to 10, 6 to 8, 6 to 10	100
North Upland	SB-24	8 to 10	50
North Upland	SB-17	10 to 12	100
North Upland	SB-28	12 to 14	90
North Upland	SB-24	14 to 15	50
North Upland	SB-27	16 to 18	0
North Upland	SB-27	18 to 20	0
North Upland	SB-29	21 to 23	--
North Upland	SB-29	23 to 24	--
Surface Sediment			
Inner Harbor	SG-22	0 to 0.3	80
Sediment Cores			
Inner Harbor, Outer Harb	SC-12, SC-34	0 to 1.4, 0 to 1.5	90
Inner Harbor	SC-17	2 to 3	85
Inner Harbor	SC-11	4 to 6	90
Inner Harbor	SC-11	6 to 8	90
Inner Harbor	SC-11	8 to 10	95

Notes:
1. Reported values include results for samples collected during 2021 and 2022 field investigations.
2. Depth intervals may partially overlap due to sampling interval being defined based on lithology.
3. Max percentage of wood debris correspond to the maximum between wet and dry visual assessment where both values were available.

Acronyms:
% = percentages; ft = feet; -- = sample not analyzed

FIGURES



Legend

- Photo Location and Direction
- Approximate Extent of Large Wood Debris
- Bainbridge Island Parks (BI Parks) Parcel Boundary

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 20 Feet

Observed Woody Debris During Phase 1 Shoreline Inspection
Remedial Investigation Report
Appendix G
Blakely Harbor Park Site
(Bainbridge Island, WA)

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Figure J-1

MVI/Sea | December 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix G\Figure G-1 Observed Wood Debris.mxd 12/19/2023 7:23:06 AM

Northeast Blakely Avenue
3-T Road
Northeast Halls Hill Road
Northeast Seaborn Road
Mill Pond
BH-TO1
BH-TO2
BH-TO3
BH-TO4
BH-TO5
BH-TO6
BH-TO7
BH-TO8
BH-HT01
BH-HT02
BH-T00
Inner Harbor
Outer Harbor
Northeast Country Club Road

Legend

- 2021 Diver Survey Transect
- Historical Diver Survey Transect
- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 240 Feet

Transect Survey Locations
Remedial Investigation Report
Appendix G
Blakely Harbor Park Site
(Bainbridge Island, WA)

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MVI/Sea | December 2023

Figure J-2

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix G\Figure G-2 Transect Survey Location.mxd 12/19/2023 7:24:14 AM

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.

Legend

Sediment Grab Penetration (ft)	Diver Sediment Penetration (ft)
> 3.0	> 3.0
2.0 - 3.0	2.0 - 3.0
1.0 - 2.0	1.0 - 2.0
0.5 - 1.0	0.5 - 1.0
< 0.5	< 0.5
Not Recorded	Not Recorded

- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

N

0 180 Feet

Soft Sediment Probing Thickness

Remedial Investigation Report
Appendix G
Blakely Harbor Park Site
(Bainbridge Island, WA)

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Figure J-3

MVI/Sea | December 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix G\Figure G-3 Sediment Probing Thickness.mxd 12/19/2023 7:25:21 AM

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Historical diver survey transect include transect surveyed in 2008 (Anchor QEA, 2009).

Legend

Wood Debris %
- > 75%
- 50 - 75%
- 10 - 50%
- < 10%
- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure
- 2021 Diver Transect Location
- Historical Diver Transect Location
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Sample Type
- Sediment Grab/Core Sample Location (2021)
- SPI Sample Location (2020)
- Diver Transect Observation (2021)
- Diver Transect Observation (2008)

0 55 110 220 Feet

N

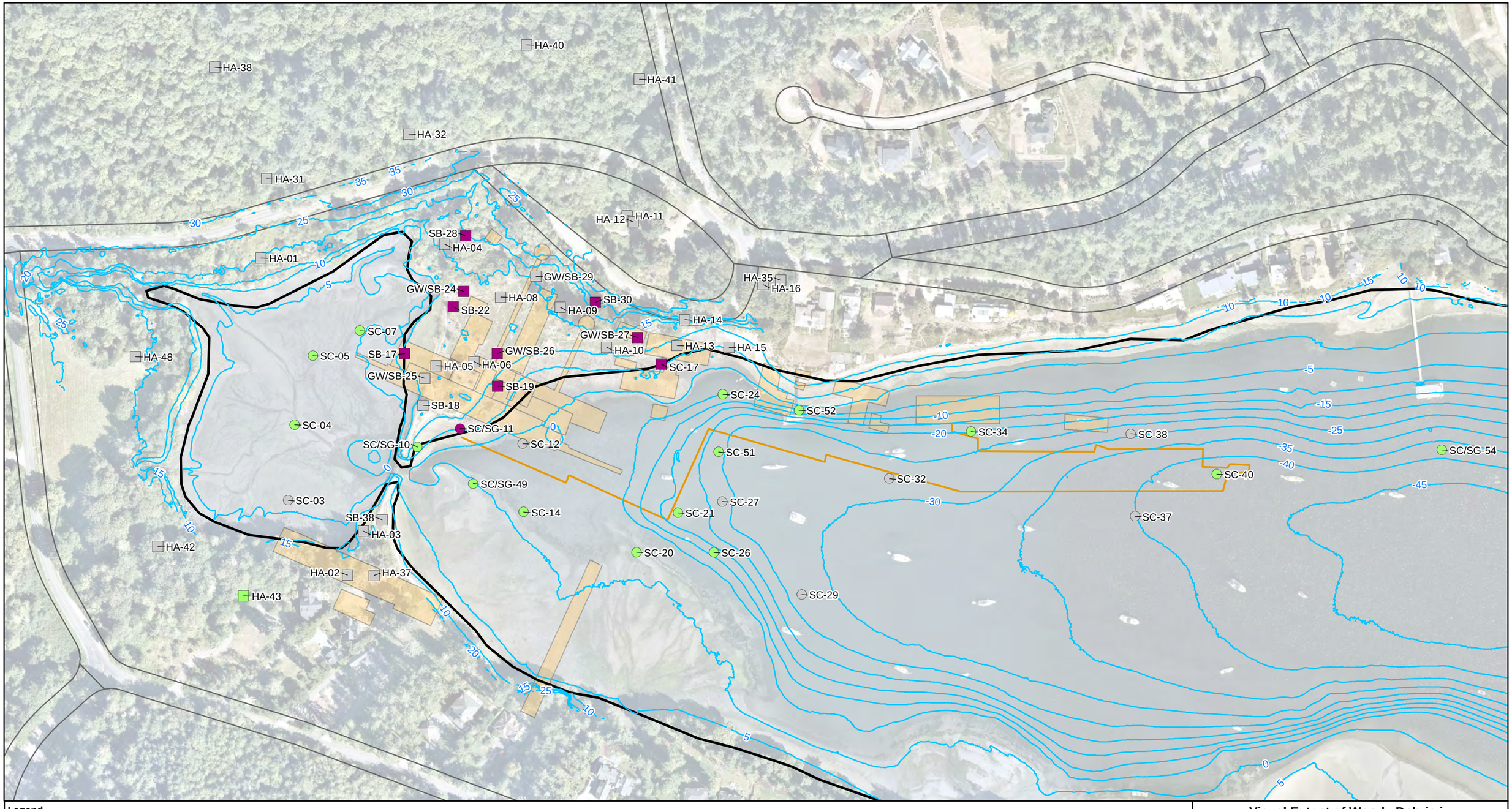
Visual Extent of Woody Debris in Surface Sediment
Remedial Investigation Report
Appendix G
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

Figure J-4

MVI/Sea | December 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix G\Figure G-4 Extent of Wood Debris with Bioassay.mxd 12/19/2023 7:26:31 AM



Legend

Wood Debris %
- > 75%
- 50 - 75%
- 10 - 50%
- < 10%
- Shoreline
- Contour (5 foot MLLW)
- Historical Wharf Structure

- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Sample Type
- Sediment Core Sample Location
- Subsurface Soil Sample Location

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.

N

0 55 110 220 Feet

Visual Extent of Woody Debris in Subsurface Soil and Sediment
Remedial Investigation Report
Appendix G
Blakely Harbor Park Site
(Bainbridge Island, WA)

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Figure J-5

MVI/Sea | December 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix G\Figure G-5 Extent of Wood Debris at Depth.mxd 12/19/2023 7:27:27 AM

ATTACHMENT J-1

GEOSYNTEC CONSULTANTS

Geosyntec consultants

Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_01 **Date: 8/20/2021 8:49 AM** **Direction: West** **Comments:** Approximate northeastern edge of area with high density of woody debris (e.g., bark, milled wood planks/boards) on the surface of the beach. Numerous pilings are present; all broken at the mudline and covered by smaller debris (small fragments and bark).	
BH_WD_02 **Date: 8/20/2021 8:42 AM** **Direction: North** **Comments:** Approximate northeastern edge of the woody debris area. Photo shows transition between area with large woody debris and area where there is high density of bricks.	

GEOSYNTEC CONSULTANTS

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Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_03 **Date: 8/20/2021 8:42 AM** **Direction: West** **Comments:** Same location and photograph BH_WD-02; looking west. Woody debris consists of smaller pieces of wood boards/ planks and bark.	
BH_WD_04 **Date: 8/20/2021 8:52 AM** **Direction: North** **Comments:** Woody debris located directly south of the slag pile area. Woody debris consists of smaller pieces of milled wood boards/ planks. Some bark debris.	

GEOSYNTEC CONSULTANTS

Geosyntec consultants

Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_05

Date: 8/20/2021 8:52 AM

Direction: East

Comments:
Same location as photo BH_WD_04; looking east. Photo shows transition between the woody debris area and area with high density of bricks on beach surface.



BH_WD_06

Date: 8/20/2021 9:31 AM

Direction: Southwest

Comments:
From this approximate location extending westward to a dense piling area adjacent to the former powerhouse, woody debris consists of milled wood boards/ planks 3 to 6 inches in width and 5 to 10 feet in length. Oriented lengthwise in an east/west direction.



GEOSYNTEC CONSULTANTS

Geosyntec consultants

Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_07 **Date: 8/20/2021 9:32 AM** **Direction: West** **Comments:** Same photo location as BH_WD_06; looking more directly west. Photo shows transition between the woody debris area and the slag pile area located to the north and piling field to north and west.	
BH_WD_08 **Date: 8/20/2021 9:34 AM** **Direction: South** **Comments:** Woody debris consists of milled wood boards/ planks 3 to 6 inches in width and 3 to 10 feet in length. Appear oriented in a roughly herringbone type pattern.	

GEOSYNTEC CONSULTANTS

Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_09 **Date: 8/20/2021 10:00 AM** **Direction:** **Comments:** Woody debris consists of milled wood boards/ planks 3 to 6 inches in width, 5 to 15 feet in length. Oriented lengthwise in east/west direction.	
BH_WD_10 **Date: 8/20/2021 9:58 AM** **Direction: West** **Comments:** Woody debris consists of milled wood boards/ planks. Oriented lengthwise in an alternating pattern between east/west and north/south directions. Photo shows transition between large woody debris area and dense piling field that is located to the west, adjacent to the powerhouse.	

GEOSYNTEC CONSULTANTS

Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_11 **Date: 8/20/2021 9:57 AM** **Direction: Southeast** **Comments:** Approximate western edge of large woody debris area. Woody debris consists of milled wood boards/planks.	
BH_WD_12 **Date: 8/20/2021 9:55 AM** **Direction: Southeast** **Comments:** Approximate northwestern edge of large woody debris area. Woody debris consists of milled wood boards/ planks oriented in a pattern that appears to be approximate herringbone pattern. Wood boards are more degraded here and generally smaller pieces/fragments (2 to 3 feet in length) and/or partially buried.	

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Photolog of Observed Woody Debris During Phase 1 Shoreline Inspection

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_WD_13

Date: 8/20/2021 9:35 AM

Direction: South

Comments:
Approximate northern edge of large woody debris area. Slag pile area located to north.



ATTACHMENT J-2

GEOSYNTEC CONSULTANTS
Diver Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park	**Site Location: Bainbridge Island, WA**

Title: Research Vessel

Date: 08/31/2021

Location: Inner Harbor

Comments:
Research vessel operated by Gravity Marine in support of the diver survey. Field observation during the diver survey were radio-communicated to the vessel crew and recorded in the field forms.

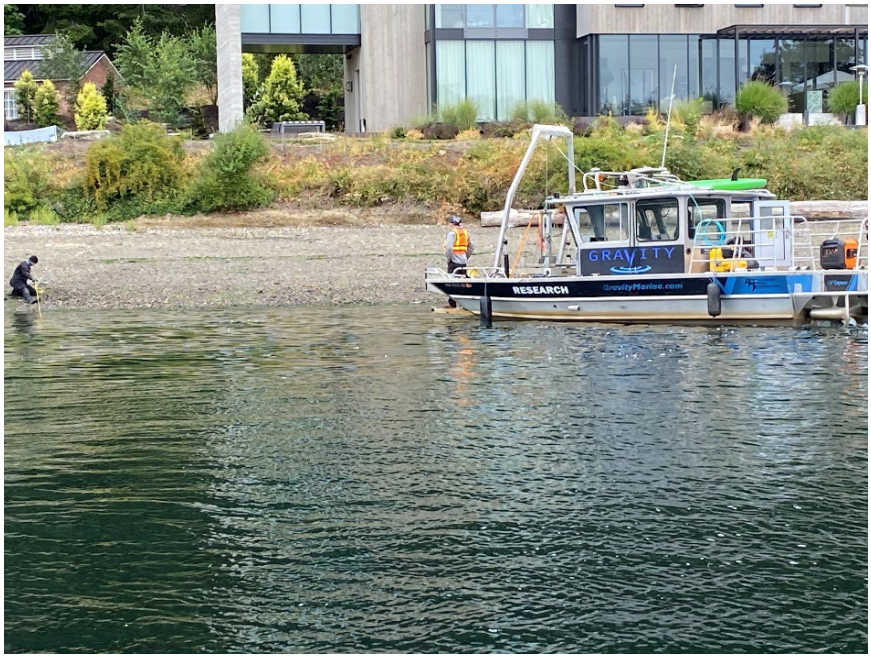


Title: Shoreline Transect End

Date: 08/31/2021

Location: Inner Harbor

Comments:
Measuring tape secured at the shoreline end of a transect. Each transect was delimited by a shoreline and a harbor end, at which coordinates were collected. The diver survey was conducted following the tape between the two ends of each transect.



GEOSYNTEC CONSULTANTS
Diver Survey Photolog

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Blakely Harbor Park	**Site Location: Bainbridge Island, WA**

Title: Diver

Date: 09/01/2021

Location: Inner Harbor

Comments:
A diver preparing for immersion in the Inner Harbor. Divers performed the probing surveys within the Inner and Outer harbors.



Title: Artifacts Collected During Diver Transects

Date: 09/02/2021

Location: Outer Harbor

Comments:
Artifacts including a pair of glasses, a glass, a jar, a boot, and a piece of glass were collected by divers during the diver transects.



APPENDIX K
Timber Pile Mapping and Sampling

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APPENDIX K
TIMBER PILE MAPPING AND SAMPLING

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

Geosyntec consultants

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Attachment K-2 Photograph Log of Sampling

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
cm	centimeters
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FS	Feasibility Study
ft	feet/foot
Geosyntec	Geosyntec Consultants, Inc.
mg/kg	milligram per kilogram
MLLW	mean lower low water
PAH	polycyclic aromatic hydrocarbons
PCA	principal component analysis
Port Blakely	Port Blakely Tree Farms
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the investigation activities including field activities, data analysis, and statistical evaluations, designed to assess whether timber pilings at the Site were treated with creosote. Except where noted, field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, the Sampling and Analysis Plan (SAP), and the Quality Assurance Project Plan (Geosyntec Consultants, Inc. [Geosyntec], 2022).

2. INSPECTION AND SAMPLING OF TIMBER PILINGS

The presence of timber pilings was noted during exploratory Site visits performed prior to initiating RI field activities. The history of the Port Blakley sawmill dates the construction of buildings and overwater structures to before the twentieth century, when creosote was used for the preservation of wood materials. A focused sampling method was designed to inspect and map timber pilings observed at the Site, collect samples, and evaluate the statistical likelihood that the piles encountered at the Site were treated with creosote (SAP, Appendix A of the RI/FS Work Plan; Geosyntec, 2022). The inspection of timber pilings and sampling activities are summarized below.

2.1 Inspection and Mapping of Pilings

On August 31, 2021, numerous wood pilings were observed at the Site during a Shoreline Seeps and Structures Survey (discussed in Appendix H). Timber pilings were observed and photographed along the northern shoreline of the Mill Pond and in the Mill Pond.

Given the tidal cycle during the inspection, there was limited time during which pilings were exposed above the water line. Therefore, pilings were grouped into four general areas for the purposes of field observation (Figures K-1a and K-1b). In general, for all areas inspected, piling extent above the mudline (referred to herein as piling "height") decreases significantly as elevation decreases and water depths increase.

1. Pile Field 01 is located directly east of the former powerhouse (locations beginning with "BH_PILEFIELD_01" on Figure K-1a). In this area, pilings are approximately 16 inches in diameter and are tightly spaced (approximately 1 to 2 feet [ft] on center or less). Close to the shoreline, pilings extend approximately 2 to 2.5 ft above the sediment surface (mudline). Some pilings within approximately 50 ft of the powerhouse appear to have been burned. In these areas, additional pilings have been driven between parallel rows of pilings (oriented east to west), resulting in a very dense arrangement. Pilings were observed to extend into the water, and most of the pilings below an

approximate elevation of 2 ft mean lower low water (MLLW) appeared broken off at mudline.

2. Pile Field 02 extends north and east of Pile Field 01 (locations beginning with "BH_PILEFIELD_02" on Figure K-1a). In this area, the pilings are generally taller in areas near the shoreline (approximately 2.5 to 5 ft in height) and spaced approximately 10 to 15 ft apart. Rows of pilings are oriented east to west and extend along the northern portion of the Mill Pond. Pilings were observed to extend into the water, and pilings located below an approximate elevation of 2 ft MLLW appeared cut at the mudline.
3. Pile Field 03 is located west of the former powerhouse in the Mill Pond (locations beginning with "BH_PILEFIELD_03" in Figure K-1a). Pilings in this area are more weathered and rotted than pilings within the Mill Pond. The maximum height of the pilings is approximately 2 to 2.5 ft. Many of the pilings are broken off close to the mudline.
4. Pile Field 04 is located along the north side of the Mill Pond (locations beginning with "BH_PILEFIELD_04" in Figure K-1b). Pilings in this area are highly weathered and rotted, similar to the pilings in Pile Field 03. Many are broken off close to the mudline.

None of the observed pilings exhibited an odor or had visible staining that may be indicative of creosote. Photographs and additional field observations are summarized in Attachment K-1. Coordinates of locations where piling fields photographs where acquired are reported in Table K-1.

2.2 Timber Pilings Sampling

Timber piles at the Site are distributed along the northern shoreline in the Mill Pond and submerged in the Mill Pond. Five sampling areas were identified based on the inspection activities noted above:

1. Area 01 located in the Mill Pond and including the footprints of Pile Fields 03 and 04.
2. Area 02 located in front of the powerhouse on the northern shoreline in the Mill Pond and including the footprint of Pile Field 01.
3. Area 03 located on the northern shoreline in the Mill Pond and partially including the footprint of Pile Field 02.
4. Area 04 located on the northern shoreline in the Mill Pond and partially including the footprint of Pile Field 02.
5. Area 05 located in the Mill Pond and including the submerged area in front of the powerhouse. The presence of an additional pile field in the subtidal area along the Mill Pond was inferred from field observations collected during the diver transect surveys. A photographic record for this pile field has not been collected due to its submerged location.

Sampling locations within the five areas were selected based on the distribution of timber pilings and included 5 timber piles (stations) in the Mill Pond, 15 stations along the eastern-northern shoreline of the Mill Pond, and 4 locations within the northern shore of the Mill Pond. Sampling

areas and locations are shown in Figure K-2, and coordinates (collected by a hand-held GPS) are provided in Table K-2.

Pile samples consisted of wood shavings. Samples were collected in September 2021 as follows:

- For samples collected on exposed surfaces: Samples were collected using hand tools. Prior to sample collection, the sampling team inspected the surface of the pilings for overall condition, which was documented in the field log. Sample location elevation was recorded, and a power drill was used to remove the surficial 3 centimeters (cm) from the target location to avoid sampling bias associated with atmospheric deposition of organic compounds. The drill was then used to penetrate the piling and extract wood shavings for analysis. Discrete samples were collected into a decontaminated stainless-steel bowl, homogenized, logged, and weighed before compositing.
- For samples collected on submerged surfaces: submerged pilings were sampled by divers. Prior to sample collection, the divers inspected the surface of the submerged pilings for overall condition, which was radio-communicate to the vessel crew and then documented in the field log. Sample location elevation above mudline was recorded, and a wood chisel was used to scrape away the surficial 3 cm from the target location to avoid sampling bias associated with deposition of organic compounds or other interactions with seawater. Samples were collected using a chisel and were retrieved to the sampling vessel. Aboard the vessel, the sample was reduced into small fragments using a chisel and a hammer, collected in a clean/decontaminated stainless-steel bowl, homogenized, logged, and weighed before compositing.

Composite samples were collected in each sampling area by homogenizing equal mass of associated discrete samples in a stainless-steel bowl. A total of 24 discrete pile samples were combined into six composite samples. A selection of pictures showing the sampling method is provided in Attachment K-2. Field observations recorded during sample collection are summarized in Table K-2.

Composite samples were collected into laboratory-supplied containers and submitted for analysis of alkylated and parent polycyclic aromatic hydrocarbon (PAH) by using EPA method 8260SIM. Analyses were performed by Alpha Analytical, Mansfield, Massachusetts.

3. RESULTS AND DATA ANALYSIS

PAH fingerprinting is a method of tracing the source of contamination in environmental matrices (air, soil, water, sediments, or woods) using multiple mathematical and statistical tools to analyze the distribution of individual compounds. PAHs represent one of the main constituents of creosote mixtures, and creosote sources exhibit a characteristic profile. The use of an extended PAH analytical suite (parent and alkylated PAHs, for a total of 44 compounds) is strongly recommended to provide a larger coverage of patterns based on source characteristics (Boehm and Farrington, 1984). PAH concentrations of composite timber piling samples were validated and subjected to statistical analysis to compare profiles to known creosote reference samples. Results and data analysis are reported below.

3.1 PAH Concentrations in Site Pilings

PAHs were generally not detected in timber piles samples, and when detected, the concentrations were below 1 milligram per kilogram (mg/kg), as showed in Table K-3. Composite samples collected in Area 01 through Area 04 show similar PAH compositions with very few detected compounds, including alkylated naphthalene and phenanthrenes/anthracenes (Table K-3, Figure K-3). Concentrations of PAHs were relatively higher and were detected at a higher frequency in the sample collected in Area 05 (BH-PS-COMP-05).

3.2 Multivariate Data Analysis

Literature reference profiles including parent and alkylated PAHs characteristic of creosote samples with different degrees of weathering (Brenner et al., 2002) show variability due to the progressive decay of PAHs in creosote-treated pilings[1] (Figure K-4). PAHs in Site pilings were compared to reference creosote profiles.

Overall, PAH concentrations in Site pilings are consistently lower than reference creosote profiles, which range up to 20 ppm (Figures K-3 and K-4). Principal component analysis (PCA) performed to evaluate correlation between the Site and the reference creosote dataset showed that samples cluster separately (Figure K-5). The two principal components (PC) considered in the analysis represent more than 90% of the variances among the datasets: 64.6% for PC1 and 27.2% for PC2. The PAH contributing to the principal components are a mix of alkylated and parent homologues. The major contributors are C3-Naphthalene (N3) and C1-Chrysene (BC1), Fluorene (F0), Pyrene (PY0), and Fluoranthene (FL0).

The PCA showed that the relative distance between the Site pilings and reference creosote samples indicates little to no correlation between datasets, and the two identified PCs captured more than 90% of the variability for the whole dataset.

3.3 Comparison of Site Pilings and Reference Creosote PAH Profiles

Variances among PAH profiles of Site piling samples and reference creosote samples were compared using the hypothesis test. A hypothesis test assesses the validity of two hypotheses:

1. The null hypothesis, H0: PAH profiles of Site pilings and reference creosote samples are similar.
2. The alternative hypothesis, H1: PAH profiles of Site pilings and reference creosote samples are different.

The plausibility of H0 to be true is measured by the p-value, with smaller p-values indicating stronger evidence against H0.

A non-parametric hypothesis test was used to compare PAH profiles of Site pilings and reference creosote samples. The null hypothesis tested was that there were no differences among the two sample groups (Site pilings and reference creosote samples). The test results (p-value = 0.012)

[1] Profiles of weathered creosote showed decrease in the relative abundance of lower-molecular weight PAHs, which are characterized by a shorter half-life.

showed that the null hypothesis can be rejected with 98.8% confidence. The hypothesis test confirmed that differences among datasets were statistically significant. A summary of the test results is provided in Table K-4.

4. SUMMARY OF FINDINGS

Timber pilings at the Site are distributed along the northern shoreline and in the Mill Pond. The distribution and structure of timber pilings varies, and most timber pilings are located in few areas including the eastern shore of the former Mill Pond and the shoreline in front of the powerhouse. Degree of weathering of timber pilings and exposure above mudline also differed based on elevation and presumed age of the pilings.

Pile scrape samples were collected from five sampling areas including four shoreline areas (located in the Mill Pond) and one submerged area within the Mill Pond. Sample analyses showed that (i) PAH concentrations in Site pilings were considerably lower than creosote reference samples, (ii) profiles did not resemble creosote signatures, and (iii) differences between datasets were statistically significant (98.8% confidence level). Based on these findings, pilings at the Site were likely not treated with creosote.

5. REFERENCES

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TABLES

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Table K-1 Coordinates of Piling Fields Photographs

Area of Investigation	Location ID	Direction of Photographs	Easting (feet)	Northing (feet)
Inner Harbor	BH_PILEFIELD_01i	W	1225387	222087
Inner Harbor	BH_PILEFIELD_01j	N	1225408	222083
Inner Harbor	BH_PILEFIELD_01h	W	1225395	222104
Inner Harbor	BH_PILEFIELD_01g	W	1225403	222120
Inner Harbor	BH_PILEFIELD_01f	W	1225469	222120
Inner Harbor	BH_PILEFIELD_01e	W	1225409	222133
Inner Harbor	BH_PILEFIELD_01d	S	1225459	222161
Inner Harbor	BH_PILEFIELD_01c	S	1225422	222171
Inner Harbor	BH_PILEFIELD_01b	E	1225369	222146
Inner Harbor	BH_PILEFIELD_01a	E	1225367	222135
Inner Harbor	BH_PILEFIELD_02d	N	1225420	222198
Inner Harbor	BH_PILEFIELD_02c	E	1225420	222198
Inner Harbor	BH_PILEFIELD_02b	E	1225402	222190
Inner Harbor	BH_PILEFIELD_02a	E	1225390	222183
Inner Harbor	BH_PILEFIELD_02e	E	1225442	222218
Inner Harbor	BH_PILEFIELD_02f	N	1225453	222224
Inner Harbor	BH_PILEFIELD_02g	E	1225491	222229
Inner Harbor	BH_PILEFIELD_02h	E	1225536	222233
Inner Harbor	BH_PILEFIELD_02i	E	1225609	222241
Inner Harbor	BH_PILEFIELD_02k	S	1225609	222241
Inner Harbor	BH_PILEFIELD_02j	W	1225609	222241
Inner Harbor	BH_PILEFIELD_02l	E	1225676	222223
Mill Pond	BH_PILEFIELD_03a	E	1225088	222191
Mill Pond	BH_PILEFIELD_03b	E	1225089	222192
Mill Pond	BH_PILEFIELD_03c	N	1225088	222191
Mill Pond	BH_PILEFIELD_04i	N	1225248	222337
Mill Pond	BH_PILEFIELD_04i	S	1225233	222350
Mill Pond	BH_PILEFIELD_04g	E	1225203	222429
Mill Pond	BH_PILEFIELD_04h	W	1225203	222429
Mill Pond	BH_PILEFIELD_04f	S	1225198	222526
Mill Pond	BH_PILEFIELD_04e	E	1225070	222491
Mill Pond	BH_PILEFIELD_04a	W	1225134	222446
Mill Pond	BH_PILEFIELD_04a	E	1225134	222446
Mill Pond	BH_PILEFIELD_04a	N	1225134	222446
Mill Pond	BH_PILEFIELD_04b	N	1225134	222446

Notes:
1. Location IDs correspond to locations where pile fields were observed and photographs were taken.
2. Multiple photographs were taken at given locations by varying the direction of view.
3. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum.

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Table K-2: Field Observations of Sampled Pilings

Area of Investigation	Location ID	Sample ID	Date Sampled	Confirmed Coordinates SPC North (ft)		Sample Elevation NAVD88 (ft)	Sample height above mudline	Mudline Elevation	Wood Scrape Depth Sampled	Mass Collected	Description
				Easting	Northing		ft MLLW	ft MLLW	cm	g	
Mill Pond	BH-PS-01	BH-PS-01-01	9/1/2021	1225193	222118	7.5	0.4	--	3	30	Yellow, brown, and black wood chips. Organic, sulfide-like odor. Pile standing 1 ft AML, covered by shells and organic slimy film.
Mill Pond	BH-PS-01	BH-PS-01-02	9/1/2021	1225178	222156	6.4	0.4	--	3	15	Clear yellow wood chips. Organic odor. Pile standing ~2.5 ft AML, highly decomposed, covered by shells and organic material.
Mill Pond	BH-PS-01	BH-PS-01-03	9/1/2021	1225143	222180	8.3	1	--	3.5	15	Clear yellow wood chips. Organic, sulfide-like odor. Pile standing ~3 ft AML, decomposed, covered by shells and organic material.
Mill Pond	BH-PS-01	BH-PS-01-04	9/1/2021	1225214	222325	8.9	1	--	3	15	Clear yellow, brown wood chips. Organic odor. Pile standing ~3.5-4 ft AML, partially covered by shells and organic material.
Mill Pond	BH-PS-01	BH-PS-01-05	9/1/2021	1225191	222532	6.4	2	--	3.5	10	Clear yellow, brown wood chips. Strong organic odor. Pile standing ~4-5 ft AML, partially covered by organic material.
Mill Pond Composite Sample	BH-PS-01	BH-PS-01-COMP	9/1/2021	1225183	222296	--	--	6.12	--	40	--
Power House Area Inner Harbor Shoreline	BH-PS-02	BH-PS-02-01	9/1/2021	1225375	222106	6.2	1	--	3.5	20	Yellow/brown wood chips. Organic odor. Pile standing 2/3 ft AML, covered by shells and organic film.
Power House Area Inner Harbor Shoreline	BH-PS-02	BH-PS-02-02	9/1/2021	1225377	222129	7	1	--	3.5	10	Clear, gray, and black wood chips. Organic, sulfide-like odor. Pile standing ~3 ft AML, partially black in color.
Power House Area Inner Harbor Shoreline	BH-PS-02	BH-PS-02-03	9/1/2021	1225389	222148	5.3	1	--	2	10	Clear, gray, and black wood chips. Organic odor. Pile standing ~2 ft AML, covered by organic film.
Power House Area Inner Harbor Shoreline	BH-PS-02	BH-PS-02-04	9/2/2021	1225408	222163	3.9	1	--	1	10	Clear wood chips. Pile standing ~2 ft AML, partially covered by organic film. Sample collection interrupted due to low battery and completed next day.
Power House Area Inner Harbor Shoreline	BH-PS-02	BH-PS-02-05	9/2/2021	1225458	222198	4.1	0.5	--	2.5	30	Clear wood chips. Organic, sulfide-like odor. Pile standing ~5 ft AML, covered by barnacles and organic material.
Power House Area Inner Harbor Shoreline Composite Sample	BH-PS-02	BH-PS-02-COMP	9/2/2021	1225405	222149	--	--	7.66	--	40	--
Northwest Area Inner Harbor Shoreline	BH-PS-03	BH-PS-03-01	9/2/2021	1225571	222225	6.9	1	--	1.5	10	Clear yellow/brown wood chips. Strong organic odor. Pile standing ~3 ft AML, partially covered by shells (bottom half).
Northwest Area Inner Harbor Shoreline	BH-PS-03	BH-PS-02-02	9/2/2021	1225624	222215	6.3	1	--	2	10	Clear yellow wood chips. Organic odor. Pile standing ≥2 ft AML, partially covered by shells (bottom half).
Northwest Area Inner Harbor Shoreline	BH-PS-03	BH-PS-03-03	9/2/2021	1225681	222217	7.1	0.5	--	1.5	10	Clear yellow/gray-ish wood chips. Pile standing >4 ft AML, partially covered by shells (bottom half).
Northwest Area Inner Harbor Shoreline	BH-PS-03	BH-PS-03-04	9/2/2021	1225727	222221	5.9	0.5	--	1.5	10	Clear brown wood chips. Organic odor. Pile standing ~2 ft AML, partially covered by shells (bottom half).
Northwest Area Inner Harbor Shoreline	BH-PS-03	BH-PS-03-05	9/2/2021	1225647	222210	5.9	0.5	--	2	10	Clear yellow/gray-ish wood chips. Organic odor. Pile standing ~2 ft AML, partially covered by shells (bottom half).
Northwest Area Inner Harbor Shoreline Composite Sample	BH-PS-03	BH-PS-03-COMP	9/2/2021	1225642	222217	--	--	8.88	--	40	--
Northeast Area Inner Harbor Shoreline	BH-PS-04	BH-PS-04-01	9/2/2021	1225780	222231	7.1	1	--	1.5	10	Clear yellow/brown wood shaves and dust. Organic odor. Pile standing ~3 ft AML, weathered and partially covered by shells.
Northeast Area Inner Harbor Shoreline	BH-PS-04	BH-PS-04-02	9/2/2021	1225807	222249	6.3	0.5	--	1.5	10	Clear yellow/brown wood shaves and dust. Organic odor. Pile standing ~2 ft AML, weathered and covered by few shells.
Northeast Area Inner Harbor Shoreline	BH-PS-04	BH-PS-04-03	9/2/2021	1225831	222255	7.5	0.5	--	1	10	Clear yellow/brown wood dust. Organic odor. Pile standing ~2 ft AML, weathered and covered by few shells.
Northeast Area Inner Harbor Shoreline	BH-PS-04	BH-PS-04-04	9/2/2021	1225913	222275	10.3	1	--	1	10	Clear yellow/brown/red-ish wood shaves and dust. Organic odor. Pile standing ~4 ft AML (0.5 feet submerged in water), very weathered and covered by few shells and likely white-rot fungi.
Northeast Area Inner Harbor Shoreline	BH-PS-04	BH-PS-04-05	9/2/2021	1225940	222273	9.6	1	--	0.75	--	Clear yellow/brown/red-ish wood shaves and dust. Organic odor. Pile standing ~3 ft AML (4 inches submerged in water), covered by few shells (10%). Very poor recovery.

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Table K-2: Field Observations of Sampled Pilings

Area of Investigation	Location ID	Sample ID	Date Sampled	Confirmed Coordinates SPC North (ft)		Sample Elevation NAVD88 (ft)	Sample height above mudline	Mudline Elevation	Wood Scrape Depth Sampled	Mass Collected	Description
				Easting	Northing		ft MLLW	ft MLLW	cm	g	
Northeast Area Inner Harbor Shoreline Composite Sample	BH-PS-04	BH-PS-04-COMP	9/2/2021	1225857	222256	--	--	7.95	--	40	--
Inner Harbor	BH-PS-05	BH-PS-05-01	9/3/2021	1225602	222123	--	--	--	3	--	Brown/black wood fragments. Pile was 3 inches AML, weathered, covered in organic debris.
Inner Harbor	BH-PS-05	BH-PS-05-02	9/3/2021	1225601	222115	--	--	--	3	--	Brown/black wood fragments. Pile was 4 inches AML, weathered, covered in organic debris and barnacles.
Inner Harbor	BH-PS-05	BH-PS-05-03	9/3/2021	1225613	222084	--	--	--	3	--	Black wood fragments. Pile was 10 inches AML (14 inches diameter), weathered, covered in organic material and barnacles.
Inner Harbor	BH-PS-05	BH-PS-05-04	9/3/2021	1225613	222084	--	--	--	3	--	Black wood fragments. Pile was 15 inches AML (14 inches diameter), weathered, covered in organic material and barnacles.
Inner Harbor Composite Sample	BH-PS-05	BH-PS-05-COMP	9/3/2021	1225606	222107	--	--	-0.63	--	40	--

Notes

1. Vertical elevation estimated from the DGPS unit to confirm NAVD88 datum
2. Sample height above mudline resumed by pictures, account 0.5 ft error margin
3. Discrete samples BH-PS-04-04 and -05 were collected ~0.5 feet above water level as the pile was partially submerged at the time of sampling (about 0.5 feet submerged)
4. Discrete sample BH-PS-04-05 was not collected for archive due to low mass of material retrieved
5. One unique set of coordinate was collected between discrete sample locations BH-PS-05-03 and -04
6. The reported mass collected does not include the 10g collected for each composite sample
7. Coordinates of centroids of discrete samples are reported for pile sample composites.

Acronyms

AML = above mudline
BH = Blakely Harbor
cm = centimeter
COMP = Composite
ft = feet
g = gram
ID = Identification
PS = Pile Scrape

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Table K-3 Summary of Analytical Results

Location ID		BH-PS-01	BH-PS-02	BH-PS-02	BH-PS-03	BH-PS-04	BH-PS-05
Sample ID		BH-PS-01-COMP	BH-PS-02-COMP	BH-PS-02-COMP-DUP	BH-PS-03-COMP	BH-PS-04-COMP	BH-PS-05-COMP
Date collected		9/1/2021	9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/3/2021
Analytes	**Abbreviation**						
Polycyclic aromatic hydrocarbons in mg/kg							
Naphthalene	N0	0.011 U	0.012 U	0.011 U	0.043	0.012 U	0.028 U
C1-Naphthalenes	N1	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
C2-Naphthalenes	N2	0.295	0.17	0.16	0.046	0.127	0.137
C3-Naphthalenes	N3	0.014	0.02	0.024	0.013	0.016	0.028
C4-Naphthalenes	N4	0.016	0.017	0.023	0.012 U	0.016	0.028 U
Acenaphthylene	AY	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Acenaphthene	AE	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Biphenyl	B	0.011 UJ	0.012 UJ	0.011 UJ	0.012 UJ	0.012 UJ	0.028 UJ
Fluorene	F0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
C1-Fluorenes	F1	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
C2-Fluorenes	F2	0.011 U	0.012 UJ	0.019 J	0.012 U	0.012 U	0.028 U
C3-Fluorenes	F3	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.204
Dibenzofuran	DF	0.011 UJ	0.012 UJ	0.011 UJ	0.012 UJ	0.012 UJ	0.028 UJ
Anthracene	A0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Phenanthrene	P0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.038
C1-Phenanthrenes/Anthracenes	PA1	0.036	0.014	0.021	0.036	0.012 U	0.114
C2-Phenanthrenes/Anthracenes	PA2	0.046	0.036	0.073	0.035	0.094	0.255
C3-Phenanthrenes/Anthracenes	PA3	0.011 U	0.012 UJ	0.073 J	0.012 U	0.012 U	0.071
C4-Phenanthrenes/Anthracenes	PA4	0.011 U	0.012 UJ	0.023 J	0.015	0.012 U	0.037
Dibenzothiophene	DBT0	0.011 UJ	0.012 UJ	0.011 UJ	0.012 UJ	0.012 UJ	0.028 UJ
C1-Dibenzothiophenes	DBT1	0.011 UJ	0.012 UJ	0.011 UJ	0.012 UJ	0.012 UJ	0.028 UJ
C2-Dibenzothiophenes	DBT2	0.011 UJ	0.013 J	0.016 J	0.012 UJ	0.012 UJ	0.028 UJ
C3-Dibenzothiophenes	DBT3	0.011 UJ	0.012 UJ	0.016 J	0.012 UJ	0.012 UJ	0.028 UJ
C4-Dibenzothiophenes	DBT4	0.011 UJ	0.012 UJ	0.095 J	0.012 UJ	0.012 UJ	0.028 UJ
Fluoranthene	FL0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.05
C1-Fluoranthenes/Pyrenes	FP1	0.011 U	0.049	0.043	0.076	0.031	0.079
C2-Fluoranthenes/Pyrenes	FP2	0.011 U	0.014	0.016	0.019	0.012 U	0.028 U
C3-Fluoranthenes/Pyrenes	FP3	0.011 U	0.021	0.022	0.02	0.012 U	0.038
C4-Fluoranthenes/Pyrenes	FP4	0.011 U	0.02	0.025	0.012 U	0.012 U	0.041
Pyrene	PY0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.056
Benz(a)anthracene	BA0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Chrysene	C0	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.034
C1-Chrysenes	BC1	0.011 U	0.012 UJ	0.015 J	0.012 U	0.012 U	0.028 U
C2-Chrysenes	BC2	0.011 U	0.019	0.02	0.012 U	0.012 U	0.04
C3-Chrysenes	BC3	0.011 U	0.05 J	0.011 UJ	0.012 U	0.012 U	0.028 U
C4-Chrysenes	BC4	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Benzo(b)fluoranthene	BBF	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Benzo(j+k)fluoranthene	BJKF	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Benzo[a]pyrene	BAP	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.029
Benzo[e]pyrene	BEP	0.011 UJ	0.012 UJ	0.011 UJ	0.012 UJ	0.012 UJ	0.028 UJ
Perylene	PER	0.011 UJ	0.012 UJ	0.011 UJ	0.012 UJ	0.012 UJ	0.028 UJ
Benzo(g,h,i)perylene	GHI	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Indeno(1,2,3-cd)pyrene	IND	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U
Dibenz[a,h]anthracene	DA	0.011 U	0.012 U	0.011 U	0.012 U	0.012 U	0.028 U

Acronyms:

J = The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

MDL = method detection limit

mg/kg = milligram per kilogram

RL = reporting limit

U = The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ = The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

Table K-4 Summary of Hypothesis Test Results

	Degree of Freedom	Sum of Squares	R^2
Minimum	1	0.4927	0.2248
1st Quartile	4	1.0957	0.5
Median	7	1.6987	0.7752
Mean	5.3	1.4609	0.6667
3rd Quartile	7.5	1.9451	0.8876
Maximum	8	2.1914	1
Overall Statistics	**F statistic: 24.13** **p-value: 0.012**		

Notes:
Non-parametric analysis of variances was performed using the function adonis in the R package vegan. The input dataset included PAH concentrations for the timber piling and the reference creosote samples grouped by "on Site" or "Reference Creosote". The function input for the null hypothesis was that the distances from centroid of variances are linearly depending on the grouping. The null hypothesis of the test is that there is no difference between groups. The R square shows that most of the variability is explained by the input function from the median on (values > 70%). The p-value of 0.012 indicates that the null hypothesis can be rejected with a 99.8% confidence.

FIGURES

DRAFT



Legend

- Approximate Extent of Pile Field
- Photo Location and Direction
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019
- Approximate Extent of Large Wood Debris
- Bainbridge Island Parks (BI Parks) Parcel Boundary

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Contour (5 foot MLLW)

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.
4. Photographs are reported in Attachment 3 - Pile Field Photolog

N

0 50 Feet

Piling Fields 01, 02, and 03
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

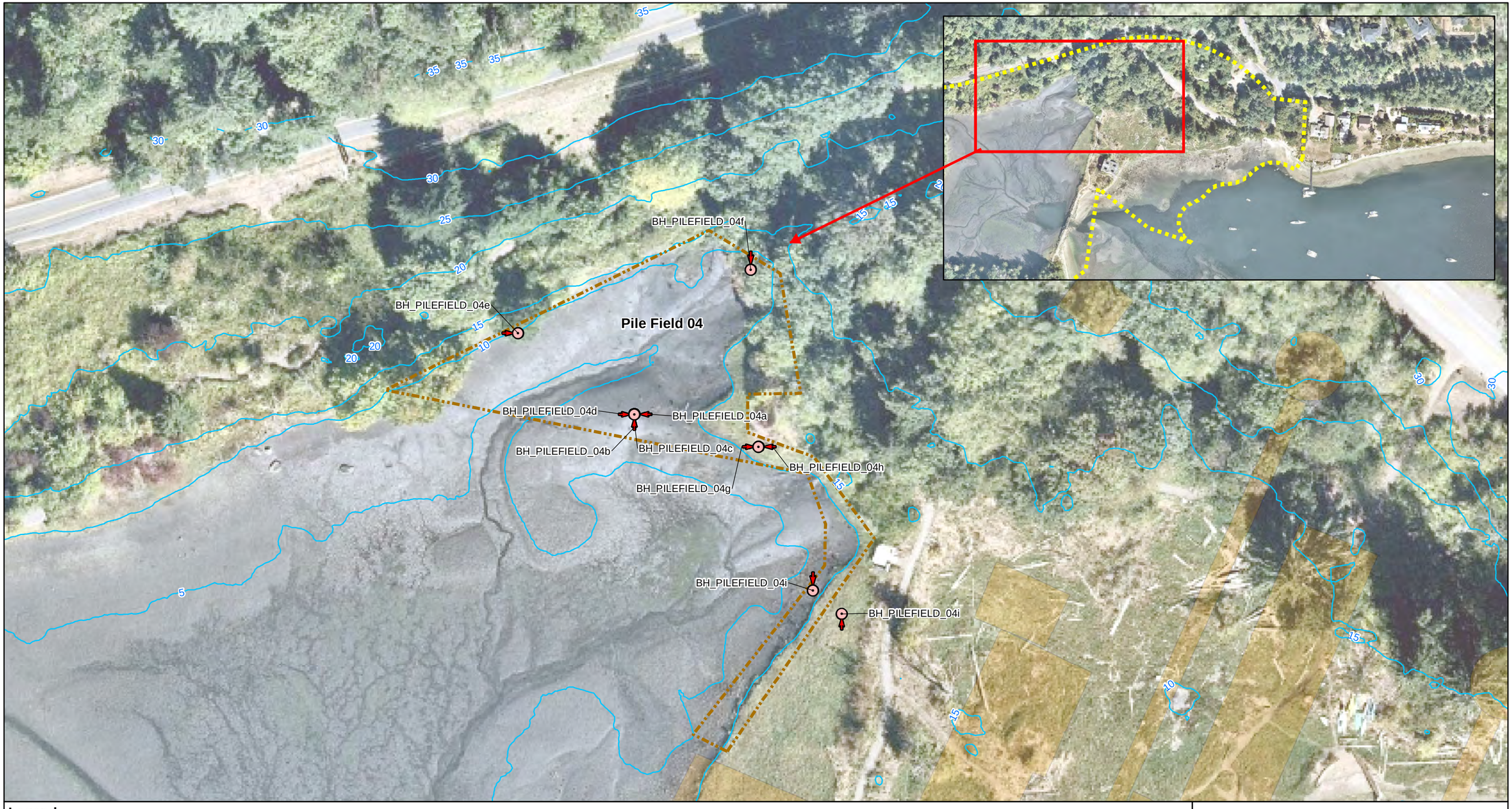
Geosyntec consultants

MVI/Sea | October 2023

Figure K-1a

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix H\Figure H-1a Pile Fields.mxd 10/9/2023 12:12:16 PM

DRAFT



Legend

- Approximate Extent of Pile Field
- Photo Location and Direction

Survey Control Points

- AGO Land Surveying (Aug. 2021)
- WDOT (Jan. 2013)
- Contour (5 foot MLLW)
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019
- Approximate Extent of Large Wood Debris
- Bainbridge Island Parks (BI Parks) Parcel Boundary

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.
4. Photographs are reported in Attachment 3 - Pile Field Photolog

N

0 50 Feet

Piling Field 04
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

MVI/Sea | October 2023

Figure K-1b

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix H\Figure H-1b Pile Fields.mxd 10/9/2023 12:13:15 PM

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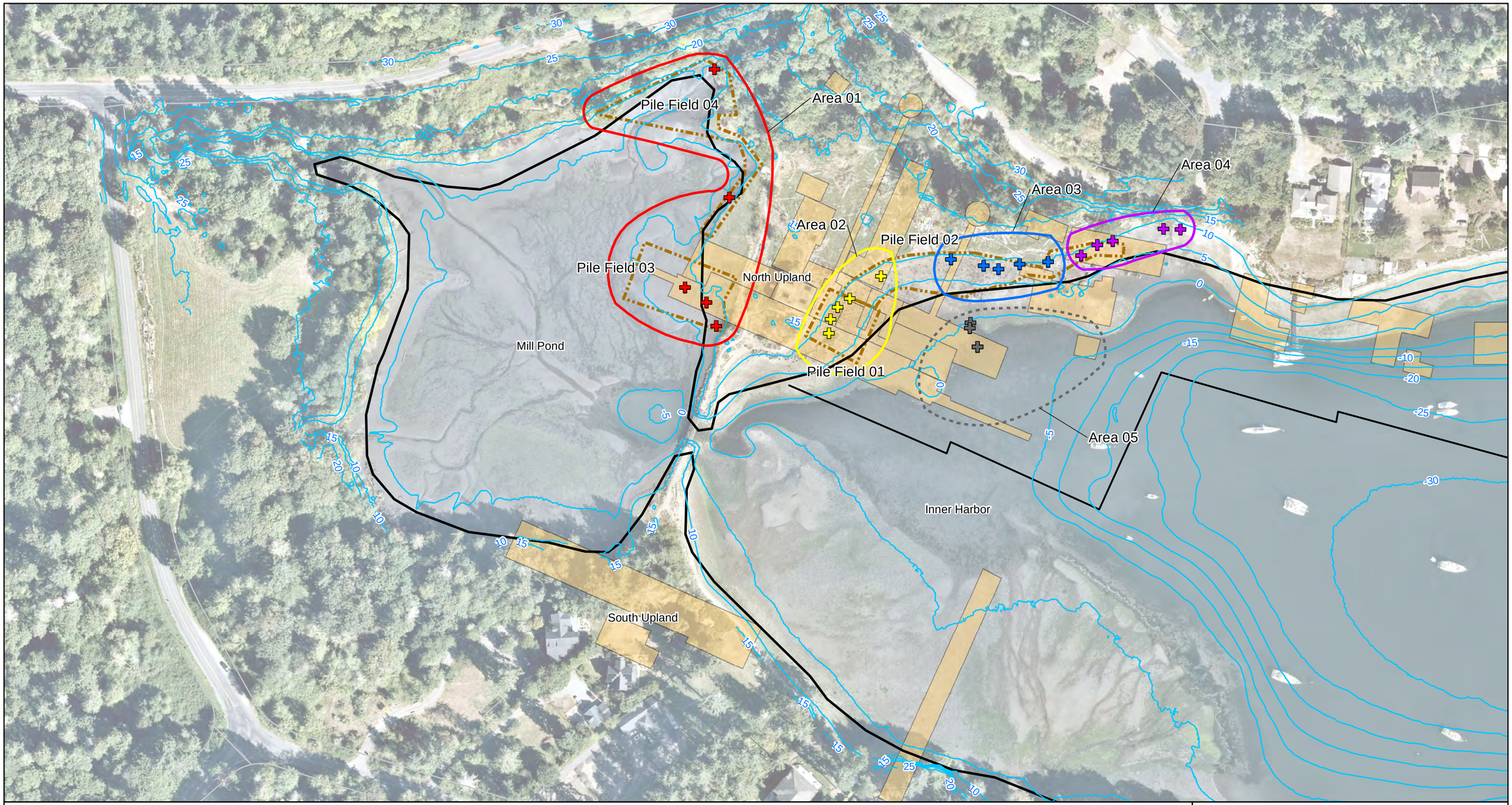

Legend

Pile Scrape Sample Location

- Area 01
- Area 02
- Area 03
- Area 04
- Area 05
- Approximate Extent of Pile Field

- Pile Area 01
- Pile Area 02
- Pile Area 03
- Pile Area 04
- Pile Area 05 (inferred footprint due to limited field observations collected by divers)
- Shoreline

- Contour (5 foot MLLW)
- Historical Wharf Structure
- Road
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Locations of historical buildings are approximate.
2. Shoreline boundary provided by Washington State Department of Natural Resources.
3. Elevation data from David Evans and Associates, 2020.

N

0 150 Feet

Pile Survey Sampling Locations

Remedial Investigation Report
Appendix H
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

Figure K-2

MVI/Sea | October 2023

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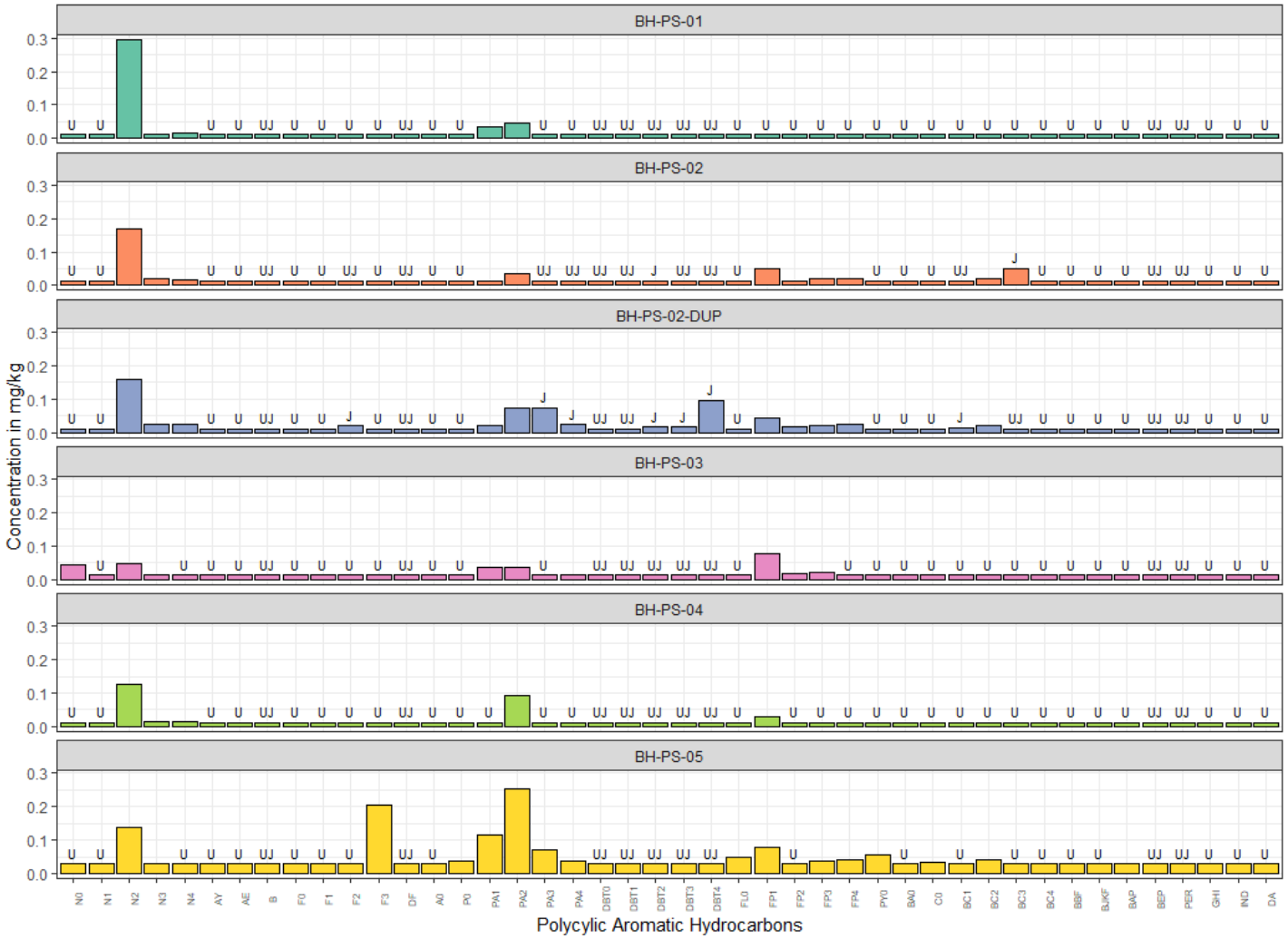


Notes:

1. Histograms shown concentration of alkylated and parent PAHs in five-point composite samples.
2. Result qualifiers are shown for each analyte: U indicates the analyte was not detected and the RL is reported; UJ indicates the analyte was not detected above the MDL and the value reported is an estimate; J indicates the analyte was detected above the MDL but below the respective RL and the value reported is an estimate.

Acronyms: MDL = method detection limit; mg/kg = milligrams per kilogram; PAHs = polycyclic aromatic hydrocarbons; RL = reporting limit

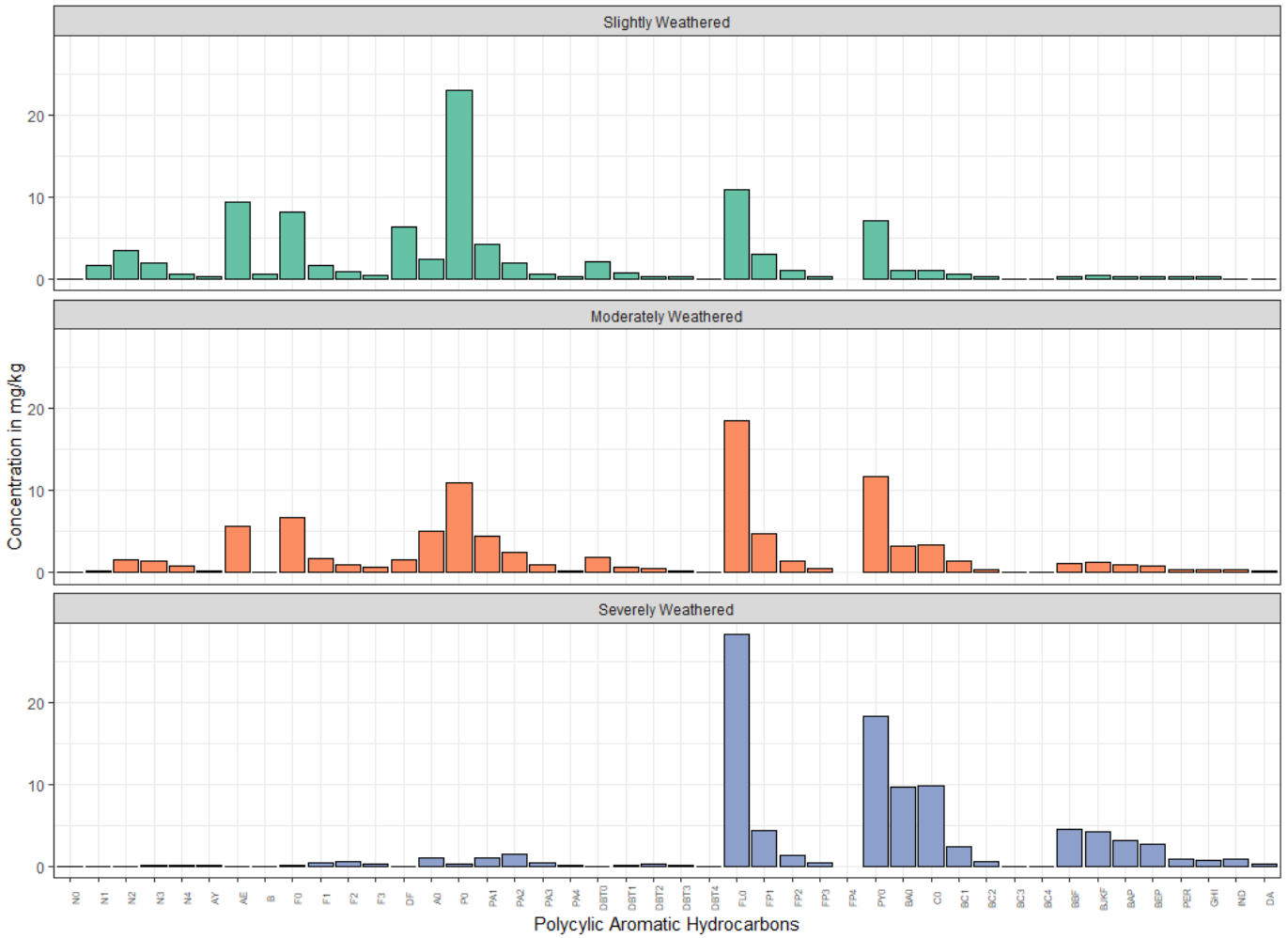
PAH Distributions in Site Pilings
Remedial Investigation Report
Blakely Harbor Park Site Bainbridge Island, WA

Geosyntec consultants

Figure **K-3**

GP/Sea | September 2023

P:\Projects\Blakely Harbor\PNG0900 (PI Blakely)\500 Technical Analyses\PAH in Timber Pilings\Figures for RI Appendix



Notes:
Histograms shown concentration of alkylated and parent PAHs in creosote reference samples reported in literature by Brenner et al., 2002.
Brenner, R.C., Magar, V.S., Ickes, J.A., Abbott, J.E., Stout, S.A., Crecelius, E.A. and Bingler, L.S., 2002. Characterization and fate of PAH-contaminated sediments at the Wyckoff/Eagle Harbor Superfund Site. Environmental science & technology, 36(12), pp.2605-2613.

Acronyms: mg/kg = milligrams per kilogram; PAHs = polycyclic aromatic hydrocarbons

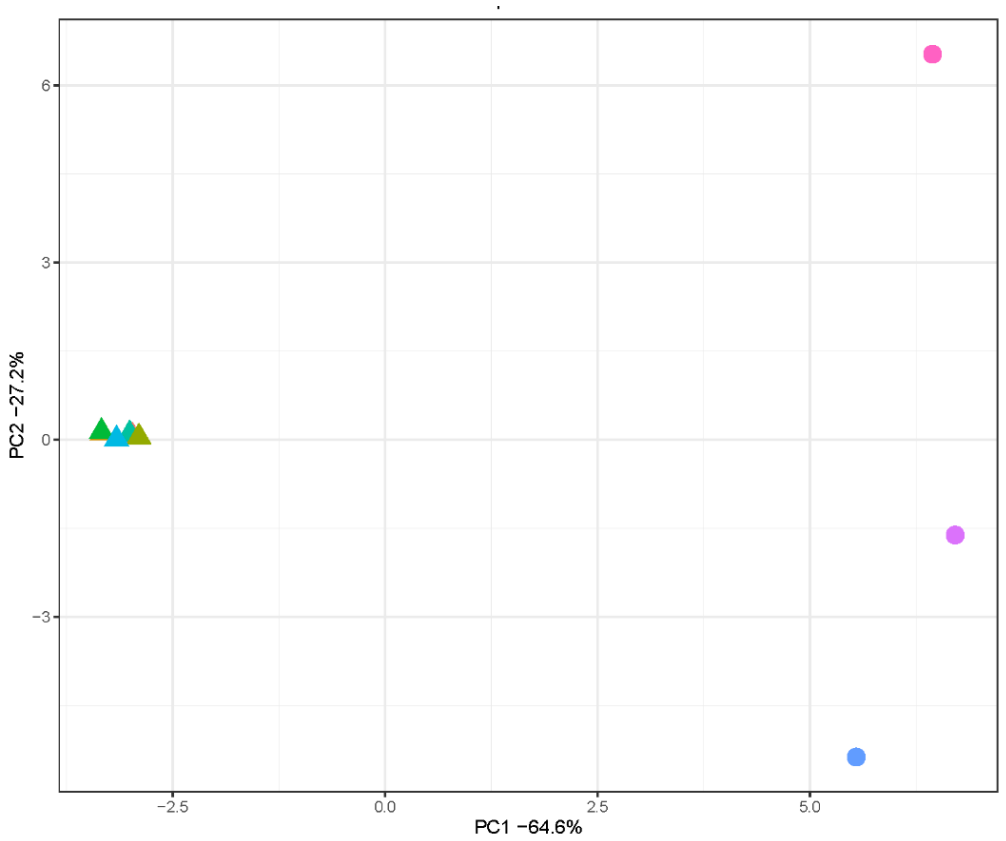
PAH Distributions in Creosote Reference Samples
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

Figure
K-4

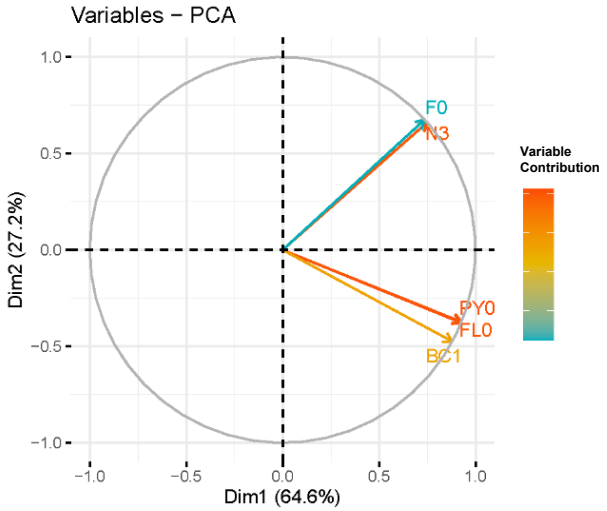
GP/Sea	September 2023

P:\Projects\Blakely Harbor\PN60900 (PI Blakely)\500 Technical Analyses\PAH in Timber Pilings\Figures for RI Appendix



Group
- Creosote Reference
- On Site Piling

Sample_ID
- Area 01
- Area 02
- Area 02 (duplicate)
- Area 03
- Area 04
- Area 05
- Slightly Weathered Creosote Reference
- Moderately Weathered Creosote Reference
- Severely Weathered Creosote Reference



Notes:
1. The left plot shown results of the principal component analysis (pca) performed using the R package prcomp. The principal components (PCs) showed represent more than 90% of the variances among datasets, respectively 64.6% for PC1 and 27.2% for PC2.
2. The right plot shown the variable (PAHs) contribution to the PCs. PAH contributing to the PCs are a mix of alkylated and parental compounds. The major contributors are C3-Naphthalene (N3) and C1-Chrysene (BC1), Fluorene (F0), Pyrene (PY0) and Fluoranthene (FL0).

Principal Component Analysis
Remedial Investigation Report
Blakely Harbor Park Site
Bainbridge Island, WA

Geosyntec consultants

Figure **K-5**

GP/Sea	September 2023

P:\Projects\Blakely Harbor\PNG0900 (PI Blakely)\500 Technical Analyses\PAH in Timber Pilings\Figures for RI Appendix

ATTACHMENT K-1
Photograph Log of Piling Fields

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_01a

Date: 8/20/2021 1:53 PM

Direction: East

Comments:
Wood piling field located directly east of former powerhouse. Pilings 16 to 18 inches in diameter at base and approximately 24 to 30 inches in height (height decreases as proceeding east at lower elevation, greater water depth). Pilings are densely spaced, and some pilings are visibly burned.



BH_PILEFIELD_01b

Date: 8/20/2021 1:52 PM

Direction: East

Comments:
Same piling field as shown in BH_PILEFIELD_01a. Pilings appear to be organized into rows oriented east/west. Additional pilings appear to have been driven in-between, creating a denser pattern. None of the pilings have observable odor or staining.



GEOSYNTEC CONSULTANTS Photographic Record – Piling Fields	Geosyntec consultants
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_01c	
Date: 8/21/2021 12:09 PM	
Direction: South	
Comments: Same piling field as shown in BH_PILEFIELD_01a. Transition between taller pilings and pilings that are broken off closer to sediment surface (approximately 12 inches or less).	

BH_PILEFIELD_01d	
Date: 8/20/2021 7:37 AM	
Direction: South	
Comments: Similar perspective of piling field as shown in BH_PILEFIELD_01c.	

GEOSYNTEC CONSULTANTS Photographic Record – Piling Fields	Geosyntec consultants
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_01e **Date: 8/20/2021 1:50 PM** **Direction: West** **Comments:** Piling field as shown in BH_PILEFIELD_01a, looking west.	
BH_PILEFIELD_01f **Date: 8/20/2021 10:37 AM** **Direction: West** **Comments:** Piling field as shown in BH_PILEFIELD_01a, looking west. Photo taken further away from the former powerhouse to show broader field of view.	

GEOSYNTEC CONSULTANTS Photographic Record – Piling Fields	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_01g **Date: 8/20/2021 1:50 PM** **Direction: West** **Comments:** Piling field as shown in BH_PILEFIELD_01a, looking west.	
BH_PILEFIELD_01h **Date: 8/20/2021 1:49 PM** **Direction: West** **Comments:** Piling field as shown in BH_PILEFIELD_01a, looking west.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_01i	
Date: 8/20/2021 1:48 PM	
Direction: West	
Comments: Piling field as shown in BH_PILEFIELD_01a, looking west.	

BH_PILEFIELD_01j	
Date: 8/21/2021 12:11 PM	
Direction: North	
Comments: Piling field as shown in BH_PILEFIELD_01a, looking north. This photo shows area further east where pilings are broken closer to sediment surface (<12 inches on average).	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_02a	
Date: 8/21/2021 8:06 AM	
Direction: East	
Comments: Piling field that extends directly to north of PILINGFIELD_01. In this area, pilings are generally taller (2.5 to 5 feet) and spaced further apart (approximately 10 to 15 feet apart). Pilings are oriented in rows extending east to west along northern shoreline. Pilings do decrease in height with elevation.	

BH_PILEFIELD_02b	
Date: 8/21/2021 8:07 AM	
Direction: East	
Comments: Piling field as shown in BH_PILEFIELD_02a, looking west. In the foreground, around base of piling, a small area of sawdust was observed under sand/gravel beach substrate. Scattered brick fragments and slag observed throughout this area.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_02c	
Date: 8/21/2021 8:09 AM	
Direction: East	
Comments: Piling field as shown in BH_PILEFIELD_02a. This row is located further north, looking west. Taller pilings in the distance. Brick fragments in the foreground.	

BH_PILEFIELD_02d	
Date: 8/21/2021 8:09 AM	
Direction: East	
Comments: Piling field as shown in BH_PILEFIELD_02c. Taller pilings in the distance. Brick fragments and boulder-sized slag in the foreground.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_02e	
Date: 8/21/2021 8:10 AM	
Direction: East	
Comments: Linear rows of pilings within BH_PILEFIELD_02. Height of pilings decreases with increasing water depth (decreasing elevation).	

BH_PILEFIELD_02f	
Date: 8/21/2021 8:11 AM	
Direction: East	
Comments: BH_PILEFIELD_02 looking east from north edge of beach.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_02g **Date: 8/21/2021 8:12 AM** **Direction: East** **Comments:** View looking east from the north edge of the beach along the northern shoreline. Intermittent pockets of sawdust and ash/charcoal in foreground.	
BH_PILEFIELD_02h **Date: 8/21/2021 8:13 AM** **Direction: East** **Comments:** BH_PILEFIELD_02 Looking east from the north edge of the beach.	

GEOSYNTEC CONSULTANTS Photographic Record – Piling Fields	
Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_02i **Date: 8/20/2021 9:58 AM** **Direction: East** **Comments:** BH_PILEFIELD_02 looking east from the north edge of the beach.	

BH_PILEFIELD_02j **Date: 8/20/2021 9:59 AM** **Direction: South** **Comments:** BH_PILEFIELD_02 looking south. Wood planking in center of photo. Scattered bricks, cobble sized slag, and intermittent sawdust.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_02k	
Date: 8/20/2021 9:59 AM	
Direction: West	
Comments: BH_PILEFIELD_02 looking west toward former powerhouse.	

BH_PILEFIELD_02l	
Date: 8/21/2021 8:18 AM	
Direction: East	
Comments: BH_PILEFIELD_02 looking east from north edge of beach.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_03a **Date: 8/20/2021 1:46 PM** **Direction: East** **Comments:** Piling field located west of former powerhouse in the Mill Pond. Pilings near shoreline approximately 12 to 24 inches in height. Height decreases quickly with decreasing elevation (increasing water depth). Many pilings are broken off close to mudline. Sediment substrate is very silty/clayey.	
BH_PILEFIELD_03b **Date: 8/20/2021 1:46 PM** **Direction: Northeast** **Comments:** BH_PILEFIELD_03 looking northeast. Pilings in this area are approximately 15 inches in diameter. Pilings are very weathered/rotted. No visual staining or odor.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_03c	
Date: 8/20/2021 1:46 PM	
Direction: North	
Comments: BH_PILEFIELD_03 looking northwest. Photo shows pilings broken close to mudline.	

BH_PILEFIELD_04a	
Date: 8/20/2021 2:23 PM	
Direction: East	
Comments: Sparse pilings located throughout this area. Pilings visually appear similar to BH_PILEFIELD _03.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_04b	
Date: 8/20/2021 2:23 PM	
Direction: North	
Comments: BH_PILEFIELD_04. In this area, some pilings are spaced approximately 10 to 15 feet apart. Some pilings are approximately 3 to 5 feet tall; some pilings are cut off at mudline. The tall pilings appear very weathered, and the pilings cut at mudline appear rotten and covered in barnacles.	

BH_PILEFIELD_04c	
Date: 8/20/2021 2:23 PM	
Direction: North	
Comments: BH_PILEFIELD_04, view looking northwest.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_04d	
Date: 8/20/2021 2:23 PM	
Direction: West	
Comments: BH_PILEFIELD_04, view looking west.	

BH_PILEFIELD_04e	
Date: 8/19/2021 1:16 PM	
Direction: North	
Comments: BH_PILEFIELD_04, view looking north from the northwest shore of the Mill Pond.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_04f	
Date: 8/19/2021 1:19 PM	
Direction: South	
Comments: BH_PILEFIELD_04, view looking south from the northern shoreline. Wood and brick debris in foreground.	

BH_PILEFIELD_04g	
Date: 8/19/2021 1:20 PM	
Direction: Southeast	
Comments: BH_PILEFIELD_04, view looking southeast from the northern shoreline.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

BH_PILEFIELD_04h	
Date: 8/19/2021 1:21 PM	
Direction: Southwest	
Comments: BH_PILEFIELD_04, view looking southwest from the northeast shore.	

BH_PILEFIELD_04i	
Date: 8/19/2021 1:22 PM	
Direction: North	
Comments: BH_PILEFIELD_04, view looking north from the northern shore of the Mill Pond.	

GEOSYNTEC CONSULTANTS
Photographic Record – Piling Fields

Geosyntec consultants

Client: Port Blakely Tree Farms	**Project Number: PNG0900/03/3.7A**
Site Name: Port Blakely Park Site	**Site Location: Bainbridge Island, WA**

P BH_PILEFIELD_04j

Date: 8/20/2021 2:05 PM

Direction: South

Comments:
BH_PILEFIELD_04, view looking south from the northern shore of the Mill Pond.



ATTACHMENT K-2
Photograph Log of Sampling

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Name: Blakely Harbor Park	**Project Number: PNG0900**
Purpose: Document Sampling Methods	**Site Location: Bainbridge Island, WA**

Title: Timber Pilings Extending on Shoreline

Date: 09/03/2021

Location: Northern Shoreline

Comments:
A view of northern shoreline (looking West). Timber piling are visible during the low tide cycle.

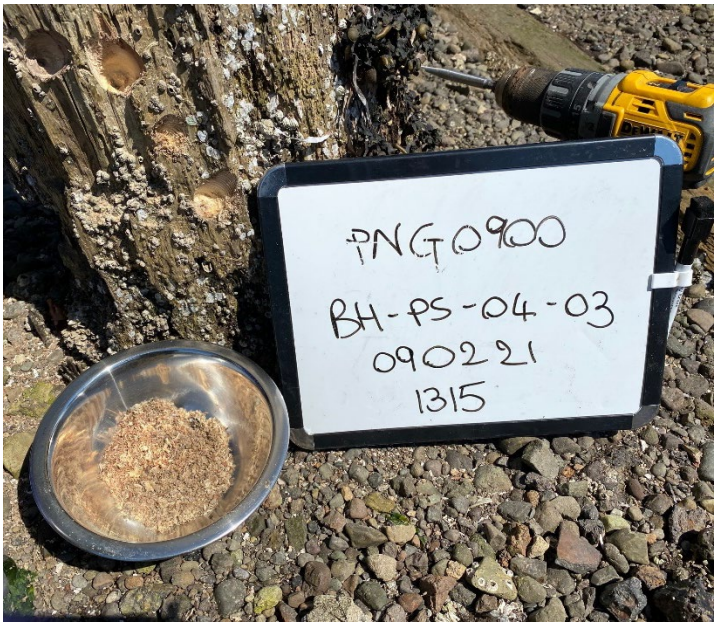


Title: Pile Scrape

Date: 09/03/2021

Location: PS-04

Comments:
Samples of timber piles were collected by using a power drill. The surface of the pilings was discarded to avoid cross contamination from atmospheric sources. Wood samples were submitted for analysis of polycyclic aromatic hydrocarbons and results were processed to evaluate if pilings were treated with creosote.



APPENDIX L
Asbestos Inspection and Sampling Report

Geosyntec consultants

engineers | scientists | innovators

APPENDIX L
ASBESTOS INSPECTION AND SAMPLING REPORT

DRAFT REMEDIAL INVESTIGATION REPORT

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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Attachment L-1 Limited Asbestos Survey and Soil Sampling for Asbestos

ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing materials
AO	Agreed Order
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
EHS	Environmental Hazards Service
EPA	United States Environmental Protection Agency
FS	Feasibility Study
G2	G2 Consultants
Geosyntec	Geosyntec Consultants, Inc.
Port Blakely	Port Blakely Tree Farms
RI	Remedial Investigation
the Site	Blakely Harbor Park Site

1. INTRODUCTION

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix describes the asbestos containing materials (ACM) inspection, sampling, and mitigation activities conducted at Blakely Harbor during Phase 1 of the RI. Field activities, including location control, reporting, and data management, followed guidelines specified in the RI/FS Work Plan and associated Field Sampling Plan, the Sampling and Analysis Plan, and the Quality Assurance Project Plan (Geosyntec Consultants, Inc. [Geosyntec], 2022).

1.1 Definition of ACM

ACM includes any material containing more than 1% asbestos fibers, as determined by polarized light microscopy. Asbestos is derived from a group of naturally occurring minerals containing many small fibers. Because asbestos is fire-resistant and a good insulator, it is a popular building construction material.[1] Asbestos is not a regulated waste material under the Washington State Department of Ecology Model Toxics Control Action unless it has been dispersed into a soil matrix. The risk of exposure to humans is primarily via inhalation of airborne fibers. Where ACM is encapsulated, exposure risk is low.

1.2 Site Background

The former Mill was first built and gradually expanded during the second half of the nineteenth century (Price, 1989). Although there is no direct evidence of asbestos having been used at the Mill or in the buildings, during the times when the Mill was constructed, mixtures of asbestos and cement were commonly used in building materials (i.e., construction panels, roof panels, decorative walls, and ceiling moldings; Alleman and Mossman, 1997). Between 1923 and 1929, the Mill was gradually decommissioned and demolished. Prior to the RI, no inspections have been documented to investigate potential presence of asbestos or ACM in debris or building materials remaining at the Site.

2. SUMMARY OF INSPECTION AND SAMPLING ACTIVITIES

This section provides details of ACM inspections conducted during the Phase 1 RI field activities, including sampling and mitigation activities. No suspected ACM was encountered during Phase 2 RI field activities.

[1] Information available at: https://www.epa.gov/large-scale-residential-demolition/asbestos-containing-materials-acm-and-demolition. Accessed on June 18, 2021.

2.1 Initial Identification of Suspected ACM and Survey

Suspected ACM were visually identified at multiple locations during a Site walk conducted by Geosyntec, Port Blakely, and Bainbridge Island Metro Parks and Recreation District on April 2, 2021.[2]

Samples of suspected ACM were collected on April 19, 2021, by Geosyntec staff at locations where suspected ACM were previously identified. Five replicate samples were collected of a fibrous white papery material identified within a block of soil (sand/gravel) and demolition debris on the southern shore of the Mill Pond. Three additional samples of fiber-wrapped rubber hose scattered on the northern shoreline of the Inner Harbor were also collected; these samples were split by the laboratory prior to analysis (Table L-1). Samples were submitted to Environmental Hazards Service (EHS) laboratory for evaluation of asbestos content according to United States Environmental Protection Agency (EPA) guidelines (Perkins and Harvey, 1993).

The presence of asbestos was confirmed in the five replicate samples collected on the southern shore of the Mill Pond; the matrix described as fibrous papery material was later identified as roofing paper (Nicolite). The Nicolite paper contained an average of 70.7% chrysotile asbestos. Asbestos was not detected in the samples collected at the three locations along the northern shoreline of the Inner Harbor. A summary of analytical results for this survey is included in Table L-1.

2.2 Site-Wide Inspection and Additional Survey

A follow-up site-wide inspection was conducted on May 11, 2021, by G2 Consultants (G2) under subcontract with Geosyntec (Attachment I-1). The purpose of the inspection was to evaluate the potential presence of additional suspected ACM in the powerhouse building and adjacent construction materials at the Site, collect soil samples, and mitigate the area where asbestos was detected (Section 3).

G2 field staff did not observe any additional suspected ACM associated with the Power House (Figure L-1). G2 collected a total of 20 bulk samples including two field duplicates from suspect ACM located on the northern shoreline of the Inner Harbor and adjacent to the powerhouse. Two replicates were collected for each identified material, and the materials sampled included former building debris, old bricks, mortar, fibrous belt-like material, a fiber-wrapped rubber hose, and other former building debris. G2 also collected six composite surface soil samples including one field duplicate from topsoil (surficial 1 inch) substrate in the area surrounding the block of demolition debris where asbestos (Nicolite paper) was identified in earlier sampling (Section 2.1).

A summary of the analytical results for this second survey is provided in Table L-2.[3] Asbestos was not detected in these samples.

[2] A supplemental sampling analysis plan was developed to describe protocols to be implemented if possible ACM was encountered at the Site (Appendix A-2 to the RI/FS Work Plan, Geosyntec, 2022).

[3] Samples were analyzed using different analytical methods based on the sample matrix (one for bulk samples and one for soil samples [Section 3.3]) according to EPA guidelines.

2.3 ACM Not Encountered During Routine Sampling Activities

Suspected ACM were not encountered by field staff during the remainder of the RI investigation, including during collection of soil and sediment samples at the Site. The filed staff were trained prior to performing sampling activities to identify suspected ACM and follow appropriate procedures to minimize risks during field activities.

3. MITIGATION ACTIVITIES

A temporary short-term mitigation of ACM was performed on May 11, 2021, by G2 at the sampling location where Nicolite was confirmed on the southern shore of the Mill Pond. The mitigation work was accomplished by spraying a fiber suppressant (liquid glue) on the area of concern using a pump sprayer. This mitigation limits airborne dispersion, therefore, reducing the risk of exposure to asbestos by confining the ACM in a solid matrix (liquid glue).

Overall, results of the preliminary investigation and absence of suspected ACM during RI field activities indicates that the presence of ACM is limited at the Site.

4. REFERENCES

Alleman, James E. and Brooke T. Mossman. 1997. "Asbestos Revisited" (PDF). *Scientific American*, 277 (1): 54–57. Bibcode:1997SciAm.277a..70A. doi:10.1038/scientificamerican 0797-70. July.

Geosyntec Consultants, Inc. 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site.* Prepared by Geosyntec Consultants, Inc. on behalf of Port Blakely Tree Farms for submittal to the Washington State Department of Ecology. 31 January.

Perkins, R.L. and B.W. Harvey. 1993. *Method for the Determination of Asbestos in Bulk Building Materials*. EPA/600/R-93/116. July.

Price, A. Jr. 1989. *Port Blakely, the Community Captain Renton Built*. Seattle, Washington. Port Blakely Books. Seattle, Washington. January.

Washington State Department of Ecology (Ecology) and Port Blakely Tree Farms (Limited Partnership). 2020. Agreed Order No. DE 16944. Issued by the State of Washington, Department of Ecology. 24 June.

TABLES

Table L-1 Summary of Analytical Results – Initial Survey

Sample Location	Sample ID	Date Collected	General Location	Easting ft	Northing ft	Elevation ft MLLW	Material Type	Result	Asbestos Content %	Notes
BH-AS-P01	BH-AS-P01-01	4/19/2021	Mill Pond	1225077	221844	9.5	White fibrous paper in concrete rubble/demolition debris (insulation) and black/gray granular matrix.	Detect	71.1% Chrysotile	The black granular matrix showed 0.80% content of Chrysolite.
	BH-AS-P01-02	4/19/2021					White fibrous paper in concrete rubble/demolition debris (insulation) and black/gray granular matrix.	Detect	69.3% Chrysotile	The black granular matrix showed 1.1% content of Chrysolite.
	BH-AS-P01-03	4/19/2021					White fibrous paper in concrete rubble/demolition debris	Detect	67.1% Chrysotile	--
	BH-AS-P01-04	4/19/2021					White fibrous paper in concrete rubble/demolition debris	Detect	72.2% Chrysotile	--
	BH-AS-P01-05	4/19/2021					white fibrous paper in concrete rubble/demolition debris	Detect	73.8% Chrysotile	--
BH-AS-B01	BH-AS-B01-01	4/19/2021	Inner Harbor	1225680	222179	4.2	Black tar-like fibrous paper/leather; long rectangular shape	Not detected	No asbestos detected (NAD)	--
	BH-AS-B01-02	4/19/2021					Black tar-like fibrous paper/leather; long rectangular shape	Not detected	No asbestos detected (NAD)	--
	BH-AS-B01-03	4/19/2021					Black tar-like fibrous paper/leather; long rectangular shape	Not detected	No asbestos detected (NAD)	--
BH-AS-B02	BH-AS-B02-01	4/19/2021	Inner Harbor	1225583	222230	9.9	Black fibrous paper/leather; short rectangular shape	Not detected	No asbestos detected (NAD)	--
	BH-AS-B02-02	4/19/2021					Black fibrous paper/leather; short rectangular shape	Not detected	No asbestos detected (NAD)	--
	BH-AS-B02-03	4/19/2021					Black fibrous paper/leather; short rectangular shape	Not detected	No asbestos detected (NAD)	--
BH-AS-B03	BH-AS-B03-01	4/19/2021	Inner Harbor	1225555	222208	7.1	Black fibrous paper surrounding timber piling	Not detected	No asbestos detected (NAD)	--
	BH-AS-B03-02	4/19/2021					Black fibrous paper surrounding timber piling	Not detected	No asbestos detected (NAD)	--
	BH-AS-B03-03	4/19/2021					Black fibrous paper surrounding timber piling	Not detected	No asbestos detected (NAD)	--

Notes:
1. Samples analyzed by EHS laboratory, EPA Method 600/R-93/116, EPA Method 600/M4-82-020, point count 1000.
2. Samples from BH-AS-P01 were collected from 5 locations in the same area. Only one set of GPS coordinates was collected for these samples.
3. Samples collected at locations BH-AS-B01, -B02, and -B03 were collected as single discrete samples; these samples were split by the laboratory and analyzed in triplicate.
4. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum. Elevation is reported in feet above Mean Lower Low Water.

Acronyms:
% = percentage; -- = not reported; AS = asbestos survey; BH = Blakely Harbor; ft = feet; ID = identification; MLLW = mean lower low water

Table L-2 Summary of Analytical Results – Asbestos Survey

Sample ID (G2)	Sample Type	Sample Description	Location Description	Easting ft	Northing ft	Elevation ft MLLW	Date Collected	Result
Bulk Samples								
21-4808-1	Primary	Cementitious mortar, gray	Southeast of former brick-lined iron refuse burner	1225522	222348	15.0	5/11/2021	No asbestos detected (NAD)
21-4808-2	Primary	Cementitious mortar, gray						No asbestos detected (NAD)
21-4808-2DUP	Field Duplicate	Cementitious mortar, gray - Field duplicate of 21-4808-2						No asbestos detected (NAD)
21-4808-3	Primary	Brick, reddish brown						No asbestos detected (NAD)
21-4808-4	Primary	Brick, reddish brown						No asbestos detected (NAD)
21-4808-5	Primary	Paneling material and yellow glue	West of former foundry	1225652	222238	12.1	5/11/2021	No asbestos detected (NAD)
21-4808-6	Primary	Paneling material and yellow glue						No asbestos detected (NAD)
21-4808-7	Primary	Pebbly cementitious material, gray	Near former brick-lined iron refuse burner	1225493	222502	26.4	5/11/2021	No asbestos detected (NAD)
21-4808-8	Primary	Pebbly cementitious material, gray						No asbestos detected (NAD)
21-4808-9	Primary	Coarse cementitious mortar, gray	Near former brick-lined iron refuse burner	1225493	222502	26.4	5/11/2021	No asbestos detected (NAD)
21-4808-10	Primary	Coarse cementitious mortar, gray						No asbestos detected (NAD)
21-4808-10DUP	Field Duplicate	Coarse cementitious mortar, gray - Field duplicate of 21-4808-10						No asbestos detected (NAD)
21-4808-11	Primary	ACM	Debris block	1225089	221830	12.3	5/11/2021	Not analyzed
21-4808-12	Primary	ACM						Not analyzed
21-4808-13	Primary	Asphaltic material, black	East of former foundry	1225760	222239	11.5	5/11/2021	No asbestos detected (NAD)
21-4808-14	Primary	Asphaltic material, black						No asbestos detected (NAD)
21-4808-15	Primary	Woven material, white	Southwest of former foundry	1225677	222205	7.7	5/11/2021	No asbestos detected (NAD)
21-4808-16	Primary	Woven material, white						No asbestos detected (NAD)
21-4808-17	Primary	Refractory brick	Near former brick-lined iron refuse burner	1225493	222502	26.4	5/11/2021	No asbestos detected (NAD)
21-4808-18	Primary	Refractory brick						No asbestos detected (NAD)
Surface Soil Samples								
21-4808-S1	Primary	Composite soil sample	W of debris block	1225083	221830	11.3	5/11/2021	No asbestos detected (NAD)
21-4808-S2	Primary	Composite soil sample	N of debris block	1225088	221833	11.3	5/11/2021	No asbestos detected (NAD)
21-4808-S3	Field Duplicate	Composite soil sample - Field duplicate of 21-4808-S2	N of debris block	1225088	221833	11.3	5/11/2021	No asbestos detected (NAD)
21-4808-S4	Primary	Composite soil sample	E of debris block	1225094	221829	13.4	5/11/2021	No asbestos detected (NAD)
21-4808-S5	Primary	Composite soil sample	S of debris block	1225089	221825	13.5	5/11/2021	No asbestos detected (NAD)
21-4808-S6	Primary	Composite soil sample	W of debris block	1225088	221830	11.9	5/11/2021	No asbestos detected (NAD)

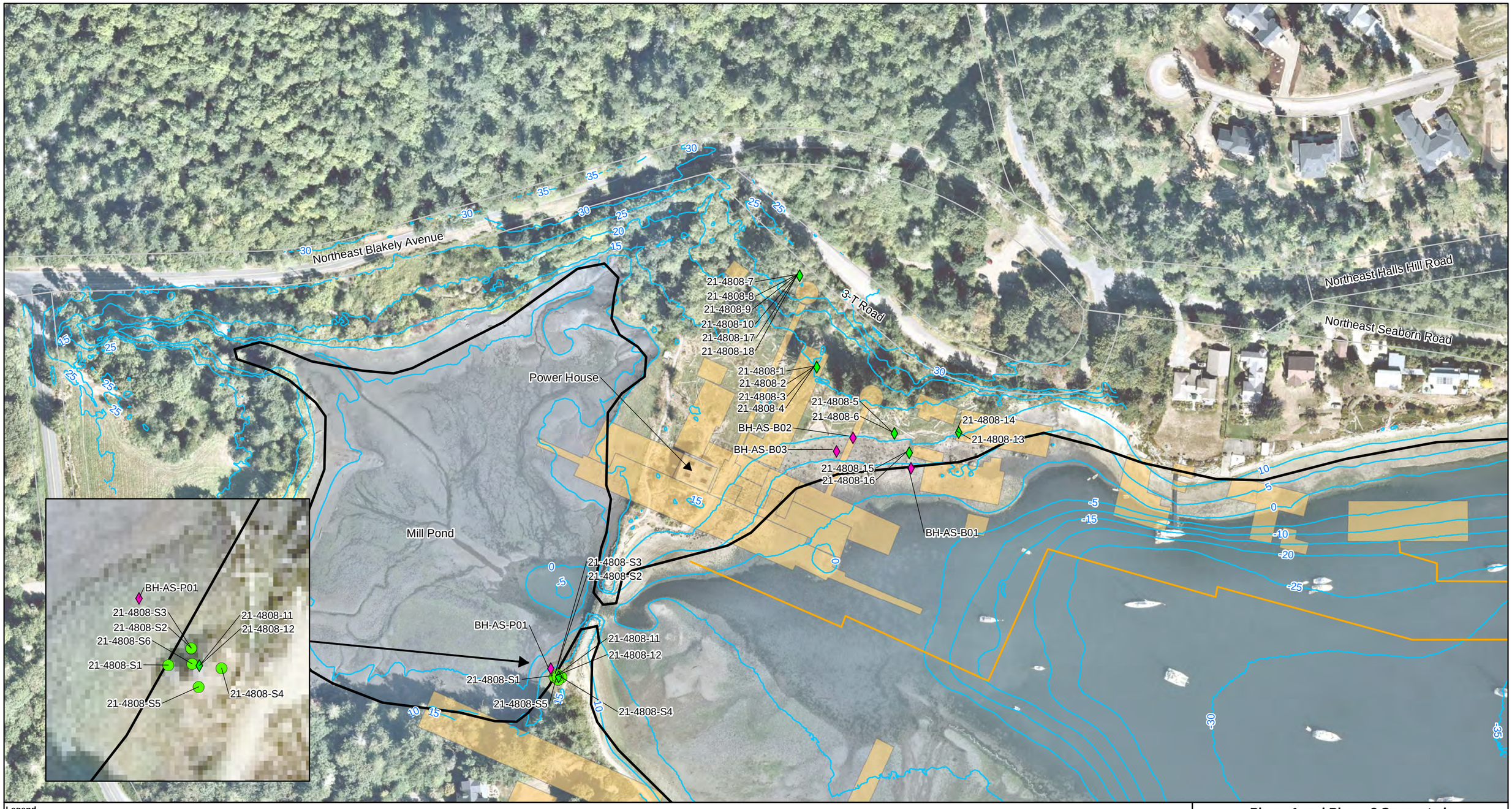
Notes:

1. Samples analyzed by SGS laboratory. Soil samples were analyzed using Modified Air Resources Board Method 435, 1000 Point Count. Bulk samples were analyzed using EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation.
2. Coordinates are reported in feet in the Washington State Plane North, NAVD1983 Datum. Elevation is reported in feet above Mean Lower Low Water.
3. Surface soil samples were collected from the first inch of surface soil including relatively small fragments of the building construction debris embedded in the soil substrate.
4. Two replicate bulk samples were collected per each of the nine identified matrix, for a total of twenty samples including two field duplicates. Bulk samples 214808-11 and 21-4808-12 were collected but not analyzed.

Acronyms:

ACM = asbestos containing material; ft = feet; ID = identification; MLLW = mean lower low water

FIGURES



Legend

Geosyntec Inspection (April 2021)
- Bulk Sample Location
- Soil Sample Location

G2 Inspection (May 2021)
- Bulk Sample Location
- Soil Sample Location

- Historical Wharf Structure
- Shoreline
- Structures From 1917 Map and Figure 2 in GeoEngineers, 2019

Notes:
1. Shoreline boundary provided by Washington Department of Natural Resources.
2. Locations of historical buildings are approximate.
3. Locations 21-4808-11 and 21-4808-12 were not analyzed.

N

0 200 Feet

Phase 1 and Phase 2 Suspected ACM Sample Locations
Remedial Investigation Report
Appendix I
Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

Figure L-1

MVI/Sea | October 2023

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\RI Report\Appendix I\Figure 1 Asbestos Sample Locations.mxd 10/5/2023 10:00:22 AM

ATTACHMENT L-1

Limited Asbestos Survey and Soil Sampling for Asbestos

consultants

Limited Asbestos Survey & Soil Sampling for Asbestos

Purpose: Blakely Harbor Project

Client:
Geosyntec Consultants, Inc.
920 SW Sixth Avenue, Suite 600
Portland, Oregon 97204

Project:
Blakely Harbor Project
Blakely Harbor Park
Bainbridge Island, Washington 98110

G2 Project #: 21-4808

REVISED: June 14, 2021

Prepared By:

G2 Consultants
16869 SW 65th Avenue, #15
Lake Oswego, Oregon 97035
www.g2ci.com

Limited Asbestos Survey & Soil Sampling for Asbestos

G2 Consultants Project #: 21-4808

Purpose of Inspection:	Blakely Harbor Project
Scope of Inspection:	Limited to areas anticipated to be impacted by the Blakely Harbor Project
Project Address:	Blakely Harbor Park
Project Address 2:	Bainbridge Island, Washington 98110
Project Description:	Blakely Harbor Project
Owner or Facility Operator:	Bainbridge Island Park District
Owner or Facility Operator Phone #:	206-842-2306

Technical Certifications

Consultant	Discipline	Certification #	Regulatory Agency	Phone Number
Andrew Bisbee	Asbestos Building Inspector	IRO-20-4436B	EPA	503-250-3266

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- Executive Summary
- Description of Structure(s)
- Scope of Inspection
- Inspection Findings
- Recommended Response Actions
- Methodology
- Limitations

Appendices

Appendix A: Laboratory Analysis Results & Chain of Custody

Appendix B: Site Map

Appendix C: Daily Project Log

Appendix D: Asbestos Material Sample Coordinates Table

Appendix E: Certifications & Accreditation

Executive Summary

G2 Consultants (G2) was retained by Geosyntec Consultants, Inc. (Geosyntec) to conduct a limited inspection for asbestos-containing materials (ACM) and soil sampling for asbestos. The survey was conducted at the Blakely Harbor Park located at Blakely Harbor in Bainbridge Island, Washington. Authorization was provided by Cindy Bartlett, RG, LG with Geosyntec.

Date(s) of Inspection: May 3, 2021

Purpose of Inspection: Blakely Harbor Project

Scope of Inspection: Limited to areas anticipated to be impacted by the upcoming Blakely Harbor Project.

Bulk Asbestos

Results of the inspection have determined that asbestos is not present in the suspect bulk materials sampled as part of this limited survey:

Asbestos-Containing Materials Identified or Presumed - Overview

Material Description	Material Location*	Approx. Quantity	Condition	Friable (Yes/No)
None	-	-	-	-

* Locations limited to only those areas included within this scope of work. Materials may also be present in other areas not included as part of this limited scope of work.

Composite Surface Soil Sampling for Asbestos

Results of the composite surface soil sampling for asbestos have determined that asbestos is not present in the soil sampled as part of this limited survey:

Composite Surface Soil Sampling for Asbestos - Overview

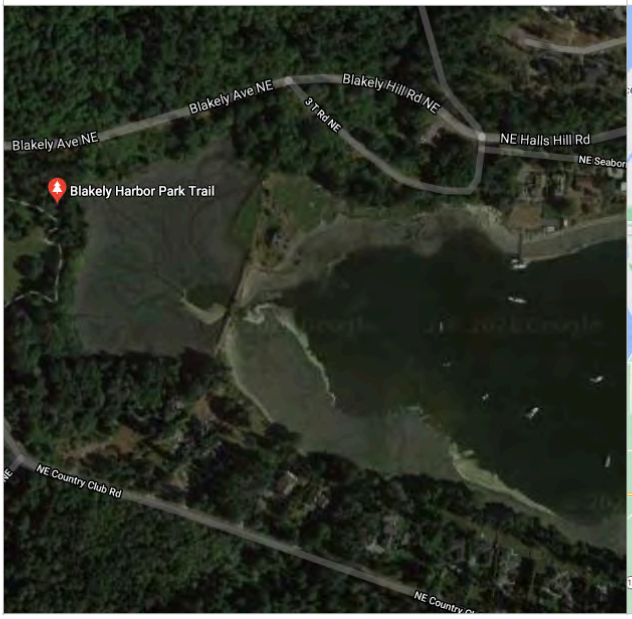
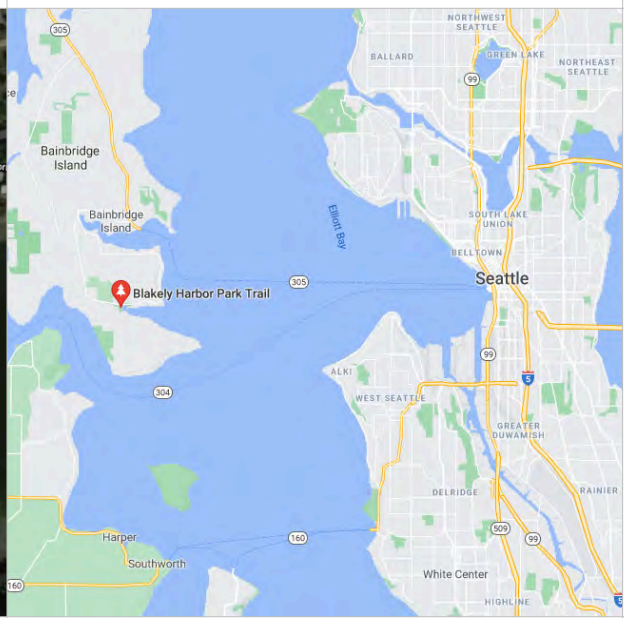
Sample No.	Soil Description	Material Location*	Depth Interval	Sample Volume	Visible ACM Fragments (Yes/No)
-	None	-	-	-	-

* Locations limited to only those areas included within this scope of work. Materials may also be present in other areas not included as part of this limited scope of work.

Details of the inspection, descriptions and locations of materials, quantities, condition and friability can be found in the following sections of this report.

Description of Structure(s)

Type of facility:	Blakely Harbor Park
Past uses:	Former Port Blakely Mill
Age of construction:	Port Blakely Mill demolished early 1900s
Approximate acreage:	40-acres (Blakely Harbor Park)
Number of floors:	-
Outbuildings included in inspection:	Power House

Arial Photo of Subject Property	Location of Subject Property
	

Scope of Inspection

G2 was contracted by Geosyntec to perform a limited inspection for ACM and soil sampling for asbestos in areas specified by Geosyntec. The survey was conducted at the Blakely Harbor Park located at Blakely Harbor in Bainbridge Island, Washington. The sampling was conducted to represent suspect materials that were observed at the time of this inspection and asbestos contamination (if any) in soil(s) that will be impacted by the upcoming Blakely Harbor Project activities. The scope of work was limited to only those suspect materials and areas expected to be impacted, as specified by Geosyntec.

Additional materials suspect for ACM may be present in other areas of the Blakely Harbor Park outside of this limited scope of work.

Asbestos

The scope of services was to perform a visual and tactile inspection, and identify the presence, quantity and location of the accessible ACM, within the area(s) of the scope of work, including the Power House structure. Identifiable and accessible suspect materials were sampled. The areas within the scope of work were within the public Blakely Harbor Park. Subsurface soil sampling techniques were not utilized to collect potentially hidden materials, such as below the ground surface, etc. Additional suspect materials may be present below ground surface that were not collected at the time of the site visit.

At the direction of Geosyntec, G2 was tasked with providing a temporary/short-term mitigation of the localized area of ACM previously identified by Geosyntec. G2 was able to perform this work per the Puget Sound Clear Air Agency (PSCAA). The temporary/short-term mitigation work was accomplished by spraying a fiber suppressant (liquid glue) to the area of concern using a pump sprayer. NOTE: G2 is not a licensed asbestos abatement contractor and has no specialized training in asbestos abatement.

Inspection Findings

Bulk Asbestos

Results of the inspection have determined that asbestos is present in the following suspect materials tested:

Asbestos-Containing Materials Identified							
HM No.†	Material Description	Material Location*	No. of Samples	Approx. Quantity	Asb. Type & Percent	Condition	Friable (Yes/No)
-	None	-	-	-	-	-	-

† Homogeneous material number

* Locations limited to only those areas included within this scope of work. Materials may also be present in other areas not included as part of this limited scope of work.

Results of the inspection have determined that asbestos is not present in any of the suspect materials tested shown in the table below:

Non-Asbestos-Containing Materials			
HM No.†	Material Description	Material Location*	No. of Samples
1	Cementitious Mortar, Gray	SE of Former Brick-Lined Iron Refuse Burner	3 (incl. duplicate)
2	Brick, Red-Brown	SE of Former Brick-Lined Iron Refuse Burner	2
3	Laminate Panel Material, and Yellow Adhesive	West of Former Foundry	2
4	Pebbly Cementitious Material, Gray and Red-Brown Layer	Near Former Brick-Lined Iron Refuse Burner	2
5	Coarse Cementitious Mortar, Gray	Near Former Brick-Lined Iron Refuse Burner	3 (incl. duplicate)
7	Presumed Asphaltic Material, Black	East of Former Foundry	2
8	Woven Material, White	SW of Former Foundry	2
9	Presumed Refractory Brick, Yellow-Tan	Near Former Brick-Lined Iron Refuse Burner	2

† Homogeneous material number
* Locations limited to only those areas included within this scope of work. Materials may also be present in other areas not included as part of this limited scope of work.

Homogeneous material number 6 (HM No. 6) was not submitted at the request of the client because the material, described as white fibrous paper in concrete rubble/demolition debris (insulation), was previously sampled by Geosyntec, and because G2's scope of work was supplemental to Geosyntec's initial assessment.

Composite Surface Soil Sampling for Asbestos

Results of the composite surface soil sampling have determined that asbestos is present in the following composite surface soil samples tested:

Composite Surface Soil Sampling for Asbestos - Overview					
Sample No.	Soil Description	Material Location*	Depth Interval	Sample Volume	Visible ACM Fragments (Yes/No)
-	None	-	-	-	-

* Locations limited to only those areas included within this scope of work. Materials may also be present in other areas not included as part of this limited scope of work.

Results of the composite surface soil sampling for asbestos have determined that asbestos is not present in any of the samples, as shown in the table below:

Composite Surface Soil Sampling for Asbestos - Overview						
Sample No.	Soil Description	Material Location*	Depth Interval (inch)	Sample Volume (gram)	Asb. Type & Percent	Visible ACM Fragments (Yes/No)
21-4808-S1	Dark Gray Soil	West Side of Debris Block	0-1	125-250	ND	No
21-4808-S2	Dark Gray Soil	North Side of Debris Block	0-1	125-250	ND	No
21-4808-S3 (Duplicate of -S2)	Dark Gray Soil	North Side of Debris Block	0-1	125-250	ND	No
21-4808-S4	Dark Gray Soil	East Side of Debris Block	0-1	125-250	ND	No
21-4808-S5	Dark Gray Soil	South Side of Debris Block	0-1	125-250	ND	No
21-4808-S6	Dark Gray Soil	West Side of Debris Block	0-1	125-250	ND	No

ND None detected

* Locations limited to only those areas included within this scope of work. Materials may also be present in other areas not included as part of this limited scope of work.

G2 collected composite surface soil samples near the building construction debris block where ACM was previously identified by Geosyntec. The composite surface soil samples consisted of approximately 12 to 16 discreet samples collected from the top approximately 1-inch of surface soil. The surface soils collected were non-homogeneous and characterized by dark gray sand, silt and gravel. G2 included relatively small fragments of the building construction debris block with the composite surface soil samples. The laboratory analyzed the composite soils after “fine milling” the samples into a homogeneous mixture, as is required by the CARB 435 Method.

Details of the samples collected, laboratory analysis reports, and a site map with sample locations can be found in the Appendices.

Recommended Response Actions

Asbestos

Asbestos-Containing Materials (ACM)

Any building material which contains asbestos in an amount greater than 1% is considered ACM by the United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and by the State of Washington Department of Labor and Industries (L&I).

None of the suspect materials sampled as part of this limited inspection were determined to be an ACM. None of the composite surface soil samples analyzed contain asbestos.

All identified and presumed ACM in a building must be removed by licensed asbestos abatement contractor, or other certified individual, prior to impact if they are to be disturbed during renovation or demolition activities.

If any additional materials are identified during renovations, not sampled as part of this limited survey, they should be assumed to be ACM and not disturbed, unless sampling and analysis of the materials proves otherwise.

Any ACM likely to be disturbed during renovation or demolition activities, other than by incidental contact with no generation of debris related to other construction activities, should be abated by a licensed asbestos-abatement contractor. Any activities conducted where the primary object of the activity is the removal of ACM must be conducted by a licensed asbestos abatement contractor or other properly trained individuals.

The National Emissions Standards for Hazardous Air Pollutants (NESHAPs) requires that all Regulated Asbestos-Containing Materials (RACMs) be removed from a building prior to demolition.

Asbestos-Containing Materials - 1% Asbestos or Less

Any building material which contains asbestos in an amount of 1% or less is considered asbestos-containing by OSHA, by the State of Washington local clean air agency, and L&I. Although these materials are not considered ACMs, workers must be protected from exposure to asbestos, regardless of the percentage.

None of the materials identified during this inspection contain 1% or less asbestos.

Materials with “trace” are not regulated for disposal purposes, but must be removed by properly trained individuals to meet OSHA/L&I requirements.

Methodology

The field work was conducted using industry best practices. Samples of representative accessible suspect materials within the scope of work were collected during the course of the inspection. Materials were sampled according to homogeneous groupings using the Asbestos Hazard Emergency Response Act (AHERA) sampling guidelines.

Bulk Asbestos

Samples were collected in such a manner as to minimize release of the material into the surroundings. Sample number, material description, sample location and material location were recorded at the time of sampling. Each sample was placed in a sample container labeled with a unique sample number and submitted to SGS Forensic Laboratories, a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory, for analysis under chain of custody documentation. Samples were analyzed in accordance with EPA Method 600/R-93-116, using PLM with dispersion staining and using visual area estimation to determine percent asbestos content. This method allows for the identification of the primary types of asbestos used in building materials. The lower limit of detection for this method is one percent. Samples containing one percent or less asbestos by PLM with visual area estimation are reported as “Trace”.

Composite Surface Soil Sampling for Asbestos

The composite surface soil samples consisted of discreet samples collected from near surface soil. The soil was collected using new disposable nitrile gloves and new disposable plastic spoons. Vegetation was removed from the sampling area and not included with the composite surface soil sample. Sample number, material description, and sample location were recorded at the time of sampling. Each sample was placed in a sample container labeled with a unique sample number and submitted to SGS Forensic Laboratories, a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory, for analysis under chain of custody documentation. Samples were analyzed in accordance with Modified Air Resources Board Method 435, using PLM with 1000 point count to determine percent asbestos content. This method allows for the identification of the primary types of asbestos used in building materials. The lower limit of detection for this method is 0.1%.

Limitations

G2 has performed this inspection in accordance with best industry methods and practices of the profession, and consistent with the level of care and skill ordinarily exercised by reputable environmental consultants under similar circumstances and conditions. The observations contained within this assessment are based upon site conditions readily accessible at the time of the site inspection. No other representation, guarantee or warranty, express or implied, is included or intended in this hazardous materials survey report. If any untested suspect materials are encountered during demolition activities, they should be assumed to be ACM and not disturbed, unless sampling and analysis of the materials proves otherwise.

G2 utilized state-of-the-art practices and techniques in accordance with regulatory standards while performing this limited sampling. G2's evaluation of the suspect building materials identified during this limited sampling is based on conditions observed at the time of the sampling. G2 cannot be responsible for changing conditions that may alter the relative exposure risk for future changes in accepted methodology.

As with all environmental investigations, this inspection is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.

Respectfully submitted and reviewed by:



Andrew Bisbee, RG
Sr. Project Specialist
G2 Consultants



Noal Kraft
VP of Operations
G2 Consultants

Appendix A:

Laboratory Analysis and Chain of Custody

SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Material Analysis

(Modified Air Resources Board Method 435, 1000 Point Count)

G2 Consultants Inc.
Noal Kraft
16869 SW 65th Avenue
#15
Lake Oswego, OR 97035

Client ID: L1159
Report Number: N013924
Date Received: 05/13/21
Date Analyzed: 05/18/21
Date Printed: 05/18/21

Job ID/Site: 21-4808

SGSFL Job ID: L1159
Total Samples Submitted: 6
Total Samples Analyzed: 6

PLM Report Number: N/A

Sample Preparation:

Sample(s) were prepared as outlined in the Air Resource Boards Method 435, Determination of Asbestos Content of Serpentiine Aggregate. Sample(s) were ground to 200 particle size in the laboratory. Approximately, 1 pint was retained for analysis.

Sample Analysis:

20 preparations were made and analyzed by point counting 1000 non-empty points. The analytical sensitivity is calculated as one point counted in 1000 non-empty points. This analysis is a modification of the ARB435 method. Exception I and Exception II are not utilized as results are calculated from the point count analysis.

Sample ID	Lab Number	Layer Description
21-4808-S1	12421637	**Dark Grey Soil**

Point Count Results:

Number of asbestos points counted	0
Number of non-empty points:	1000
Percent asbestos in sample:	**None Detected**
Analytical sensitivity (%):	< 0.1
Asbestos type(s) detected:	None Detected

Comment:

Sample ID	Lab Number	Layer Description
21-4808-S2	12421638	**Dark Grey Soil**

Point Count Results:

Number of asbestos points counted	0
Number of non-empty points:	1000
Percent asbestos in sample:	**None Detected**
Analytical sensitivity (%):	< 0.1
Asbestos type(s) detected:	None Detected

Comment:

Sample ID	Lab Number	Layer Description
21-4808-S3	12421639	**Dark Grey Soil**

Point Count Results:

Number of asbestos points counted	0
Number of non-empty points:	1000
Percent asbestos in sample:	**None Detected**
Analytical sensitivity (%):	< 0.1
Asbestos type(s) detected:	None Detected

Comment:

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-42

Bulk Asbestos Material Analysis

(Modified Air Resources Board Method 435, 1000 Point Count)

G2 Consultants Inc.
Noal Kraft
16869 SW 65th Avenue
#15
Lake Oswego, OR 97035

Client ID: L1159
Report Number: N013924
Date Received: 05/13/21
Date Analyzed: 05/18/21
Date Printed: 05/18/21

Job ID/Site: 21-4808

SGSFL Job ID: L1159
Total Samples Submitted: 6
Total Samples Analyzed: 6

PLM Report Number: N/A

Sample Preparation:

Sample(s) were prepared as outlined in the Air Resource Boards Method 435, Determination of Asbestos Content of Serpentiine Aggregate. Sample(s) were ground to 200 particle size in the laboratory. Approximately, 1 pint was retained for analysis.

Sample Analysis:

20 preparations were made and analyzed by point counting 1000 non-empty points. The analytical sensitivity is calculated as one point counted in 1000 non-empty points. This analysis is a modification of the ARB435 method. Exception I and Exception II are not utilized as results are calculated from the point count analysis.

Sample ID	Lab Number	Layer Description
21-4808-S4	12421640	**Dark Grey Soil**

Point Count Results:

Number of asbestos points counted	0
Number of non-empty points:	1000
Percent asbestos in sample:	**None Detected**
Analytical sensitivity (%):	< 0.1
Asbestos type(s) detected:	None Detected

Comment:

Sample ID	Lab Number	Layer Description
21-4808-S5	12421641	**Dark Grey Soil**

Point Count Results:

Number of asbestos points counted	0
Number of non-empty points:	1000
Percent asbestos in sample:	**None Detected**
Analytical sensitivity (%):	< 0.1
Asbestos type(s) detected:	None Detected

Comment:

Sample ID	Lab Number	Layer Description
21-4808-S6	12421642	**Dark Grey Soil**

Point Count Results:

Number of asbestos points counted	0
Number of non-empty points:	1000
Percent asbestos in sample:	**None Detected**
Analytical sensitivity (%):	< 0.1
Asbestos type(s) detected:	None Detected

Comment:

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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Material Analysis

(Modified Air Resources Board Method 435, 1000 Point Count)

G2 Consultants Inc.
Noal Kraft
16869 SW 65th Avenue
#15
Lake Oswego, OR 97035

Client ID: L1159
Report Number: N013924
Date Received: 05/13/21
Date Analyzed: 05/18/21
Date Printed: 05/18/21

Job ID/Site: 21-4808

SGSFL Job ID: L1159
Total Samples Submitted: 6
Total Samples Analyzed: 6

PLM Report Number: N/A

Sample Preparation:

Sample(s) were prepared as outlined in the Air Resource Boards Method 435, Determination of Asbestos Content of Serpentiine Aggregate. Sample(s) were ground to 200 particle size in the laboratory. Approximately, 1 pint was retained for analysis.

Sample Analysis:

20 preparations were made and analyzed by point counting 1000 non-empty points. The analytical sensitivity is calculated as one point counted in 1000 non-empty points. This analysis is a modification of the ARB435 method. Exception I and Exception II are not utilized as results are calculated from the point count analysis.

Sample ID	Lab Number	Layer Description

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Detection (LOD) = 0.1%. Trace denotes the presence of asbestos below the LOD. ND = None Detected.

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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

G2 Consultants Inc.
Noal Kraft
16869 SW 65th Avenue
#15
Lake Oswego, OR 97035

Client ID: L1159
Report Number: B317854
Date Received: 05/13/21
Date Analyzed: 05/17/21
Date Printed: 05/18/21
First Reported: 05/18/21

Job ID/Site: 21-4808

Date(s) Collected: 05/11/2021

SGSFL Job ID: L1159
Total Samples Submitted: 18
Total Samples Analyzed: 18

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
21-4808-1	12421619						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-2	12421620						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-2DUP	12421621						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-3	12421622						
Layer: Red-Brown Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-4	12421623						
Layer: Red-Brown Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-5	12421624						
Layer: Beige Non-Fibrous Material			**ND**				
Layer: Yellow Adhesive			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							

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Report Number: B317854

Client Name: G2 Consultants Inc. **Date Printed:** 05/18/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
21-4808-6	12421625						
Layer: Beige Non-Fibrous Material			**ND**				
Layer: Yellow Adhesive			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-7	12421626						
Layer: White Cementitious Material			**ND**				
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-8	12421627						
Layer: White Cementitious Material			**ND**				
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-9	12421628						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-10	12421629						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-10DUP	12421630						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-13	12421631						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-14	12421632						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Analyst: TTHROWER Date Analyzed: 05/17/21							

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Report Number: B317854

Client Name: G2 Consultants Inc. **Date Printed:** 05/18/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
21-4808-15	12421633						
Layer: White Woven Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (99 %)							
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-16	12421634						
Layer: White Woven Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (99 %)							
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-17	12421635						
Layer: Tan Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
Analyst: TTHROWER Date Analyzed: 05/17/21							
21-4808-18	12421636						
Layer: Tan Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
Analyst: TTHROWER Date Analyzed: 05/17/21							

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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CHAIN OF CUSTODY RECORD

consultants

Page #: 1 of 1
G2 Job #: 21-4808
Sample Date: 5-11-21
Submit Date: 5-12-21
Sampled By: ANDREW BISBEE

Jobsite Address:
Bainbridge Island
0
Bainbridge Island
WA

G2 Client: Geosyntec Consultants, Inc
Address: 920 SW Sixth Ave., Suite 600

G2 Contact: Andrew Bisbee
Phone #: (503) 250-3266

Asbestos:

☐ PLM ☐ PLM/Point Count 400 ☐ Wipe
☐ TEM ☑ PLM/Point Count 1000 ☐ Vac
☐ Other:

Notes: PLM / POINT COUNT 1000

Turn-Around Time: ☐ RUSH ☐ 24-Hour ☐ 48-Hour ☑ 72-Hour

Results to: labresults@g2ci.com

HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
	COMPOSITE SOIL SAMPLE	21-4808-S1	WEST SIDE OF DEBRIS BLOCK			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
	COMPOSITE SOIL SAMPLE	21-4808-S2	NORTH SIDE OF DEBRIS BLOCK			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
	COMPOSITE SOIL SAMPLE	21-4808-S3	NORTH SIDE OF DEBRIS BLOCK			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
	COMPOSITE SOIL SAMPLE	21-4808-S4	EAST SIDE OF DEBRIS BLOCK			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
	COMPOSITE SOIL SAMPLE	21-4808-S5	SOUTH SIDE OF DEBRIS BLOCK			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
	COMPOSITE SOIL SAMPLE	21-4808-S6	WEST SIDE OF DEBRIS BLOCK			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity

Samples Relinquished by: ANDREW BISBEE
Date and Time: 5-12-21 15:30
Samples Received by:
Date and Time:

Samples Relinquished by:
Date and Time:
Samples Received by:
Date and Time:

MAY 13 2021

consultants

CHAIN OF CUSTODY RECORD

Page #: 1 of 2
G2 Job #: 21-4808
Sample Date: 5-11-21
Submit Date: 5-12-21
Sampled By: ANDREW BISBEE

Jobsite Address:
Bainbridge Island
0
Bainbridge Island
WA

G2 Client: Geosyntec Consultants, Inc
Address: 920 SW Sixth Ave., Suite 600

G2 Contact: Andrew Bisbee
Phone #: (503) 250-3266

Asbestos:

☐ PLM ☐ PLM/Point Count 400 ☐ Wipe
☐ TEM ☑ PLM/Point Count 1000 ☐ Vac

☐ Other:

Notes: PLM / POINT COUNT 1000

Turn-Around Time: ☐ RUSH ☐ 24-Hour ☐ 48-Hour ☑ 72-Hour

Results to: labresults@g2ci.com

HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
1	CEMENTITIOUS MORTAR, GRAY	21-4808-1	SE OF FORMER BRICK-LINED IRON REFUSE BURNER			
		-2				
		-2 DUP				
2	BRICK, RED-BROWN	-3				
		-4				
3	LAMINATE PANEL MATERIAL, AND YELLOW ADHESIVE	-5	WEST OF FORMER FOUNDRY			
		-6				
4	PEBBLY CEMENTITIOUS MATERIAL, GRAY AND RED-BROWN LAYER	-7	NEAR FORMER BRICK-LINED IRON REFUSE BURNER			
		-8				
5	COARSE CEMENTITIOUS MORTAR, GRAY	-9				
		-10				
		-10 DUP				
6	PRESUMED NICOLITE MATERIAL, WHITE (NOT SUBMITTED)	-11	NEAR BUILDING CONSTRUCTION DEBRIS BLOCK			
		-12				
7	PRESUMED ASPHALTIC MATERIAL, BLACK	-13	EAST OF FORMER FOUNDRY			
		-14				
8	WOVEN MATERIAL, WHITE	-15	SW OF FORMER FOUNDRY			
		-16				

Samples Relinquished by: ANDREW BISBEE	Samples Relinquished by:
Date and Time: 5-12-21 15:30	Date and Time:
Samples Received by:	Samples Received by:
Date and Time:	Date and Time: MAY 13 2021

Jobsite Address:
Bainbridge Island
0
Bainbridge Island
98110

G2 Job #: 21-4808

HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
9	PRESUMED REFRACTORY BRICK, YELLOW-TAN	21-4808-17 -18	NEAR FORMER BRICK-LINED IRON REFUSE BURNER			
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition I/P	Friable Y/N	Quantity
HM#	Material Description	Sample #	Sample Location	Condition G/F/P	Friable Y/N	Quantity

MAY 18 2021

Appendix B:

Site Map

21-4808 Blakely Harbor Project

Limited ACM Survey & Composite Soil Sampling



Notes:

This is a design drawing and is the property of G2 Consultants, Inc. It is not intended to replace required architectual or engineering plans. This drawing is not to be reused or reproduced without written permission from G2 Consultants, Inc.

Client: Geosyntec Consultants, Inc
Project: Blakely Harbor Project ACM and Soil
Location: Bainbridge Island, WA 98110

G2 Project #: 21-4808

Location: Blakely Harbor
Dwg Type: ACM and Soil Sample Locations

consultants
16869 SW 65th Avenue
#15
Lake Oswego, OR 97035
888.998.g2ci
888.887.6422 fax
www.g2ci.com

Report North

Date:
5-26-21

Drawn By:
SMF

Page #:
1/1

Appendix C:

Daily Project Log

DAILY PROJECT LOG

Client:
Geosyntec Consultants, Inc.
920 SW Sixth Ave, Ste 600
Portland, OR 97204

Site Contact: City Bartlett, RG, LG
Company: Geosyntec
Phone: (971) 271-5895
Email: cbartlett@geosyntec.com

G2 Project Manager: Andrew Bisbee
G2 Technician:
G2 Project #: 21-4808

Project:
Blakely Harbor Park
Bainbridge Island, WA 98110

Add. Site Contact:
Company:
Phone:

Date of Activity: May 11, 2021
Scope of Work: Limited Asbestos Survey & Soil Sampling for Asbestos

May 11, 2021

06:30 - G2 mobilized to project site.

11:00 - G2 arrived at project site.

11:25 - G2 collected 5 surface composite soil samples (21-4808-S1 to 21-4808-S2 and 21-4808-S4 to 21-4808-S6) and one duplicate (21-4808-S3) in the vicinity of the building construction debris block (near HA-03 location). No subsurface sampling was performed. The composite surface soil samples consisted of discreet samples collected from the top approximately 1-inch of surface soil. The surface soils collected were non-homogeneous and characterized by dark gray sand, silt and gravel.

11:45 - G2 applied a temporary/short-term mitigation fiber suppressant at the localized area of ACM on the debris block. G2 was able to perform this work per the Puget Sound Clear Air Agency (PSCAA). The temporary/short-term mitigation work was accomplished by spraying a fiber suppressant (liquid glue) to the area of concern using a pump sprayer. NOTE: G2 is not a certified abatement contractor, and does not have specialized training in performing asbestos abatement.

12:05 - G2 collected samples 21-4808-1 to 21-4808-4 of cementitious mortar and brick that was located SE of the former brick-lined iron refuse burner.

12:30 - G2 collected samples 21-4808-5 and 21-4808-6 of paneling material and yellow glue that was located west of the former foundry.

12:40 - G2 collected samples 21-4808-7 to 21-4808-10 of cementitious material that was located near the former brick-lined iron refuse burner. G2 observed mounds of brick debris in this area.

13:00 - G2 collected samples 21-4808-11 and 21-4808-12 of the ACM located at the debris block.

13:30 - G2 collected samples 21-4808-13 and 21-4808-14 of the asphaltic material located east of the former foundry.

13:35 - G2 collected additional samples of woven material SW of the former foundry. G2 collected additional samples of refractory brick located near the former brick-lined iron refuse burner. G2 observed that the refractory brick was a different material than the red brick.

14:00 - G2 mobilized offsite.

DAILY PROJECT LOG

Client:
Geosyntec Consultants, Inc.
920 SW Sixth Ave, Ste 600
Portland, OR 97204

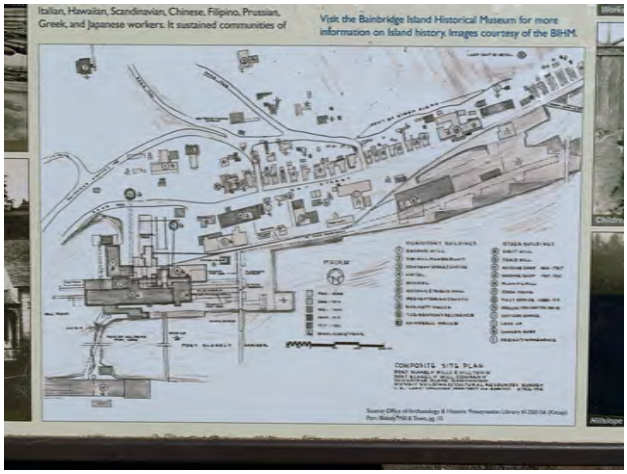
Site Contact: City Bartlett, RG, LG
Company: Geosyntec
Phone: (971) 271-5895
Email: cbartlett@geosyntec.com

G2 Project Manager: Andrew Bisbee
G2 Technician:
G2 Project #: 21-4808

Project:
Blakely Harbor Park
Bainbridge Island, WA 98110

Add. Site Contact:
Company:
Phone:

Date of Activity: May 11, 2021
Scope of Work: Limited Asbestos Survey & Soil Sampling for Asbestos



Site Plan of former Port Blakely Mills.


Localized area of ACM previously identified by Geosyntec.


Cementitious mortar, gray (HM No. 1) sampled SE of former brick-lined iron refuse burner.


Brick, red-brown (HM No. 2) sampled SE of former brick-lined iron refuse burner.

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G2 Technician:
G2 Project #: 21-4808

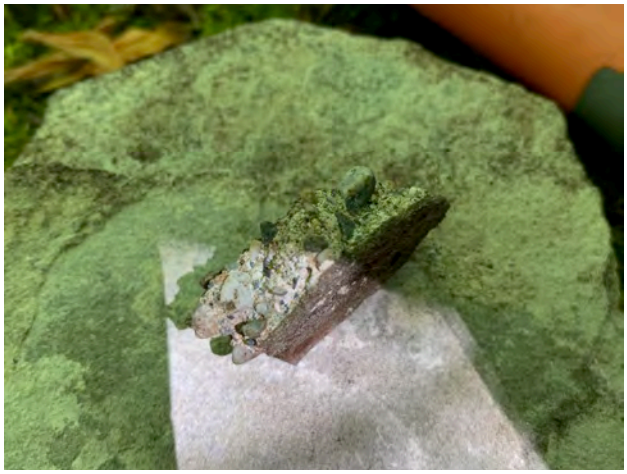
Project:
Blakely Harbor Park
Bainbridge Island, WA 98110

Add. Site Contact:
Company:
Phone:

Date of Activity: May 11, 2021
Scope of Work: Limited Asbestos Survey & Soil Sampling for Asbestos



Laminate panel material, and yellow adhesive (HM No. 3) sampled west of former foundry.



Pebbly cementitious material, gray and red-brown layer (HM No. 4) sampled near former brick-lined iron refuse burner.



Coarse cementitious mortar, gray (HM No. 5) sampled near former brick-lined iron refuse burner.



G2 did not observe suspect building materials in/around the Power House structure.

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Site Contact: City Bartlett, RG, LG
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Email: cbartlett@geosyntec.com

Add. Site Contact:
Company:
Phone:

G2 Project Manager: Andrew Bisbee
G2 Technician:
G2 Project #: 21-4808

Date of Activity: May 11, 2021
Scope of Work: Limited Asbestos Survey & Soil Sampling for Asbestos



Presumed asphaltic material, black (HM No. 7) sampled East of the former foundry.


Woven material, white (HM No. 8) sampled SW of former foundry.


Presumed refractory brick, yellow-tan (HM No. 9) sampled near former brick-lined iron refuse burner.


Building construction debris block previously identified by Geosyntec.

Appendix D:

Asbestos Material Sample Coordinates Table

Geosyntec Consultants, Inc.
Blakely Harbor Project
Asbestos Material Sample Coordinates Table
Blakely Harbor, Bainbridge Island, Washington
May 26, 2021

Sample #	Material Description	Sample Location	Latitude	Longitude
21-4808-S1	Composite soil sample	W of debris block	47.595688°	-122.516794°
21-4808-S2	Composite soil sample	N of debris block	47.595698°	-122.516775°
21-4808-S3	Composite soil sample (duplicate)	N of debris block	47.595698°	-122.516775°
21-4808-S4	Composite soil sample	E of debris block	47.595687°	-122.516749°
21-4808-S5	Composite soil sample	S of debris block	47.595676°	-122.516768°
21-4808-S6	Composite soil sample	W of debris block	47.595689°	-122.516774°
21-4808-1	Cementitious mortar, gray	SE of former brick-lined iron refuse burner	47.597136°	-122.515060°
21-4808-2	Cementitious mortar, gray	SE of former brick-lined iron refuse burner	47.597136°	-122.515060°
21-4808-2DUP	Cementitious mortar, gray (duplicate)	SE of former brick-lined iron refuse burner	47.597136°	-122.515060°
21-4808-3	Brick, reddish brown	SE of former brick-lined iron refuse burner	47.597136°	-122.515060°
21-4808-4	Brick, reddish brown	SE of former brick-lined iron refuse burner	47.597136°	-122.515060°
21-4808-5	Paneling material and yellow glue	W of former foundry	47.596840°	-122.514523°
21-4808-6	Paneling material and yellow glue	W of former foundry	47.596840°	-122.514523°
21-4808-7	Pebbly cementitious material, gray	Near former brick-lined iron refuse burner	47.597555°	-122.515190°
21-4808-8	Pebbly cementitious material, gray	Near former brick-lined iron refuse burner	47.597555°	-122.515190°
21-4808-9	Coarse cementitious mortar, gray	Near former brick-lined iron refuse burner	47.597555°	-122.515190°
21-4808-10	Coarse cementitious mortar, gray	Near former brick-lined iron refuse burner	47.597555°	-122.515190°

NOTE: latitudes/longitudes may not be exact and were noted from onsite observations and the Google Earth coordinate system (WGS84 datum)

Geosyntec Consultants, Inc.
Blakely Harbor Project
Asbestos Material Sample Coordinates Table
Blakely Harbor, Bainbridge Island, Washington
May 26, 2021

Sample #	Material Description	Sample Location	Latitude	Longitude
21-4808-10DUP	Coarse cementitious mortar, gray (duplicate)		47.597555°	-122.515190°
21-4808-11	ACM	Debris block	47.595688°	-122.516768°
21-4808-12	ACM	Debris block	47.595688°	-122.516768°
21-4808-13	Asphaltic material, black	E of former foundry	47.596851°	-122.514086°
21-4808-14	Asphaltic material, black	E of former foundry	47.596851°	-122.514086°
21-4808-15	Woven material, white	SW of former foundry	47.596753°	-122.514418°
21-4808-16	Woven material, white	SW of former foundry	47.596753°	-122.514418°
21-4808-17	Refractory brick	Near former brick-lined iron refuse burner	47.597555°	-122.515190°
21-4808-18	Refractory brick	Near former brick-lined iron refuse burner	47.597555°	-122.515190°

NOTE: latitudes/longitudes may not be exact and were noted from onsite observations and the Google Earth coordinate system (WGS84 datum)

Appendix E:

Certifications & Accreditation

THIS IS TO CERTIFY THAT

ANDREW BISBEE

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ONLINE AHERA ASBESTOS INSPECTOR REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 07/14/2020

Course Location: Portland, OR

Certificate: IRO-20-4436B

4-Hour Online AHERA Inspector Refresher Training; AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 07/14/2021

For verification of the authenticity of this certificate contact:
PBS Environmental
4412 SW Corbett Avenue
Portland, OR 97239
(503) 248-1939

Andy Fridley, Instructor

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101459-0

SGS Forensic Laboratories

Hayward, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2020-07-01 through 2021-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

SGS Forensic Laboratories
3777 Depot Road, Suite 409
Hayward, CA 94545-2761
Mr. Steven Takahashi
Phone: 310-294-4365 Fax: 310-764-1136
Email: steven.takahashi@sgs.com
http://www.falaboratories.com

ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 101459-0**

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

APPENDIX M
Chemistry Tables

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	HA-01-0to12	HA-01-12to24	HA-02-0to12	HA-02-12to24	HA-03-0to12	HA-03-12to24	HA-04-0to12	HA-04-12to24	HA-05-0to12	HA-05-12to24	HA-06-0to12	HA-06-0to12-D	HA-06-12to24	HA-07-0to12	HA-07-0to12-D	HA-08-0to12
Location:	HA-01	HA-01	HA-02	HA-02	HA-03	HA-03	HA-04	HA-04	HA-05	HA-05	HA-06	HA-06	HA-06	HA-07	HA-07	HA-08
Sample Date:	2021-08-19	2021-08-19	2021-08-20	2021-08-20	2021-08-20	2021-08-20	2021-08-20	2021-08-20	2021-08-19	2021-08-19	2021-08-19	2021-08-19	2021-08-19	2021-08-24	2021-08-24	2021-08-24
Depth Interval:	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	0 - 1	1 - 2	0 - 1	0 - 1	0 - 1
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:												Duplicate			Duplicate	
Analyte																
Metals (mg/kg)																
Arsenic	**4.27**	**3.53**	**13.9**	**9.02**	**3.54**	**5.50**	**7.78**	**5.92**	**5.63**	**9.09**	**6.10**	**5.61**	**3.81**	**4.87**	**5.01**	**4.96**
Cadmium	**0.12**	**0.16 J**	**0.45 J**	**0.23 J**	**0.05 J**	**0.05 J**	**0.25 J**	0.18 U	**0.53 J**	**1.25**	**0.29 J**	**0.29 J**	**0.61**	**0.43**	**0.48**	**0.25 J**
Chromium	**26.6 J**	**24.6**	**11.7**	**13.6**	**9.60**	**9.86**	**25.5**	**31.3**	**23.9**	**61.4**	**32.0**	**22.2**	**18.4**	**31.0**	**34.0**	**21.5**
Chromium (VI)	--	--	--	--	--	--	**3.22 R**	--	**0.614 R**	**0.674 R**	--	--	--	--	--	--
Copper	**72.9 J+**	**38.7**	**59.5**	**44.1**	**6.29**	**8.50**	**74.4**	**76.0**	**70.7**	**146**	**108 J**	**236 J**	**68.5**	**63.8**	**60.9**	**119**
Lead	**51.3 J+**	**77.5**	**122**	**159**	**18.8**	**20.2**	**125**	**98.7**	**249**	**694**	**171**	**252**	**51.2**	**51.3**	**55.6**	**495**
Mercury	**0.0834**	**0.0884**	**0.261**	**2.17**	**0.00819 J**	**0.0111 J**	**0.119**	**0.0638**	**0.0863**	**0.110**	**0.804**	**0.648**	**0.0520**	**0.131**	**0.101**	**0.0251 J**
Zinc	**68.4**	**56.0**	**96.6**	**82.1**	**31.3**	**33.5**	**130**	**157**	**249**	**1210**	**845**	**1160**	**549**	**213**	**146**	**196**
Petroleum Hydrocarbons (mg/kg)																
Diesel Range Organics (DRO)	28 U	**12.9**	**171**	**76.2**	**8.90**	5.50 U	**24.3**	**18.1**	**17.8**	**24.7**	**37.6**	**49.8**	5.95 U	**29.6**	**38.1**	**24.2**
Lube Oil	**87.7 J**	**49.2 J**	**388 J**	**164 J**	13.2 UJ	11.0 UJ	**124 J**	**73.9 J**	**82.8 J**	**99.2 J**	**434 J**	**630 J**	11.9 UJ	**196 J**	**255 J**	**55.9 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)																
1-Methylnaphthalene	**5.73**	**7.4**	**90.6**	**28**	5.01 U	4.99 U	**13.7**	5.01 U	5.01 U	**5.44**	**6.87 J**	**39.9 J**	5.01 U	4.99 U	4.99 U	4.99 U
2-Methylnaphthalene	**7.26**	**6.19**	**90.4**	**29.1**	**1.34 J**	**1.84 J**	**21.1**	**2.61 J**	**5.78**	**8.55**	**8.65 J**	**53.2 J**	**1.91 J**	**5.04**	**6.68**	**4.61 J**
Acenaphthene	**11.4**	**52.9**	**361**	**127**	5.01 U	4.99 U	4.99 U	5.01 U	5.01 U	5 U	**7.75 J**	**62 J**	5.01 U	**2.37 J**	**3.1 J**	0.57 U
Anthracene	**23.8**	**84.9**	**1290**	**315**	**3.39 J**	**7.12**	**51**	**3.96 J**	**16.5**	**22.7**	**21.2 J**	**85.4 J**	**2.28 J**	**7.65**	**10.6**	**4.49 J**
Benzo(a)anthracene	**130**	**179**	**3400**	**2670**	**8.08**	**20.4**	**204**	**31.4**	**76.1**	**111**	**96 J**	**208 J**	**13**	**31.1**	**33.7**	**14.1**
Benzo(a)pyrene	**178**	**202**	**2850**	**2470**	**9.12**	**28.4**	**268**	**53.7**	**114**	**192**	**130 J**	**260 J**	**82.7**	**49.2**	**67.5**	**31.9**
Benzo(b)fluoranthene	**114**	**118**	**1770**	**1390**	**6.06**	**16.4**	**186**	**45.2**	**115**	**175**	**140**	**232**	**49.7**	**55**	**76**	**52.3**
Benzo(k)fluoranthene	**69.7**	**71.9**	**1090**	**484**	**3.67 J**	**9.14**	**117**	**23.4**	**50.7**	**87**	**68.5 J**	**124 J**	**24.1**	**26.8**	**37.7**	**21.5**
2-Chloronaphthalene	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	7.9 U	8 U	8 U	7.9 U	7.9 U	7.9 U
Chrysene	**144**	**194**	**3530**	**2630**	**8.74**	**24.2**	**259**	**53.6**	**111**	**163**	**171 J**	**321 J**	**24.3**	**49.5**	**72.9**	**40.7**
Dibenzo(a,h)anthracene	**33.9**	**34.4**	**191**	**206**	**2.07 J**	**5.12**	**56**	**12.1**	**30.5**	**61.3**	**28.6 J**	**52.5 J**	**26.4**	**13**	**17.6**	**17.7**
Fluoranthene	**233**	**400**	**7690**	**4140**	**16.4**	**41.9**	**444**	**73.6**	**190**	**238**	**279**	**663**	**43.8**	**88.2**	**118**	**33.5**
Fluorene	**7.68**	**32.4**	**291**	**118**	**1.3 J**	**1.62 J**	**21.1**	**1.4 J**	**7.28**	**5.59**	**10.2 J**	**62.3 J**	**1.22 J**	**2.88 J**	**3.73 J**	**1.77 J**
Indeno(1,2,3-c,d)pyrene	**107**	**118**	**1230**	**1070**	**6.54**	**19.5**	**197**	**60.7**	**191**	**340**	**153**	**216**	**221**	**55.1**	**63.1**	**128**
Naphthalene	**13.1**	**14**	**255**	**95.4**	1.28 U	**3.61 J**	**80.6**	**12.4**	**31**	**54.3**	**34.3 J**	**118 J**	**5.14**	**14.8**	**20.9**	**43.2**
Pyrene	**226**	**361**	**7340**	**4360**	**15**	**46.4**	**358**	**62.4**	**163**	**202**	**238 J**	**452 J**	**32.3**	**95.6**	**111**	**29.7**
Total Benzofluoranthenes	**241**	**249**	**3310**	**2280**	**12.5**	**33.5**	**398**	**88.8**	**215**	**342**	**270**	**462**	**97.7**	**104**	**143**	**93.6**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)																
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**220**	**256**	**3700**	**3080**	**11.8**	**35.7**	**347**	**71.5**	**161**	**270**	**180**	**350**	**116**	**67.8**	**91**	**55.7**
Total cPAH TEQ (ND=0)[a]	**220**	**256**	**3700**	**3080**	**11.8**	**35.7**	**347**	**71.5**	**161**	**270**	**180**	**350**	**116**	**67.8**	**91**	**55.7**
Phenols (µg/kg)																
2,4,5-Trichlorophenol	25.7 U	25.7 U	25.7 U	25.8 U	25.8 U	25.7 U	25.8 U	25.7 U	25.7 U	25.7 U	25.7 U	25.8 U	25.8 U	25.6 U	25.7 U	25.6 U
2,4,6-Trichlorophenol	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U	8.9 U	9 U	8.9 U
2,4-Dichlorophenol	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.2 U
2,4-Dinitrophenol	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.8 U	33.7 U	33.7 U	33.7 U
2-Chlorophenol	13.8 U	13.8 U	13.8 U	13.9 U	13.9 U	13.8 U	13.9 U	13.8 U	13.8 U	13.8 U	13.8 U	13.9 U	13.9 U	13.8 U	13.8 U	13.8 U
4,6-Dinitro-2-methylphenol	38 U	38 U	38 U	38 U	38 U	38 U	38 U	38 U	38 U	37.9 U	37.9 U	38 U	38 U	37.8 U	37.9 U	37.8 U
4-Chloro-3-Methylphenol	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U
2,4-Dimethylphenol	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
2-Methylphenol (o-Cresol)	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.7 U	6.6 U	6.6 U	6.6 U
4-Methylphenol (p-Cresol)	7.4 U	7.4 U	**24.5**	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U
Pentachlorophenol	31.2 U	31.2 U	31.2 U	31.3 U	31.3 U	31.2 U	31.3 U	31.2 U	31.2 U	31.2 U	31.2 U	31.2 U	31.3 U	31.3 U	31.1 U	31.2 U	31.1 U
Phenol	4.4 U	4.4 U	**20.1**	4.4 U	4.4 U	4.4 U	**5.7 J**	4.4 U	4.4 U	**6.9 J**	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	**5.5 J**
Phthalates (µg/kg)																
bis(2-Ethylhexyl)phthalate	**14.6 J**	**7.5 J**	5.5 U	5.5 U	**15 J**	**11.5 J**	**12.7 J**	5.5 U	**17.4 J**	5.5 U	**21.8 J**	**17.3 J**	5.5 U	**14.9 J**	**12.4 J**	5.4 U
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U
Diethyl phthalate	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	**40.2 J**	**26.9 J**	**32.4 J**	**33.4 J**	**55**	19.6 U	19.6 U	49.8 U
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	**15.4 J**	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Dioxin/Furans (ng/kg)																
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	4.86 U	**3.42 J**	4.85 U	**2.59 J**	4.82 U	**2.37 J**	**15.6**	**10.0**	**45.0**	**356**	**51.2**	**44.3**	**2.25 J**	**233**	**201**	**160**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**145**	**103**	**1010**	**2040**	**187**	**138**	**1230**	**945**	**609**	**504**	**423**	**394**	**101**	**2800**	**3540**	**219**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**5.38**	**9.42**	**4.27**	**5.52**	**5.56**	**3.81**	**18.3**	**11.1**	**108**	**554**	**127**	**82.8**	**4.54**	**55.9**	**46.8**	**165**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**23.9**	**16.0**	**101**	**99.2**	**23.0**	**26.6**	**146**	**104**	**216**	**293**	**131**	**118**	**15.0**	**245**	**239**	**77.5**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	2.43 U	**0.645 J**	2.43 U	**0.544 J**	2.41 U	**0.196 J**	2.50 U	**1.53 J**	**6.55**	**10.4**	**4.68**	**3.31**	**0.263 J**	**4.91**	**3.98**	**3.53**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	2.43 U	**4.21**	2.43 U	**2.90**	2.41 U	**1.43 J**	**7.94**	**5.52**	**71.1**	**186**	**69.4**	**43.3**	**2.48**	**5.73**	**5.82**	**42.5**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	2.43 U	**1.31 J**	**3.13**	**3.21**	2.41 U	**1.28 J**	**11.1**	**8.08**	**24.4**	**38.9**	**14.2**	**12.9**	**1.38 J**	**6.26**	**6.23**	**8.55**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.43 U	**2.44 J**	2.43 U	**2.26 J**	2.41 U	**0.662 J**	**7.13**	**4.78**	**22.2**	**41.3**	**19.7**	**13.5**	**1.34 J**	**4.54**	**4.73**	**11.4**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.59**	**2.49**	**5.03**	**5.00**	2.41 U	**2.06 J**	**20.4**	**14.0**	**36.6**	**59.9**	**26.4**	**23.6**	**2.33 J**	**14.2**	**13.0**	**13.1**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.43 U	**0.238 J**	2.43 U	**0.226 J**	2.41 U	**0.0971 J**	2.50 U	**0.484 J**	2.37 U	**2.18 J**	2.50 U	2.36 U	**0.138 J**	2.40 U	2.36 U	2.44 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.55 R**	**2.07 J**	**6.54**	**5.90**	2.41 U	**2.67**	**19.8**	**13.0**	**28.0**	**46.9**	**21.1**	**19.2**	**1.86 J**	**14.3**	**14.3**	**10.1**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	2.43 U	**4.23**	**2.44**	**4.02**	2.41 U	**0.772 J**	**10.6**	**8.41**	**37.1**	**77.5**	**35.3**	**28.6**	**2.86**	**5.40**	**5.80**	**17.3**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	2.43 U	**2.00 J**	**2.77**	**3.18**	2.41 U	**1.02 J**	**17.3**	**12.8**	**31.4**	**50.6**	**21.2**	**18.9**	**2.29 J**	**7.95**	**7.39**	**10.6**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.43 U	**2.16 J**	2.43 U	**2.17 J**	2.41 U	**0.363 J**	**5.22**	**3.57**	**10.4**	**19.7**	**11.2**	**7.16**	**0.969 J**	**3.86**	**3.95**	**6.19**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	2.43 U	**3.34**	**2.59**	**3.77**	2.41 U	**0.496 J**	**10.5**	**7.38**	**21.4**	**36.0**	**18.6**	**14.2**	**2.20 J**	**5.45**	**5.73**	**10.5**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**4.01**	**4.48**	**6.79**	**9.25**	0.428 U	**0.610**	**17.9**	**12.2**	**39.9**	**73.9**	**35.7**	**30.6**	**5.90**	**11.8**	**12.4**	**28.7**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.621 J**	**0.500 J**	**1.49**	**1.67**	**0.0688 J**	**0.177 J**	**4.04**	**2.13**	**12.8**	**16.2**	**6.81**	**6.16**	**1.23**	**2.93**	**3.03**	**3.68**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**3.85**	**5.86**	**9.11**	**10.9**	**2.89**	**2.63**	**35.9**	**25.0**	**78.6**	**136**	**57.3**	**47.5**	**6.13**	**22.8**	**22.5**	**32.7**
Total TCDD TEQ (ND=0)[b]	**1.62**	**5.86**	**8.61**	**10.9**	**0.410**	**2.63**	**35.8**	**25.0**	**78.5**	**136**	**57.2**	**47.4**	**6.13**	**22.7**	**22.4**	**32.6**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	HA-08-12to24	HA-09-0to12	HA-09-12to24	HA-10-0to12	HA-10-12to24	HA-10-12to24-D	HA-11-0to12	HA-11-12to24	HA-12-0to12	HA-12-12to24	HA-12-12to24-D	HA-13-0to12	HA-13-12to24	HA-14-0to12	HA-14-12to24	HA-15-0to12
Location:	HA-08	HA-09	HA-09	HA-10	HA-10	HA-10	HA-11	HA-11	HA-12	HA-12	HA-12	HA-13	HA-13	HA-14	HA-14	HA-15
Sample Date:	2021-08-24	2021-08-24	2021-08-24	2021-08-24	2021-08-24	2021-08-24	2021-08-23	2021-08-23	2021-08-23	2021-08-23	2021-08-23	2021-08-23	2021-08-23	2021-08-23	2021-08-23	2021-08-23
Depth Interval:	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:						Duplicate					Duplicate					
Analyte																
Metals (mg/kg)																
Arsenic	**4.40**	**8.32**	**6.71**	**21.4**	**18.4**	**12.8**	**7.04**	**3.91**	**3.26**	**4.46**	**5.22**	**8.13**	**43.3**	**5.03**	**8.06**	**11.0 J**
Cadmium	**0.22 J**	**0.16**	**0.10**	**0.29 J**	**0.50**	**0.66**	**0.23**	**0.18**	**0.16**	**0.31**	**0.35**	**0.10 J**	**0.70 J**	**0.10 J**	**0.14 J**	**0.10 J**
Chromium	**23.5**	**20.4**	**44.8**	**21.1**	**20.9**	**32.8**	**37.5**	**37.7**	**26.5**	**34.1**	**28.8**	**31.2**	**31.2**	**24.2**	**31.2**	**29.4 J**
Chromium (VI)	--	**0.545 R**	**0.525 R**	--	--	--	**0.532 R**	--	--	--	--	--	--	--	--	--
Copper	**109**	**52.4**	**59.9**	**270**	**384**	**227**	**69.8**	**54.6**	**29.5**	**43.3**	**45.9**	**80.3**	**199**	**74.8**	**439**	**109 J+**
Lead	**202**	**28.4**	**3.96**	**706**	**758**	**339**	**155**	**11.0**	**50.5**	**45.7**	**51.3**	**71.2**	**272**	**144**	**177**	**156**
Mercury	**0.0221 J**	**0.0739**	**0.0202 J**	**0.101**	**0.159**	**0.100**	**0.0713**	**0.0256**	**0.246**	**1.79**	**0.510**	**0.0295**	**0.226**	**0.112**	**0.0308 J**	**0.111 J**
Zinc	**190**	**73.0**	**68.5**	**324**	**566**	**1900**	**87.6**	**62.9**	**65.5**	**97.9**	**112**	**93.3**	**258**	**126**	**158**	**134 J-**
Petroleum Hydrocarbons (mg/kg)																
Diesel Range Organics (DRO)	7.31 U	**39.7**	**9.44**	**18.3**	**143**	**310**	**20.7**	**8.43**	**40.5**	**31.4**	**39.9**	**18.7**	**861**	7.08 U	9.35 U	**66.9 J**
Lube Oil	**27.3 J**	**113 J**	**28.3 J**	**40.5 J**	**195 J**	**375 J**	**54.2 J**	**15.1 J**	**231 J**	**294 J**	**271 J**	**20.1 J**	**599 J**	14.2 UJ	**20.7 J**	**317 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)																
1-Methylnaphthalene	5 U	4.99 U	5 U	**7.84**	**299 J**	**70.8 J**	**19.1**	**8.94**	5 U	4.98 U	5 U	**21.7**	**979**	5 U	**11.3**	**15.2**
2-Methylnaphthalene	1.1 U	**5.15**	1.1 U	**11.6**	**308 J**	**72.1 J**	**14.6**	**6.46**	1.1 U	**2.68 J**	**1.22 J**	**23.1**	**2140**	**2.83 J**	**10.3**	**11.5**
Acenaphthene	0.57 U	0.57 U	0.57 U	**10.5**	**1700**	**107**	**45.5**	**18.9**	5 U	4.98 UJ	0.57 UJ	**21.6**	**368**	**3.47 J**	**19.8**	**76.2**
Anthracene	**1.43 J**	**4.51 J**	**0.96 J**	**47.2**	**2620**	**349**	**72.3**	**48.9**	**10.9**	**16.4**	**14.8**	**31**	**262**	**11.2**	**61.1**	**109**
Benzo(a)anthracene	**9.58**	**8.64**	**2.07 J**	**133**	**6110**	**791**	**229**	**138**	**59.5**	**81.1**	**50.3**	**113**	**6070**	**43**	**211**	**224**
Benzo(a)pyrene	**40.3**	**7.83**	**2.65 J**	**163**	**6430**	**881**	**225**	**139**	**68.7**	**105**	**67.9**	**238**	**13900**	**68.1**	**235**	**239**
Benzo(b)fluoranthene	**50.6**	**10.9**	**3.25 J**	**169**	**4330**	**642**	**164**	**95.8**	**138**	**185**	**158**	**186**	**10200**	**67.8**	**143**	**176**
Benzo(k)fluoranthene	**23.8**	**5.19**	**1.81 J**	**91.4**	**2890**	**410**	**112**	**59.7**	**68.4**	**90.6**	**77.1**	**127**	**6700**	**40.7**	**96**	**118**
2-Chloronaphthalene	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U	8 U	8 U	7.9 U	8 U	7.9 U	8 U	7.9 U	7.9 U
Chrysene	**19.6**	**19.3**	**4.7 J**	**188**	**7230**	**962**	**270**	**149**	**125**	**166**	**113**	**291**	**18300**	**73.5**	**277**	**272**
Dibenzo(a,h)anthracene	**24.8**	**1.29 J**	0.89 U	**54.6**	**1250**	**153**	**42.8**	**23.4**	**18.1**	**27.5**	**21.8**	**43.5**	**2450**	**20.1**	**43.4**	**46.7**
Fluoranthene	**13**	**49**	**10.1**	**194**	**13600**	**1800**	**427**	**281**	**113**	**152 J**	**72.4 J**	**603**	**41400**	**100**	**378**	**494**
Fluorene	0.63 U	**1.69 J**	0.63 U	**14.8**	**1380**	**150**	**42.1**	**29.7**	**1.55 J**	**2.6 J**	**1.14 J**	**36.3**	**2780**	**3.43 J**	**25.6**	**45.3**
Indeno(1,2,3-c,d)pyrene	**187**	**10.4**	**2.69 J**	**183**	**3840**	**554**	**141**	**82**	**53.6**	**73.7**	**55.7**	**168**	**10300**	**55.3**	**130**	**144**
Naphthalene	**12.2**	**35.6**	**6.6**	**19.7**	**360 J**	**117 J**	**17.9**	**5.43**	1.27 U	**2.39 J**	**2.15 J**	**40.3**	**3960**	**5.54**	**16.1**	**18.2**
Pyrene	**16.1**	**60.7**	**12**	**312**	**16600**	**1970**	**687**	**389**	**76.9**	**116**	**96.8**	**713**	**47100**	**144**	**671**	**646**
Total Benzofluoranthenes	**97.1**	**20.9**	**6.46**	**334**	**9400**	**1400**	**370**	**203**	**259**	**344**	**291**	**410**	**22000**	**140**	**317**	**384**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)																
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**70.1**	**11.7**	**3.7**	**228**	**8340**	**1100**	**300**	**180**	**104**	**152**	**105**	**305**	**18000**	**91.5**	**300**	**313**
Total cPAH TEQ (ND=0)[a]	**70.1**	**11.7**	**3.7**	**228**	**8340**	**1100**	**300**	**180**	**104**	**152**	**105**	**305**	**18000**	**91.5**	**300**	**313**
Phenols (µg/kg)																
2,4,5-Trichlorophenol	25.7 U	25.7 U	25.6 U	25.7 U	25.6 U	25.6 U	25.6 U	25.6 U	25.8 U	25.7 U	25.6 U	25.8 U	25.7 U	25.7 U	25.6 U	25.6 U
2,4,6-Trichlorophenol	9 U	9 U	8.9 U	9 U	8.9 U	8.9 U	8.9 U	8.9 U	9 U	9 U	8.9 U	9 U	9 U	9 U	8.9 U	8.9 U
2,4-Dichlorophenol	15.3 U	15.3 U	15.2 U	15.3 U	15.2 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.2 U	15.3 U
2,4-Dinitrophenol	33.7 U	33.7 U	33.6 U	33.7 U	33.6 U	33.7 U	33.7 U	33.7 U	33.8 U	33.8 U	33.7 U	33.8 U	33.7 U	33.8 U	33.6 U	33.7 U
2-Chlorophenol	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.9 U	13.8 U	13.8 U	13.9 U	13.8 U	13.8 U	13.8 U	13.8 U
4,6-Dinitro-2-methylphenol	37.9 U	37.9 U	37.7 U	37.9 U	37.8 U	37.8 U	37.8 U	37.8 U	38 U	37.9 U	37.8 U	38 U	37.9 U	38 U	37.8 U	37.8 U
4-Chloro-3-Methylphenol	12.4 U	12.4 U	12.3 U	12.4 U	12.3 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.3 U	12.4 U
2,4-Dimethylphenol	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	**135**	3.8 U	3.8 U	3.8 U
2-Methylphenol (o-Cresol)	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	6.7 U	6.7 U	6.6 U	6.7 U	**115**	6.7 U	6.6 U	6.6 U
4-Methylphenol (p-Cresol)	7.4 U	7.4 U	7.3 U	7.4 U	**13.8 J**	**10.6 J**	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	**11.3 J**	**387**	7.4 U	7.4 U	7.4 U
Pentachlorophenol	31.2 U	31.2 U	31.1 U	31.2 U	31.1 U	31.1 U	31.1 U	31.1 U	31.3 U	31.2 U	31.1 U	31.3 U	31.2 U	31.2 U	31.1 U	31.1 U
Phenol	4.4 U	**25.1**	**4.7 J**	**8.8 J**	**18.6 J**	**14.7 J**	**5.1 J**	4.4 U	4.4 U	**5.1 J**	4.4 UJ	**14.6 J**	**301**	**5.8 J**	**9.1 J**	**6.6 J**
Phthalates (µg/kg)																
bis(2-Ethylhexyl)phthalate	5.4 U	5.4 U	**10.1 J**	**21.4 J**	**42.8 J**	**57.6 J**	**43.9 J**	**14.8 J**	**27 J**	**163 J**	**65 J**	5.5 U	**281**	**36.1 J**	5.4 U	**50.4**
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U
Diethyl phthalate	49.9 U	49.9 U	**91.9**	19.7 U	49.7 UJ	19.6 UJ	49.8 U	49.8 U	19.7 U	19.7 UJ	49.8 UJ	50 U	49.9 U	50 U	19.6 U	49.8 U
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	**5.8 J**	4.4 UJ	4.4 U	4.4 U	4.4 U	4.4 U	**6.6 J**
Di-n-butyl phthalate	5.6 U	5.6 U	**6 J**	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 UJ	**9.5 J**	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Dioxin/Furans (ng/kg)																
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**277**	**9.65**	**0.897 J**	**30.1**	**55.6**	**50.3**	**19.0**	**0.634 J**	**61.9**	**364**	**327**	4.81 U	**2.03 J**	**30.8**	**13.6 J**	**27.2**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**287**	**419**	**379**	**918**	**1270**	**969**	**374**	**150**	**1230**	**3260**	**3080**	**322**	**62.0**	**4760**	**533 J**	**603**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**338**	**12.7**	2.41 U	**58.9**	**41.7**	**36.6**	**13.4**	2.44 U	**31.3**	**162**	**157**	**6.00**	**2.84**	**26.4**	**11.2**	**12.8**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**132**	**88.4**	**36.9**	**144**	**164**	**133**	**47.0**	**19.7**	**146**	**477**	**463**	**25.6**	**9.56**	**349**	**45.8**	**68.5**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**7.14**	2.37 U	**0.0883 J**	**3.40**	**3.07**	**2.89**	2.42 U	0.0487 U	2.37 U	**10.0 J**	**18.9 J**	2.40 U	**0.249 J**	2.27 U	**0.676 J**	2.43 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**102**	**5.09**	**0.542 J**	**9.33**	**8.26**	**8.23**	**4.24**	**0.159 J**	**2.89**	**16.7**	**20.2**	2.40 U	**0.887 J**	**4.77**	**5.09**	2.43 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**17.8**	**4.61**	**1.01 J**	2.50 U	**4.59**	**4.80**	2.42 U	**0.473 J**	2.37 U	**6.05**	**6.48**	2.40 U	**0.852 J**	**5.62**	**1.45 J**	2.43 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**22.4**	**2.91**	**0.248 J**	**7.75**	**6.71**	**6.61**	**2.84**	**0.150 J**	2.37 U	**11.9**	**14.8**	2.40 U	**0.920 J**	**8.41**	**3.72**	2.43 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**23.8**	**11.1**	**2.34 J**	**6.32**	**9.21**	**8.83**	**3.80**	**1.34 J**	**6.19**	**21.9**	**20.3**	2.40 U	**1.53 J**	**17.0**	**3.46**	**3.08**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**1.13 J**	2.37 U	**0.0685 J**	2.50 U	**0.546 J**	**0.493 J**	2.42 U	**0.0629 J**	2.37 U	**0.737 J**	**2.21 J**	2.40 U	**0.115 J**	2.27 U	**0.264 J**	2.43 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**18.6**	**9.07**	**3.13**	**4.27**	**5.72**	**5.91**	**4.52**	**2.17 J**	**4.47**	**13.1**	**13.4**	**1.93 J**	**1.20 J**	**42.7**	**5.43**	**2.13 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**36.8**	**4.85**	**0.485 J**	**4.29**	**6.60**	**7.18**	**3.11**	**0.299 J**	2.37 U	**4.58**	**7.64**	2.40 U	**1.40 J**	2.27 U	**7.71**	2.43 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**25.2**	**5.57**	**1.06 J**	2.50 U	**5.45**	**5.22**	**2.78**	**0.630 J**	2.37 U	**3.77**	**4.08**	2.40 U	**1.29 J**	**6.69**	**4.09**	2.43 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**9.67**	2.37 U	**0.190 J**	**7.74**	**7.09**	**6.82**	2.42 U	**0.115 J**	2.37 U	**11.4**	**12.4**	2.40 U	**0.789 J**	**9.68**	**2.96**	2.43 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**18.4**	**3.90**	**0.326 J**	**5.81**	**7.87**	**8.53**	**3.37**	**0.189 J**	2.37 U	**5.71**	**7.07**	2.40 U	**1.45 J**	**6.12**	**7.48**	2.43 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**43.1**	**9.06**	**0.770**	**4.45**	**10.2**	**11.0**	**5.13**	**0.511**	**2.33**	**16.0**	**18.1**	**1.75**	**2.66**	**2.81**	**19.5**	**1.70**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**10.9**	**1.40**	**0.257 J**	**0.425 J**	**1.91**	**2.24**	**0.787**	**0.238 J**	**0.416 J**	**0.690 J**	**0.820 J**	**0.442 J**	**0.630 J**	**1.30**	**2.17**	**0.302 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**71.5**	**13.9**	**2.76**	**10.1**	**17.6**	**17.5**	**7.82**	**1.69**	**6.23**	**23.7**	**25.5**	**3.55**	**3.44**	**24.3**	**13.7**	**4.23**
Total TCDD TEQ (ND=0)[b]	**71.5**	**13.6**	**2.74**	**8.63**	**17.6**	**17.5**	**7.45**	**1.67**	**4.16**	**23.7**	**25.5**	**1.22**	**3.44**	**24.1**	**13.7**	**2.00**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	HA-15-12to24	HA-16-0to12	HA-16-12to24	BH-HA-31-0to1	BH-HA-31-1to2	BH-HA-31-1to2-D	BH-HA-32-0to1	BH-HA-32-1to2	BH-HA-33-0to1	BH-HA-33-0to1-D	BH-HA-34-0to1	BH-HA-35-0to1	BH-HA-35-1to2	BH-HA-36-0to1
Location:	HA-15	HA-16	HA-16	HA-31	HA-31	HA-31	HA-32	HA-32	HA-33	HA-33	HA-34	HA-35	HA-35	HA-36
Sample Date:	2021-08-23	2021-08-23	2021-08-23	2022-09-14	2022-09-14	2022-09-14	2022-09-14	2022-09-14	2022-09-15	2022-09-15	2022-09-14	2022-09-13	2022-09-13	2022-09-13
Depth Interval:	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2	1 - 2	0 - 1	1 - 2	0 - 1	0 - 1	0 - 1	0 - 1	1 - 2	0 - 1
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:						Duplicate				Duplicate				
Analyte														
Metals (mg/kg)														
Arsenic	**14.9**	**6.66**	**5.46**	**8.29 J**	**8.11**	**8.04**	**5.56**	**3.61**	**6.86**	**6.34**	**8.37**	**9.92**	**10.1**	**9.09**
Cadmium	**0.45**	**0.28**	**0.18**	**0.49**	**0.30**	**0.33**	**0.18**	**0.25**	**0.33**	**0.34**	**0.20**	**0.57**	**0.28**	**1.04**
Chromium	**28.0**	**36.8**	**36.7**	**39.8 J-**	**44.3**	**47.4**	**75.1**	**88.9**	**50.0**	**51.9**	**52.5**	**51.8**	**49.2**	**17.0**
Chromium (VI)	--	**0.489 R**	--	--	--	--	--	--	--	--	--	--	--	--
Copper	**108**	**62.8**	**55.9**	**62.6**	**59.2**	**59.6**	**80.8**	**115**	**60.3**	**60.8**	**54.5**	**118**	**89.8**	**18.7**
Lead	**148**	**563**	**141**	**119**	**78.9**	**62.1**	**32.3**	**10.4**	**36.4**	**32.1**	**46.8**	**821**	**314**	**74.8**
Mercury	**0.153**	**0.739**	**0.0340**	**0.113**	**0.0539**	**0.0544**	**0.0783**	**0.0636**	**0.111**	**0.119**	**0.105**	**0.212**	**0.143**	**0.107**
Zinc	**105**	**174**	**83.7**	**138**	**114**	**103**	**95.0**	**93.4**	**99.6**	**97.0**	**71.2**	**265**	**141**	**232**
Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics (DRO)	**46.3**	**20.1**	**5.35**	**24.6**	**21.8**	**18.7**	**14.5**	2.85 U	**59.3**	**40.4**	**26.9**	**19.5**	**8.52**	**20.4**
Lube Oil	**225 J**	**76.1 J**	**15.5 J**	**181 J**	**114 J**	**99.3 J**	**78.8 J**	**32.8 J**	**181 J**	**139 J**	**204 J**	**124 J**	**51.7 J**	**147 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)														
1-Methylnaphthalene	**8.45**	5 U	0.4 U	5 U	4.99 U	4.96 U	**5.14**	5.19 U	4.99 U	4.96 U	4.96 U	**9.18**	**5.89**	4.96 U
2-Methylnaphthalene	**9.32**	**1.6 J**	1.11 U	4.5 U	4.5 U	4.5 U	**10.5 J**	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	**5.1 J**
Acenaphthene	**17.4**	5 U	0.57 U	5 U	4.99 U	4.96 U	4.99 U	0.59 U	5 U	5 U	4.96 U	**13.7**	4.7 U	**17.9**
Anthracene	**37.8**	**2.98 J**	0.87 U	**4.23 J**	**2.12 J**	**2.53 J**	**2.68 J**	0.9 UJ	**1.2 J**	**1.5 J**	**3.14 J**	**23.5 J-**	**9.29 J-**	**40.7 J-**
Benzo(a)anthracene	**102**	**31.9**	**2.25 J**	**22.5**	**17.3**	**13.8**	**17.9**	**4.4 J**	**5.99**	**5.85**	**12.7**	**88.5**	**80**	**193**
Benzo(a)pyrene	**118**	**24.1**	**2.43 J**	**27.6 J-**	**18.3 J-**	**15.4 J-**	**17.4 J-**	**3.76 J**	**8.67 J-**	**7.88 J-**	**17.3 J-**	**96.9 J-**	**76.1 J-**	**177 J-**
Benzo(b)fluoranthene	**84.3**	**34.7**	**3.47 J**	**39.7**	**28.3 J**	**15.2 J**	**55**	**12.7**	**17.8**	**19**	**23.5**	**87.2**	**55.6**	**157**
Benzo(k)fluoranthene	**50.4**	**16.7**	**1.76 J**	**19.6**	**13**	**8.03**	**16.8**	**4.22 J**	**5.56**	**5.95**	**11.2**	**49.7**	**36.5**	**92.8**
2-Chloronaphthalene	7.9 U	8 U	8 U	8 U	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U	8 U	7.9 U	7.9 U	8 U	7.9 U
Chrysene	**121**	**50.7**	**3.74 J**	**45.2**	**33.5**	**23.6**	**70.9**	**16.4**	**23.7**	**23.9**	**28**	**140**	**91.1**	**257**
Dibenzo(a,h)anthracene	**31.3**	**4.93 J**	0.89 U	**8.81**	**6.1 J**	**3.9 J**	**7.55**	**1.99 J**	**3.28 J**	**3.54 J**	**4.51 J**	**19**	**15.1**	**43.1**
Fluoranthene	**194**	**64.7**	**4.04 J**	**77.6**	**58.6**	**40.9**	**255**	**58.3**	**52.3**	**55.3**	**85.2**	**222**	**107**	**303**
Fluorene	**17.2**	**0.86 J**	0.63 U	5 U	4.99 U	5 U	4.99 U	0.65 U	5 U	5 U	4.96 U	**9.09**	4.68 U	**10**
Indeno(1,2,3-c,d)pyrene	**96.1**	**21.3**	**2.77 J**	**32.5**	**22.7**	**15.6**	**45.6**	**11.2**	**22.1**	**22**	**23.6**	**83.4**	**53**	**155**
Naphthalene	**23**	**3.2 J**	1.28 U	**21.4**	**12**	**10.2**	**75.3**	**19.7**	**28.9**	**30**	**39.2**	**29.3**	**12.2**	**11**
Pyrene	**292**	**54.2**	**3.21 J**	**61.3**	**45.4**	**33.1**	**53.1**	**12.5**	**16.1**	**17**	**38.8**	**217**	**96.2**	**370**
Total Benzofluoranthenes	**173**	**67.6**	**6.7**	**80.7**	**56.7**	**32.6**	**91.2**	**22.1**	**29.6**	**32.4**	**47.3**	**191**	**129**	**365**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)														
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**156**	**35.6**	**3.5**	**40.4**	**27.4**	**21.3**	**32.4**	**7.37**	**14.4**	**13.8**	**25.1**	**130**	**101**	**244**
Total cPAH TEQ (ND=0)[a]	**156**	**35.6**	**3.5**	**40.4**	**27.4**	**21.3**	**32.4**	**7.37**	**14.4**	**13.8**	**25.1**	**130**	**101**	**244**
Phenols (µg/kg)														
2,4,5-Trichlorophenol	25.7 U	25.7 U	25.8 U	25.8 U	25.6 U	25.6 U	25.6 U	25.7 U	25.6 U	25.7 U	25.6 U	25.5 U	25.7 U	25.6 U
2,4,6-Trichlorophenol	9 U	9 U	9 U	9 U	8.9 U	8.9 U	8.9 U	9 U	8.9 U	9 U	8.9 U	8.9 U	9 U	8.9 U
2,4-Dichlorophenol	15.3 U	15.3 U	15.3 U	15.3 U	15.2 U	15.2 U	15.2 U	15.3 U	15.2 U	15.3 U	15.2 U	15.2 U	15.3 U	15.3 U
2,4-Dinitrophenol	33.7 U	33.8 U	33.8 U	33.8 UJ	33.6 UJ	33.6 UJ	33.6 UJ	33.7 UJ	33.6 UJ	33.8 UJ	33.6 UJ	33.4 UJ	33.8 UJ	33.7 UJ
2-Chlorophenol	13.8 U	13.8 U	13.9 U	13.9 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.7 U	13.8 U	13.8 U
4,6-Dinitro-2-methylphenol	37.9 U	38 U	38 U	38 U	37.8 U	37.8 U	37.8 U	37.9 U	37.8 U	38 U	37.8 U	37.6 U	37.9 U	37.8 U
4-Chloro-3-Methylphenol	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.3 U	12.3 U	12.4 U	12.3 U	12.4 U	12.3 U	12.3 U	12.4 U	12.4 U
2,4-Dimethylphenol	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.7 U	3.8 U	3.8 U
2-Methylphenol (o-Cresol)	6.6 U	6.7 U	6.7 U	6.7 U	6.6 U	6.6 U	6.6 U	6.6 U	6.6 U	6.7 U	6.6 U	6.6 U	6.7 U	6.6 U
4-Methylphenol (p-Cresol)	**42.9**	7.4 U	7.4 U	7.4 U	7.4 U	7.3 U	7.3 U	7.4 U	7.4 U	7.4 U	7.4 U	7.3 U	7.4 U	7.4 U
Pentachlorophenol	31.2 U	31.2 U	31.3 U	31.3 U	31.1 U	31.1 U	31.1 U	31.2 U	31.1 U	31.2 U	31.1 U	30.9 U	31.2 U	31.1 U
Phenol	**49.2**	4.4 U	4.4 U	**28.4**	**13.2 J**	4.4 UJ	4.4 U	4.4 U	4.4 UJ	**16.5 J**	**21**	**18.8 J**	4.4 U	**16.5 J**
Phthalates (µg/kg)														
bis(2-Ethylhexyl)phthalate	5.4 U	**524**	**7.4 J**	5.5 U	5.4 U	5.4 U	5.4 U	5.4 U	**20.4 J**	5.5 UJ	**24.3 J**	5.4 U	5.5 U	**17.5 J**
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.3 U	9.4 U	**12.9 J**
Diethyl phthalate	49.9 U	**257**	19.7 U	19.7 UJ	19.6 UJ	19.6 UJ	19.6 UJ	19.7 UJ	19.6 UJ	19.7 UJ	19.6 UJ	19.5 UJ	19.7 UJ	19.6 UJ
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.3 U	4.4 U	4.4 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.5 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.3 U	4.4 U	4.4 U
Dioxin/Furans (ng/kg)														
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**42.4**	**12.1**	**1.97 J**	**10.2 J**	4.78 UJ	4.85 UJ	**5.37 J**	4.94 UJ	**18.8 J**	**20.9 J**	24.6 UJ	**26.3 J**	**8.41 J**	**9.12 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**657**	**249**	**184**	**299 J**	**376 J**	**416 J**	**321 J**	**116 J**	**1640 J**	**1480 J**	**6830 J**	**587 J**	**299 J**	**989 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**18.0**	**19.7**	**4.02**	**5.89 J**	**2.58 J**	**2.63 J**	**3.97 J**	2.47 UJ	**7.83 J**	**7.87 J**	**5.80 J**	**22.0 J**	**7.72 J**	**14.6 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**82.4**	**44.3**	**24.6**	**37.2 J**	**28.5 J**	**33.7 J**	**43.7 J**	**13.9 J**	**110 J**	**102 J**	**185 J**	**100 J**	**41.5 J**	**107 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.09 J**	**2.43**	**0.483 J**	**0.560 J**	**0.240 J**	**0.278 J**	**0.460 J**	**0.119 J**	**0.672 J**	**0.669 J**	**0.486 J**	**2.22 J**	**0.828 J**	**0.985 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**1.77 J**	**10.9**	**2.22 J**	2.48 UJ	2.39 UJ	2.43 UJ	2.45 UJ	2.47 UJ	2.43 UJ	2.47 UJ	2.46 UJ	**7.36 J**	**3.10 J**	**5.61 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.963 J**	**3.39**	**1.10 J**	**1.58 J**	**0.900 J**	**1.04 J**	**3.47 J**	**1.01 J**	**3.12 J**	**2.82 J**	**3.17 J**	**6.18 J**	**2.52 J**	**3.66 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.29 J**	**11.2**	**1.97 J**	**1.06 J**	**0.514 J**	**0.529 J**	**1.35 J**	**0.393 J**	**1.95 J**	**1.88 J**	**1.28 J**	**8.02 J**	**3.20 J**	**4.79 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.44**	**5.90**	**2.11 J**	**2.95 J**	**1.73 J**	**1.96 J**	**5.49 J**	**1.50 J**	**6.03 J**	**5.59 J**	**6.19 J**	**10.9 J**	**4.82 J**	**6.16 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.155 J**	2.41 U	**0.219 J**	**0.119 J**	0.0478 UJ	**0.0562 J**	**0.140 J**	0.0494 UJ	**0.154 J**	**0.176 J**	**0.0940 J**	**0.617 J**	**0.257 J**	**0.302 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.90 J**	**10.3**	**3.00**	**2.74 J**	**1.69 J**	**2.01 J**	**4.80 J**	**1.49 J**	**6.17 J**	**4.98 J**	**7.52 J**	**9.50 J**	**4.70 J**	**6.48 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**1.12 J**	**17.7**	**3.39**	2.48 UJ	2.39 UJ	2.43 UJ	**2.81 J**	2.47 UJ	**4.75 J**	**4.65 J**	2.46 UJ	**11.0 J**	**5.48 J**	**8.00 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.855 J**	**6.44**	**1.76 J**	2.48 UJ	2.39 UJ	2.43 UJ	**4.64 J**	2.47 UJ	**4.37 J**	**3.74 J**	**2.77 J**	**9.31 J**	**4.06 J**	**3.27 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.33 J**	**10.3**	**1.80 J**	**0.913 J**	**0.450 J**	**0.484 J**	**0.981 J**	**0.277 J**	**1.42 J**	**1.52 J**	**1.18 J**	**8.58 J**	**3.21 J**	**4.75 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**1.21 J**	**23.0**	**3.84**	**1.61 J**	**0.877 J**	**0.853 J**	**2.65 J**	**0.783 J**	**4.75 J**	**4.37 J**	**2.38 J**	**13.4 J**	**5.33 J**	**9.80 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**1.36**	**31.0**	**5.27**	**3.84 J**	**2.03 J**	**1.74 J**	**9.39 J**	**2.62 J**	**15.1 J**	**14.8 J**	**5.65 J**	**24.4 J**	**9.87 J**	**28.2 J**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.259 J**	**2.56**	**0.719 J**	**0.701 J**	**0.370 J**	**0.457 J**	**2.34 J**	**0.734 J**	**2.47 J**	**2.22 J**	**1.18 J**	**3.91 J**	**1.33 J**	**1.77 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**3.96**	**25.6**	**5.85**	**4.43**	**3.14**	**3.36**	**11.1**	**3.28**	**13.6**	**12.3**	**11.3**	**26.6**	**10.9**	**15.7**
Total TCDD TEQ (ND=0)[b]	**3.96**	**25.5**	**5.85**	**3.03**	**1.79**	**1.99**	**11.0**	**1.87**	**13.5**	**12.1**	**11.1**	**26.6**	**10.9**	**15.7**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-HA-37-0to1	BH-HA-37-1to2	BH-HA-37-2to2.9	BH-HA-38-0to1	BH-HA-38-0to1-D	BH-HA-38-0to1	BH-HA-38-1to2	BH-HA-38-1to2	BH-HA-39-0to1	BH-HA-39-0to1	BH-HA-39-1to2	BH-HA-39-1to2	BH-HA-40-0to1	BH-HA-40-0to1
Location:	HA-37 (2022)	HA-37 (2022)	HA-37 (2023)	HA-38	HA-38	HA-38	HA-38	HA-38	HA-39	HA-39	HA-39	HA-39	HA-40	HA-40
Sample Date:	2022-09-13	2022-09-13	2023-12-14	2022-09-15	2022-09-15	2022-10-06	2022-09-15	2022-10-06	2022-09-15	2022-10-06	2022-09-15	2022-10-06	2022-09-15	2022-10-06
Depth Interval:	0 - 1	1 - 2	2 - 2.9	0 - 1	0 - 1	0 - 1	1 - 2	1 - 2	0 - 1	0 - 1	1 - 2	1 - 2	0 - 1	0 - 1
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:					Duplicate									
Analyte														
Metals (mg/kg)														
Arsenic	**15.9**	**14.1**	**10.2**	--	**4.06**	**6.10**	--	**5.46**	--	**4.43**	--	**2.54**	--	**9.54**
Cadmium	**0.53**	**0.29**	**0.06 J**	--	**0.26**	**0.42**	--	**0.22**	--	**0.18**	--	0.04 U	--	**0.68**
Chromium	**31.2**	**41.4**	**9.87**	--	**54.3**	**44.9**	--	**42.5**	--	**31.5**	--	**27.2**	--	**30.8**
Chromium (VI)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	**94.9**	**87.1**	**26.8**	--	**40.6**	**33.1**	--	**34.7**	--	**22.3**	--	**20.3**	--	**37.9**
Lead	**242**	**140**	**29.8**	--	**16.4**	**21.0**	--	**11.7**	--	**16.0**	--	**7.35**	--	**45.8**
Mercury	**0.108**	**0.138**	**0.0352**	--	--	**0.0908**	--	**0.0513**	--	**0.0728**	--	**0.0513**	--	**0.213**
Zinc	**184**	**125**	**50.6**	--	**103**	**138**	--	**120**	--	**137**	--	**43.1**	--	**184**
Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics (DRO)	**165**	**93.4**	**40.1**	--	--	**32.8**	--	**21.4**	--	**31.2**	--	3.17 U	--	**84.6**
Lube Oil	**1820 J**	**875 J**	**803 J**	--	--	**104 J**	--	**45.6 J**	--	**101 J**	--	**27.4 J**	--	**159 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)														
1-Methylnaphthalene	**13.4**	**8.28**	14.8 U	--	--	**3.53 J**	--	**0.67 J**	--	1.2 U	--	0.4 U	--	**2.03 J**
2-Methylnaphthalene	**35.6**	**16.6 J**	4.5 U	--	--	4.5 U	--	4.5 U	--	4.5 U	--	4.5 U	--	4.5 U
Acenaphthene	**26**	**12**	**9.57 J**	--	--	1.71 U	--	0.57 U	--	1.71 U	--	0.57 U	--	1.71 U
Anthracene	**39.1 J-**	**21.8 J-**	**11.4 J**	--	--	2.61 U	--	0.87 U	--	2.61 U	--	0.87 U	--	**4.56 J**
Benzo(a)anthracene	**133**	**85.6**	**35**	--	--	2.47 U	--	**1.08 J**	--	**2.99 J**	--	0.82 U	--	**6.66 J**
Benzo(a)pyrene	**147 J-**	**102 J-**	**28.1**	--	--	15 U	--	5 U	--	15 U	--	0.61 U	--	15 U
Benzo(b)fluoranthene	**144**	**109**	**29.3**	--	--	15 U	--	5 U	--	15 U	--	1.37 U	--	**32.3**
Benzo(k)fluoranthene	**81**	**56.4**	**17.5**	--	--	2.28 U	--	**1.15 J**	--	**4.52 J**	--	0.76 U	--	**11.6 J**
2-Chloronaphthalene	7.9 U	8 U	7.9 U	--	--	8 U	--	8 U	--	7.9 U	--	8 U	--	8 U
Chrysene	**222**	**145**	**46.8**	--	--	**7.71 J**	--	**3.36 J**	--	**14.3 J**	--	1.05 U	--	**38.4**
Dibenzo(a,h)anthracene	**33.9**	**25.2**	**8.34 J**	--	--	2.67 U	--	0.89 U	--	2.67 U	--	0.89 U	--	**5.01 J**
Fluoranthene	**315**	**203**	**44.6**	--	--	**12.2 J**	--	**5.89**	--	**43.9**	--	**1.39 J**	--	**160**
Fluorene	**16.6**	**8.8**	**8.83 J**	--	--	1.89 U	--	0.63 U	--	1.89 U	--	0.63 U	--	1.89 U
Indeno(1,2,3-c,d)pyrene	**193**	**134**	**21.4**	--	--	15 U	--	5 U	--	15 U	--	1.05 U	--	**36.7**
Naphthalene	**98.2**	**64.1**	14.8 U	--	--	**6.1 J**	--	**1.96 J**	--	**11.1 J**	--	1.27 U	--	**31.1**
Pyrene	**374**	**216**	**87.9**	--	--	**5.31 J**	--	**2.68 J**	--	**7.17 J**	--	**1.8 J**	--	**20.1**
Total Benzofluoranthenes	**317**	**230**	**61.4**	--	--	**15 U**	--	**6.15**	--	**19.5**	--	**4.99 U**	--	**51.4**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)														
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**208**	**144**	**39.7**	--	--	**9.45**	--	**3.3**	--	**10**	--	4.99 U	--	**17.1**
Total cPAH TEQ (ND=0)[a]	**208**	**144**	**39.7**	--	--	**0.0771**	--	**0.26**	--	**0.894**	--	4.99 U	--	**9.61**
Phenols (µg/kg)														
2,4,5-Trichlorophenol	25.7 U	25.7 U	25.6 U	--	--	25.8 U	--	25.8 U	--	25.7 U	--	25.7 U	--	25.7 U
2,4,6-Trichlorophenol	9 U	9 U	8.9 U	--	--	9 U	--	9 U	--	9 U	--	9 U	--	9 U
2,4-Dichlorophenol	15.3 U	15.3 U	15.2 U	--	--	15.3 U	--	15.3 U	--	15.3 U	--	15.3 U	--	15.3 U
2,4-Dinitrophenol	33.7 UJ	33.8 UJ	33.6 UJ	--	--	33.8 UJ	--	33.8 UJ	--	33.7 UJ	--	33.8 UJ	--	33.8 UJ
2-Chlorophenol	13.8 U	13.8 U	13.8 U	--	--	13.9 U	--	13.9 U	--	13.8 U	--	13.8 U	--	13.8 U
4,6-Dinitro-2-methylphenol	37.9 U	38 U	37.8 UJ	--	--	38 UJ	--	38 UJ	--	37.9 UJ	--	37.9 UJ	--	38 UJ
4-Chloro-3-Methylphenol	12.4 U	12.4 U	12.3 U	--	--	12.4 U	--	12.4 U	--	12.4 U	--	12.4 U	--	12.4 U
2,4-Dimethylphenol	3.8 U	3.8 U	8.9 UJ	--	--	3.8 U	--	3.8 U	--	3.8 U	--	3.8 U	--	3.8 U
2-Methylphenol (o-Cresol)	**13.9 J**	**8.8 J**	6.6 U	--	--	6.7 UJ	--	6.7 UJ	--	6.6 UJ	--	6.7 UJ	--	6.7 UJ
4-Methylphenol (p-Cresol)	**36.4**	**9.2 J**	7.4 U	--	--	7.4 U	--	7.4 U	--	7.4 U	--	7.4 U	--	7.4 U
Pentachlorophenol	31.2 U	31.2 U	31.1 UJ	--	--	31.3 UJ	--	31.3 UJ	--	31.2 UJ	--	31.2 UJ	--	31.2 UJ
Phenol	4.4 U	4.4 U	4.4 U	--	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U
Phthalates (µg/kg)														
bis(2-Ethylhexyl)phthalate	**19.6 J**	**22.3 J**	14 U	--	--	5.5 U	--	5.5 U	--	5.4 U	--	5.5 U	--	5.5 U
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	--	--	9.4 U	--	9.4 U	--	9.4 U	--	9.4 U	--	9.4 U
Diethyl phthalate	19.7 UJ	19.7 UJ	19.6 U	--	--	19.7 U	--	50 U	--	49.9 U	--	19.7 U	--	50 U
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	--	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	--	--	5.6 U	--	5.6 U	--	5.6 U	--	5.6 U	--	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	--	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U
Dioxin/Furans (ng/kg)														
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**69.8 J**	**50.9 J**	**3.48 J**	**2.24 J**	4.72 U	--	**0.965 J**	--	**1.53 J**	--	4.79 U	--	**3.30 J**	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**2370 J**	**2710 J**	**2640**	**126**	**155**	--	**61.2**	--	**5320**	--	**3600**	--	**118**	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**265 J**	**221 J**	**14.4**	**1.96 J**	2.36 U	--	**0.688 J**	--	**0.233 J**	--	2.39 U	--	**2.64**	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**339 J**	**307 J**	**153**	**19.3**	**20.7**	--	**8.27**	--	**273**	--	**217**	--	**25.2**	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**15.9 J**	**12.4 J**	**0.558 J**	**0.194 J**	**0.183 J**	--	**0.182 J**	--	**0.0606 J**	--	0.0479 UJ	--	**0.276 J**	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**105 J**	**95.1 J**	**5.92**	**0.689 J**	**0.734 J**	--	**0.382 J**	--	**0.107 J**	--	0.0479 UJ	--	**1.04 J**	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**24.0 J**	**21.4 J**	**4.65**	**1.07 J**	**1.22 J**	--	**0.483 J**	--	**2.21 J**	--	**1.92 J**	--	**2.17 J**	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**93.6 J**	**85.1 J**	**5**	**0.643 J**	**0.665 J**	--	**0.334 J**	--	**0.0921 J**	--	0.0479 UJ	--	**1.10 J**	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**31.3 J**	**27.0 J**	**7.51**	**1.71 J**	2.36 U	--	**0.703 J**	--	**4.92 J**	--	**5.41**	--	**3.21**	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**4.89 J**	**4.52 J**	0.514 U	0.0598 U	**0.0509 J**	--	**0.146 J**	--	**0.0583 J**	--	0.0479 UJ	--	**0.0800 J**	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**29.5 J**	**25.4 J**	**10.1**	**1.44 J**	**1.68 J**	--	**0.681 J**	--	**6.90 J**	--	**9.96**	--	**2.59 J**	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**147 J**	**165 J**	**8.15**	**1.46 J**	2.36 U	--	**0.594 J**	--	**0.202 J**	--	2.39 U	--	**2.40 J**	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**42.6 J**	**42.8 J**	**3.57**	**1.14 J**	**1.40 J**	--	**0.527 J**	--	**0.915 J**	--	**0.828 J**	--	**2.80**	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**70.4 J**	**60.6 J**	**4.46**	**0.491 J**	**0.540 J**	--	**0.306 J**	--	**0.0847 J**	--	0.0479 UJ	--	**0.907 J**	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**143 J**	**154 J**	**9.45**	**1.36 J**	**1.53 J**	--	**0.550 J**	--	**0.176 J**	--	0.0479 UJ	--	**2.42 J**	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**297 J**	**347 J**	**14.5**	**3.65**	**3.77**	--	**1.08**	--	**0.412 J**	--	**0.119 J**	--	**6.03**	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**28.9 J**	**32.5 J**	**1.56**	**0.493 J**	**0.387 J**	--	**0.163 J**	--	**0.216 J**	--	**0.199 J**	--	**1.28**	--
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**191**	**199**	**20**	**3.31**	**3.53**	--	**1.39**	--	**7.00**	--	**6.08**	--	**6.91**	--
Total TCDD TEQ (ND=0)[b]	**191**	**199**	**20**	**3.31**	**3.37**	--	**1.39**	--	**7.00**	--	**6.02**	--	**6.91**	--

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-HA-40-1to2	BH-HA-40-1to2	BH-HA-41-0to1	BH-HA-41-0to1	BH-HA-41-1to2	BH-HA-41-1to2	BH-HA-42-0to1	BH-HA-42-0to1	BH-HA-42-1to2	BH-HA-42-1to2	BH-HA-43-0to1	BH-HA-43-0to1	BH-HA-43-1to2	BH-HA-43-1to2-D
Location:	HA-40	HA-40	HA-41	HA-41	HA-41	HA-41	HA-42	HA-42	HA-42	HA-42	HA-43	HA-43	HA-43	HA-43
Sample Date:	2022-09-15	2022-10-06	2022-09-15	2022-10-06	2022-09-15	2022-10-06	2022-09-13	2022-10-06	2022-09-13	2022-10-06	2022-09-22	2022-10-06	2022-09-22	2022-09-22
Depth Interval:	1 - 2	1 - 2	0 - 1	0 - 1	1 - 2	1 - 2	0 - 1	0 - 1	1 - 2	1 - 2	0 - 1	0 - 1	1 - 2	1 - 2
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:														Duplicate
Analyte														
Metals (mg/kg)														
Arsenic	--	**5.50**	--	**7.32**	--	**3.27**	--	**9.67**	--	**13.9**	--	**17.0**	--	**16.1 J**
Cadmium	--	**0.48**	--	**0.38**	--	**0.11**	--	**0.72**	--	**0.54**	--	**0.40**	--	**0.10 J**
Chromium	--	**38.6**	--	**51.1**	--	**46.6**	--	**26.1**	--	**19.6**	--	**16.0**	--	**19.4**
Chromium (VI)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	**27.3**	--	**48.0**	--	**55.6**	--	**35.3**	--	**20.1**	--	**19.8**	--	**19.0**
Lead	--	**21.8**	--	**25.8**	--	**8.37**	--	**216**	--	**51.4**	--	**26.1**	--	**10.6**
Mercury	--	**0.102**	--	**0.0953**	--	**0.0493**	--	**0.0848**	--	**0.0665**	--	**0.0892 J**	--	--
Zinc	--	**163**	--	**84.1**	--	**76.4**	--	**142**	--	**82.1**	--	**65.4**	--	**55.4**
Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics (DRO)	--	**41.4**	--	**37.9**	--	**19.2**	--	**8.54**	--	2.67 U	--	**64.9**	--	--
Lube Oil	--	**76.3 J**	--	**101 J**	--	**43.8 J**	--	**81.7 J**	--	**31.6 J**	--	**274 J**	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)														
1-Methylnaphthalene	--	1.2 U	--	**1.71 J**	--	1.2 U	--	1.2 U	--	0.4 U	--	**1.83 J**	--	--
2-Methylnaphthalene	--	4.5 U	--	**13.8 J**	--	4.5 U	--	4.5 U	--	4.5 U	--	**6.4 J**	--	--
Acenaphthene	--	1.71 U	--	1.71 U	--	1.71 U	--	1.71 U	--	0.57 U	--	1.71 U	--	--
Anthracene	--	2.61 U	--	**3.7 J**	--	2.6 U	--	2.61 U	--	0.87 U	--	**3.22 J**	--	--
Benzo(a)anthracene	--	**3.74 J**	--	**5.03 J**	--	2.46 U	--	**3.13 J**	--	**1.78 J**	--	**6.37 J**	--	--
Benzo(a)pyrene	--	15 U	--	15 U	--	15 U	--	15 U	--	5 U	--	15 U	--	--
Benzo(b)fluoranthene	--	15 U	--	**17.4**	--	15 U	--	15 U	--	4.97 U	--	15 U	--	--
Benzo(k)fluoranthene	--	**4.51 J**	--	**7.85 J**	--	**4.01 J**	--	**2.75 J**	--	0.76 U	--	**8.91 J**	--	--
2-Chloronaphthalene	--	8 U	--	8 U	--	7.9 U	--	8 U	--	7.9 U	--	8 U	--	--
Chrysene	--	**14.5 J**	--	**26**	--	**11.6 J**	--	**7.75 J**	--	**2.29 J**	--	**19**	--	--
Dibenzo(a,h)anthracene	--	2.67 U	--	2.67 U	--	2.66 U	--	2.67 U	--	0.89 U	--	**2.74 J**	--	--
Fluoranthene	--	**51.8**	--	**116**	--	**40.7**	--	**9.35 J**	--	**2.75 J**	--	**56**	--	--
Fluorene	--	1.89 U	--	1.89 U	--	1.89 U	--	1.89 U	--	0.63 U	--	1.89 U	--	--
Indeno(1,2,3-c,d)pyrene	--	**16.1**	--	15 U	--	15 U	--	15 U	--	4.97 U	--	15 UJ	--	--
Naphthalene	--	**9.19 J**	--	**37.6**	--	**12.6 J**	--	**7.06 J**	--	**1.98 J**	--	**19.5**	--	--
Pyrene	--	**9.36 J**	--	**13.2 J**	--	**7.25 J**	--	**6.45 J**	--	**1.93 J**	--	**18.7**	--	--
Total Benzofluoranthenes	--	**19.5**	--	**32.8**	--	**19**	--	**17.7**	--	**4.97 U**	--	**23.9**	--	--
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)														
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	--	**11**	--	**11.7**	--	**9.77**	--	**9.8**	--	**3.3**	--	**11**	--	--
Total cPAH TEQ (ND=0)[a]	--	**2.58**	--	**3.29**	--	**0.517**	--	**0.665**	--	**0.2**	--	**1.99**	--	--
Phenols (µg/kg)														
2,4,5-Trichlorophenol	--	25.7 U	--	25.8 U	--	25.7 U	--	25.7 U	--	25.7 U	--	25.8 U	--	--
2,4,6-Trichlorophenol	--	9 U	--	9 U	--	9 U	--	9 U	--	9 U	--	9 U	--	--
2,4-Dichlorophenol	--	15.3 U	--	15.3 U	--	15.3 U	--	15.3 U	--	15.3 U	--	15.3 U	--	--
2,4-Dinitrophenol	--	33.8 UJ	--	33.8 UJ	--	33.8 UJ	--	33.8 UJ	--	33.7 UJ	--	33.8 UJ	--	--
2-Chlorophenol	--	13.8 U	--	13.9 U	--	13.8 U	--	13.8 U	--	13.8 U	--	13.9 U	--	--
4,6-Dinitro-2-methylphenol	--	38 UJ	--	38 UJ	--	37.9 UJ	--	38 UJ	--	37.9 UJ	--	38 UJ	--	--
4-Chloro-3-Methylphenol	--	12.4 U	--	12.4 U	--	12.4 U	--	12.4 U	--	12.4 U	--	12.4 U	--	--
2,4-Dimethylphenol	--	3.8 U	--	3.8 U	--	3.8 U	--	3.8 U	--	3.8 U	--	3.8 U	--	--
2-Methylphenol (o-Cresol)	--	6.7 UJ	--	6.7 UJ	--	6.6 UJ	--	6.7 UJ	--	6.6 UJ	--	6.7 U	--	--
4-Methylphenol (p-Cresol)	--	7.4 U	--	7.4 U	--	7.4 U	--	7.4 U	--	7.4 U	--	7.4 U	--	--
Pentachlorophenol	--	31.2 UJ	--	31.3 UJ	--	31.2 UJ	--	31.2 UJ	--	31.2 UJ	--	31.3 UJ	--	--
Phenol	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	--
Phthalates (µg/kg)														
bis(2-Ethylhexyl)phthalate	--	5.5 U	--	5.5 U	--	5.5 U	--	5.5 U	--	5.4 U	--	5.5 U	--	--
Butylbenzyl phthalate	--	9.4 U	--	9.4 U	--	9.4 U	--	9.4 U	--	9.4 U	--	9.4 U	--	--
Diethyl phthalate	--	19.7 U	--	50 U	--	**127**	--	19.7 U	--	19.7 U	--	19.7 U	--	--
Dimethyl phthalate	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	--
Di-n-butyl phthalate	--	5.6 U	--	5.6 U	--	5.6 U	--	5.6 U	--	5.6 U	--	5.6 U	--	--
Di-n-octyl phthalate	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	4.4 U	--	--
Dioxin/Furans (ng/kg)														
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**0.630 J**	--	**7.83**	--	**2.06 J**	--	**2.07 J**	--	0.165 U	--	**2.43 J**	--	**0.838 J**	0.18 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**97.3**	--	**311**	--	**261**	--	**1530**	--	**1500**	--	**1270**	--	**1660**	**1580**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**0.563 J**	--	**5.38**	--	**1.39 J**	--	**2.01 J**	--	2.49 U	--	**1.66 J**	--	2.46 U	2.44 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**9.38**	--	**44.9**	--	**25.8**	--	**146**	--	**160**	--	**129**	--	**170**	**150**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**0.0542 J**	--	**0.508 J**	--	**0.104 J**	--	**0.273 J**	--	0.102 U	--	**0.209 J**	--	0.125 U	0.0867 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**0.239 J**	--	**1.88 J**	--	**0.472 J**	--	**0.918 J**	--	0.154 U	--	**0.697 J**	--	0.207 U	0.104 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.427 J**	--	**2.57**	--	**0.836 J**	--	**3.78**	--	**3.39**	--	**4.18**	--	**4.23**	**3.56**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.225 J**	--	**1.87 J**	--	**0.462 J**	--	**0.643 J**	--	0.15 U	--	**0.571 J**	--	0.192 U	0.0976 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.709 J**	--	**4.33**	--	**1.46 J**	--	**5.37**	--	**4.54**	--	**6.57**	--	**6.86**	**5.2**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.0486 U	--	**0.130 J**	--	0.0493 U	--	0.211 U	--	0.176 U	--	0.154 U	--	0.23 U	0.119 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.599 J**	--	**4.17 J**	--	**1.44 J**	--	**7.76**	--	**6.76**	--	**8.53**	--	**10.3**	**9.31**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**0.498 J**	--	**3.38**	--	**0.849 J**	--	**1.42 J**	--	0.151 U	--	**1.23 J**	--	**0.309 J**	**0.372 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.590 J**	--	**3.79**	--	**1.05 J**	--	**1.4 J**	--	**0.864 J**	--	**2.3 J**	--	**1.45 J**	**1.31 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.184 J**	--	**1.41 J**	--	**0.391 J**	--	**0.572 J**	--	0.145 U	--	**0.758 J**	--	0.219 U	0.107 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.497 J**	--	**3.79**	--	**1.07 J**	--	**1.53 J**	--	0.138 U	--	**1.44 J**	--	**0.419 J**	**0.399 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**1.23**	--	**8.27**	--	**2.02**	--	**2.71**	--	0.27 U	--	**3.13**	--	**0.85 J**	**0.813**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.279 J**	--	**1.51**	--	**0.435 J**	--	**0.741**	--	**0.464 J**	--	**1.04 J**	--	**0.715 J**	**0.606 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**1.53**	--	**9.60**	--	**2.89**	--	**6.8**	--	**4.9**	--	**8.0**	--	**6.8**	**5.9**
Total TCDD TEQ (ND=0)[b]	**1.52**	--	**9.60**	--	**2.89**	--	**6.8**	--	**4.8**	--	**7.9**	--	**6.7**	**5.9**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-HA-43-1to2	BH-HA-44-0to1	BH-HA-44-0to1-D	BH-HA-44-1to2	BH-HA-45-0to1	BH-HA-45-1to2	BH-HA-46-0to1	BH-HA-46-1to1.8	BH-HA-47-0to1	BH-HA-47-1to2	BH-HA-48-0to1	BH-HA-48-1to2	BH-HA-49-0to1	BH-HA-49-1to2
Location:	HA-43	HA-44	HA-44	HA-44	HA-45	HA-45	HA-46	HA-46	HA-47	HA-47	HA-48	HA-48	HA-49	HA-49
Sample Date:	2022-10-06	2023-12-13	2023-12-13	2023-12-13	2023-12-14	2023-12-14	2023-12-14	2023-12-14	2023-12-13	2023-12-13	2022-09-13	2022-09-13	2023-12-14	2023-12-14
Depth Interval:	1 - 2	0 - 1	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	1 - 1.8	0 - 1	1 - 2	0 - 1	1 - 2	0 - 1	1 - 2
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:			Duplicate											
Analyte														
Metals (mg/kg)														
Arsenic	**14.8**	**5.63**	**5.95**	**3.34**	**5.19**	**2.95**	**16.7**	**15.6**	**19.8**	**11.8**	**4.84**	**6.69**	**8.44**	**4.84**
Cadmium	**0.23**	**0.35**	**0.26**	**0.13**	**1.70**	**0.31**	**0.79**	**0.33 J-**	**0.14**	**0.10 J**	**0.22**	**0.27**	**0.42**	**0.19**
Chromium	**15.2**	**47.7**	**46.6**	**74.7**	**34.8**	**27.2**	**92.7**	**12.8**	**15.5**	**20.2**	**18.2**	**15.3**	**24.5**	**32.3**
Chromium (VI)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	**15.1**	**36.9**	**36.4**	**54.1**	**50.2**	**64.9**	**37.4**	**14.0**	**17.1**	**12.3**	**24.6**	**12.3**	**85.5**	**58.8**
Lead	**21.3**	**34.8**	**35.6**	**4.84**	**4360**	**408**	**23.9**	**18.0**	**20.0**	**5.96**	**38.7**	**7.20**	**776**	**347**
Mercury	**0.114**	**0.0824**	**0.132**	**0.0371**	**0.0438**	**0.0583**	**0.0538**	**0.0490**	**0.0986**	**0.0290**	**0.0540**	**0.0323**	**0.0233 J**	**0.0684**
Zinc	**57.9**	**102**	**108**	**74.5**	**1170**	**244**	**115**	**54.7**	**51.4**	**41.0**	**44.1**	**26.7**	**132**	**127**
Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics (DRO)	**47.5**	**16.6**	**12.3**	2.73 U	**7.32**	2.77 U	**12.5**	2.63 U	**6.50**	2.56 U	**8.43**	2.52 U	**20.1**	**11.1**
Lube Oil	**176 J**	**105 J**	**104 J**	3.49 UJ	**95.9 J**	**34.1 J**	**85.0 J**	**21.9 J**	**55.0 J**	**12.7 J**	**43.1 J**	**14.1 J**	**127 J**	**60.7 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)														
1-Methylnaphthalene	**1.3 J**	4.99 U	4.91 U	0.4 U	4.97 U	4.99 U	**14.1**	4.97 U	4.95 U	0.39 U	4.86 U	5 U	**7.62 J+**	5 U
2-Methylnaphthalene	**5.3 J**	4.1 U	**5.3 J**	4.4 U	4.3 U	4.1 U	**40.2**	4.3 U	4.5 U	4.5 U	4.5 U	4.5 U	**16.1 J**	**10.4 J**
Acenaphthene	1.71 U	**3.08 J**	**3.66 J**	0.57 U	**4.06 J**	0.57 U	**103**	**23.4**	**0.63 J**	0.56 U	4.86 U	5 U	**7.23**	**3.7 J**
Anthracene	**4.07 J**	**4.55 J**	**4.56 J**	0.86 U	**9.26**	**1.73 J**	**127**	**27.7**	**2.52 J**	0.86 U	**2.96 J**	**1.16 J**	**14.5**	**7.75**
Benzo(a)anthracene	**4.5 J**	**16.7**	**19.5**	**1.23 J**	**34.9**	**6.62**	**301**	**84.4**	**5.11**	0.81 U	**15.4**	**2.55 J**	**67.1**	**42.6**
Benzo(a)pyrene	15 U	**24.1**	**20.1**	**1.49 J**	**43.8**	**10.7**	**297**	**79.3**	**7.06**	**1.26 J**	**15.1 J-**	**1.95 J**	**70.7**	**47.4**
Benzo(b)fluoranthene	15 U	**15.2**	**15.9**	**1.69 J**	**63.3**	**11.5**	**169**	**50.3**	**6.5**	**1.54 J**	**20.8**	**3.93 J**	**58**	**34.8**
Benzo(k)fluoranthene	**7.08 J**	**9.37**	**10.5**	**1.27 J**	**30.4**	**5.3**	**119**	**33.7**	**3.2 J**	0.75 U	**10.5**	**2.03 J**	**30.8**	**20.2**
2-Chloronaphthalene	7.9 U	7.3 U	7.7 U	7.8 U	7.5 U	7.3 U	7.1 U	7.6 U	7.9 U	7.9 U	8 U	7.9 U	7.6 U	7.3 U
Chrysene	**16.3**	**21.5**	**23.1**	**1.54 J**	**57**	**10.1**	**324**	**85.4**	**8.46**	**1.45 J**	**24.8**	**5.18**	**91.7**	**49.6**
Dibenzo(a,h)anthracene	**3.25 J**	**4.33 J**	**5.26**	0.88 U	**15.2**	**4.15 J**	**38.9**	**11.8**	0.88 U	0.88 U	**4.81 J**	**0.92 J**	**13.4**	**9.35**
Fluoranthene	**54.4**	**37.5**	**49.2**	**2.51 J**	**52.2**	**10.4**	**498**	**120**	**18.2**	**3.41 J**	**40.6**	**7.68**	**107**	**57.4**
Fluorene	1.89 U	**2.16 J**	**2.7 J**	0.62 U	**2.53 J**	**0.84 J**	**73.1**	**15.9**	**0.65 J**	0.62 U	4.86 U	0.63 U	**5.4**	**2.49 J**
Indeno(1,2,3-c,d)pyrene	15 UJ	**23.1**	**18.8**	1.04 U	**101**	**18.6**	**153**	**41.5**	**5.15**	**1.22 J**	**19.5**	**3.55 J**	**50.4**	**36**
Naphthalene	**19**	**7.72 J+**	**6.62 J+**	1.26 U	**12.3 J+**	4.99 U	**63.9**	**6.53 J+**	**8.26 J+**	4.92 U	**5.9**	**2.86 J**	**30.8 J+**	**9.92 J+**
Pyrene	**15.8**	**50.4**	**50.9**	**7.2**	**97.5**	**17.9**	**906**	**189**	**18.9**	**2.7 J**	**40.4**	**6.75**	**185**	**96.5**
Total Benzofluoranthenes	**22.1**	**35.5**	**35.6**	**4.42**	**134**	**23.9**	**410**	**118**	**13.8**	**2.6**	**43**	**8.41**	**123**	**75.6**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)														
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**10.6**	**31.2**	**27.3**	**2**	**68.8**	**15.4**	**378**	**102**	**9.2**	**1.7**	**22.4**	**3.3**	**93.6**	**62.2**
Total cPAH TEQ (ND=0)[a]	**1.65**	**31.2**	**27.3**	**1.9**	**68.8**	**15.4**	**378**	**102**	**9.1**	**1.6**	**22.4**	**3.3**	**93.6**	**62.2**
Phenols (µg/kg)														
2,4,5-Trichlorophenol	25.7 U	23.6 U	24.9 U	25.2 U	24.3 U	23.5 U	22.9 U	24.7 U	25.6 U	25.5 U	25.7 U	25.5 U	24.7 U	23.6 U
2,4,6-Trichlorophenol	9 U	8.2 U	8.7 U	8.8 U	8.5 U	8.2 U	8 U	8.6 U	8.9 U	8.9 U	9 U	8.9 U	8.6 U	8.2 U
2,4-Dichlorophenol	15.3 U	14 U	14.8 U	15 U	14.5 U	14 U	13.6 U	14.7 U	15.3 U	15.2 U	15.3 U	15.2 U	14.7 U	14.1 U
2,4-Dinitrophenol	33.7 UJ	31 UJ	32.7 UJ	33.1 UJ	32 UJ	30.9 UJ	30 UJ	32.4 UJ	33.7 UJ	33.5 UJ	33.8 UJ	33.5 UJ	32.4 UJ	31 UJ
2-Chlorophenol	13.8 U	12.7 U	13.4 U	13.6 U	13.1 U	12.7 U	12.3 U	13.3 U	13.8 U	13.7 U	13.8 U	13.7 U	13.3 U	12.7 U
4,6-Dinitro-2-methylphenol	37.9 UJ	34.8 UJ	36.8 UJ	37.2 UJ	35.9 UJ	34.7 UJ	33.7 UJ	36.4 UJ	37.8 UJ	37.7 UJ	38 U	37.7 U	36.4 UJ	34.9 UJ
4-Chloro-3-Methylphenol	12.4 U	11.4 U	12 U	12.1 U	11.7 U	11.3 U	11 U	11.9 U	12.4 U	12.3 U	12.4 U	12.3 U	11.9 U	11.4 U
2,4-Dimethylphenol	3.8 U	8.2 UJ	8.6 UJ	8.7 UJ	8.4 UJ	8.2 UJ	7.9 UJ	8.5 UJ	8.9 UJ	8.8 UJ	3.8 U	3.7 U	8.5 UJ	8.2 UJ
2-Methylphenol (o-Cresol)	6.6 U	6.1 U	**6.5 J**	6.5 U	6.3 U	6.1 U	5.9 U	**13.3 J**	6.6 U	6.6 U	6.7 U	6.6 U	6.4 U	6.1 U
4-Methylphenol (p-Cresol)	7.4 U	6.8 U	7.2 U	7.2 U	7 U	6.8 U	6.6 U	7.1 U	**22.2**	7.3 U	7.4 U	7.3 U	**9.5 J**	6.8 U
Pentachlorophenol	31.2 UJ	28.6 UJ	30.3 UJ	30.6 UJ	29.5 UJ	28.6 UJ	27.8 UJ	29.9 UJ	31.1 UJ	31 UJ	31.2 U	31 U	29.9 UJ	28.7 UJ
Phenol	4.4 U	**10.5 J**	4.3 U	4.3 U	4.2 U	4 U	3.9 U	4.2 U	**15.5 J**	4.4 U	4.4 U	**5.4 J**	4.2 U	4 U
Phthalates (µg/kg)														
bis(2-Ethylhexyl)phthalate	5.4 U	12.9 U	13.6 U	13.8 U	13.3 U	12.9 U	12.5 U	13.5 U	14 U	13.9 U	**11.9 J**	**11 J**	**18.2 J**	12.9 U
Butylbenzyl phthalate	9.4 U	8.6 U	9.1 U	9.2 U	8.9 U	8.6 U	8.4 U	9 U	9.4 U	9.3 U	9.4 U	9.3 U	9 U	8.6 U
Diethyl phthalate	19.7 U	18.1 U	19.1 U	19.3 U	18.6 U	18 U	17.5 U	18.9 U	19.6 U	19.5 U	19.7 UJ	19.6 UJ	18.9 U	18.1 U
Dimethyl phthalate	4.4 U	4 U	4.3 U	4.3 U	4.2 U	4 U	3.9 U	4.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.2 U	4 U
Di-n-butyl phthalate	5.6 U	5.1 U	5.4 U	5.5 U	5.3 U	5.1 U	5 U	5.4 U	5.6 U	5.6 U	5.6 U	5.6 U	5.4 U	5.2 U
Di-n-octyl phthalate	4.4 U	4 U	4.3 U	4.3 U	4.2 U	4 U	3.9 U	4.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.2 U	4 U
Dioxin/Furans (ng/kg)														
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	**1.26 J**	**3.37 J**	0.209 U	**10.5**	**2.81 J**	**2.26 J**	0.266 U	**1.78 J**	0.272 U	**11.2 J**	5.10 UJ	**20.9**	**6.1**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	**144**	**166**	**410**	**164**	**85.9**	**2630**	**1280**	**723**	**463**	**198 J**	**247 J**	**483**	**162**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	--	**0.893 J**	**2.57 J**	**0.365 J**	**11.4**	**2.7**	**1.32 J**	**0.396 J**	**1.33 J**	**0.226 J**	**6.03 J**	2.55 UJ	**16**	**9.76**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	--	**13.5**	**21.3**	**21.3**	**25.8**	**11.3**	**283**	**140**	**85.5**	**53.1**	**27.1 J**	**27.3 J**	**69.9**	**26.3**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	--	0.142 UJ	**0.335 J**	0.0914 U	**1.19 J**	**0.308 J**	0.12 U	0.11 U	**0.188 J**	0.119 U	**0.303 J**	**0.122 J**	**1.85 J**	**1.33 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	--	**0.85 J**	**0.919 J**	0.117 U	**4.58**	**1.41 J**	**1.25 J**	0.188 U	**0.573 J**	0.185 U	2.47 UJ	2.55 UJ	**6.05**	**4.33**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	**1.05 J**	**1.76 J**	**0.373 J**	**1.69 J**	**0.775 J**	**6.42**	**3.23**	**2.61**	**1.52 J**	**0.864 J**	**0.594 J**	**4.29**	**2.56**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	**0.566 J**	**1.21 J**	0.111 U	**4.07**	**1.28 J**	**0.398 J**	0.173 U	**0.695 J**	0.181 U	**0.618 J**	**0.127 J**	**5.39 J**	**3.99**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	--	**1.01 J**	**2.59 J**	**0.975 J**	**2.06 J**	**0.887 J**	**9.74**	**4.39**	**3.89**	**2.02 J**	**1.59 J**	**0.834 J**	**7.87**	**4.63**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	--	0.247 U	0.294 U	0.171 U	0.414 U	0.37 U	0.243 U	0.244 U	0.239 U	0.264 U	**0.0538 J**	**0.0833 J**	0.667 U	0.385 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	--	**1.02 J**	**1.82 J**	**1.67 J**	**2.22 J**	**0.819 J**	**14.4**	**7.29**	**4.61**	**3.04 J**	**1.39 J**	**1.20 J**	**6.91**	**3.41**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	--	**1.43 J**	**2.99 J**	0.139 U	**6.37**	**1.82 J**	**1.62 J**	**0.538 J**	**1.15 J**	**0.203 J**	2.47 UJ	2.55 UJ	**9.78**	**5.57**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	--	**1.03 J**	**2.16 J**	**0.209 J**	**1.52 J**	**0.775 J**	**1.95 J**	**0.836 J**	**1.05 J**	**0.318 J**	2.47 UJ	2.55 UJ	**6.62**	**3.5**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	--	**0.498 J**	**0.863 J**	0.107 U	**5**	**1.06 J**	**0.594 J**	**0.197 J**	**0.511 J**	0.181 U	**0.522 J**	**0.123 J**	**6.46**	**4.47**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	--	**1.24 J**	**2.86 J**	0.14 U	**8.37**	**2.83**	**1.18 J**	**0.539 J**	**0.946 J**	**0.326 J**	**0.793 J**	**0.141 J**	**13.4**	**8.22**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	**2.54 J**	**5.52 J**	**0.461 J**	**7.53**	**3.27**	**1.38 J**	**0.768 J**	**1.31 J**	0.113 U	**1.55 J**	**0.184 J**	**17.2**	**9.51**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	**0.565 J**	**1.09 J**	0.169 U	**0.839**	**0.202 J**	**2.36**	**0.656 J**	**0.499**	**0.173 J**	**0.492 J**	**0.160 J**	**2.53**	**1.28**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	--	**3.0**	**5.97**	**1.0**	**8**	**3.0**	**12**	**5.1**	**4.39**	**1.97**	**3.18**	**2.32**	**20**	**11**
Total TCDD TEQ (ND=0)[b]	--	**3.0**	**5.96**	**0.90**	**8**	**3.0**	**12**	**5.0**	**4.37**	**1.93**	**1.79**	**0.865**	**20**	**11**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-HA-50b-0to1	BH-HA-50b-1to1.6	BH-HA-51-0to1	BH-HA-51-0to1-D	BH-HA-51-1to1.6	BH-HA-52-0to1	BH-HA-52-1to2	S-1-0-1	S-2-0-1	S-3-1-2	S-4-0-1	S-5-0-1	BH-SB-17-0to2	BH-SB-17-0to2-D	BH-SB-17-2to4	BH-SB-17-4to6
Location:	HA-50b	HA-50b	HA-51	HA-51	HA-51	HA-52	HA-52	S-1	S-2	S-3	S-4	S-5	SB-17	SB-17	SB-17	SB-17
Sample Date:	2023-12-14	2023-12-14	2023-12-14	2023-12-14	2023-12-14	2023-12-13	2023-12-13	2019-06-05	2019-06-05	2019-06-05	2019-06-05	2019-06-05	2021-09-15	2021-09-15	2021-09-15	2021-09-15
Depth Interval:	0 - 1	1 - 1.6	0 - 1	0 - 1	1 - 1.6	0 - 1	1 - 2	0 - 1	0 - 1	1 - 2	0 - 1	0 - 1	0 - 2	0 - 2	2 - 4	4 - 6
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:				Duplicate										Duplicate		
Analyte																
Metals (mg/kg)																
Arsenic	**1.85**	**2.42**	**2.59 J**	**4.42 J**	**2.74**	**4.59 J**	**3.31**	**10.1**	**16.6**	**4.84**	**5.96**	**5.53**	**4.81**	**4.83**	**14.4**	**9.19**
Cadmium	**0.15**	**0.07 J**	**0.08 J**	**0.19 J**	**0.14**	**0.28**	**0.24**	**0.4**	**0.61**	**0.07 J**	**0.32**	**0.21**	**0.17**	**0.24**	0.11 U	**0.28 J**
Chromium	**23.2**	**25.1**	**61.0**	**54.9**	**58.3**	**81.9 J-**	**68.3**	**23.6**	**26.2**	**19**	**28.1**	**33.7**	**25.1**	**28.2**	**15.0**	**13.3**
Chromium (VI)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	**17.5**	**25.0**	**83.9**	**61.5**	**68.7**	**92.0 J-**	**80.5**	--	--	--	--	--	**26.3**	**30.2**	**34.9**	**31.8**
Lead	**4.56**	**6.29**	**7.86 J**	**16.4 J**	**11.2**	**9.40 J**	**10.1**	**468**	**133**	**10.8**	**161**	**123**	**21.5**	**22.1**	**189**	**92.4**
Mercury	**0.0257**	**0.0201 J**	**0.0438 J**	**0.0943 J**	**0.0428**	**0.0799 J**	**0.0700**	**0.319 J**	**0.189 J**	**0.0608 J**	**0.0798 J**	**0.0623 J**	0.00685 UJ	**0.0141 J**	**0.0936**	**0.0666 J**
Zinc	**34.8**	**36.8**	**72.9**	**75.2**	**85.4**	**102 J-**	**74.9**	--	--	--	--	--	**84.3**	**86.6**	**33.1**	**157**
Petroleum Hydrocarbons (mg/kg)																
Diesel Range Organics (DRO)	**13.0**	2.33 U	**21.2 J**	**9.96 J**	2.83 U	2.92 U	3.00 U	**161**	--	69.8 U	--	**82.4**	7.05 U	7.03 U	**398**	**131**
Lube Oil	**71.1 J**	**40.3 J**	**209 J**	**99.1 J**	**28.0 J**	**22.1 J**	**13.6 J**	**366**	--	140 U	--	**287**	**44.4 J**	**44.2 J**	**878 J**	**588 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)																
1-Methylnaphthalene	4.93 U	0.4 U	4.93 U	4.87 U	5 U	4.96 U	4.99 U	**116**	--	--	--	**252**	5 U	5 U	18.5 U	20.1 U
2-Methylnaphthalene	4.4 U	3.9 U	4.3 U	4.4 U	4.3 U	4.1 U	4 U	**163**	**12.3**	0.7 U	**8.66**	**125**	4.5 U	4.5 U	16.7 U	18.1 U
Acenaphthene	**0.99 J**	0.57 U	**2.02 J**	0.56 UJ	0.57 U	**0.57 J**	0.57 U	**278**	**5.61**	**0.22 J**	**4.45**	**189**	5 UJ	0.57 UJ	2.11 U	20.1 U
Anthracene	**1.34 J**	**1.87 J**	**2.71 J**	**1.18 J**	**1.69 J**	**1.56 J**	0.87 U	**678**	**30.4**	**0.52**	**29**	**362**	**5.26**	**5.03**	**4.8 J**	**8.85 J**
Benzo(a)anthracene	**6.46**	**6.15**	**8.74 J**	**3.26 J**	**7.22**	**3.59 J**	**2.33 J**	**2400**	**102**	**0.54**	**243**	**1850**	**26.4**	**25.4**	**11.8 J**	**25.8**
Benzo(a)pyrene	**7.55**	**9.83**	**10.1 J**	**3.92 J**	**7.46**	**3.52 J**	**2.91 J**	**2000**	**92.3**	**0.64 J**	**229**	**2010**	**183**	**144**	**31.8**	**36.8**
Benzo(b)fluoranthene	**6.03**	**6.06**	**7.26 J**	**3.24 J**	**6.93**	**3.81 J**	**3.34 J**	**994**	**87.3**	**1.09 J**	**126**	**556**	**128**	**111**	**35.9**	**37.2**
Benzo(k)fluoranthene	**4.21 J**	**4.84 J**	**4.41 J**	**2.59 J**	**4.96 J**	**2.25 J**	**2.04 J**	**605**	**48.8**	**0.41 J**	**73.7**	**335**	**63 J**	**54.4 J**	**15.9 J**	**19.7 J**
2-Chloronaphthalene	7.7 U	6.8 U	7.6 U	7.8 U	7.6 U	7.3 U	7.1 U	20 U	--	--	--	19.9 U	7.9 U	8 U	29.5 U	32 U
Chrysene	**7.35**	**7.67**	**11**	**6.99**	**9.38**	**5.63**	**4.46 J**	**3260**	**186**	**1.95 J**	**264**	**2430**	**45.5**	**42.6**	**41.5**	**44.1**
Dibenzo(a,h)anthracene	**2.39 J**	**1.58 J**	**2.83 J**	**1.29 J**	**1.34 J**	**0.92 J**	0.89 U	**276**	**18.1**	**0.23 J**	**82.9**	**156**	**60.6 J**	**50.2 J**	**15.2 J**	**16.7 J**
Fluoranthene	**13.3**	**11.6**	**12.6 J**	**3.63 J**	**10.6**	**9.47**	**7.73**	**8210**	**359**	**4.81**	**422**	**6090**	**53.7**	**49**	**55.1**	**68.9**
Fluorene	**1.22 J**	0.63 U	**1.34 J**	0.61 UJ	**0.71 J**	**0.97 J**	0.63 U	**208**	**8.9**	**0.18 J**	**7.58**	**156**	5 U	5 U	18.5 U	20.1 U
Indeno(1,2,3-c,d)pyrene	**6.33**	**4.74 J**	**8.3 J**	**4.16 J**	**5.91**	**4.17 J**	**3.55 J**	**1140**	**91.2**	**1.56 J**	**214**	**741**	**765**	**600**	**86.7**	**68.1**
Naphthalene	4.93 U	1.27 U	4.93 U	4.87 U	5 U	4.96 U	4.99 U	**602**	**66.3**	4.07 U	**35.5**	**229**	**13.8**	**11.5**	**47.6**	**67**
Pyrene	**17.5**	**17**	**22.4 J**	**7.71 J**	**17.4**	**8.68**	**6.06**	**8480**	**293**	**1.19**	**503**	**7190**	**68.9**	**65.9**	**67**	**87.8**
Total Benzofluoranthenes	**14.1**	**16**	**15.9**	**8.4**	**16.9**	**9.08**	**7.96**	**1600**	**136**	**1.5**	**200**	**891**	**247**	**214**	**68.7**	**75.6**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)																
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**10.2**	**12.2**	**13.4**	**5.44**	**10.2**	**5.1**	**4.1**	**3000**	**129**	**1**	**306**	**2400**	**288**	**230**	**48.8**	**54**
Total cPAH TEQ (ND=0)[a]	**10.2**	**12.2**	**13.4**	**5.44**	**10.2**	**5.1**	**4.1**	**3000**	**129**	**1**	**306**	**2400**	**288**	**230**	**48.8**	**54**
Phenols (µg/kg)																
2,4,5-Trichlorophenol	24.9 U	22 U	24.6 U	25.1 U	24.7 U	23.7 U	23 U	99.8 U	--	--	--	99.6 U	25.7 U	25.8 U	95.3 U	104 U
2,4,6-Trichlorophenol	8.7 U	7.7 U	8.6 U	8.7 U	8.6 U	8.3 U	8 U	99.8 U	--	--	--	99.6 U	9 U	9 U	33.3 U	36.1 U
2,4-Dichlorophenol	14.8 U	13.1 U	14.6 U	14.9 U	14.7 U	14.1 U	13.7 U	99.8 U	--	--	--	99.6 U	15.3 U	15.3 U	56.7 U	61.7 U
2,4-Dinitrophenol	32.6 UJ	28.9 UJ	32.3 UJ	32.9 UJ	32.4 UJ	31.1 UJ	30.2 UJ	200 U	--	--	--	199 U	33.7 U	33.8 U	125 U	136 U
2-Chlorophenol	13.4 U	11.8 U	13.2 U	13.5 U	13.3 U	12.7 U	12.4 U	20 U	--	--	--	19.9 U	13.8 U	13.9 U	51.3 U	55.7 U
4,6-Dinitro-2-methylphenol	36.7 UJ	32.4 UJ	36.3 UJ	37 UJ	36.4 UJ	34.9 UJ	33.9 UJ	200 U	--	--	--	199 U	37.9 U	38 U	141 U	153 U
4-Chloro-3-Methylphenol	12 U	10.6 U	11.9 U	12.1 U	11.9 U	11.4 U	11.1 U	99.8 U	--	--	--	99.6 U	12.4 U	12.4 U	46 U	49.9 U
2,4-Dimethylphenol	8.6 UJ	7.6 UJ	8.5 UJ	8.7 UJ	8.5 UJ	8.2 UJ	8 UJ	99.8 U	--	--	--	99.6 U	3.8 U	3.8 U	14 U	15.2 U
2-Methylphenol (o-Cresol)	6.4 U	5.7 U	6.4 U	6.5 U	6.4 U	6.1 U	5.9 U	**8.5 J**	--	--	--	19.9 U	6.6 U	6.7 U	24.7 U	26.8 U
4-Methylphenol (p-Cresol)	7.1 U	6.3 U	7.1 U	7.2 U	7.1 U	6.8 U	6.6 U	**23.4**	--	--	--	19.9 U	7.4 U	7.4 U	27.4 U	29.7 U
Pentachlorophenol	30.2 UJ	26.7 UJ	29.9 UJ	30.4 UJ	29.9 UJ	28.7 UJ	27.9 UJ	99.8 U	--	--	--	99.6 U	31.2 U	31.3 U	116 U	126 U
Phenol	4.2 U	**55.4 J**	4.2 U	4.3 U	4.2 U	4 U	3.9 U	**23.8**	--	--	--	19.9 U	**6.1 J**	**5.1 J**	**32.1 J**	**90.7**
Phthalates (µg/kg)																
bis(2-Ethylhexyl)phthalate	13.6 U	12 U	13.4 U	13.7 U	13.5 U	12.9 U	12.6 U	49.9 U	--	--	--	49.8 U	5.4 U	5.5 U	**98.7 J**	**121 J**
Butylbenzyl phthalate	**15.4 J**	8 U	9 U	9.2 U	9 U	8.6 U	8.4 U	20 U	--	--	--	19.9 U	9.4 U	9.4 U	34.8 U	37.9 U
Diethyl phthalate	19 U	16.8 U	18.8 U	19.2 U	18.9 U	18.1 U	17.6 U	20 U	--	--	--	19.9 U	19.7 UJ	**21.4 J**	73 U	79.3 U
Dimethyl phthalate	4.2 U	3.7 U	4.2 U	4.3 U	4.2 U	4 U	3.9 U	20 U	--	--	--	19.9 U	4.4 U	4.4 U	16.3 U	17.7 U
Di-n-butyl phthalate	5.4 U	4.8 U	5.4 U	5.5 U	5.4 U	5.2 U	5 U	20 U	--	--	--	19.9 U	5.6 U	5.6 U	**95.2**	**110**
Di-n-octyl phthalate	4.2 U	3.7 U	4.2 U	4.3 U	4.2 U	4 U	3.9 U	20 U	--	--	--	19.9 U	4.4 U	4.4 U	16.3 U	17.7 U
Dioxin/Furans (ng/kg)																
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**4.84 J**	**4.74 J**	**11.6**	**15**	**1.15 J**	**4.93**	**2.63 J**	**86 J**	**21.4 J**	2.49 UJ	**7.1 J**	**94.7 J**	**18.2 J**	**11.9 J**	7.97 UJ	7.92 UJ
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**191**	**361**	**1990**	**1530**	**880**	**268 J**	**208**	**919**	**495**	**4150 J**	**581**	**330 J**	**100 J**	**148 J**	**48.0 J**	**358 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**1.71 J**	**1.38 J**	**4.77**	**5.52**	**0.673 J**	**3.39**	**2.35 J**	**324**	**66.7**	0.994 UJ	**7.89**	**181 J**	**51.7 J**	**43.9 J**	3.99 UJ	**8.52 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**12.4**	**16.7**	**118**	**109**	**45**	**30.2**	**28.7**	**368**	**197**	**231 J**	**36.5**	**181 J**	**49.8 J**	**61.7 J**	**18.3 J**	**29.3 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.109 U	0.16 U	0.106 UJ	**0.41 J**	0.102 U	0.206 U	**0.254 J**	**9.96**	**2.92**	**0.136 J**	1.01 U	**9.34 J**	**6.30 J**	**4.97 J**	3.99 UJ	3.96 UJ
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.102 U	0.164 U	**0.506 J**	**1.39 J**	**0.27 J**	**0.598 J**	**0.709 J**	**60.8 J**	**19.2 J**	**0.176 J**	**2.35**	**109 J**	**33.5 J**	**27.6 J**	3.99 UJ	3.96 UJ
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.334 J**	**0.542 J**	**2.41**	**2.69**	**0.908 J**	**0.664 J**	**1.22 J**	**31.5**	**10.7**	**4.54 J**	**1.56**	**21.3 J**	**6.70 J**	**6.73 J**	**3.06 J**	**1.65 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.103 U	0.144 U	**0.872 J**	**0.647 J**	**0.231 J**	**0.873 J**	**1.04 J**	**46.7**	**11.3 J**	0.994 UJ	**2.09**	**32.2 J**	**22.5 J**	**19.5 J**	3.99 UJ	3.96 UJ
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.469 J**	**0.733 J**	**4.41**	**5**	**1.99 J**	**1.44 J**	**1.65 J**	**66.2**	**26.1**	**5.98 J**	2.74 U	**36.7 J**	**9.64 J**	**10.4 J**	3.99 UJ	3.96 UJ
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.148 U	0.221 U	0.188 U	0.413 U	0.236 U	0.279 U	0.333 U	**9.05**	**2.11**	**0.107 J**	**0.545 J**	**6.51 J**	**2.02 J**	**1.51 J**	**0.187 J**	**0.560 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.653 J**	**0.706 J**	**8.5**	**7.88**	**3.51**	**1.67 J**	**2.02 J**	**56.3**	**23.5**	**13.2 J**	3.21 U	**35.4 J**	**7.24 J**	**6.89 J**	**3.92 J**	3.96 UJ
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.178 U	0.153 U	**1.02 J**	**1.43 J**	**0.747 J**	**1.7 J**	**1.65 J**	**47.1 J**	**15.8 J**	**0.306 J**	**2.46 J**	**64.2 J**	**27.6 J**	**24.8 J**	3.99 UJ	3.96 UJ
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.172 J**	0.155 U	**1.34 J**	**1.57 J**	**0.798 J**	**0.847 J**	**0.825 J**	**46.8**	**16.7**	**1.9 J**	**2.46**	**28.7 J**	**11.6 J**	**10.8 J**	**4.70 J**	**1.83 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.178 J**	0.151 U	**0.661 J**	**0.605 J**	0.198 U	**0.703 J**	**0.436 J**	**48.3**	**9.57**	0.994 UJ	**1.75**	**16.4 J**	**16.1 J**	**14.1 J**	3.99 UJ	3.96 UJ
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.156 U	0.143 U	**1.29 J**	**1.33 J**	**0.781 J**	**1.54 J**	**1.68 J**	**51.5**	**13.1**	**0.333 J**	**1.92**	**25.9 J**	**28.9 J**	**25.7 J**	**3.38 J**	**2.09 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.117 U	0.181 U	**1.4 J**	**2.22**	**1.7 J**	**2.7**	**2.86**	**56.4 J**	**20.1 J**	**0.541 J**	**3.28 J**	**37.8 J**	**37.2 J**	**34.2 J**	**7.26 J**	**4.30 J**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.16 U	0.175 U	**0.618 J**	**0.987 J**	**0.172 J**	**0.323 J**	**0.502 J**	**7.88**	**2.96**	**0.55 J**	0.517 U	**7.08 J**	**5.10 J**	**5.03 J**	**2.49 J**	**0.873 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**0.67**	**0.72**	**6.1**	**7**	**2.8**	**3.0**	**3.27**	**120**	**39.1**	**8.7**	**6.0**	**79**	**40.8**	**37.5**	**10.7**	**5.54**
Total TCDD TEQ (ND=0)[b]	**0.54**	**0.49**	**6.1**	**7**	**2.8**	**3.0**	**3.25**	**120**	**39.1**	**8.6**	**6.0**	**79**	**40.8**	**37.5**	**9.84**	**4.47**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-17-6to10	BH-SB-17-6to10-D	BH-SB-17-10to12	BH-SB-18-0to2	BH-SB-18-2to4	BH-SB-18-4to6	BH-SB-18-6to9	BH-SB-18-9to11	BH-SB-19-0to2	BH-SB-19-2to6	BH-SB-19-2to6-Dup	BH-SB-19-6to8	BH-SB-19-8to10
Location:	SB-17	SB-17	SB-17	SB-18	SB-18	SB-18	SB-18	SB-18	SB-19	SB-19	SB-19	SB-19	SB-19
Sample Date:	2021-09-15	2021-09-15	2021-09-15	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14
Depth Interval:	6 - 10	6 - 10	10 - 12	0 - 2	2 - 4	4 - 6	6 - 9	9 - 11	0 - 2	2 - 6	2 - 6	6 - 8	8 - 10
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:		Duplicate									Duplicate		
Analyte													
Metals (mg/kg)													
Arsenic	**6.24**	**7.28**	**10.8**	**16.0**	**5.74**	**3.54**	**8.66**	**7.81**	**30.2**	**6.45**	**8.54**	**6.39**	**7.50**
Cadmium	**1.14**	**0.93**	0.36 UJ	**0.18**	**0.52**	**0.12**	0.13 U	**0.14 J+**	1.93 U	**0.43 J**	**1.09 J**	**0.13**	0.11 U
Chromium	**8.72**	**9.27**	**14.0**	**16.0**	**20.4**	**52.1**	**81.8**	**58.5**	**14.7**	**2.90**	**3.17**	**4.97**	**24.8**
Chromium (VI)	--	--	--	--	**3.86 R**	**0.599 R**	--	--	--	--	--	--	--
Copper	**23.5**	**24.9**	**37.6**	**17.3**	**74.6**	**62.2**	**141**	**73.5**	**778**	**120**	**119**	**147**	**52.7**
Lead	**37.2**	**40.9**	**87.0**	**20.5**	**138**	**2.00**	**31.4**	**21.2**	**5160**	**982**	**1580**	**483**	**2.13**
Mercury	--	--	--	**0.0613**	**0.0655**	**0.0350**	--	--	**0.162**	0.108 U	0.137 U	--	--
Zinc	**419**	**436**	**93.6**	**53.8**	**303**	**61.0**	**101**	**93.9**	**1540**	**1230**	**1980**	**732**	**64.2**
Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics (DRO)	--	--	--	2.5 U	**18.8**	2.91 U	--	--	**2160**	**1860**	**1440**	--	--
Lube Oil	--	--	--	**39.7 J**	**60.4 J**	12.4 UJ	--	--	**4280 J**	**4960 J**	**3830 J**	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	**27.7**	**30.2**	**12.9**	5 U	5 U	5 U	4.95 U	5.12 U	**317**	29.4 U	26 U	14.8 U	4.95 U
2-Methylnaphthalene	**31.7 J**	**37.2 J**	**10.3 J**	**2 J**	**11.8 J**	1.1 U	19.9 U	20 U	**286**	**22.3 J**	**21.6 J**	59.8 U	19.9 U
Acenaphthene	**14.9**	**16.9**	**12.8**	5 U	5 U	0.57 U	4.95 U	5.12 U	**271**	29.4 U	26 U	14.8 U	4.95 U
Anthracene	**30.5**	**34.9**	**25.3**	**1.72 J**	**12.8**	0.87 U	4.95 U	**1.37 J**	**432**	**35.3**	**43.5**	14.8 U	4.95 U
Benzo(a)anthracene	**36.9**	**47.5**	**19.5**	**7.87**	**106**	0.82 U	**0.89 J**	**2.54 J**	**1390**	**89.6**	**121**	**3.29 J**	4.95 U
Benzo(a)pyrene	**48.1 J**	**80.2 J**	**17.5**	**8.72**	**189**	5 U	**1.07 J**	**3.14 J**	**2110**	**126**	**91.5**	14.8 U	4.95 U
Benzo(b)fluoranthene	**40.9 J**	**73.1 J**	**14.6**	**10.8**	**206**	**1.6 J**	**1.6 J**	**4.11 J**	**1070**	**144**	**155**	14.8 U	4.95 U
Benzo(k)fluoranthene	**24 J**	**37 J**	**11.4**	**4.92 J**	**102 J**	0.76 U	4.95 U	**2.26 J**	**689 J**	**96.8 J**	**61.1 J**	14.8 U	4.95 U
2-Chloronaphthalene	40.3 U	37.9 U	37.8 U	0.83 U	0.83 U	0.83 U	19.9 U	20 U	2.5 U	4.89 U	4.32 U	59.8 U	19.9 U
Chrysene	**58.6**	**74.3**	**25**	**14**	**186**	**1.31 J**	**2.06 J**	**4.28 J**	**2330**	**142**	**163**	**4.51 J**	4.95 U
Dibenzo(a,h)anthracene	**16.1 J**	**30.5 J**	**4.94 J**	5 UJ	**61.2 J**	0.89 U	**1.2 J**	**1.5 J**	**272 J**	**73.6 J**	**61.5 J**	14.8 U	4.95 U
Fluoranthene	**102**	**109**	**84.5**	**23.2**	**267**	5 U	**2.57 J**	**8.06**	**5670**	**103**	**76.4**	**1.93 J**	**0.54 J**
Fluorene	**18.2**	**18.2**	**16.3**	5 U	**5.11**	0.63 U	**2.78 J**	5.12 U	**601**	29.4 U	26 U	14.8 U	4.95 U
Indeno(1,2,3-c,d)pyrene	**132 J**	**189 J**	**18.5**	**10.5**	**352**	**1.96 J**	**2.05 J**	**6.03**	**899**	**125**	**127**	14.8 U	4.95 U
Naphthalene	**316**	**348**	**132**	5 U	**52.2**	5 U	**1.57 J**	**7.96**	**395**	**94.4**	**83.3**	**6.8 J**	4.95 U
Pyrene	**115**	**125**	**87.9**	**17.8**	**231**	5 U	**2.36 J**	**6.43**	**5640**	**134**	**123**	**15.9**	**0.82 J**
Total Benzofluoranthenes	**87.9**	**151**	**34.2**	**19.8**	**391**	2.3	**5**	**8.44**	**2300**	**318**	**298**	**14.8 U**	**4.95 U**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)													
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**73.7**	**119**	**24.6**	**13**	**274**	**3**	**1.9**	**4.83**	**2570**	**180**	**146**	**10.7**	4.95 U
Total cPAH TEQ (ND=0)[a]	**73.7**	**119**	**24.6**	**12**	**274**	**0.37**	**1.7**	**4.83**	**2570**	**180**	**146**	**0.374**	4.95 U
Phenols (µg/kg)													
2,4,5-Trichlorophenol	201 U	190 U	189 U	25.7 U	25.7 U	25.7 U	99.7 U	99.8 U	25.8 U	151 U	134 U	299 U	99.6 U
2,4,6-Trichlorophenol	201 U	190 U	189 U	9 U	9 U	9 U	99.7 U	99.8 U	9 U	52.8 U	46.7 U	299 U	99.6 U
2,4-Dichlorophenol	201 U	190 U	189 U	15.3 U	15.3 U	15.3 U	99.7 U	99.8 U	15.3 U	90 U	79.6 U	299 U	99.6 U
2,4-Dinitrophenol	403 UJ	379 UJ	378 UJ	33.8 U	33.8 U	33.7 U	199 UJ	200 UJ	33.8 U	199 U	176 U	598 UJ	199 UJ
2-Chlorophenol	40.3 U	37.9 U	37.8 U	13.8 U	13.8 U	13.8 U	19.9 U	20 U	13.9 U	81.4 U	72 U	59.8 U	19.9 U
4,6-Dinitro-2-methylphenol	403 UJ	379 UJ	378 UJ	38 U	37.9 U	37.9 U	199 UJ	200 UJ	38 U	223 U	197 U	598 UJ	199 UJ
4-Chloro-3-Methylphenol	201 U	190 U	189 U	12.4 U	12.4 U	12.4 U	99.7 U	99.8 U	12.4 U	72.9 U	64.5 U	299 U	99.6 U
2,4-Dimethylphenol	201 U	190 U	189 U	3.8 U	3.8 U	3.8 U	99.7 U	99.8 U	3.8 U	22.2 U	19.6 U	299 U	99.6 U
2-Methylphenol (o-Cresol)	40.3 U	37.9 U	37.8 U	6.7 U	6.7 U	6.6 U	19.9 U	20 U	6.7 U	39.1 U	34.6 U	59.8 U	19.9 U
4-Methylphenol (p-Cresol)	**28.8 J**	**38.7**	**30.5 J**	7.4 U	7.4 U	7.4 U	19.9 U	20 U	**17.3 J**	**71.4 J**	**101 J**	59.8 U	19.9 U
Pentachlorophenol	201 UJ	190 UJ	189 UJ	31.2 U	31.2 U	31.2 U	99.7 UJ	99.8 UJ	31.3 U	184 U	162 U	299 UJ	99.6 UJ
Phenol	**53.6**	**59.2**	**42.7**	4.4 U	**6.5 J**	4.4 U	**7 J**	**6.3 J**	**18.7 J**	25.8 U	22.8 U	**28.8 J**	**6.3 J**
Phthalates (µg/kg)													
bis(2-Ethylhexyl)phthalate	101 U	94.8 U	**17.9 J**	**33.3 J**	5.5 U	**21.5 J**	**12.9 J**	**11.9 J**	5.5 U	32.1 UJ	**258 J**	**29.1 J**	**9.1 J**
Butylbenzyl phthalate	40.3 U	37.9 U	37.8 U	9.4 U	9.4 U	9.4 U	19.9 U	20 U	9.4 U	55.3 U	48.9 U	59.8 U	19.9 U
Diethyl phthalate	101 U	94.8 U	94.6 U	50 U	49.9 U	49.9 U	49.8 U	49.9 U	50 U	294 UJ	102 UJ	149 U	49.8 U
Dimethyl phthalate	40.3 U	37.9 U	37.8 U	4.4 U	4.4 U	4.4 U	19.9 U	20 U	4.4 U	25.8 U	22.8 U	59.8 U	19.9 U
Di-n-butyl phthalate	40.3 U	37.9 U	37.8 U	**47.8**	5.6 U	**49.8**	19.9 U	20 U	5.6 U	33 UJ	**660 J**	59.8 U	19.9 U
Di-n-octyl phthalate	40.3 U	37.9 U	37.8 U	4.4 U	4.4 U	4.4 U	19.9 U	20 U	4.4 U	25.8 U	22.8 U	59.8 U	19.9 U
Dioxin/Furans (ng/kg)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	5.46 U	4.91 U	5.34 U	**49.0**	**32.6**	**0.213 J**	**130**	4.82 U	**36.3**	**0.728 J**	**0.589 J**	5.82 U	0.0483 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**75.1**	**93.2**	**59.7**	**1130**	**196**	**508**	**365**	**185**	**122**	**69.1**	**44.8**	5.82 U	**71.8**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	2.73 U	2.45 U	2.67 U	**55.3**	**106**	2.41 U	**280**	**22.4**	**112**	5.46 U	5.84 U	2.91 U	2.41 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**7.26**	**7.73**	**6.93**	**93.6**	**179**	**22.2**	**34.0**	**44.1**	**65.7**	**5.60**	5.84 U	2.91 U	**6.42**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**0.129 J**	**0.118 J**	**0.0765 J**	**1.33 J**	**4.94**	0.0482 U	**8.35**	**2.64**	**9.12**	**0.160 J**	**0.207 J**	**0.114 J**	0.0483 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	2.73 U	2.45 U	2.67 U	**8.69**	**69.5**	**0.163 J**	**21.7**	**33.0**	**43.2**	**1.05 J**	**1.02 J**	2.91 U	0.0483 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.560 J**	**0.533 J**	**0.441 J**	**3.20**	**29.9**	**0.614 J**	**1.63 J**	**2.51**	**8.36**	**0.646 J**	**0.649 J**	**0.0792 J**	**0.151 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.478 J**	**0.350 J**	**0.396 J**	**2.69**	**21.0**	**0.0806 J**	**15.6**	**14.7**	**34.7**	**0.825 J**	**0.885 J**	**0.168 J**	0.0483 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.860 J**	**0.906 J**	**0.735 J**	**5.15**	**48.5**	**0.959 J**	**2.58**	**8.14**	**13.2**	**0.931 J**	**0.870 J**	**0.137 J**	**0.318 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.73 U	2.45 U	2.67 U	2.41 U	2.26 U	2.41 U	2.42 U	2.41 U	2.64 U	5.46 U	0.271 U	2.91 U	2.41 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.02 J**	**1.05 J**	**0.727 J**	**6.02**	**36.9**	**1.84 J**	**2.39 J**	**6.66**	**12.8**	1.05 U	1.21 U	**0.0692 J**	**0.526 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	2.73 U	2.45 U	2.67 U	**3.16**	**42.2**	**0.253 J**	**4.96**	**7.95**	**41.3**	**1.74 J**	**1.78 J**	2.91 U	0.0570 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.818 J**	**0.870 J**	**0.838 J**	**2.07 J**	**48.3**	**0.687 J**	**1.96 J**	**2.39 J**	**12.8**	**0.939 J**	**0.982 J**	**0.107 J**	**0.149 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.282 J**	**0.245 J**	**0.283 J**	**1.99 J**	**11.5**	**0.0765 J**	**15.5**	**5.62**	**32.1**	**0.710 J**	**0.795 J**	**0.159 J**	0.0483 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.710 J**	**0.678 J**	**0.775 J**	**1.78 J**	**23.3**	**0.135 J**	**4.96**	**4.44**	**41.5**	**1.41 J**	**1.68 J**	**0.109 J**	0.0570 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**2.29**	**1.89**	**1.81**	**2.83**	**49.4**	**0.527**	**4.95**	**5.05**	**75.0**	**3.73**	**3.94**	**0.123 J**	0.0483 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.607 J**	**0.603 J**	**0.542 J**	**0.898**	**11.9**	**0.260 J**	**0.805 J**	**0.481 J**	**6.50**	**0.459 J**	**0.970 J**	0.0582 U	**0.0635 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**2.71**	**2.57**	**2.46**	**8.63**	**98.2**	**1.93**	**14.3**	**12.9**	**57.0**	**3.09**	**3.47**	**0.609**	**0.550**
Total TCDD TEQ (ND=0)[b]	**2.38**	**2.28**	**2.14**	**8.51**	**98.1**	**1.80**	**14.2**	**12.8**	**56.8**	**2.74**	**3.34**	**0.214**	**0.398**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-20-0to3	BH-SB-20-3to5	BH-SB-20-5to9	BH-SB-21-0to2	BH-SB-21-2to4	BH-SB-21-4to6	BH-SB-21-6to10	BH-SB-21-10to12	BH-SB-22-0to2	BH-SB-22-2to4	BH-SB-22-4to6	BH-SB-22-6to10	BH-SB-22-6to10-D
Location:	SB-20	SB-20	SB-20	SB-21	SB-21	SB-21	SB-21	SB-21	SB-22	SB-22	SB-22	SB-22	SB-22
Sample Date:	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15
Depth Interval:	0 - 3	3 - 5	5 - 9	0 - 2	2 - 4	4 - 6	6 - 10	10 - 12	0 - 2	2 - 4	4 - 6	6 - 10	6 - 10
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:													Duplicate
Analyte													
Metals (mg/kg)													
Arsenic	**19.2**	**6.23**	**10.4**	**60.3**	**5.69**	**10.8**	**15.1**	**5.84**	**5.49**	**4.32**	**10.0**	**5.43**	**7.25**
Cadmium	**0.38**	**0.56**	0.1 U	**0.36 J**	**0.11 J**	**0.35 J**	**0.130**	0.1 U	**0.52**	**0.33**	**0.32**	0.27 U	**0.24 J**
Chromium	**24.2**	**7.33**	**39.6**	**34.3**	**23.3**	**20.3**	**86.2**	**35.9**	**18.5**	**14.8**	**25.5**	**33.4**	**10.4**
Chromium (VI)	**0.913 R**	--	--	**1.02 R**	**0.769 R**	--	--	--	--	--	--	--	--
Copper	**192**	**27.4**	**87.4 J-**	**655**	**73.0**	**145**	**35.6**	**62.4**	**56.4**	**95.3**	**59.1**	**79.8**	**57.6**
Lead	**3700**	**57.8**	**24.4**	**656**	**155**	**341**	**33.5**	**1.43**	**98.5**	**262**	**1960**	**102**	**45.9**
Mercury	**0.119**	0.0708 U	--	**0.222 J**	0.0321 U	**0.112**	--	--	**0.0507**	**0.0245 J**	**0.0350**	0.0167 U	0.0172 U
Zinc	**379**	**66.9**	**87.6 J**	**240**	**103**	**105**	**93.3**	**53.7**	**620**	**453**	**254**	**249**	**314**
Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics (DRO)	**69.4**	**149**	--	**2370**	**4010**	**371**	--	--	**15.0**	10.9 U	**36.3**	**633 J**	**116 J**
Lube Oil	**203 J**	**751 J**	--	**7930 J**	**10500 J**	**1290 J**	--	--	**86.1 J**	**21.9 J**	**50.2 J**	**795 J**	**184 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	**13.4**	22.9 U	4.91 U	**234**	14.9 U	12.8 U	4.99 U	4.96 U	4.99 U	4.99 U	4.99 U	**352**	**625**
2-Methylnaphthalene	**13.5**	**7.2 J**	19.9 U	**217**	**9.7 J**	**7.76 J**	20 U	19.9 U	**5.4 J**	4.5 U	**12.3 J**	**670**	**326**
Acenaphthene	**5.09**	22.9 U	**5.27**	**2080**	14.9 U	12.8 U	**0.64 J**	**1.73 J**	4.99 U	0.57 U	4.99 U	**234**	**418**
Anthracene	**28.3**	**5.57 J**	**13.9**	**4430**	**18.3**	**13.8**	**1.49 J**	**2.45 J**	**9.74**	**8.11**	**11.1**	**2760**	**1390**
Benzo(a)anthracene	**127**	22.9 U	**23.1**	**17300**	**85.2**	**63.9**	**2.6 J**	**3.74 J**	**50.7**	**62.3**	**49.4**	**6860**	**3110**
Benzo(a)pyrene	**159**	**27.8**	**20.4**	**16900**	**210**	**82.7**	**2.92 J**	**2.99 J**	**155**	**270**	**106**	**8230**	**4400**
Benzo(b)fluoranthene	**145**	**26.3**	**14.6**	**9350**	**159**	**59.9**	4.99 U	**1.87 J**	**191**	**397**	**159**	**5910**	**3610**
Benzo(k)fluoranthene	**77.3 J**	**13.1 J**	**9.96**	**6590 J**	**64.3 J**	**33.9 J**	**2.02 J**	**1.22 J**	**86.9 J**	**165 J**	**72.9 J**	**3760 J**	**2100 J**
2-Chloronaphthalene	0.83 U	3.82 U	19.9 U	8.32 U	2.49 U	2.13 U	20 U	19.9 U	8 U	7.9 U	7.9 U	31.5 U	31.8 U
Chrysene	**173**	**29.8**	**23.1**	**16000**	**125**	**78.1**	**3.69 J**	**3.91 J**	**97.2**	**133**	**77.7**	**8190**	**4070**
Dibenzo(a,h)anthracene	**34.7 J**	22.9 UJ	**4.01 J**	**1690 J**	**35.8 J**	**20.1 J**	4.99 U	**1.06 J**	**64.8 J**	**149 J**	**62.5 J**	**1540 J**	**1140 J**
Fluoranthene	**277**	**57.4**	**37.4**	**35100**	**50.8**	**104**	**6.49**	**5.09**	**128**	**104**	**85.4**	**15900**	**8190**
Fluorene	**9.98**	2.9 U	**5.15**	**2290**	14.9 U	12.8 U	**0.87 J**	**1.63 J**	4.99 U	4.99 U	4.99 U	**867**	**732**
Indeno(1,2,3-c,d)pyrene	**135**	**52.9**	**10.4**	**9720**	**26**	**48**	**1.78 J**	**1.89 J**	**529**	**1090**	**469**	**7000**	**5340**
Naphthalene	**50.5**	**43.3**	**4.77 J**	**402**	**40.5**	**27.1**	**1.95 J**	4.96 U	**57.5**	**41.5**	**60.5**	**6150**	**10500**
Pyrene	**216**	**29.8**	**38.4**	**40400**	**196**	**87.7**	**4.93 J**	**8.1**	**135**	**84.5**	**94.9**	**18600**	**8740**
Total Benzofluoranthenes	**286**	**52.1**	**33.1**	**20100**	**248**	**123**	**18.6**	**4.1**	**355**	**733**	**300**	**12600**	**7700**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)													
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**213**	**39.6**	**26.8**	**22000**	**250**	**106**	**4.1**	**4.01**	**248**	**460**	**188**	**11000**	**6000**
Total cPAH TEQ (ND=0)[a]	**213**	**37.3**	**26.8**	**22000**	**250**	**106**	**3.6**	**4.01**	**248**	**460**	**188**	**11000**	**6000**
Phenols (µg/kg)													
2,4,5-Trichlorophenol	25.7 U	118 U	99.6 U	257 U	25.7 U	65.9 U	100 U	99.7 UJ	25.8 U	25.7 U	25.7 U	102 U	103 U
2,4,6-Trichlorophenol	8.9 U	41 U	99.6 U	89.7 U	9 U	23 U	100 U	99.7 U	9 U	9 U	9 U	35.6 U	35.9 U
2,4-Dichlorophenol	15.3 U	70 U	99.6 U	153 U	15.3 U	39.2 U	100 U	99.7 U	15.3 U	15.3 U	15.3 U	60.7 U	61.3 U
2,4-Dinitrophenol	33.7 U	154 U	199 UJ	338 U	33.8 U	86.5 U	200 UJ	199 UJ	33.8 U	33.7 U	33.8 U	134 U	135 U
2-Chlorophenol	13.8 U	63.2 U	19.9 U	138 U	13.8 U	35.4 U	20 U	19.9 U	13.9 U	13.8 U	13.8 U	54.9 U	55.4 U
4,6-Dinitro-2-methylphenol	37.9 U	173 U	199 UJ	380 U	38 U	97.2 U	200 UJ	199 UJ	38 U	37.9 U	37.9 U	150 U	152 U
4-Chloro-3-Methylphenol	12.4 U	56.7 U	99.6 U	124 U	12.4 U	31.7 U	100 U	99.7 UJ	12.4 U	12.4 U	12.4 U	49.1 U	49.6 U
2,4-Dimethylphenol	3.8 U	17.3 U	99.6 U	37.8 U	3.8 U	9.7 U	100 U	99.7 U	3.8 U	3.8 U	3.8 U	**82 J**	**36.2 J**
2-Methylphenol (o-Cresol)	6.6 U	30.4 U	19.9 U	66.5 U	6.7 U	17 U	20 U	19.9 U	6.7 U	6.6 U	6.7 U	**115**	**72.6 J**
4-Methylphenol (p-Cresol)	7.4 U	33.7 U	19.9 U	73.8 U	**10.3 J**	18.9 U	**942**	19.9 U	7.4 U	7.4 U	**8.2 J**	**417 J**	**217 J**
Pentachlorophenol	31.1 U	143 U	99.6 UJ	312 U	31.2 U	79.9 U	100 U	99.7 UJ	31.3 U	31.2 U	31.2 U	124 U	125 U
Phenol	**11.9 J**	20 U	**7.1 J**	43.9 U	**8.1 J**	11.2 U	**86.1**	**9.8 J**	**6.9 J**	**6.8 J**	**12.6 J**	**289**	**115**
Phthalates (µg/kg)													
bis(2-Ethylhexyl)phthalate	5.4 U	24.9 U	**7.3 J**	54.5 U	5.5 U	14 U	50 U	**7.5 J**	5.5 U	**18.6 J**	**16.4 J**	**343**	**95.6 J**
Butylbenzyl phthalate	9.4 U	43 U	19.9 U	94 U	9.4 U	24.1 U	20 U	19.9 U	9.4 U	9.4 U	9.4 U	37.3 U	37.6 U
Diethyl phthalate	49.8 U	90 U	49.8 U	197 U	50 U	**143**	**23.2 J**	49.9 U	19.7 U	19.7 U	19.7 U	78.1 U	78.8 U
Dimethyl phthalate	4.4 U	20 U	19.9 U	43.9 U	4.4 U	11.2 U	20 U	19.9 U	4.4 U	4.4 U	4.4 U	17.4 U	17.6 U
Di-n-butyl phthalate	5.6 U	**183**	19.9 U	56 U	5.6 U	**108**	20 U	19.9 U	5.6 U	**7.9 J**	**12.8 J**	**90.9**	**91.7**
Di-n-octyl phthalate	4.4 U	20 U	19.9 U	43.9 U	4.4 U	11.2 U	20 U	19.9 U	4.4 U	4.4 U	4.4 U	17.4 U	17.6 U
Dioxin/Furans (ng/kg)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**5.84**	**3.55 J**	4.76 U	**32.7**	**66.8**	**30.7**	6.80 U	4.83 U	**29.3 J**	25.6 UJ	**21500 J**	**22.4 J**	**39.5 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**320**	**30.8**	**43.3**	**218**	**146**	**226**	**16.5**	**102**	**251 J**	**106 J**	**38500 J**	**104**	**131**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**8.39**	4.70 U	2.38 U	**83.4**	**682**	**124**	**6.79**	2.41 U	**86.0 J**	**19.1 J**	**37800 J**	**58.6 J**	**108 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**42.2**	**5.70**	**6.62**	**48.7**	**117**	**38.4**	**3.55**	**9.68**	**154 J**	**73.4 J**	**61100 J**	**82.5**	**127**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**0.566 J**	**0.247 J**	**0.0882 J**	**2.46**	**12.3**	**2.88 J**	**0.198 J**	0.0483 U	**4.69 J**	12.8 UJ	**1360 J**	**2.49**	**3.63 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**3.09**	**0.724 J**	2.38 U	**18.7 J**	**370**	**85.1**	**4.45**	2.41 U	**72.0 J**	**15.4 J**	**26200 J**	**45.7**	**75.3**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.10 J**	**0.605 J**	**0.293 J**	**3.44**	**12.7**	**3.94**	**0.431 J**	**0.267 J**	**24.1 J**	**18.7 J**	**4140 J**	**13.0**	**15.4**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**2.00 J**	**0.482 J**	**0.252 J**	**16.2**	**117**	**26.7**	**1.38 J**	0.0483 U	**21.4 J**	12.8 UJ	**4470 J**	**10.3**	**15.8**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.86**	**0.971 J**	**0.513 J**	**5.21**	**23.2**	**7.27**	**0.520 J**	**0.479 J**	**43.7 J**	**21.4 J**	**14100 J**	**21.6**	**29.6**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	2.39 U	0.102 U	2.38 U	2.35 U	**3.03**	3.84 U	3.41 U	0.0483 U	**1.74 J**	**0.663 J**	**271 J**	2.48 U	2.26 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**3.05**	**0.911 J**	**0.705 J**	**4.13**	**22.8**	**6.66**	**0.691 J**	**0.833 J**	**34.4 J**	**16.9 J**	**6830 J**	**14.7**	**16.9**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**2.74**	**1.05 J**	2.38 U	**27.0**	**117**	**27.6**	3.40 U	2.41 U	**53.8 J**	**23.4 J**	**9490 J**	**24.9**	**33.9**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**3.14**	**0.994 J**	**0.380 J**	**6.59**	**15.4**	**5.85**	**0.375 J**	**0.229 J**	**43.6 J**	**38.4 J**	**2770 J**	**23.0**	**23.7**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**1.77 J**	**0.484 J**	**0.262 J**	**12.7**	**80.0**	**18.5**	**1.05 J**	0.0483 U	**10.1 J**	12.8 UJ	**1050 J**	**4.14**	**4.83**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**2.91**	**0.849 J**	**0.293 J**	**32.3**	**87.3**	**21.4**	**1.24 J**	0.0483 U	**27.2 J**	**18.3 J**	**2330 J**	**13.1**	**15.5**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**6.69**	**2.47**	**0.407 J**	**96.1**	**69.3**	**18.4**	**1.08**	0.0483 U	**63.0 J**	**61.1 J**	**3920 J**	**37.0**	**39.0**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**1.84**	**0.754 J**	**0.205 J**	**5.24**	**6.20**	**2.40**	**0.163 J**	**0.0876 J**	**16.2 J**	**33.3 J**	**515 J**	**12.1**	**11.9**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**8.92**	**2.80**	**1.28**	**39.5**	**129**	**34.1**	**2.20**	**0.788**	**99.1**	**93.6**	**11400**	**56.0**	**63.5**
Total TCDD TEQ (ND=0)[b]	**8.80**	**2.77**	**0.996**	**39.4**	**129**	**33.9**	**1.98**	**0.602**	**99.1**	**92.3**	**11400**	**55.9**	**63.4**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-22-10to12	BH-SB-23-0to2	BH-SB-23-2to4	BH-SB-23-4to6	BH-SB-23-6to7	BH-SB-23-7to10	BH-SB-24-0to2	BH-SB-24-2to4	BH-SB-24-6to8	BH-SB-24-8to10	BH-SB-24-10to12	BH-SB-24-12to14	BH-SB-24-14to15
Location:	SB-22	SB-23	SB-23	SB-23	SB-23	SB-23	SB-24	SB-24	SB-24	SB-24	SB-24	SB-24	SB-24
Sample Date:	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29
Depth Interval:	10 - 12	0 - 2	2 - 4	4 - 6	6 - 7	7 - 10	0 - 2	2 - 4	6 - 8	8 - 10	10 - 12	12 - 14	14 - 15
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:													
Analyte													
Metals (mg/kg)													
Arsenic	**10.7**	**6.95**	**3.67**	**6.03**	**9.91**	**7.72**	**2.09 J**	**5.08**	**6.26**	**6.56**	**4.48**	**8.21**	**12.3**
Cadmium	**0.51 J-**	**0.15**	**0.13**	**0.11 J**	0.16 UJ	0.21 UJ	0.20 UJ	**0.48 J**	**0.59 J**	**1.22**	**0.34 J**	**0.73**	**0.52**
Chromium	**37.2**	**20.4**	**16.3**	**19.5**	**17.3**	**20.1**	**5.04 J**	**8.19 J**	**17.4**	**21.9**	**12.0**	**27.3**	**30.3**
Chromium (VI)	--	--	--	--	--	--	--	--	1.69 U,R	1.47 U,R	--	--	--
Copper	**107**	**62.9**	**95.5**	**69.5**	**127**	**123**	**35.6 J**	**49.1**	**67.7**	**103**	**47.4**	**39.8**	**24.7**
Lead	**112**	**115**	**288**	**62.2**	**14.0**	**9.23**	**8.78 J**	**10.7**	**11.4**	**21.9**	**35.2**	**31.8**	**10.0**
Mercury	--	**0.0302**	**0.0395**	**0.0160 J**	--	--	0.0123 U	0.0203 U	0.0142 U	0.0157 U	**0.0283 J**	**0.0760**	**0.0288**
Zinc	**922**	**146**	**128**	**99.0**	**131**	**115**	**36.9 J**	**98.1 J**	**130**	**136**	**81.6**	**63.8**	**57.8**
Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics (DRO)	--	**19.2**	**7.45**	**6.97**	--	--	6.48 U	8.62 U	7.42 U	**24.9**	**75.4**	**89.6**	**26.7**
Lube Oil	--	**81.8 J**	**23.4 J**	**52.6 J**	--	--	8.28 UJ	11.0 UJ	9.48 UJ	**34.8 J**	**144 J**	**103 J**	**101 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	**68.2**	5 U	5 U	**6.33**	5.1 U	5 U	4.98 U	4.98 U	**7.68**	**54.8 J-**	**160**	**125 J**	**39.7 J**
2-Methylnaphthalene	**81.2**	**27.9**	4.5 U	**325**	20 U	20 U	4.5 U	**6 J**	**43.9**	**72.8**	4.5 U	**187 J**	**144 J**
Acenaphthene	**59.3**	**12.5**	**5.47**	**13.2**	5.09 U	5 U	**0.76 J**	0.57 U	**1.21 J**	**7.75 J-**	**42.3**	**37.2 J**	**16.9 J**
Anthracene	**205**	**49.8**	**19.9**	**33.8**	5.09 U	5 U	**1.48 J**	0.87 UJ	**3.05 J**	**4.77 J**	**57.2 J-**	**107 J**	**26.4 J**
Benzo(a)anthracene	**627**	**233**	**58.6**	**196**	**1.26 J**	5 U	**4.83 J**	**1.23 J**	**2.64 J**	**1.58 J**	**31**	**87.6 J**	**12.7 J**
Benzo(a)pyrene	**932**	**253**	**65.9**	**212**	**2.31 J**	**1.01 J**	**4.85 J**	**1.5 J**	**5.24 J-**	**1.65 J**	**46.4 J-**	**124 J**	**14.4 J**
Benzo(b)fluoranthene	**597**	**208**	**101**	**188**	**3.86 J**	**1.85 J**	**13.5**	**4.14 J**	**6.92**	**1.9 J**	**57.1**	**130 J**	**11.7 J**
Benzo(k)fluoranthene	**361**	**122 J**	**42.5 J**	**107 J**	**2.08 J**	5 U	**4.79 J**	**1.74 J**	**3.76 J**	**0.81 J**	**27.8**	**67.7 J**	**6.47 J**
2-Chloronaphthalene	19.9 U	8 U	8 U	8 U	20 U	20 U	8 U	7.9 U	8 U	7.8 U	7.9 U	7.8 U	7.6 U
Chrysene	**754**	**273**	**92.3**	**250**	**3.35 J**	**2.38 J**	**12.7**	**5.36**	**3.96 J**	**2.63 J**	**44.6**	**117 J**	**15.2 J**
Dibenzo(a,h)anthracene	**200**	**55.7 J**	**30.8 J**	**45.3 J**	**1.42 J**	5 U	**3.04 J**	0.89 U	**1.7 J**	17 U	**13.9 J**	**31.1 J**	**2.71 J**
Fluoranthene	**1270**	**456**	**140**	**352**	**4.45 J**	**2.82 J**	**27**	**14.6**	**10.4**	**19.7 J-**	**202**	**368 J**	**89.6 J**
Fluorene	**118**	**16.3**	5 U	**11.9**	5.09 U	5 U	**1.69 J**	**0.83 J**	**2.15 J**	**16.9 J-**	**88.9**	**102 J**	**29.1 J**
Indeno(1,2,3-c,d)pyrene	**946**	**184**	**205**	**166**	**9.81**	**3.34 J**	**21.1**	**5.05**	**14**	**2.38 J**	**130**	**246 J**	**19.8 J**
Naphthalene	**969**	**8.75**	**10.6**	**8.9**	**4.64 J**	**27.6**	**50.1**	**40.1**	**119**	**679 J**	**2730**	**1960 J**	**682 J**
Pyrene	**1560**	**759**	**193**	**601**	**2.9 J**	**1.39 J**	**11**	**3.25 J**	**9.34**	**15.5 J-**	**178**	**339 J**	**82.5 J**
Total Benzofluoranthenes	**1270**	**425**	**183**	**379**	**7.6**	**6.85**	**25.1**	**7.73**	**16.1**	**4.1**	**124**	**290**	**28**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)													
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**1000**	**336**	**111**	**280**	**4.19**	**2.3**	**9.7**	**2.8**	**8.18**	**3.2**	**73**	**180**	**19.9**
Total cPAH TEQ (ND=0)[a]	**1000**	**336**	**111**	**280**	**4.19**	**1.55**	**9.7**	**2.8**	**8.18**	**2.3**	**73**	**180**	**19.9**
Phenols (µg/kg)													
2,4,5-Trichlorophenol	99.7 U	25.7 U	25.7 U	25.7 U	100 U	99.8 U	25.7 U	25.6 U	25.8 U	25.4 U	25.5 U	25.1 U	24.6 U
2,4,6-Trichlorophenol	99.7 U	9 U	9 U	9 U	100 U	99.8 U	9 U	8.9 U	9 U	8.8 U	8.9 U	8.8 U	8.6 U
2,4-Dichlorophenol	99.7 U	15.3 U	15.3 U	15.3 U	100 U	99.8 U	15.3 U	15.2 U	15.3 U	15.1 U	15.1 U	14.9 U	14.7 U
2,4-Dinitrophenol	199 UJ	33.8 U	33.8 U	33.8 U	200 UJ	200 UJ	33.8 U	33.6 U	33.8 U	33.3 U	33.4 U	33 UJ	32.4 UJ
2-Chlorophenol	19.9 U	13.8 U	13.8 U	13.8 U	20 U	20 U	13.8 U	13.8 U	13.9 U	13.6 U	13.7 U	13.5 U	13.3 U
4,6-Dinitro-2-methylphenol	199 UJ	38 U	38 U	38 U	200 UJ	200 UJ	38 U	37.7 U	38 U	37.4 U	37.6 U	37.1 U	36.4 U
4-Chloro-3-Methylphenol	99.7 U	12.4 U	12.4 U	12.4 U	100 U	99.8 U	12.4 U	12.3 U	12.4 U	12.2 U	12.3 U	12.1 U	11.9 U
2,4-Dimethylphenol	**8 J**	3.8 U	3.8 U	3.8 U	100 U	99.8 U	3.8 U	3.8 U	3.8 U	3.7 U	3.7 U	**36.5 J**	**15.8 J**
2-Methylphenol (o-Cresol)	**18.8 J**	6.7 U	6.7 U	6.7 U	20 U	20 U	6.7 U	6.6 U	**53.3**	6.6 U	6.6 U	**133**	**40**
4-Methylphenol (p-Cresol)	**67**	7.4 U	7.4 U	7.4 U	20 U	20 U	7.4 U	**14.6 J**	**161**	**101**	7.3 U	**347**	**139**
Pentachlorophenol	99.7 UJ	31.2 U	31.2 U	31.2 U	100 UJ	99.8 UJ	31.2 U	31.1 U	31.3 U	30.8 U	30.9 U	30.5 U	29.9 U
Phenol	**48.8**	**5.5 J**	4.4 U	**5.7 J**	**7 J**	**5.3 J**	**12.2 J**	4.4 U	**72.3**	**44.2**	4.3 U	**92.2 J**	**36.8 J**
Phthalates (µg/kg)													
bis(2-Ethylhexyl)phthalate	**14 J**	5.5 U	5.5 U	5.5 U	**9.4 J**	**25.1 J**	5.5 U	**6.7 J**	5.5 U	5.4 U	5.4 U	5.3 U	5.2 U
Butylbenzyl phthalate	19.9 U	9.4 U	9.4 U	9.4 U	20 U	20 U	9.4 U	9.4 U	9.4 U	9.3 U	9.3 U	9.2 U	9 U
Diethyl phthalate	**20.4 J**	19.7 U	19.7 U	19.7 U	50 U	49.9 U	19.7 U	19.6 U	19.7 U	**21.7 J**	19.5 U	19.2 U	18.9 U
Dimethyl phthalate	19.9 U	4.4 U	4.4 U	4.4 U	20 U	20 U	4.4 U	4.4 U	4.4 U	4.3 U	4.3 U	4.3 U	4.2 U
Di-n-butyl phthalate	19.9 U	5.6 U	5.6 U	5.6 U	20 U	20 U	**6.5 J**	5.6 U	5.6 U	5.5 U	5.5 U	5.5 U	5.4 U
Di-n-octyl phthalate	19.9 U	4.4 U	4.4 U	4.4 U	20 U	20 U	4.4 U	4.4 U	4.4 U	4.3 U	4.3 U	4.3 U	4.2 U
Dioxin/Furans (ng/kg)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**1090**	**27.6 J**	4.76 UJ	24.4 UJ	4.77 U	4.82 U	4.62 U	4.52 U	4.95 U	**6.10**	**5.04 J**	5.02 U	4.99 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**2820**	**690 J**	**23.6 J**	**462 J**	4.77 U	**4.89**	**46.7**	**13.6**	**10.3**	**31.6**	**48.7**	**467**	**223**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**3400**	**115 J**	**5.36 J**	**60.6 J**	2.39 U	2.41 U	2.31 U	2.26 U	2.48 U	**20.4**	**16.3**	**10.5**	2.50 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**4920**	**174 J**	**25.4 J**	**104 J**	2.39 U	2.41 U	**7.97**	2.26 U	**4.34**	**42.0**	**11.7**	**53.7**	**19.4**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**135**	**7.67 J**	2.38 UJ	12.2 UJ	0.0477 U	0.0482 U	2.31 U	0.0452 U	2.48 U	2.35 U	**0.578 J**	2.51 U	2.50 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**2770**	**64.7 J**	**2.82 J**	**37.6 J**	2.39 U	2.41 U	2.31 U	2.26 U	**3.34**	**24.1**	**14.8**	**5.95**	2.50 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**379**	**13.1 J**	**6.77 J**	**9.79 J**	**0.301 J**	**0.0731 J**	2.31 U	2.26 U	2.48 U	**5.95**	**2.77 J**	**4.91**	2.50 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**480**	**25.7 J**	2.38 UJ	**15.2 J**	**0.138 J**	0.0482 U	2.31 U	2.26 U	2.48 U	**4.66**	**3.11 J**	**3.18**	2.50 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**1200**	**37.5 J**	**6.45 J**	**24.7 J**	**0.351 J**	**0.0728 J**	2.31 U	2.26 U	2.48 U	**13.4**	**3.12 J**	**7.12**	2.50 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**35.7**	**1.54 J**	**0.217 J**	**0.914 J**	2.39 U	0.0482 U	2.31 U	0.0452 U	2.48 U	2.35 U	0.23 U	2.51 U	0.0499 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**628**	**24.6 J**	**5.47 J**	**15.6 J**	**0.309 J**	0.102 U	2.31 U	2.26 U	2.48 U	**10.1**	**2.57 J**	**6.35**	6.24 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**1210**	**24.8 J**	**3.91 J**	**17.8 J**	2.39 U	2.41 U	2.31 U	2.26 U	**2.56**	**18.6**	**7.88**	**6.74**	2.50 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**328**	**17.6 J**	**10.7 J**	**11.4 J**	**0.417 J**	0.189 U	2.31 U	2.26 U	2.48 U	**8.86**	**2.84 J**	**8.25 J**	2.50 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**99.2**	**11.7 J**	2.38 UJ	12.2 UJ	**0.195 J**	0.0482 U	2.31 U	2.26 U	2.48 U	2.35 U	**1.13 J**	2.51 U	2.50 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**252**	**15.7 J**	**3.51 J**	**11.2 J**	**0.159 J**	**0.0718 J**	2.31 U	2.26 U	2.48 U	**5.53**	**2.89 J**	**5.41**	2.50 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**388**	**15.8 J**	**9.91 J**	**14.2 J**	**0.363 J**	**0.274 J**	**2.23**	**1.20**	**2.38**	**20.3**	**7.73**	**14.5**	**1.27**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**54.0**	**2.27 J**	**6.88 J**	**1.97 J**	**0.211 J**	**0.103 J**	**0.683 J**	**0.351 J**	**0.397 J**	**2.76**	**1.25**	**4.46**	**0.493 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**1180**	**48.0**	**22.5**	**31.5**	**1.14**	**0.457**	**3.37**	**2.68**	**3.47**	**22.6**	**9.0**	**19.8**	**3.51**
Total TCDD TEQ (ND=0)[b]	**1180**	**48.0**	**22.2**	**30.8**	**0.841**	**0.168**	**1.00**	**0.475**	**1.09**	**22.3**	**9.0**	**19.5**	**0.881**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-25-0to2	BH-SB-25-2to4	BH-SB-25-2to4-D	BH-SB-25-4to6	BH-SB-25-8to10	BH-SB-25-10to12	BH-SB-25-12to14	BH-SB-25-14to15	BH-SB-26-0to2	BH-SB-26-2to4	BH-SB-26-4to6	BH-SB-26-7to9	BH-SB-26-9to10
Location:	SB-25	SB-25	SB-25	SB-25	SB-25	SB-25	SB-25	SB-25	SB-26	SB-26	SB-26	SB-26	SB-26
Sample Date:	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29	2022-09-29
Depth Interval:	0 - 2	2 - 4	2 - 4	4 - 6	8 - 10	10 - 12	12 - 14	14 - 15	0 - 2	2 - 4	4 - 6	7 - 9	9 - 10
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:			Duplicate										
Analyte													
Metals (mg/kg)													
Arsenic	**9.55**	**7.77**	**8.02**	**8.85**	**7.03**	**7.20**	**7.23**	**5.48**	**5.81**	**5.91**	**7.24**	**8.24**	**5.26**
Cadmium	**0.64 J**	**0.76 J**	**0.33 J**	**0.09 J**	**0.07 J**	**0.10 J**	**0.14**	**0.11 J**	**0.44 J**	**0.68**	**0.07 J**	**0.04 J**	**0.16**
Chromium	**29.7**	**27.7**	**36.5**	**40.6**	**35.0**	**36.6**	**37.7**	**30.8**	**51.8**	**4.22**	**35.2**	**38.2**	**25.0**
Chromium (VI)	7.39 U,R	0.623 U,R	--	0.547 U,R	--	--	--	--	--	--	--	--	--
Copper	**121**	**132**	**136**	**80.9**	**60.0**	**68.7**	**60.0**	**70.7**	**113**	**18.5**	**52.2**	**70.9**	**42.0**
Lead	**243 J**	**724 J**	**578**	**34.5**	**2.91**	**13.1**	**1.53**	**1.55**	**199**	**14.0**	**2.42**	**1.83**	**1.49**
Mercury	**0.0502**	**0.0800**	**0.0518**	**0.00986 J**	**0.00502 J**	0.00490 U	0.00430 U	0.00575 U	**0.0561 J**	0.0260 U	0.00529 U	**0.00498 J**	0.00556 U
Zinc	**424**	**866**	**671**	**262**	**170**	**159**	**77.4**	**49.7**	**278**	**154**	**66.7**	**66.5**	**47.5**
Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics (DRO)	**50.0**	2.84 U	3.00 U	2.55 U	2.57 U	2.62 U	2.67 U	2.64 U	**36.8**	**49.6**	2.73 U	2.70 U	2.68 U
Lube Oil	**147 J**	**20.7 J**	**24.5 J**	3.26 UJ	3.28 UJ	3.34 UJ	3.41 UJ	3.37 UJ	**55.3 J**	17.1 UJ	3.49 UJ	3.44 UJ	3.43 UJ
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	14.7 UJ	14.9 UJ	14.9 UJ	5.3 U	4.9 U	5 U	5.2 U	5.2 U	5.3 U	20 U	5.2 U	5.2 U	5.1 U
2-Methylnaphthalene	**10.7 J**	4.5 U	4.2 U	4.5 U	4.2 U	4.3 U	4.5 U	4.5 U	4.5 U	17.2 U	4.5 U	4.5 U	4.4 U
Acenaphthene	14.7 UJ	**27.9 J**	4.9 U	5.2 U	4.9 U	4.9 U	5.2 U	5.2 U	5.2 U	19.9 U	5.2 U	5.2 U	5.1 U
Anthracene	**22.5 J**	**57.3 J**	**3.84 J**	**1.07 J**	6.7 U	6.8 U	7.1 U	7.2 U	**2.77 J**	27.4 U	7.2 U	7.1 U	7 U
Benzo(a)anthracene	**69.2 J**	**99.2 J**	**19.4 J**	**1.29 J**	5.6 U	5.6 U	5.9 U	5.9 U	**7.37 J**	22.7 U	5.9 U	5.9 U	5.8 U
Benzo(a)pyrene	**140 J**	**88.8 J**	**31.4 J**	**2.11 J**	0.6 UJ	**0.78 J**	0.61 UJ	0.6 UJ	**29.6 J**	2.35 UJ	0.61 UJ	0.6 UJ	0.61 UJ
Benzo(b)fluoranthene	**168 J**	**79.2 J**	**43.3 J**	**4.34 J**	1.35 UJ	**2.33 J**	1.37 UJ	1.35 UJ	**32 J**	5.24 UJ	1.37 UJ	1.35 UJ	1.35 UJ
Benzo(k)fluoranthene	**76.6 J**	**45.8 J**	**21.6 J**	**1.89 J**	0.75 UJ	**0.9 J**	0.76 UJ	0.75 UJ	**16.4 J**	2.9 UJ	0.76 UJ	0.75 UJ	0.75 UJ
2-Chloronaphthalene	7.6 U	7.9 U	7.5 U	8 U	7.4 U	7.5 U	7.9 U	7.9 U	7.9 U	30.3 U	7.9 U	7.9 U	7.8 U
Chrysene	**130 J**	**122 J**	**28.5 J**	**3.66 J**	1.03 UJ	**1.9 J**	1.05 UJ	1.04 UJ	**17 J**	4.02 UJ	1.05 UJ	1.03 UJ	1.04 UJ
Dibenzo(a,h)anthracene	**56.5 J**	**24.7 J**	**14.9 J**	**1.09 J**	0.87 UJ	0.87 UJ	0.89 UJ	0.88 UJ	**15.5 J**	3.4 UJ	0.89 UJ	0.87 UJ	0.88 UJ
Fluoranthene	**190 J**	**206 J**	**40.6 J**	**4.78 J**	**1.02 J**	**2.04 J**	0.47 UJ	0.46 UJ	**23.6 J**	**5.56 J**	0.47 UJ	0.46 UJ	0.46 UJ
Fluorene	**9.59 J**	**23.8 J**	13.6 U	14.6 U	13.6 U	13.8 U	14.5 U	14.5 U	14.5 U	55.5 U	14.5 U	14.5 U	14.2 U
Indeno(1,2,3-c,d)pyrene	**482 J**	**117 J**	**103 J**	**6.56 J**	1.03 UJ	**3.76 J**	1.05 UJ	1.03 UJ	**121 J**	4.01 UJ	1.05 UJ	1.03 UJ	1.04 UJ
Naphthalene	**39.6 J**	**21.7 J**	**16.6 J**	5 UJ	4.9 UJ	4.87 UJ	4.98 UJ	4.2 U	15 UJ	19.1 UJ	4.2 U	4.2 U	4.1 U
Pyrene	**162 J**	**199 J**	**34.7 J**	**4.16 J**	**0.76 J**	**1.56 J**	5.6 U	5.7 U	**11 J**	**4.28 J**	5.7 U	5.6 U	5.5 U
Total Benzofluoranthenes	**342**	**179**	**90.9**	**8.53**	**4.9 U**	**4.4**	4.98 U	4.92 U	**69.3**	**19.1 U**	4.99 U	4.91 U	4.94 U
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)													
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**230**	**127**	**51.9**	**3.66**	4.9 U	**1.8**	4.98 U	4.92 U	**49**	19.1 U	4.99 U	4.91 U	4.94 U
Total cPAH TEQ (ND=0)[a]	**230**	**127**	**51.9**	**3.66**	4.9 U	**1.5**	4.98 U	4.92 U	**49**	19.1 U	4.99 U	4.91 U	4.94 U
Phenols (µg/kg)													
2,4,5-Trichlorophenol	24.7 U	25.6 U	24.1 U	25.7 U	24 U	24.4 U	25.6 UJ	25.7 U,R	25.7 U	98 U	25.7 U,R	25.6 U,R	25.1 U,R
2,4,6-Trichlorophenol	8.6 U	8.9 U	8.4 U	9 U	8.4 U	8.5 U	8.9 UJ	8.9 U,R	9 U	34.2 U	9 U,R	8.9 U,R	8.8 U,R
2,4-Dichlorophenol	14.7 U	15.2 U	14.3 U	15.3 U	14.3 U	14.5 U	15.2 UJ	15.3 U,R	15.3 U	58.3 U	15.3 U,R	15.2 U,R	14.9 U,R
2,4-Dinitrophenol	32.4 UJ	33.6 UJ	31.6 UJ	33.8 UJ	31.5 UJ	32 UJ	33.6 UJ	33.7 U,R	33.7 UJ	129 UJ	33.7 U,R	33.6 U,R	33 U,R
2-Chlorophenol	13.3 U	13.8 U	13 U	13.8 U	12.9 U	13.1 U	13.8 UJ	13.8 U,R	13.8 U	52.7 U	13.8 U,R	13.8 U,R	13.5 U,R
4,6-Dinitro-2-methylphenol	36.5 U	37.8 U	35.6 U	38 U	35.4 U	35.9 U	37.8 UJ	37.9 U,R	37.9 U	145 U	37.9 U,R	37.7 U,R	37.1 U,R
4-Chloro-3-Methylphenol	11.9 U	12.3 U	11.6 U	12.4 U	11.6 U	11.7 U	12.3 UJ	12.4 U,R	12.4 U	47.3 U	12.4 U,R	12.3 U,R	12.1 U,R
2,4-Dimethylphenol	3.6 U	3.8 U	3.5 U	3.8 U	3.5 U	3.6 U	3.8 UJ	3.8 U,R	3.8 U	14.4 U	3.8 U,R	3.8 U,R	3.7 U,R
2-Methylphenol (o-Cresol)	6.4 U	6.6 U	6.2 U	6.7 U	6.2 U	6.3 U	6.6 U	6.6 U	6.6 U	25.4 U	6.6 U	6.6 U	6.5 U
4-Methylphenol (p-Cresol)	7.1 U	7.4 U	6.9 U	7.4 U	6.9 U	7 U	7.3 U	7.4 U	7.4 U	28.1 U	7.4 U	7.3 U	7.2 U
Pentachlorophenol	30 U	31.1 U	29.2 U	31.2 U	29.2 U	29.6 U	31.1 UJ	31.1 U,R	31.2 U	119 U	31.2 U,R	31 U,R	30.5 U,R
Phenol	4.2 U	4.4 UJ	**7.1 J**	4.4 U	4.1 U	4.2 U	4.4 UJ	4.4 U,R	**14.4 J**	**60.7 J**	**16.2 J**	**13.4 J**	**21.8 J-**
Phthalates (µg/kg)													
bis(2-Ethylhexyl)phthalate	5.2 U	5.4 U	5.1 U	5.5 U	5.1 U	5.2 U	5.4 U	5.4 U	5.5 U	20.8 U	5.4 U	5.4 U	5.3 U
Butylbenzyl phthalate	9 U	9.4 U	8.8 U	9.4 U	8.8 U	8.9 U	9.4 U	9.4 U	9.4 U	35.8 U	9.4 U	9.3 U	9.2 U
Diethyl phthalate	18.9 U	19.6 U	18.4 U	19.7 U	18.4 U	18.6 U	19.6 U	19.6 U	19.7 U	75 U	19.6 U	19.6 U	**28.9 J**
Dimethyl phthalate	4.2 U	4.4 U	4.1 U	4.4 U	4.1 U	4.2 U	4.4 U	4.4 U	4.4 U	16.7 U	4.4 U	4.4 U	4.3 U
Di-n-butyl phthalate	5.4 U	5.6 U	5.3 U	5.6 U	5.2 U	5.3 U	5.6 U	5.6 U	5.6 U	21.4 U	5.6 U	5.6 U	5.5 U
Di-n-octyl phthalate	4.2 U	4.4 U	4.1 U	4.4 U	4.1 U	4.2 U	4.4 U	4.4 U	4.4 U	16.7 U	4.4 U	4.4 U	4.3 U
Dioxin/Furans (ng/kg)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**61.8**	**31.0**	**6.18**	**1.72 J**	**0.215 J**	**0.816 J**	0.0534 U	**0.174 J**	4.24 U	0.0557 U	4.56 U	4.68 U	0.0462 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**277**	**124**	**85.8**	**47.4**	**32.9**	**43.3**	**76.5**	**110**	**1050**	5.57 U	**34.2**	**44.7**	**87.3**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**228**	**166**	**20.3**	**6.13**	**0.429 J**	**1.74 J**	**0.0849 J**	**0.178 J**	**2.96**	2.78 U	2.28 U	2.34 U	2.31 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**316**	**84.0**	**52.6**	**13.9**	**4.19**	**7.80**	**6.66**	**8.52**	**47.4**	2.78 U	**4.73**	**6.03**	**9.34**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**10.8**	**8.69**	**1.34 J**	**0.461 J**	0.0475 U	**0.133 J**	0.0534 U	0.0459 U	2.12 U	0.0557 U	0.0456 U	0.0468 U	0.0462 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**189**	**46.1**	**10.6**	**4.75**	**0.250 J**	**1.02 J**	0.0534 U	**0.0463 J**	**2.38**	2.78 U	2.28 U	2.34 U	0.0462 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**54.6**	**12.4**	**8.71**	**1.10 J**	**0.208 J**	**0.600 J**	**0.187 J**	**0.217 J**	**3.17**	**0.0680 J**	**0.150 J**	**0.194 J**	**0.232 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**49.5**	**36.7**	**6.65**	**1.49 J**	**0.101 J**	**0.416 J**	0.0534 U	0.0459 U	2.12 U	0.0557 U	0.0456 U	0.0468 U	0.0462 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**82.6**	**17.3**	**12.2**	**2.00 J**	**0.376 J**	**1.15 J**	**0.351 J**	**0.419 J**	**4.49**	2.78 U	2.28 U	2.34 U	2.31 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**3.44**	**1.61 J**	**0.453 J**	**0.123 J**	0.0475 U	0.0493 U	0.0534 U	0.0459 U	2.12 U	0.0557 U	0.0456 U	0.0468 U	0.0462 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**50.9 J**	**10.5 J**	**9.81 J**	**1.38 J**	**0.562 J**	**0.965 J**	**0.413 J**	**0.532 J**	**6.34 J**	0.0569 U	**0.621 J**	**0.860 J**	**0.982 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**103**	**23.9**	**11.7**	**1.78 J**	**0.197 J**	**0.724 J**	0.0534 U	**0.0493 J**	**2.48**	2.78 U	2.28 U	2.34 U	2.31 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**78.9**	**15.8**	**12.0**	**1.38 J**	**0.264 J**	**0.869 J**	**0.173 J**	**0.176 J**	**5.23**	2.78 U	2.28 U	2.34 U	2.31 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**20.5**	**51.6**	**5.18**	**0.549 J**	**0.0604 J**	**0.206 J**	0.0534 U	0.0459 U	**0.509 J**	0.0557 U	0.0456 U	0.0468 U	0.0462 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**46.1**	**39.8**	**10.7**	**0.875 J**	**0.0942 J**	**0.417 J**	0.0534 U	0.0459 U	2.12 U	2.78 U	2.28 U	0.0468 U	0.0462 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**84.1**	**35.5**	**23.2**	**1.20**	**0.202 J**	**0.778**	0.0534 U	0.0459 U	**5.34**	**0.185 J**	**0.144 J**	**0.0607 J**	0.0462 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**18.2**	**5.51**	**4.17**	**0.389 J**	**0.0929 J**	**0.198 J**	**0.0881 J**	**0.0645 J**	**1.91**	**0.0600 J**	**0.0707 J**	**0.0638 J**	**0.107 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**173**	**57.8**	**28.2**	**3.56**	**0.626**	**1.84**	**0.469**	**0.500**	**10.8**	**2.25**	**1.98**	**1.71**	**1.68**
Total TCDD TEQ (ND=0)[b]	**173**	**57.8**	**28.2**	**3.56**	**0.623**	**1.84**	**0.447**	**0.483**	**10.3**	**0.0853**	**0.220**	**0.249**	**0.348**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-27-2.5to3.5	BH-SB-27-4to6	BH-SB-27-8to10	BH-SB-27-12to14	BH-SB-27-14to16	BH-SB-27-16to18	BH-SB-27-18to20	BH-SB-28-0to2	BH-SB-28-2to4	BH-SB-28-4to6	BH-SB-28-6to8	BH-SB-28-8to10	BH-SB-28-8to10-D
Location:	SB-27	SB-27	SB-27	SB-27	SB-27	SB-27	SB-27	SB-28	SB-28	SB-28	SB-28	SB-28	SB-28
Sample Date:	2022-09-30	2022-09-30	2022-09-30	2022-09-30	2022-09-30	2022-09-30	2022-09-30	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28
Depth Interval:	2.5 - 3.5	4 - 6	8 - 10	12 - 14	14 - 16	16 - 18	18 - 20	0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	8 - 10
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:													Duplicate
Analyte													
Metals (mg/kg)													
Arsenic	**4.11**	**11.5**	**5.96**	**6.12**	**8.94**	--	--	**6.14**	**6.17**	**3.68**	**10.5**	**6.82**	**8.40**
Cadmium	**0.15 J**	**1.15**	**0.05 J**	**0.08 J**	**0.08 J**	--	--	**0.28 J**	**0.13 J**	0.17 U	**0.14 J**	**0.10 J**	**0.06 J**
Chromium	**15.3**	**46.6**	**35.8**	**44.6**	**39.0**	--	--	**28.9**	**23.8**	**14.2**	**35.2**	**17.0**	**15.1**
Chromium (VI)	0.648 U,R	--	--	--	--	--	--	--	--	--	--	--	--
Copper	**165**	**122**	**66.8**	**102**	**92.6**	--	--	**64.6**	**103**	**64.4**	**232**	**104**	**120**
Lead	**1650**	**288**	**2.37**	**1.49**	**1.99**	--	--	**119**	**134**	**9.87**	**26.4**	**8.46 J**	**14.7 J**
Mercury	**0.113**	**0.108**	**0.0134 J**	**0.00973 J**	**0.0102 J**	--	--	**0.0579**	**0.0403**	0.00888 U	0.00722 U	0.00753 U	0.00819 U
Zinc	**116**	**206**	**75.9**	**68.8**	**84.1**	--	--	**144**	**122**	**74.8**	**213**	**79.7**	**85.6**
Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics (DRO)	**33.2**	**236**	2.71 U	2.78 U	2.80 U	--	--	**35.3**	3.44 U	5.38 U	4.45 U	4.53 U	4.11 U
Lube Oil	**49.8 J**	**193 J**	3.46 UJ	3.55 UJ	3.58 UJ	--	--	**251 J**	**26.9 J**	6.88 UJ	5.68 UJ	5.78 UJ	5.25 UJ
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	**75.5**	38.8 U	0.4 U	0.4 U	0.4 U	--	--	14.8 UJ	4.96 UJ	5 UJ	4.89 UJ	**14 J**	**8.15 J**
2-Methylnaphthalene	**128**	**39.4 J**	4.5 U	4.5 U	4.5 U	--	--	**15.2 J**	**10.9 J**	4.4 U	4.5 U	**10.8 J**	**12.1 J**
Acenaphthene	**4.32 J**	4.43 U	0.57 U	0.57 U	0.57 U	--	--	**13 J**	**0.67 J**	5.1 U	**0.83 J**	**4.78 J**	**3.13 J**
Anthracene	**8.75 J**	**60.4**	0.87 U	0.87 U	0.87 U	--	--	**547 J**	**9.12 J**	**1.05 J**	**1.91 J**	**2.59 J**	**1.36 J**
Benzo(a)anthracene	**41**	**132**	**1.22 J**	0.82 U	0.82 U	--	--	**202 J**	**12.7 J**	**2.58 J**	**2.04 J**	**0.98 J**	5.9 U
Benzo(a)pyrene	**48.9**	**131**	**1.04 J**	0.61 U	0.61 U	--	--	**160 J**	**12.9 J**	**2.85 J**	**1.55 J**	4.2 U	4.2 U
Benzo(b)fluoranthene	**71.3**	**170**	1.37 U	1.37 U	1.36 U	--	--	**171 J**	**32.2 J**	**11.7 J**	**4.33 J**	6.9 U	7 U
Benzo(k)fluoranthene	**25.6**	**64.9**	0.76 U	0.76 U	0.76 U	--	--	**104 J**	**11.7 J**	**4.59 J**	**2.44 J**	4.9 U	5 U
2-Chloronaphthalene	8 U	20.6 U	7.9 U	8 U	7.9 U	--	--	7.8 U	7.9 U	7.8 U	7.9 U	7.8 U	7.9 U
Chrysene	**137**	**285**	**1.75 J**	1.05 U	1.05 U	--	--	**552 J**	**35 J**	**8.3 J**	**5.57 J**	**1.77 J**	**1.41 J**
Dibenzo(a,h)anthracene	**23.3**	**38 J**	0.89 U	0.89 U	0.89 U	--	--	**43.4 J**	**6.41 J**	**2.16 J**	**0.95 J**	16.9 U	17.2 U
Fluoranthene	**74.1**	**338**	**2.24 J**	0.47 U	**0.95 J**	--	--	**569 J**	**43.6 J**	**10.5 J**	**5.81 J**	**9.99 J**	**4.66 J**
Fluorene	**12 J**	**20.7 J**	0.63 U	0.63 U	0.63 U	--	--	**66.6 J**	**2.08 J**	14.3 U	**0.92 J**	**5.23 J**	**2.87 J**
Indeno(1,2,3-c,d)pyrene	**72.5**	**99**	1.05 U	1.05 U	1.04 U	--	--	**126 J**	**28.6 J**	**12.1 J**	**2.9 J**	14.4 U	14.6 U
Naphthalene	**37.1**	**73**	1.27 U	**1.34 J**	**3.58 J**	--	--	**36 J**	**20.8 J**	**16.5 J**	**18.2 J**	**158 J**	**79.2 J**
Pyrene	**73.7**	**329**	**2.23 J**	0.63 U	**0.7 J**	--	--	**515 J**	**31.4 J**	**5.34 J**	**4.92 J**	**8.32 J**	**3.34 J**
Total Benzofluoranthenes	**127**	**320**	**1.8**	5 U	**4.97 U**	--	--	**382**	**58.6**	**22**	**9.27**	**19.7 U**	**19.9 U**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)													
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**73.6**	**180**	**1.4**	5 U	4.97 U	--	--	**230**	**22.4**	**6.25**	**2.9**	**4.4**	**4.6**
Total cPAH TEQ (ND=0)[a]	**73.6**	**180**	**1.2**	5 U	4.97 U	--	--	**230**	**22.4**	**6.25**	**2.9**	**0.12**	**0.014**
Phenols (µg/kg)													
2,4,5-Trichlorophenol	25.7 U	66.7 U	25.5 U	25.8 U	25.6 U	--	--	25.2 U	25.6 U	25.2 U	25.6 U	25.3 U	25.7 U
2,4,6-Trichlorophenol	9 U	23.3 U	8.9 U	9 U	8.9 U	--	--	8.8 U	8.9 U	8.8 U	8.9 U	8.8 U	9 U
2,4-Dichlorophenol	15.3 U	39.7 U	15.2 U	15.3 U	15.2 U	--	--	15 U	15.3 U	15 U	15.2 U	15.1 U	15.3 U
2,4-Dinitrophenol	33.8 U	87.6 U	33.5 U	33.8 U	33.6 U	--	--	33.1 U	33.7 U	33.1 U	33.6 U	33.2 U	33.7 U
2-Chlorophenol	13.8 U	35.9 U	13.7 U	13.9 U	13.8 U	--	--	13.6 U	13.8 U	13.6 U	13.7 U	13.6 U	13.8 U
4,6-Dinitro-2-methylphenol	37.9 U	98.4 U	37.7 U	38 U	37.8 U	--	--	37.2 U	37.8 U	37.2 U	37.7 U	37.3 U	37.9 U
4-Chloro-3-Methylphenol	12.4 U	32.1 U	12.3 U	12.4 U	12.3 U	--	--	12.1 U	12.4 U	12.2 U	12.3 U	12.2 U	12.4 U
2,4-Dimethylphenol	3.8 U	9.8 U	3.7 U	3.8 U	3.8 U	--	--	3.7 U	3.8 U	3.7 U	3.8 U	3.7 U	3.8 U
2-Methylphenol (o-Cresol)	6.7 U	17.3 U	6.6 U	6.7 U	6.6 U	--	--	6.5 U	6.6 U	6.5 U	6.6 U	6.5 U	6.6 U
4-Methylphenol (p-Cresol)	7.4 U	19.1 U	7.3 U	7.4 U	7.3 U	--	--	7.2 U	7.4 U	7.2 U	7.3 U	7.3 UJ	**11.5 J**
Pentachlorophenol	31.2 U	81 U	31 U	31.3 U	31.1 U	--	--	30.6 U	31.1 U	30.6 U	31 U	30.7 U	31.1 U
Phenol	4.4 U	**131**	20 U	4.4 U	20 U	--	--	4.3 U	4.4 U	4.3 U	4.4 U	4.3 U	4.4 U
Phthalates (µg/kg)													
bis(2-Ethylhexyl)phthalate	5.5 U	14.1 U	5.4 U	5.5 U	5.4 U	--	--	5.3 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
Butylbenzyl phthalate	9.4 U	24.4 U	9.3 U	9.4 U	9.4 U	--	--	9.2 U	9.4 U	9.2 U	9.3 U	9.2 U	9.4 U
Diethyl phthalate	19.7 U	51.1 U	19.6 U	**20.6 J**	19.6 U	--	--	**62.8**	**19.8 J**	19.3 U	19.6 U	**19.6 J**	**45 J**
Dimethyl phthalate	4.4 U	11.4 U	4.4 U	4.4 U	4.4 U	--	--	4.3 U	4.4 U	4.3 U	4.4 U	4.3 U	4.4 U
Di-n-butyl phthalate	5.6 U	14.5 U	5.6 U	5.6 U	5.6 U	--	--	5.5 U	5.6 U	5.5 U	5.6 U	5.5 U	5.6 U
Di-n-octyl phthalate	4.4 U	11.4 U	4.4 U	4.4 U	4.4 U	--	--	4.3 U	4.4 U	4.3 U	4.4 U	4.3 U	4.4 U
Dioxin/Furans (ng/kg)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**8.93**	**18.9**	**0.0644 J**	**0.906 J**	0.0503 U	0.261 U	0.369 U	**29.2**	**9.28**	**0.650 J**	**1.05 J**	**0.423 J**	**0.309 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**217**	**365**	**163**	**215**	**125**	**52.7**	**165**	**1390**	**536**	**54.2**	**45.4**	**7.84**	**7.35**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**22.3**	**17.2**	**0.0945 J**	**0.583 J**	**0.0914 J**	2.44 U	0.0921 U	**29.4**	**8.91**	**0.696 J**	**1.43 J**	**0.818 J**	**0.600 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**36.4**	**54.8**	**15.2**	**18.2**	**12.0**	**6.89**	**15.7**	**134**	**50.3**	**5.47**	**5.23**	2.28 U	2.61 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**1.39 J**	**0.769 J**	0.0491 U	0.0487 U	0.0503 U	0.117 U	0.158 U	**1.63 J**	**0.674 J**	**0.0510 J**	**0.0837 J**	**0.0645 J**	**0.0640 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**8.26**	**4.11**	0.0491 U	0.0487 U	0.0503 U	0.161 U	0.17 U	**9.05**	**2.85**	**0.369 J**	**0.718 J**	**0.342 J**	**0.232 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**4.05**	**2.12 J**	**0.361 J**	**0.525 J**	**0.298 J**	0.283 U	**0.481 J**	**5.27**	**2.15 J**	**0.468 J**	**0.392 J**	**0.168 J**	**0.127 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**6.84**	**2.75**	0.0491 U	0.0487 U	0.0503 U	0.15 U	0.139 U	**4.07**	**1.51 J**	**0.179 J**	**0.389 J**	**0.207 J**	**0.145 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**6.18**	**4.50**	**0.683 J**	**0.838 J**	**0.580 J**	**0.443 J**	**0.675 J**	**11.6**	**4.25**	**0.607 J**	**0.600 J**	**0.264 J**	**0.211 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.389 J**	**0.149 J**	0.0491 U	0.0487 U	0.0503 U	0.213 U	0.228 U	**0.293 J**	**0.145 J**	0.0493 U	0.0466 U	0.0455 U	0.0523 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**8.12 J**	**11.2 J**	**1.36 J**	**1.64 J**	**1.06 J**	**0.801 J**	**1.26 J**	**11.2**	**4.72**	**0.522 J**	**0.255 J**	**0.128 J**	**0.0770 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**8.38**	**2.90**	0.0491 U	0.0487 U	0.0503 U	0.16 U	0.133 U	**5.94**	**2.58**	**0.430 J**	**0.776 J**	**0.430 J**	**0.307 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**6.11**	**2.52**	**0.268 J**	**0.417 J**	**0.250 J**	**0.277 J**	0.201 U	**7.22**	**3.11**	**0.649 J**	**0.560 J**	**0.300 J**	**0.222 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**5.40**	**2.39 J**	0.0491 U	0.0487 U	0.0503 U	0.156 U	0.175 U	**2.83**	**1.08 J**	**0.109 J**	**0.307 J**	**0.139 J**	**0.109 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**9.94**	**3.44**	0.0491 U	0.0487 U	0.0503 U	0.16 U	0.158 U	**4.74**	**1.99 J**	**0.274 J**	**0.647 J**	**0.352 J**	**0.245 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**14.7**	**4.54**	0.0491 U	0.0487 U	0.0503 U	0.302 U	0.345 U	**8.75**	**4.59**	**0.917**	**1.49**	**0.876**	**0.686**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**2.09**	**0.669 J**	**0.0891 J**	**0.195 J**	**0.0907 J**	0.206 U	0.208 U	**2.59**	**1.01**	**0.201 J**	**0.265 J**	**0.158 J**	**0.117 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**17.5**	**8.33**	**0.820**	**1.19**	**0.714**	**0.69**	**0.73**	**18.8**	**7.69**	**1.34**	**1.54**	**0.814**	**0.605**
Total TCDD TEQ (ND=0)[b]	**17.5**	**8.33**	**0.799**	**1.16**	**0.693**	**0.49**	**0.45**	**18.8**	**7.69**	**1.34**	**1.54**	**0.800**	**0.589**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-28-10to12	BH-SB-28-12to14	BH-SB-29-2to4	BH-SB-29-4to6	BH-SB-29-8to10	BH-SB-29-13to15	BH-SB-29-19to21	BH-SB-29-21to23	BH-SB-29-23to24	BH-SB-30-3to4	BH-SB-30-4to5	BH-SB-30-8to10	BH-SB-30-8to10-D
Location:	SB-28	SB-28	SB-29	SB-29	SB-29	SB-29	SB-29	SB-29	SB-29	SB-30	SB-30	SB-30	SB-30
Sample Date:	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-28	2022-09-30	2022-09-30	2022-09-30	2022-09-30
Depth Interval:	10 - 12	12 - 14	2 - 4	4 - 6	8 - 10	13 - 15	19 - 21	21 - 23	23 - 24	3 - 4	4 - 5	8 - 10	8 - 10
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:													Duplicate
Analyte													
Metals (mg/kg)													
Arsenic	**4.72**	**3.54**	**7.97**	**6.31**	**5.07 J-**	**4.29**	--	--	--	**11.0**	**10.1**	**8.20**	**11.0**
Cadmium	0.06 U	**0.38**	**0.18**	**0.26**	**0.10 J**	**0.09 J**	--	--	--	**0.18 J**	**0.59 J**	**0.09 J**	**0.09 J**
Chromium	**12.0**	**28.2**	**43.4**	**44.2**	**53.5**	**50.8**	--	--	--	**32.2**	**15.7**	**51.9 J**	**29.7 J**
Chromium (VI)	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	**119**	**95.6**	**60.6**	**63.2**	**79.5**	**62.7**	--	--	--	**213**	**162**	**101**	**75.1**
Lead	**35.2**	**45.1**	**11.0**	**1.47**	**1.56 J**	**2.13**	--	--	--	**556**	**499**	**10.0**	**7.60**
Mercury	0.00753 U	**0.116**	**0.00729 J**	**0.00491 J**	**0.00587 J**	**0.00902 J**	--	--	--	**0.0583**	**0.145**	**0.0117 J**	**0.0138 J**
Zinc	**124**	**149**	**65.5**	**59.9**	**73.5**	**67.7**	--	--	--	**258**	**106**	**93.0**	**90.8**
Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics (DRO)	**13.2**	**97.4**	2.52 U	2.48 U	2.63 U	2.67 U	--	--	--	**83.1**	**220**	2.79 U	2.88 U
Lube Oil	**41.3 J**	**191 J**	3.22 UJ	3.17 UJ	3.36 UJ	3.42 UJ	--	--	--	**140 J**	**72.4 J**	3.56 UJ	3.68 UJ
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	**21.8 J**	**41.1 J**	5 UJ	5.2 U	5 UJ	5 UJ	--	--	--	49.9 U	61.7 U	0.4 U	0.4 U
2-Methylnaphthalene	**39.5**	**88.9**	4.5 U	4.5 U	4.5 U	4.5 U	--	--	--	**205**	**135**	4.5 U	4.5 U
Acenaphthene	**6.18 J**	**18.2 J**	5.2 U	5.2 U	5.2 U	5.2 U	--	--	--	**60.6**	7.05 U	0.57 U	0.57 U
Anthracene	**1.4 J**	**6.8 J**	**4.48 J**	7.1 U	7.1 U	7.1 U	--	--	--	**538**	**21.1 J**	0.87 U	0.87 U
Benzo(a)anthracene	5.9 U	**3.33 J**	**3.87 J**	5.9 U	5.9 U	5.9 U	--	--	--	**2060**	**60.4 J**	0.82 U	0.82 U
Benzo(a)pyrene	4.2 U	**3.05 J**	**2.91 J**	4.2 U	4.2 U	4.2 U	--	--	--	**2290**	**73.5**	0.61 U	0.61 U
Benzo(b)fluoranthene	6.9 U	**2.45 J**	**4.14 J**	1.36 UJ	1.36 UJ	1.36 UJ	--	--	--	**1500**	**60.7 J**	1.37 U	1.37 U
Benzo(k)fluoranthene	4.9 U	**1.15 J**	**2.47 J**	0.76 UJ	0.75 UJ	0.75 UJ	--	--	--	**964**	**33.5 J**	0.76 U	0.76 U
2-Chloronaphthalene	7.8 U	8 U	7.9 U	7.9 U	7.9 U	7.9 U	--	--	--	39.6 U	32.9 U	7.9 U	7.9 U
Chrysene	6 U	**4.4 J**	**7.75 J**	1.05 UJ	1.05 UJ	1.04 UJ	--	--	--	**2500**	**78.6**	1.05 U	1.05 U
Dibenzo(a,h)anthracene	17 U	17.2 U	**0.91 J**	0.89 UJ	0.88 UJ	0.88 UJ	--	--	--	**397**	**18.8 J**	0.89 U	0.89 U
Fluoranthene	**2.47 J**	**23.6 J**	**12.6 J**	**0.7 J**	**1.08 J**	0.47 UJ	--	--	--	**4960**	**144**	0.47 U	0.47 U
Fluorene	**8.08 J**	**21.3 J**	**0.89 J**	14.4 U	14.5 U	14.4 U	--	--	--	**84**	**8.67 J**	0.63 U	0.63 U
Indeno(1,2,3-c,d)pyrene	14.4 U	**2.63 J**	**3.73 J**	1.04 UJ	1.04 UJ	1.04 UJ	--	--	--	**1610**	**59.9 J**	1.05 U	1.05 U
Naphthalene	**90.2 J**	**314 J**	**3.29 J**	**1.86 J**	4.2 U	**1.47 J**	--	--	--	**689**	**67.6**	1.27 U	1.27 U
Pyrene	**1.8 J**	**20.1 J**	**11.5 J**	5.6 U	**0.84 J**	5.6 U	--	--	--	**4600**	**125**	0.62 U	0.63 U
Total Benzofluoranthenes	**19.7 U**	**5.4**	**9.3**	4.97 U	**4.97 U**	4.95 U	--	--	--	**3500**	**134**	4.99 U	4.99 U
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)													
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	19.7 U	**4.91**	**4.5**	19.8 U	19.8 U	19.8 U	--	--	--	**3000**	**97.6**	4.99 U	4.99 U
Total cPAH TEQ (ND=0)[a]	19.7 U	**4.05**	**4.5**	19.8 U	19.8 U	19.8 U	--	--	--	**3000**	**97.6**	4.99 U	4.99 U
Phenols (µg/kg)													
2,4,5-Trichlorophenol	25.3 U	25.7 U	25.7 U	25.5 U	25.6 UJ	25.4 UJ	--	--	--	128 U	106 U	25.6 U,R	25.7 U
2,4,6-Trichlorophenol	8.8 U	9 U	9 U	8.9 U	8.9 UJ	8.9 UJ	--	--	--	44.6 U	37.1 U	8.9 U,R	9 U
2,4-Dichlorophenol	15.1 U	15.3 U	15.3 U	15.2 U	15.2 UJ	15.1 UJ	--	--	--	76.1 U	63.3 U	15.2 U,R	15.3 U
2,4-Dinitrophenol	33.3 U	33.8 U	33.7 U	33.5 U	33.5 UJ	33.4 UJ	--	--	--	168 U	140 U	33.6 U,R	33.7 U
2-Chlorophenol	13.6 U	13.8 U	13.8 U	13.7 U	13.7 UJ	13.7 UJ	--	--	--	68.8 U	57.3 U	13.8 U,R	13.8 U
4,6-Dinitro-2-methylphenol	37.4 U	38 U	37.9 U	37.7 U	37.7 UJ	37.5 UJ	--	--	--	189 U	157 U	37.8 U,R	37.9 U
4-Chloro-3-Methylphenol	12.2 U	12.4 U	12.4 U	12.3 U	12.3 UJ	12.3 UJ	--	--	--	61.7 U	51.3 U	12.3 U,R	12.4 U
2,4-Dimethylphenol	**58.4 J**	**235**	3.8 U	3.7 U	3.8 UJ	3.7 UJ	--	--	--	18.8 U	15.6 U	3.8 U,R	3.8 U
2-Methylphenol (o-Cresol)	**90.4**	**316**	6.6 U	6.6 U	6.6 U	6.6 U	--	--	--	33.1 U	27.5 U	6.6 U	6.6 U
4-Methylphenol (p-Cresol)	**211**	**1000**	7.4 U	7.3 U	7.3 U	7.3 U	--	--	--	36.7 U	30.6 U	7.4 U	7.4 U
Pentachlorophenol	30.8 U	31.2 U	31.2 U	31 U	31 UJ	30.9 UJ	--	--	--	155 U	129 U	31.1 U,R	31.2 U
Phenol	**114**	**255**	**7.9 J**	4.4 U	4.4 UJ	4.3 UJ	--	--	--	99.4 U	**103**	4.4 U,R	4.4 U
Phthalates (µg/kg)													
bis(2-Ethylhexyl)phthalate	5.4 U	5.5 U	5.4 U	5.4 U	5.4 U	5.4 U	--	--	--	27.1 U	**307**	5.4 U	5.4 U
Butylbenzyl phthalate	9.3 U	9.4 U	9.4 U	9.3 U	9.3 U	9.3 U	--	--	--	46.8 U	38.9 U	9.4 U	9.4 U
Diethyl phthalate	**22.3 J**	**23.5 J**	**23 J**	19.5 U	19.6 U	19.5 U	--	--	--	98 U	81.5 U	19.6 UJ	**20.2 J**
Dimethyl phthalate	4.3 U	4.4 U	4.4 U	4.4 U	4.4 U	4.3 U	--	--	--	21.8 U	18.2 U	4.4 U	4.4 U
Di-n-butyl phthalate	5.5 U	5.6 U	5.6 U	5.6 U	5.6 U	5.5 U	--	--	--	27.9 U	23.2 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.3 U	4.4 U	4.4 U	4.4 U	4.4 U	4.3 U	--	--	--	21.8 U	18.2 U	4.4 U	4.4 U
Dioxin/Furans (ng/kg)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**0.620 J**	**0.607 J**	**1.67 J**	**0.186 J**	**0.141 J**	4.86 U	0.353 U	0.212 U	0.189 U	**9.25**	**5.39 J**	0.0459 UJ	**0.0609 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**9.94**	**579 J**	**159**	**101**	**90.7**	**120**	**34**	**52.2**	**152**	**164**	**94.2**	**145**	**195**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**1.29 J**	**2.06 J**	**6.71**	**0.321 J**	**0.191 J**	2.43 U	2.48 U	2.46 U	0.0519 U	**22.0**	**9.61**	**0.118 J**	**0.126 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.47 U	**37.1**	**17.9**	**14.6**	**12.2**	**13.0**	**5.62**	**5.84**	**17.2**	**70.2**	**22.7**	**14.5**	**18.6**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	**0.109 J**	**0.196 J**	**0.309 J**	0.0477 U	0.0488 U	0.0486 U	0.16 U	0.112 U	0.075 U	**1.03 J**	**0.782 J**	0.0459 U	0.0467 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	**1.05 J**	**1.43 J**	**2.28 J**	**0.130 J**	**0.0645 J**	2.43 U	0.139 U	0.114 U	0.0958 U	**8.83**	**3.01**	**0.0533 J**	0.0467 UJ
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.206 J**	**1.26 J**	**0.697 J**	**0.338 J**	**0.293 J**	2.43 U	**0.344 J**	0.372 U	**0.355 J**	**5.52**	**1.59 J**	**0.351 J**	**0.413 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.482 J**	**0.981 J**	**1.87 J**	**0.0795 J**	**0.0563 J**	0.0486 U	0.126 U	0.102 U	0.094 U	**5.39**	**2.39 J**	0.0459 U	0.0467 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.466 J**	**2.62**	**1.29 J**	**0.833 J**	**0.789 J**	2.43 U	0.352 U	**0.565 J**	**1.02 J**	**11.5**	**2.91**	**0.772 J**	**0.955 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	**0.0753 J**	**0.0877 J**	**0.0980 J**	0.0477 U	0.0488 U	0.0486 U	0.184 U	0.153 U	0.134 U	**0.315 J**	**0.175 J**	0.0459 U	0.0467 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.355 J**	**3.09**	**1.29 J**	**1.18 J**	**1.39 J**	2.43 U	**0.779 J**	**0.827 J**	**2 J**	**89.6 J**	**7.26 J**	**1.24 J**	**1.87 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	**1.03 J**	**2.35 J**	**3.00**	**0.119 J**	**0.0955 J**	2.43 U	0.175 U	0.196 U	0.076 U	**7.81**	**2.68 J**	0.0459 U	0.0467 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.369 J**	**2.11 J**	**1.13 J**	**0.432 J**	**0.326 J**	2.43 U	0.199 U	0.326 U	**0.24 J**	**7.68**	**2.47 J**	**0.300 J**	**0.326 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	**0.350 J**	**0.738 J**	**1.68 J**	**0.0721 J**	0.0488 U	0.0486 U	0.132 U	0.109 U	0.101 U	**3.97**	**2.48 J**	0.0459 U	0.0467 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	**0.886 J**	**2.03 J**	**3.23**	**0.105 J**	**0.0647 J**	0.0486 U	0.192 U	0.2 U	0.0893 U	**7.47**	**3.11**	0.0459 U	0.0467 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**2.17**	**5.72**	**6.53**	**0.0874 J**	**0.0894 J**	0.0486 U	0.392 U	0.34 U	0.127 U	**15.7**	**6.42**	0.0459 U	0.0467 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.169 J**	**1.07**	**0.632 J**	**0.108 J**	**0.0972 J**	**0.630 J**	0.18 U	0.35 U	0.137 U	**2.49**	**0.938**	**0.0730 J**	**0.0974 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**1.38**	**6.02**	**4.69**	**1.03**	**0.870**	**2.56**	**0.48**	**0.7**	**0.9**	**27.7**	**7.41**	**0.821**	**1.01**
Total TCDD TEQ (ND=0)[b]	**1.37**	**6.02**	**4.69**	**1.03**	**0.865**	**0.796**	**0.18**	**0.2**	**0.8**	**27.7**	**7.41**	**0.804**	**0.993**

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-30-10to12	BH-SB-30-12to14	BH-SB-38-2to4	BH-SB-38-2to4-D	BH-SB-38-4to5	BH-SB-38-6to8	BH-SB-38-8to10	BH-SB-38-8to10-D	BH-SB-38-10to12	BH-SB-38-10to12-D	BH-SB-38-12to14	BH-SB-38-14to16
Location:	SB-30	SB-30	SB-38	SB-38	SB-38	SB-38	SB-38	SB-38	SB-38	SB-38	SB-38	SB-38
Sample Date:	2022-09-30	2022-09-30	2022-10-03	2022-10-03	2022-10-03	2022-10-03	2022-10-03	2022-10-03	2022-10-03	2022-10-03	2022-10-03	2022-10-03
Depth Interval:	10 - 12	12 - 14	2 - 4	2 - 4	4 - 5	6 - 8	8 - 10	8 - 10	10 - 12	10 - 12	12 - 14	14 - 16
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:				Duplicate				Duplicate		Duplicate		
Analyte												
Metals (mg/kg)												
Arsenic	**5.62**	**4.70**	**3.55**	**4.12**	**8.83**	**8.91**	**13.8**	**14.1**	**9.03**	**7.11**	**8.11**	**12.9**
Cadmium	**0.11 J**	**0.06 J**	**0.04 J**	**0.05 J**	**0.05 J**	**0.08 J**	**0.14**	**0.20**	**0.19 J**	**0.11 J**	**0.14**	**0.15**
Chromium	**40.5**	**33.2**	**10.4**	**9.60 J**	**13.4**	**19.8**	**19.1**	**21.4**	**22.5**	**15.7**	**13.7**	**19.2**
Chromium (VI)	--	--	0.618 U,R	--	--	--	--	--	--	--	--	--
Copper	**66.5**	**51.1**	**5.53**	**6.40**	**29.6**	**13.9**	**13.3**	**13.1**	**13.8**	**9.59**	**10.0**	**17.0**
Lead	**2.01**	**1.25**	**6.83**	**6.99**	**23.3**	**9.87**	**4.41**	**4.93**	**6.72**	**4.46**	**5.48**	**13.7**
Mercury	**0.0114 J**	**0.00896 J**	**0.0306 J**	**0.00811 J**	**0.0138 J**	**0.0168 J**	**0.0275**	**0.0249 J**	**0.0191 J**	**0.0138 J**	**0.0216 J**	**0.0348**
Zinc	**82.5**	**69.5**	**23.9**	**40.0 J**	**50.6**	**41.2**	**48.6**	**51.3**	**52.6**	**39.6**	**37.1**	**45.7**
Petroleum Hydrocarbons (mg/kg)												
Diesel Range Organics (DRO)	2.89 U	2.76 U	2.58 U	2.64 U	**14.7**	2.83 U	**6.86 J**	2.93 UJ	**14.5 J**	2.81 UJ	**10.4**	2.92 U
Lube Oil	3.70 UJ	3.53 UJ	3.30 UJ	3.37 UJ	**24.9 J**	3.61 UJ	**15.2 J**	**13.1 J**	**45.9 J**	**20.8 J**	**26.7 J**	**17.1 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)												
1-Methylnaphthalene	0.4 U	0.4 UJ	0.4 U	0.4 U	**37.7**	**1.06 J**	**1.14 J**	**1.23 J**	**3.33 J**	**4.59 J**	**6.42**	**16.2**
2-Methylnaphthalene	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	**6.1 J**	4.5 UJ	4.5 U	4.5 U
Acenaphthene	0.57 U	0.57 UJ	0.57 U	0.57 U	**358**	**1.53 J**	**1.06 J**	**1.61 J**	**1.7 J**	**2.41 J**	**4.37 J**	**120**
Anthracene	0.87 U	0.87 UJ	**1.03 J**	0.87 UJ	**433**	**2.36 J**	**1.45 J**	**2.61 J**	**6.24 J**	**3.73 J**	**4.18 J**	**117**
Benzo(a)anthracene	0.82 U	0.82 UJ	**1.39 J**	**0.95 J**	**782**	**3.43 J**	**2.73 J**	**2.79 J**	**24.6 J**	**6.03 J**	**5.41**	**186**
Benzo(a)pyrene	0.61 U	0.61 U	**1.17 J**	**1.59 J**	**716 J-**	**3.69 J**	**2.44 J**	**2.08 J**	**21.2 J**	**4.63 J**	**4.72 J**	**147 J-**
Benzo(b)fluoranthene	1.37 U	1.37 UJ	**1.97 J**	**1.8 J**	**417**	**3.34 J**	**1.71 J**	**1.74 J**	**14.1 J**	**5.02 J**	**3.05 J**	**92.4**
Benzo(k)fluoranthene	0.76 U	0.76 U	**1.53 J**	**1.03 J**	**295**	**2.08 J**	**1.34 J**	**1.22 J**	**9.97 J**	**2.33 J**	**2.11 J**	**66.7**
2-Chloronaphthalene	8 U	7.9 U	7.9 U	7.9 U	7.9 U	8 U	8 U	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U
Chrysene	1.05 U	1.05 UJ	**2.1 J**	**1.53 J**	**928**	**6.29**	**3.97 J**	**4.06 J**	**26.4 J**	**8.7 J**	**6.77**	**222**
Dibenzo(a,h)anthracene	0.89 U	0.89 UJ	**1.46 J**	0.89 UJ	**101**	**0.98 J**	0.89 U	0.89 U	**4.85 J**	**1.48 J**	**0.91 J**	**21.2**
Fluoranthene	0.47 U	0.47 UJ	**2.66 J**	**2.04 J**	**2130**	**12.5**	**7.75**	**9.29**	**32 J**	**14.8 J**	**13.8**	**454**
Fluorene	0.63 U	0.63 UJ	0.63 U	0.63 U	**223**	**1.34 J**	**1.43 J**	**3.93 J**	**3.37 J**	**2.83 J**	**4.72 J**	**80.1**
Indeno(1,2,3-c,d)pyrene	1.05 U	1.05 UJ	**1.92 J**	**1.59 J**	**429**	**3.67 J**	**1.76 J**	**1.71 J**	**11.4 J**	**3.51 J**	**2.94 J**	**88.7**
Naphthalene	1.27 U	1.28 UJ	1.27 U	1.27 U	**62**	**7.43**	**9.58**	**7.67**	**22.1**	**22.8**	**21.7**	**44.9**
Pyrene	0.62 U	0.63 UJ	**2.16 J**	**1.71 J**	**2150**	**11.4**	**6.81**	**8.6**	**34.4 J**	**15.7 J**	**14.5**	**466**
Total Benzofluoranthenes	4.98 U	5 U	**4.94**	**3.88**	**1060**	**7.86**	**4.55**	**4.51**	**35.4**	**10.5**	**7.86**	**240**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)												
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	4.98 U	5 U	**2.02**	**2.2**	**928**	**5.1**	**3.3**	**2.9**	**28**	**6.55**	**6.2**	**195**
Total cPAH TEQ (ND=0)[a]	4.98 U	5 U	**2.02**	**2.1**	**928**	**5.1**	**3.2**	**2.9**	**28**	**6.55**	**6.2**	**195**
Phenols (µg/kg)												
2,4,5-Trichlorophenol	25.8 U	25.6 U	25.7 U	25.7 U	25.7 U	25.7 U	25.7 U	25.6 U	25.7 U	25.7 U	25.7 U	25.7 U
2,4,6-Trichlorophenol	9 U	8.9 U	9 U	9 U	8.9 U	9 U	9 U	8.9 U	9 U	8.9 U	8.9 U	9 U
2,4-Dichlorophenol	15.3 U	15.2 U	15.3 U	15.3 U	15.3 U	15.3 U	15.3 U	15.2 U	15.3 U	15.3 U	15.3 U	15.3 U
2,4-Dinitrophenol	33.8 U	33.6 U	33.7 U	33.7 U	33.7 U	33.8 U	33.8 U	33.7 U	33.7 U	33.7 U	33.7 U	33.8 U
2-Chlorophenol	13.9 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U	13.8 U
4,6-Dinitro-2-methylphenol	38 U	37.8 U	37.9 U	37.9 U	37.9 U	38 U	38 U	37.8 U	37.9 U	37.8 U	37.8 U	37.9 U
4-Chloro-3-Methylphenol	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U
2,4-Dimethylphenol	3.8 U	3.8 U	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R	3.8 U,R
2-Methylphenol (o-Cresol)	6.7 U	6.6 U	6.6 UJ	6.6 U	6.6 U	6.7 U	6.7 U	6.6 U	6.6 U	6.6 U	6.6 U	6.7 U
4-Methylphenol (p-Cresol)	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U
Pentachlorophenol	31.3 U	31.1 U	31.2 U	31.2 U	31.1 U	31.2 U	31.2 U	31.1 U	31.2 U	31.1 U	31.1 U	31.2 U
Phenol	4.4 U	4.4 U	4.4 U	4.4 U	20 U	4.4 U	20 U	4.4 U	4.4 U	20 U	19.9 U	20 U
Phthalates (µg/kg)												
bis(2-Ethylhexyl)phthalate	5.5 U	5.4 U	5.4 UJ	5.4 UJ	5.4 UJ	5.5 UJ	5.5 UJ	5.4 UJ	5.4 UJ	5.4 UJ	5.4 UJ	5.5 UJ
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U
Diethyl phthalate	19.7 U	19.6 U	19.7 UJ	**30.1 J**	**22.3 J**	**56.8 J**	**23.6 J**	**26.7 J**	**34.1 J**	**161 J**	**24.9 J**	19.7 UJ
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Dioxin/Furans (ng/kg)												
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	0.0471 U	0.0476 U	**0.614 J**	**0.600 J**	**0.907 J**	**0.547 J**	0.0463 U	0.0474 U	4.37 U	0.0471 U	4.82 U	4.84 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**154**	**197**	**351**	**182**	**449**	**619**	**885**	**978**	**463**	**511**	**583**	**1460**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	**0.0916 J**	**0.0959 J**	**1.25 J**	**0.446 J**	**1.56 J**	**1.13 J**	**0.0775 J**	**0.104 J**	2.19 U	2.35 U	2.41 U	2.42 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**13.5**	**17.0**	**15.1**	**13.6**	**56.3**	**57.0**	**92.2**	**96.7**	**54.8**	**68.3**	**60.5**	**70.6**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.0471 U	0.0476 U	0.0475 U	0.0484 U	**0.0747 J**	0.0476 U	0.0463 U	0.0474 U	0.0437 U	0.0471 U	0.0482 U	0.0484 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.0471 U	0.0476 U	**0.262 J**	**0.132 J**	**0.631 J**	**0.138 J**	**0.0486 J**	**0.0649 J**	0.0437 U	0.0471 U	2.41 U	2.42 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.315 J**	**0.388 J**	**0.363 J**	**0.303 J**	**1.19 J**	**1.14 J**	**1.60 J**	**1.68 J**	2.19 U	2.35 U	2.41 U	2.42 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.0471 U	0.0476 U	**0.104 J**	**0.0764 J**	**0.254 J**	**0.0799 J**	0.0463 U	**0.0516 J**	0.0437 U	0.0471 U	2.41 U	2.42 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	**0.568 J**	**0.735 J**	**0.646 J**	**0.540 J**	**2.43**	**1.90 J**	**2.65**	**2.84**	**2.58 J**	2.35 UJ	2.41 U	2.42 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.0471 U	0.0476 U	0.0475 U	0.0484 U	0.0476 U	0.0476 U	0.0463 U	0.0474 U	0.0437 U	0.0471 U	0.0482 U	0.0484 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**1.19 J**	**1.19 J**	**0.712 J**	**0.669 J**	**2.92 J**	**1.69 J**	**4.86**	**5.37**	**3.33**	**4.04**	**3.37**	**3.62**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.0471 U	0.0476 U	0.0475 U	**0.0916 J**	**0.433 J**	**0.109 J**	**0.0678 J**	**0.0817 J**	2.19 U	2.35 U	2.41 U	2.42 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	**0.253 J**	**0.307 J**	**0.253 J**	**0.223 J**	**0.619 J**	**0.421 J**	**0.548 J**	**0.559 J**	2.19 U	2.35 U	2.41 U	2.42 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.0471 U	0.0476 U	**0.0543 J**	0.0484 U	**0.168 J**	0.0476 U	0.0463 U	0.0474 U	0.0437 U	0.0471 U	0.0482 U	2.42 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.0471 U	0.0476 U	**0.0832 J**	**0.0538 J**	**0.266 J**	**0.0622 J**	0.0463 U	**0.0749 J**	0.0437 U	0.0471 U	2.41 U	2.42 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.0471 U	0.0476 U	**0.0908 J**	**0.0748 J**	**0.436 J**	**0.148 J**	**0.133 J**	**0.235 J**	**0.0923 J**	0.0471 UJ	**0.178 J**	**0.291 J**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.0967 J**	**0.128 J**	**0.0746 J**	0.0631 U	**0.305 J**	**0.133 J**	**0.198 J**	**0.260 J**	**0.376 J**	**0.240 J**	**0.156 J**	**0.222 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**0.759**	**0.916**	**0.848**	**0.653**	**2.54**	**1.86**	**2.88**	**3.13**	**2.93**	**2.96**	**3.39**	**3.99**
Total TCDD TEQ (ND=0)[b]	**0.739**	**0.896**	**0.845**	**0.617**	**2.53**	**1.85**	**2.87**	**3.13**	**1.66**	**1.48**	**1.29**	**1.76**

Geosyntec consultants

Table M-1. Blakely Harbor Analytical Summary - Soil

Sample:	BH-SB-38-16to18	BH-SB-38-16to18-D	BH-SB-38-18to20
Location:	SB-38	SB-38	SB-38
Sample Date:	2022-10-03	2022-10-03	2022-10-03
Depth Interval:	16 - 18	16 - 18	18 - 20
Depth Units:	ft	ft	ft
QA/QC:		Duplicate	
Analyte			
Metals (mg/kg)			
Arsenic	**34.3**	**41.0**	**6.65**
Cadmium	**0.24**	**0.26**	**0.22**
Chromium	**30.8**	**35.6**	**29.0**
Chromium (VI)	--	--	--
Copper	**30.7**	**34.5**	**35.9**
Lead	**9.32 J**	**44.1 J**	**8.67**
Mercury	**0.0199 J**	**0.0271 J**	**0.0229 J**
Zinc	**80.9**	**108**	**81.2**
Petroleum Hydrocarbons (mg/kg)			
Diesel Range Organics (DRO)	**10.9 J**	3.18 UJ	3.34 U
Lube Oil	**13.6 J**	4.06 UJ	**16.2 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)			
1-Methylnaphthalene	**0.65 J**	**1.25 J**	0.4 U
2-Methylnaphthalene	4.5 U	4.5 U	4.5 U
Acenaphthene	**0.82 J**	0.57 UJ	0.57 U
Anthracene	**2.7 J**	**1.15 J**	0.87 U
Benzo(a)anthracene	**5.1 J**	**1.32 J**	0.82 U
Benzo(a)pyrene	**3.8 J**	**1.21 J**	**0.62 J**
Benzo(b)fluoranthene	**3.37 J**	1.37 UJ	1.37 U
Benzo(k)fluoranthene	**2.13 J**	0.76 UJ	0.76 U
2-Chloronaphthalene	8 U	7.9 U	7.9 U
Chrysene	**6.14 J**	**1.9 J**	1.05 U
Dibenzo(a,h)anthracene	**1.18 J**	0.89 UJ	0.89 U
Fluoranthene	**10.6 J**	**3.54 J**	**1.39 J**
Fluorene	**1.39 J**	0.63 UJ	0.63 U
Indeno(1,2,3-c,d)pyrene	**4.15 J**	1.05 UJ	1.05 U
Naphthalene	**4.48 J**	**5.98**	1.27 U
Pyrene	**9.95 J**	**3.9 J**	**1.6 J**
Total Benzofluoranthenes	**8.13**	**1.8**	**4.98 U**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)			
Total cPAH TEQ (ND=1/2 MDL/PQL)[a]	**5.45**	**1.6**	**0.87**
Total cPAH TEQ (ND=0)[a]	**5.45**	**1.4**	**0.62**
Phenols (µg/kg)			
2,4,5-Trichlorophenol	25.7 U	25.6 U	25.7 U
2,4,6-Trichlorophenol	9 U	8.9 U	9 U
2,4-Dichlorophenol	15.3 U	15.2 U	15.3 U
2,4-Dinitrophenol	33.8 U	33.6 U	33.7 U
2-Chlorophenol	13.8 U	13.8 U	13.8 U
4,6-Dinitro-2-methylphenol	38 U	37.7 U	37.9 U
4-Chloro-3-Methylphenol	12.4 U	12.3 U	12.4 U
2,4-Dimethylphenol	3.8 U,R	3.8 U,R	3.8 U,R
2-Methylphenol (o-Cresol)	6.7 U	6.6 U	6.6 U
4-Methylphenol (p-Cresol)	7.4 U	7.3 U	7.4 U
Pentachlorophenol	31.2 U	31 U	31.2 U
Phenol	20 U	4.4 U	20 U
Phthalates (µg/kg)			
bis(2-Ethylhexyl)phthalate	5.5 UJ	5.4 UJ	5.4 UJ
Butylbenzyl phthalate	9.4 U	9.3 U	9.4 U
Diethyl phthalate	19.7 UJ	49.7 UJ	49.9 UJ
Dimethyl phthalate	4.4 U	4.4 U	4.4 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U
Dioxin/Furans (ng/kg)			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	0.0980 U	0.0483 U	4.80 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**803**	**942**	**1470**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	2.47 U	0.0483 U	0.0480 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**54.4**	**64.1**	**98.1**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.0493 U	0.0483 U	0.0480 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.0493 U	0.0483 U	0.0480 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	2.47 U	2.41 U	2.40 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.0493 U	0.0483 U	0.0480 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	2.47 U	2.41 U	**2.51**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.0493 U	0.0483 U	0.0480 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	**2.98**	**3.00**	**4.79**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.0493 U	0.0483 U	0.0480 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	2.47 U	2.41 U	2.40 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.0493 U	0.0483 U	0.0480 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.0493 U	0.0483 U	0.0480 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.0493 U	0.0483 U	0.0480 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.268 J**	**0.294 J**	**0.290 J**
Total TCDD TEQ (ND=1/2MDL/PQL)[b]	**2.87**	**2.98**	**3.78**
Total TCDD TEQ (ND=0)[b]	**1.35**	**1.52**	**2.44**

Bold indicates that the analyte was detected.

Notes:
1. Analytes reported as per the Work Plan (Geosyntec, 2022)
2. Non detect values are reported to the MDL or PQL. The default is MDL was adjusted based on results of the data validation (See Section 6.4).
3. Sample depth reported as recovered.
4. Results for data collected for the RI (collected in 2021 to 2023) were validated following level IV guidance for dioxin and furans and level 2B guidance for metals, PAHs, SVOCs, and TPHs.
5. Results are presented to the same number of significant digits as reported by the Analytical Laboratory Reports.
6. All values presented in dry weight.
7. PAHs were analyzed using both the EPA 8270E and the EPA 8270E-SIM methods. The EPA 8270E-SIM result is presented when the data validator determined both values to be reportable.

Qualifiers:
J indicates values qualified as **J flag**, analytes detected below the method reporting limit, result is an estimate.
J+ indicates values qualified as **J+ flag**, analytes were estimated with high biases in the sample.
J- indicates values qualified as **J- flag**, analytes were estimated with low biases in the sample.
R indicates values qualified as **R flag**, analytes was rejected during data validation.
U indicates values qualified as **U flag**, analytes not detected or below the method reporting limit.
UJ indicates values qualified as **UJ flag**, analytes were estimated less than the MDL.
"**--**" indicates either not applicable or not analyzed.

Footnotes:
a. The cPAH TEQ was calculated by summing the products of the TEF referenced from the Washington Ecology Implementation Memorandum Number 10 (Ecology, 2015) for following chemicals: Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, and Indeno(1,2,3-cd)pyrene.
b. The TCDD TEQ were calculated by summing the products of the mammal TEF referenced from the Implementation Memorandum #13 (Ecology, 2016) with the 17 Dioxin/Furan congeners listed in the table.

Acronyms:
µg/kg - microgram(s) per kilogram
cPAH - carcinogenic polycyclic aromatic hydrocarbons
DRO - diesel range organics
EPA - United States Environmental Protection Agency
ft - feet
MDL - method detection limit
mg/kg - milligrams per kilogram
ND - not detected
ng/kg - nanograms per kilogram
PAH - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
QA/QC - quality assurance/quality control
RI - remedial investigation
SIM - selective ion monitoring
SVOC - semivolatile organic compounds
TCDD - 2,3,7,8 Tetrachlorodibenzodioxin
TEF - Toxicity Equivalency Factors
TEQ - toxicity equivalent
TPH - total petroleum hydrocarbons

References:
Ecology. 2015. *Implementation Memorandum #10: Evaluating the Human Health Toxicity of Carcinogenic PAHs (cPAHs) using Toxicity Equivalency Factors (TEFs)*Toxics Cleanup Program. Publication # 15-09-049. April.
Ecology. 2016. *Implementation Memorandum #13: Dioxins, Furans, and Dioxin-Like PCB Congeners: Ecological Risk Calculation Methodology for Upland Soil*Toxics Cleanup Program. Publication # 16-09-044. July.
Ecology. 2024. Cleanup Levels and Risk Calculation Tables. February update. Available at: https://ecology.wa.gov/regulations-permits/guidance-technical-assistance/contamination-clean-up-tools/clarc/data-tables.
Geosyntec, 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site*. January.

Table M-2. Blakely Harbor Analytical Summary - Groundwater

Sample:	BH-GW-17-210916	BH-GW-18-210916	BH-GW-19-210917	BH-GW-20-210917	BH-GW-21-210917	BH-GW-21-210917-D	BH-GW-24-221007	BH-GW-24-230131	BH-GW-24-230424	BH-GW-24-230801	BH-GW-26-221007	BH-GW-26-230131	BH-GW-26-230424
Location[a]:	GW-17	GW-18	GW-19	GW-20	GW-21	GW-21	GW-24	GW-24	GW-24	GW-24	GW-26	GW-26	GW-26
Sample Date:	2021-09-16	2021-09-16	2021-09-17	2021-09-17	2021-09-17	2021-09-17	2022-10-07	2023-01-31	2023-04-24	2023-08-01	2022-10-07	2023-01-31	2023-04-24
Depth Interval:	7 - 17	2 - 12	2 - 12	1.5 - 11.5	6.47 - 11.47	6.47 - 11.47	4 - 14	4 - 14	4 - 14	4 - 14	5 - 15	5 - 15	5 - 15
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:						Duplicate							
Analyte													
Field Parameters													
Conductivity (S/cm)	**2.7E-05**	**0.0431**	**0.0457**	**0.045**	**0.0435**	**0.0435**	**0.033878**	**0.026**	**0.016**	**0.03636**	**0.045321**	**0.02**	**0.0359**
Dissolved Oxygen (mg/L)	**11.07**	**1.64**	**4.44**	**5.3**	**4.27**	**4.27**	**-0.03**	**0.23**	**6.24**	**0.23**	**2.53**	**3.19**	**5.51**
ORP (mV)	**-202**	**-51**	**-326**	**84**	**-172**	**-172**	**-24.3**	**-6.9**	**105.1**	**159.3**	**87.2**	**84.9**	**126.4**
pH	**5.56**	**6.94**	**7.05**	**7.55**	**7.25**	**7.25**	**6.82**	**7.25**	**7.3**	**6.69**	**6.68**	**6.83**	**6.63**
Salinity[b] (%)	**35**	**30**	**29.35**	**29.3**	**34**	**34**	**--**	**15.75**	**9.49**	**25.96**	**--**	**11.87**	**22.57**
Temperature (˚C)	**14.91**	**20.66**	**16.28**	**14.63**	**14.2**	**14.2**	**15.7**	**8**	**10.3**	**16.2**	**15.6**	**7.8**	**9.87**
Turbidity (NTU)	**2.08**	**4.54**	**10.85**	**12.5**	**4.17**	**4.17**	**108.77**	**3**	**1.59**	**1.7**	**11.82**	**11.7**	**4.4**
Conventional Parameters[c] (mg/L)													
Total nitrogen as ammonia	**1.23**	**0.133**	**0.506**	0.040 U	0.040 U	0.040 U	**0.041**	0.040 U	0.040 U	0.040 U	**0.065**	0.040 U	**0.057**
Nitrogen as Ammonia (NH3)	**0.000254**	**0.000655**	**0.00321**	0.000790 U	0.000400 U	0.000400 U	**0.000153**	0.000400 U	0.000448 U	0.000111 U	**0.000176**	0.000153 U	**0.000138**
Nitrogen as Ammonium (NH4+)	**1.23**	**0.132**	**0.503**	0.0392 U	0.0396 U	0.0396 U	**0.0408**	0.0396 U	0.0396 U	0.0399 U	**0.0648**	0.0398 U	**0.0569**
Sulfide	0.050 U	0.050 U	**1.77**	0.050 U	0.050 U	0.050 U	0.050 U,R	0.050 U	0.050 U	0.05 U	0.050 U,R	0.050 U	0.050 U
Total dissolved solids	--	--	--	--	--	--	**21200 J**	**12200**	**10100**	**22500**	**29500 J**	**12300**	**23700**
Total organic carbon	--	--	--	--	--	--	**2.64**	**3.36**	**3.22 J+**	**2.22**	**2.65**	**4.39**	**2.34 J**
Total Solids	--	--	--	--	--	--	**21460**	**17930**	--	**26100 J-**	**29500**	**12700**	--
Total Suspended Solids	--	--	--	--	--	--	**2**	**2**	**1**	**3**	**10**	**14**	**6**
Total volatile solids	--	--	--	--	--	--	**1680**	**2360**	**2630**	**5340 J-**	**2120**	**1680**	**4980**
Metals, Dissolved (µg/L)													
Arsenic	4 U	4 U	4 U	4 U	4 U	4 U	**2.47**	**2.08 J**	**2.05**	**2.25**	**2.55**	**1.3 J**	**1.38 J**
Cadmium	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.300 U	0.600 U	0.300 U	**0.59 J**	**0.440 J**	0.600 U	0.600 U
Chromium	**0.987 J+**	**1.14 J+**	**16.0**	**14.4 J**	**14.7 J**	**15.4 J**	**7.70 J+**	10.0 U	**0.375 J**	5.00 U	**8.28 J+**	10.0 U	5.20 U
Copper	3.46 U	3.46 U	3.46 U	3.46 U	3.46 U	3.46 U	1.73 U	3.46 U	1.73 U	1.73 U	5.00 U	3.46 U	3.46 U
Lead	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	0.513 U	0.513 U	1.03 U	1.03 U	1.03 U
Mercury	**0.013 J**	0.0130 U	**0.021 J**	**0.021 J**	**0.020 J**	0.0130 UJ	0.013 UJ	0.10 U	0.013 UJ	0.0130 UJ	0.013 UJ	0.1 U	0.013 UJ
Zinc	58.4 U	58.4 U	58.4 U	58.4 U	58.4 U	58.4 U	29.2 U	58.4 U	29.2 U	29.2 U	29.2 U	58.4 U	58.4 U
Metals, Total (µg/L)													
Arsenic	**3.08 J**	**3.84 J**	**4.24**	**2.30 J**	**1.68 J**	**1.64 J**	**2.74**	**2.34 J**	**2.43**	**2.21**	**2.34 J**	**0.98 J**	**1.18 J**
Cadmium	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.300 U	0.600 U	0.300 U	**0.4 J**	**0.420 J**	0.600 U	0.600 U
Chromium	**1.88 J+**	**4.06 J+**	**40.8**	10 UJ	10 UJ	10 UJ	**8.16 J+**	10.0 U	2.60 U	**5.04**	**11.5**	**9.32 J**	5.20 U
Copper	3.46 U	**9.90 J**	**5.00 J**	**3.84 J**	3.46 U	3.46 U	1.73 U	3.46 U	1.73 U	1.73 U	10.0 U	3.46 U	3.46 U
Lead	2 U	**8.30 J+**	**7.50 J+**	1.03 U	**2.84 J+**	**3.72 J+**	0.513 U	1.03 U	0.513 U	0.513 U	0.513 U	1.03 U	1.03 U
Mercury	**0.016 J**	**0.025 J**	**0.026 J**	**0.014 J**	0.0130 UJ	0.0130 U	0.013 UJ	0.013 U	0.013 UJ	0.0130 UJ	0.013 UJ	0.10 U	0.013 UJ
Zinc	58.4 U	58.4 U	58.4 U	58.4 U	58.4 U	58.4 U	29.2 U	58.4 U	29.2 U	29.2 U	58.4 U	58.4 U	58.4 U
Petroleum Hydrocarbons (µg/L)													
tph, diesel range organics	100 U	100 U	**205**	100 U	100 U	100 U	33 U	33 U	33 U	33 U	33 U	33 U	33 U
Lube Oil	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	**251 J**
Polycyclic Aromatic Hydrocarbons (µg/L)													
1-Methylnaphthalene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.06 U
2-Methylnaphthalene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthene	0.02 U	0.03 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.06 U
Benzo(a)anthracene	0.05 U	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.14 U
Benzo(a)pyrene	0.06 U	0.07 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.17 U
Benzo(b)fluoranthene	0.09 U	0.11 U	0.10 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.26 U
Benzo(i)fluoranthene	0.03 U	0.04 U	0.04 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.09 U
Benzo(k)fluoranthene	0.09 U	0.11 U	0.10 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.26 U
2-Chloronaphthalene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chrysene	0.06 U	0.07 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.17 U
Dibenzo(a,h)anthracene	0.09 U	0.11 U	0.10 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.27 U
Dibenzofuran	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U
Fluoranthene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.05 U
Fluorene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.05 U
Indeno(1,2,3-c,d)pyrene	0.08 U	0.11 U	0.10 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.25 U
Naphthalene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.05 U
Pyrene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.08 U
Total Benzofluoranthenes	0.1 U	0.13 U	0.11 U	0.1 U	0.1 U	0.1 U	0.10 U	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.30 U
Carcinogenic Polycyclic Aromatic Hydrocarbons[d] (µg/L)													
Total cPAH TEQ (ND=1/2 MDL/PQL)	0.1 U	0.13 U	0.11 U	0.1 U	0.1 U	0.1 U	0.10 U	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.30 U
Total cPAH TEQ (ND=0)	0.1 U	0.13 U	0.11 U	0.1 U	0.1 U	0.1 U	0.10 U	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.30 U
Phenols (µg/L)													
2-Chlorophenol	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Methylphenol (o-Cresol)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,4-Dichlorophenol	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
2,4-Dimethylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 UJ
2,4-Dinitrophenol	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 UJ	1.7 U	1.7 U	1.7 U
2,4,5-Trichlorophenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U
2,4,6-Trichlorophenol	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
4-Chloro-3-Methylphenol	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
4-Methylphenol (p-Cresol)	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4,6-Dinitro-2-methylphenol	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 UJ	2.4 U	2.4 U	2.4 U
Phenol	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Pentachlorophenol	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 UJ	1.2 U	1.2 U	1.2 U	1.2 UJ	1.2 U
Phthalates (µg/L)													
bis(2-Ethylhexyl)phthalate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 U
Butylbenzyl phthalate	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Diethyl phthalate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	**0.4 J**	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Di-n-butyl phthalate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 U
Di-n-octyl phthalate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Dioxin/Furans[e] (ng/L)													
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**0.00113 J**	**0.00196 J**	0.000547 U	0.000501 U	**0.000614 J**	0.000526 UJ	0.000505 U	0.00308 U	0.00424 U	0.00231 U	0.000502 U	0.00393 U	0.00589 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	0.0503 U	**0.0902**	0.0547 U	0.0501 U	0.0529 U	0.0526 U	0.0505 U	0.00346 U	0.00688 U	0.00344 U	0.0502 U	0.00356 U	0.0074 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.000503 U	**0.00409 J**	0.000547 U	0.000501 U	**0.00439 J**	**0.002 J**	0.000505 U	0.000832 U	0.00154 U	0.000543 U	0.000502 U	0.000741 U	0.00167 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	**0.000841 J**	**0.0105 J**	**0.00287 J**	**0.0024 J**	**0.00125 J**	**0.000878 J**	0.000505 U	0.00148 U	0.00253 U	0.000829 U	0.0251 U	0.00122 U	0.00288 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.000503 U	0.00077 U	0.000547 U	0.000501 U	0.000529 U	0.000526 U	0.000505 U	0.00122 U	0.00222 U	0.000663 U	0.000502 U	0.00126 U	0.00196 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.000503 U	**0.00314 J**	0.000547 U	0.000501 U	**0.00323 J**	**0.00176 J**	0.000505 U	0.00124 U	0.00194 U	0.000578 U	0.000502 U	0.00098 U	0.00202 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.000503 U	**0.00105 J**	0.000547 U	0.000501 U	0.000529 U	0.000526 U	0.000505 U	0.00187 U	0.00372 U	0.00102 U	0.000502 U	0.00167 U	0.00305 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.000503 U	**0.00179 J**	0.000547 U	0.000501 U	**0.000735 J**	0.000526 UJ	0.000505 U	0.00113 U	0.00198 U	0.000526 U	0.000502 U	0.00096 U	0.00186 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.000503 U	**0.00207 J**	0.000547 U	0.000501 U	0.000529 U	0.000526 U	0.000505 U	0.002 U	0.00341 U	0.001 U	0.000502 U	0.00176 U	0.00302 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.0252 U	0.0329 U	0.000547 U	0.025 U	0.0264 U	0.0263 U	0.000505 U	0.00175 U	0.0025 U	0.000711 U	0.000502 U	0.00126 U	0.00246 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.000503 U	**0.00143 J**	0.000547 U	0.000501 U	0.000529 U	0.000526 U	0.000505 U	0.00222 U	0.00397 U	0.000976 U	0.000502 U	0.00188 U	0.00302 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.000503 U	**0.00167 J**	0.000547 U	0.000501 U	**0.000869 J**	**0.000602 J**	0.000505 U	0.00095 U	0.0025 U	0.00094 U	0.000502 U	0.000968 U	0.00218 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.000503 U	**0.00118 J**	0.000547 U	0.000501 U	0.000529 U	0.000526 U	0.000505 U	0.00158 U	0.00313 U	0.00182 U	0.000502 U	0.00132 U	0.0031 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.000503 U	**0.00146 J**	0.000547 U	0.000501 U	**0.000754 J**	0.000526 UJ	0.000505 U	0.00135 U	0.00194 U	0.00057 U	0.000502 U	0.00103 U	0.0022 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.000503 U	**0.00126 J**	0.000547 U	0.000501 U	**0.000865 J**	**0.000553 J**	0.000505 U	0.001 U	0.00222 U	0.000895 U	0.000502 U	0.00107 U	0.00217 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.000503 U	**0.0027 J**	0.000547 U	0.000501 U	**0.00117 J**	**0.000765 J**	0.000505 U	0.00146 U	0.00252 U	0.000448 U	0.000502 U	0.00162 U	0.00191 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.000503 U	0.00099 U	0.000547 U	0.000501 U	0.000529 U	0.000526 U	0.000505 U	0.00231 U	0.00275 U	0.00118 U	0.000502 U	0.00263 U	0.00359 U
Total TCDD TEQ (ND=1/2 MDL/PQL)	**0.00204**	**0.00529**	**0.000899**	**0.00205**	**0.00287**	**0.00245**	0.00253 U	0.003 U	0.003 U	0.00246 U	0.00251 U	0.003 U	0.0025 U
Total TCDD TEQ (ND=0)	**0.00000875**	**0.00315**	**0.0000287**	**0.000024**	**0.000931**	**0.000465**	0.0253 U	0.03 U	0.03 U	0.0246 U	0.0251 U	0.03 U	0.025 U

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Table M-2. Blakely Harbor Analytical Summary - Groundwater

Sample:	BH-GW-26-230801	BH-GW-27-221007	BH-GW-27-230131	BH-GW-27-230424	BH-GW-27-230801	BH-GW-29-221007	BH-GW-29-221007-D	BH-GW-29-230201	BH-GW-29-D-230201	BH-GW-29-230424
Location[a]:	GW-26	GW-27	GW-27	GW-27	GW-27	GW-29	GW-29	GW-29	GW-29	GW-29
Sample Date:	2023-08-01	2022-10-07	2023-01-31	2023-04-24	2023-08-01	2022-10-07	2022-10-07	2023-02-01	2023-02-01	2023-04-24
Depth Interval:	5 - 15	9 - 19	9 - 19	9 - 19	9 - 19	12.9 - 22.9	12.9 - 22.9	12.9 - 22.9	12.9 - 22.9	12.9 - 22.9
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:							Duplicate		Duplicate	
Analyte										
Field Parameters										
Conductivity (S/cm)	**0.04824**	**0.042378**	**0.007**	**0.022**	**0.04212**	**0.037153**	**0.037153**	**0.002**	**0.002**	**0.0004**
Dissolved Oxygen (mg/L)	**1.65**	**6.75**	**6.99**	**9.11**	**7.2**	**1.66**	**1.66**	**4.27**	**4.27**	**6.02**
ORP (mV)	**175.4**	**122**	**9.1**	**88.1**	**0.01849**	**189.2**	**189.2**	**40.5**	**40.5**	**25.1**
pH	**6.2**	**6.6**	**7.59**	**7.19**	**6.68**	**6.04**	**6.04**	**7.63**	**7.63**	**7.96**
Salinity[b] (%)	**35.52**	**--**	**3.74**	**13.04**	**30.7**	**--**	**--**	**0.96**	**0.96**	**0.19**
Temperature (°C)	**17.36**	**15.3**	**10.3**	**10.91**	**14.3**	**12.3**	**12.3**	**7.9**	**7.9**	**8.42**
Turbidity (NTU)	**2.41**	**3.44**	**13.3**	**30.1**	**9.29**	**2.03**	**2.03**	**34.9**	**34.9**	**57.6**
Conventional Parameters[c] (mg/L)										
Total nitrogen as ammonia	0.040 U	0.040 U	0.040 U	**0.041**	0.040 U	0.040 U	0.040 U	0.040 U	0.040 U	**0.067 J**
Nitrogen as Ammonia (NH3)	--	9.03E-05 U	0.000865 U	**0.000358**	0.000108 U	2.49E-05 U	2.49E-05 U	0.000947 U	0.000947 U	**0.00330 J**
Nitrogen as Ammonium (NH4+)	--	0.0399 U	0.0391 U	**0.0406**	0.0399 U	0.0400 U	0.0400 U	0.0391 U	0.0391 U	**0.0637 J**
Sulfide	0.05 U	0.050 U,R	0.050 U	0.050 U	0.05 U	0.050 U,R	0.050 U,R	**0.064**	**0.056**	0.050 U
Total dissolved solids	**30100**	**27300 J**	**4970**	**13400**	**26500**	**23000 J**	**20600 J**	**1150**	**1180**	**529 J**
Total organic carbon	**2.38**	**1.22**	**2**	**3.55 J+**	2.5 U	**1.56**	**1.56**	**7.94**	**8.07**	**6.67 J+**
Total Solids	**36000 J-**	**28820**	**3840**	--	**30900 J-**	**22820**	**21900**	**1226**	**1154**	--
Total Suspended Solids	**5**	**6**	**8**	**9**	**4**	**6 J**	**3 J**	**10 J**	**4 J**	**5 J**
Total volatile solids	**7560 J-**	**3170**	**160**	**2670**	**6400 J-**	**2340**	**1990**	**30**	**36**	**92.00**
Metals, Dissolved (µg/L)										
Arsenic	**1.52 J**	2.00 U	**1.2 J**	**0.820 J**	**1 J**	2.00 U	2.00 U	0.746 UJ	**0.9 J**	**1.53**
Cadmium	0.6 U	0.300 U	0.600 U	0.600 U	0.6 U	0.300 U	**0.370 J**	0.600 U	0.600 U	0.0300 U
Chromium	**12.5**	**10.6**	10.0 U	**5.66 J**	10.0 U	**5.65 J+**	**5.44 J+**	5.20 U	5.20 U	**0.776 J**
Copper	3.46 U	1.73 U	**9.16 J**	3.46 U	3.46 U	1.73 U	1.73 U	**6.5 J**	**4.74 J**	**3.27 J+**
Lead	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	1.03 U	0.0513 U
Mercury	0.0130 UJ	0.013 UJ	0.10 U	0.013 UJ	0.0130 UJ	0.013 UJ	0.013 UJ	0.10 U	0.10 U	0.013 UJ
Zinc	58.4 U	29.2 U	58.4 U	58.4 U	58.4 U	**42.2 J**	29.2 UJ	58.4 U	58.4 U	2.92 U
Metals, Total (µg/L)										
Arsenic	**1.54 J**	**1.68 J**	**1.08 J**	**0.920 J**	**0.82 J**	**0.870 J**	**0.870 J**	**1.42 J**	**1.12 J**	**2.66 J**
Cadmium	0.6 U	0.300 U	0.600 U	0.600 U	0.6 U	0.300 U	**0.380 J**	0.600 U	0.600 U	0.0600 U
Chromium	**15.2**	**12.4**	**335**	**83.4**	**93.4**	**7.75 J+**	**6.02 J+**	**62.7 J**	**43.1 J**	**10.8 J**
Copper	**10.1**	1.73 U	**23.1**	3.46 U	3.46 U	1.73 U	1.73 U	10.0 U	10.0 U	**16.1 J**
Lead	1.03 U	0.513 U	1.03 U	1.03 U	1.03 U	0.513 U	0.513 U	1.03 U	1.03 U	**0.538 J**
Mercury	0.0130 UJ	0.013 UJ	0.10 U	0.013 UJ	0.0130 UJ	0.013 UJ	0.013 UJ	0.10 U	0.10 U	0.013 UJ
Zinc	**123**	29.2 U	58.4 U	58.4 U	58.4 U	29.2 U	29.2 U	58.4 U	58.4 U	**10.4 J**
Petroleum Hydrocarbons (µg/L)										
tph, diesel range organics	33 U	33 U	33 U	33 U	33 U	33 U	33 U	33 U	33 U	33 U
Lube Oil	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ	56 UJ
Polycyclic Aromatic Hydrocarbons (µg/L)										
1-Methylnaphthalene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
2-Methylnaphthalene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.6 U
Acenaphthene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(a)anthracene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Benzo(a)pyrene	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Benzo(b)fluoranthene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
Benzo(i)fluoranthene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Benzo(k)fluoranthene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Chloronaphthalene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.6 U
Chrysene	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
Dibenzo(a,h)anthracene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
Dibenzofuran	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.6 U
Fluoranthene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Fluorene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Indeno(1,2,3-c,d)pyrene	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
Naphthalene	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Pyrene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Total Benzofluoranthenes	0.1 U	0.10 U	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Carcinogenic Polycyclic Aromatic Hydrocarbons[c]										
Total cPAH TEQ (ND=1/2 MDL/PQL)	0.1 U	0.10 U	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Total cPAH TEQ (ND=0)	0.1 U	0.10 U	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Phenols (µg/L)										
2-Chlorophenol	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.6 U
2-Methylphenol (o-Cresol)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.6 U
2,4-Dichlorophenol	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	2.6 U
2,4-Dimethylphenol	1 U	1.0 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	1.0 U	3.0 UJ
2,4-Dinitrophenol	1.7 UJ	1.7 U	1.7 UJ	1.7 U	1.7 UJ	1.7 U	1.7 U	1.7 U	1.7 UJ	5.0 U
2,4,5-Trichlorophenol	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1.0 U	3.0 U
2,4,6-Trichlorophenol	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	3.4 U
4-Chloro-3-Methylphenol	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	2.7 U
4-Methylphenol (p-Cresol)	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.8 U
4,6-Dinitro-2-methylphenol	2.4 UJ	2.4 U	2.4 U	2.4 U	2.4 UJ	2.4 U	2.4 U	2.4 U	2.4 U	7.1 U
Phenol	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.7 U
Pentachlorophenol	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 UJ	1.2 U	3.6 U
Phthalates (µg/L)										
bis(2-Ethylhexyl)phthalate	0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 UJ	**0.7 J**	0.3 UJ	0.3 U	0.3 U	1.0 U
Butylbenzyl phthalate	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	1.1 U
Diethyl phthalate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.8 U
Di-n-butyl phthalate	0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 U	0.3 U	0.3 U	0.3 U	0.8 U
Di-n-octyl phthalate	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.8 U
Dioxin/Furans[d] (ng/L)										
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	0.00174 U	0.000503 U	0.00373 U	0.0075 U	0.00165 U	0.000505 U	0.000501 U	0.00408 U	0.00433 U	0.00539 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	0.00214 U	0.0503 U	0.00423 U	0.00867 U	0.00221 U	0.0505 U	0.0501 U	**0.0257 J**	**0.0215 J**	**0.0309 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.000734 U	0.000503 U	0.00102 U	0.0024 U	0.00067 U	0.000505 U	0.000501 U	0.0011 U	0.00086 U	0.00205 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.000979 U	0.0252 U	0.00216 U	0.00364 U	0.00103 U	0.0253 U	0.025 U	**0.00286 J**	0.00162 U	0.00382 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.000927 U	0.000503 U	0.00156 U	0.00293 U	0.000819 U	0.000505 U	0.000501 U	0.00157 U	0.00139 U	0.00265 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.000502 U	0.000503 U	0.00181 U	0.00223 U	0.000579 U	0.000505 U	0.000501 U	0.00107 U	0.00111 U	0.00301 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.000695 U	0.000503 U	0.00208 U	0.00326 U	0.00104 U	0.000505 U	0.000501 U	0.00168 U	0.00212 U	0.00428 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.000506 U	0.000503 U	0.0017 U	0.00215 U	0.000531 U	0.000505 U	0.000501 U	0.00105 U	0.00101 U	0.00269 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.000662 U	0.000503 U	0.00223 U	0.00367 U	0.00108 U	0.000505 U	0.000501 U	0.0017 U	0.00232 U	0.00426 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.000605 U	0.000503 U	0.00246 U	0.00269 U	0.000643 U	0.000505 U	0.000501 U	0.00133 U	0.00171 U	0.00317 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.000627 U	0.000503 U	0.00225 U	0.00378 U	0.00105 U	0.000505 U	0.000501 U	0.00178 U	0.00245 U	0.00447 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.001 U	0.000503 U	0.00196 U	0.00272 U	0.00106 U	0.000505 U	0.000501 U	0.001 U	0.00149 U	0.00263 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.00159 U	0.000503 U	0.00202 U	0.00434 U	0.00118 U	0.000505 U	0.000501 U	0.00174 U	0.00141 U	0.00388 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.000505 U	0.000503 U	0.00187 U	0.00262 U	0.000556 U	0.000505 U	0.000501 U	0.00116 U	0.0012 U	0.00278 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.000961 U	0.000503 U	0.00213 U	0.00266 U	0.00104 U	0.000505 U	0.000501 U	0.00106 U	0.00164 U	0.0028 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.000518 U	0.000503 U	0.00206 U	0.00298 U	0.000707 U	0.000505 U	0.000501 U	0.00143 U	0.00199 U	0.00329 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.00109 U	0.000503 U	0.00341 U	0.0042 U	0.0012 U	0.000505 U	0.000501 U	0.00294 U	0.00239 U	0.00303 U
Total TCDD TEQ (ND=1/2 MDL/PQL)	0.00243 U	0.00252 U	0.00247 U	0.00248 U	0.00244 U	0.00253 U	0.0025 U	**0.000103**	**0.0001**	**0.000187**
Total TCDD TEQ (ND=0)	0.0243 U	0.0252 U	0.0247 U	0.0248 U	0.0244 U	0.0253 U	0.025 U	**0.00004**	**0.0000065**	**0.0000093**

Geosyntec consultants

Table M-2. Blakely Harbor Analytical Summary - Groundwater

Sample:	BH-GW-29-D-230424	BH-GW-29-230801	BH-GW-29-D-230801
Location[a]:	GW-29	GW-29	GW-29
Sample Date:	2023-04-24	2023-08-01	2023-08-01
Depth Interval:	12.9 - 22.9	12.9 - 22.9	12.9 - 22.9
Depth Units:	ft	ft	ft
QA/QC:	Duplicate		Duplicate
Analyte			
Field Parameters			
Conductivity (S/cm)	**0.0004**	**0.03573**	**0.03573**
Dissolved Oxygen (mg/L)	**6.02**	**2.16**	**2.16**
ORP (mV)	**25.1**	**254.4**	**254.4**
pH	**7.96**	**6.04**	**6.04**
Salinity[b] (%)	**0.19**	**25.72**	**25.72**
Temperature (°C)	**8.42**	**12.02**	**12.02**
Turbidity (NTU)	**57.6**	**2.82**	**2.82**
Conventional Parameters[c] (mg/L)			
Total nitrogen as ammonia	0.040 UJ	0.040 U	0.040 U
Nitrogen as Ammonia (NH3)	0.00197 UJ	2.49E-05 U	2.49E-05 U
Nitrogen as Ammonium (NH4+)	0.0380 UJ	0.0400 U	0.0400 U
Sulfide	0.050 U	0.05 U	0.05 U
Total dissolved solids	**388 J**	**20800**	**21300**
Total organic carbon	**6.45 J+**	**1.36**	**1.28**
Total Solids	--	**25200 J-**	**25500 J-**
Total Suspended Solids	**10 J**	**3**	**3**
Total volatile solids	**92.00**	**6560 J-**	**7300 J-**
Metals, Dissolved (µg/L)			
Arsenic	**1.54**	**0.63 J**	**0.63 J**
Cadmium	0.0300 U	**0.52 J**	**0.45 J**
Chromium	**0.962 J**	5.00 U	5.00 U
Copper	**3.49 J+**	1.73 U	1.73 U
Lead	0.0513 U	0.513 U	0.513 U
Mercury	0.013 UJ	0.0130 UJ	0.0130 UJ
Zinc	2.92 U	29.2 U	29.2 U
Metals, Total (µg/L)			
Arsenic	**1.49 J**	**0.42 J**	0.373 UJ
Cadmium	0.0600 U	0.3 U	0.3 U
Chromium	**5.33 J**	**8.27**	**8.07**
Copper	**10.7 J**	1.73 U	1.73 U
Lead	**0.368 J**	0.513 U	0.513 U
Mercury	0.013 UJ	0.0130 UJ	0.0130 UJ
Zinc	**6.25 J**	**92.1 J**	29.2 UJ
Petroleum Hydrocarbons (µg/L)			
tph, diesel range organics	33 U	33 U	33 U
Lube Oil	56 UJ	56 UJ	56 UJ
Polycyclic Aromatic Hydrocarbons (µg/L)			
1-Methylnaphthalene	0.06 U	0.02 U	0.02 U
2-Methylnaphthalene	0.2 U	0.2 U	0.2 U
Acenaphthene	0.06 U	0.02 U	0.02 U
Benzo(a)anthracene	0.14 U	0.05 U	0.05 U
Benzo(a)pyrene	0.17 U	0.06 U	0.06 U
Benzo(b)fluoranthene	0.26 U	0.09 U	0.09 U
Benzo(i)fluoranthene	0.09 U	0.03 U	0.03 U
Benzo(k)fluoranthene	0.26 U	0.09 U	0.09 U
2-Chloronaphthalene	0.2 U	0.2 U	0.2 U
Chrysene	0.17 U	0.06 U	0.06 U
Dibenzo(a,h)anthracene	0.27 U	0.09 U	0.09 U
Dibenzofuran	0.2 U	0.2 UJ	0.2 UJ
Fluoranthene	0.05 U	0.02 U	0.02 U
Fluorene	0.05 U	0.02 U	0.02 U
Indeno(1,2,3-c,d)pyrene	0.25 U	0.08 U	0.08 U
Naphthalene	0.05 U	0.02 U	0.02 U
Pyrene	0.08 U	0.03 U	0.03 U
Total Benzofluoranthenes	0.30 U	0.1 U	0.1 U
Carcinogenic Polycyclic Aromatic Hydrocarbons[c]			
Total cPAH TEQ (ND=1/2 MDL/PQL)	0.30 U	0.1 U	0.1 U
Total cPAH TEQ (ND=0)	0.30 U	0.1 U	0.1 U
Phenols (µg/L)			
2-Chlorophenol	0.2 U	0.2 U	0.2 U
2-Methylphenol (o-Cresol)	0.2 U	0.2 U	0.2 U
2,4-Dichlorophenol	0.9 U	0.9 U	0.9 U
2,4-Dimethylphenol	1.0 UJ	1 U	1 U
2,4-Dinitrophenol	1.7 U	1.7 UJ	1.7 UJ
2,4,5-Trichlorophenol	1.0 U	1 U	1 U
2,4,6-Trichlorophenol	1.1 U	1.1 U	1.1 U
4-Chloro-3-Methylphenol	0.9 U	0.9 U	0.9 U
4-Methylphenol (p-Cresol)	0.3 U	0.3 U	0.3 U
4,6-Dinitro-2-methylphenol	2.4 U	2.4 UJ	2.4 UJ
Phenol	0.2 U	0.2 U	0.2 U
Pentachlorophenol	1.2 U	1.2 U	1.2 U
Phthalates (µg/L)			
bis(2-Ethylhexyl)phthalate	0.3 U	0.3 UJ	0.3 UJ
Butylbenzyl phthalate	0.4 U	0.4 U	0.4 U
Diethyl phthalate	0.3 U	0.3 U	0.3 U
Di-n-butyl phthalate	0.3 U	0.3 UJ	0.3 UJ
Di-n-octyl phthalate	0.3 U	0.3 U	0.3 U
Dioxin/Furans[d] (ng/L)			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	0.00531 U	0.00124 U	0.00179 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**0.0372 J**	0.00208 U	0.00226 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.00203 U	0.000532 U	0.000746 U
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.00322 U	0.000594 U	0.00105 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.00245 U	0.000634 U	0.000901 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.00242 U	0.000382 U	0.000675 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.00385 U	0.000778 U	0.00127 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.00245 U	0.000328 U	0.000618 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.00375 U	0.0008 U	0.00126 U
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.00303 U	**0.00123 J**	0.00077 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.00381 U	0.000778 U	0.00118 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.00194 U	0.000787 U	0.000894 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.00311 U	0.00129 U	0.00167 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.00269 U	0.000352 U	0.000635 U
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.00216 U	0.000762 U	0.000876 U
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.00303 U	0.000391 U	0.000516 U
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.00427 U	0.00082 U	0.0011 U
Total TCDD TEQ (ND=1/2 MDL/PQL)	**0.000179**	**0.000126**	0.00247 U
Total TCDD TEQ (ND=0)	**0.0000112**	**0.0001**	0.0247 U

Bold indicates that the analyte was detected.

Notes:
1. Analytes reported as per the RI Work Plan (Geosyntec, 2022)
2. Non detect values are reported to the MDL or PQL. The default is MDL but may be adjusted based on results of the data validation (See section 6.4).
3. Results were validated following level IV guidance for dioxin and furans and level 2B guidance for conventional parameters, metals, PAHs, SVOCs, and TPHs.
4. Results are presented to the same number of significant digits as reported by the Analytical Laboratory Reports.

Qualifiers:
J indicates values qualified as **J flag**, analytes detected below the method reporting limit, result is an estimate.
J+ indicates values qualified as **J+ flag**, analytes were estimated with high biases in the sample.
J- indicates values qualified as **J- flag**, analytes were estimated with low biases in the sample.
U indicates values qualified as **U flag**, analytes not detected or below the method reporting limit.
UJ indicates values qualified as **UJ flag**, analytes were estimated less than the method detection limit.
"--" indicates either not applicable or not analyzed

Footnotes:
a. 2021 Sample locations (GW-17, GW-18, GW-19, GW-20, and GW-21) indicate temporary wells sampled once after development. 2022 Sample locations (GW-24, GW-26, GW-27, and GW-29) indicate monitoring wells sampled once per quarter over a 12 months time period.
b. Salinity was collected during the Fall 2022 sampling event due to technical issues resulting in not reliable data based on best professional judgement of field staff.
c. Ammonia and ammonium concentrations in water were calculated based on pH measured during sample collections when applicable (salinity below 35‰); a correction for temperature variations was not applied. Solids and total organic carbon were not analyzed in groundwater samples collected from temporary monitoring wells (2021 samples). Total suspended solids were not analyzed in samples collected during the third quarterly sampling (April 2022) due to analytical issues.
d. The carcinogenic polycyclic aromatic hydrocarbons were calculated by summing the products of the Toxicity Equivalency Factors referenced from the Washington Ecology Implementation Memorandum Number 10 (Ecology, 2015) for following chemicals: Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, and Indeno(1,2,3-cd)pyrene.
e. The TCDD TEQ were calculated by summing the products of the mammal TEF referenced from the Implementation Memorandum #13 (Ecology, 2016) with the 17 Dioxin/Furan congeners listed in the table.

Acronyms:

% - percent	mV - millivolts	RI - remedial investigation
° C - degrees Celsius	ND - not detected	S/cm - Siemens per centimeter
µg/L - micrograms per liter	ng/L - nanograms per liter	SVOC - semivolatile organic compounds
cPAH - carcinogenic polycyclic aromatic hydrocarbons	NTU - nephelometric turbidity unit	TCDD - 2,3,7,8 Tetrachlorodibenzodioxin
ft - feet	PAH - polycyclic aromatic hydrocarbons	TEF - Toxicity Equivalency Factors
MDL – method detection limit	PQL - practical quantitation limit	TEQ - toxicity equivalent
mg/L - milligrams per liter	QA/QC - quality assurance/quality control	TPH - total petroleum hydrocarbons

References:
Ecology. 2015. *Implementation Memorandum #10: Evaluating the Human Health Toxicity of Carcinogenic PAHs (cPAHs) using Toxicity Equivalency Factors (TEFs)* . Toxics Cleanup Program. Publication # 15-09-049. April.
Ecology. 2016. *Implementation Memorandum #13: Dioxins, Furans, and Dioxin-Like PCB Congeners: Ecological Risk Calculation Methodology for Upland Soil* . Toxics Cleanup Program. Publication # 16-09-044. July.
Geosyntec, 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site* . January.

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH2-01-S	BH2-02-S	BH2-03-S	BH2-04-S	BH2-04-D	BH2-04-T	BH2-05-S	BH2-06-S	BH2-07-S	BH2-08-S	BH2-09-S	BH2-10-S	BH2-11-S	BH2-12-S	BH2-13-S	BH2-14-S	BH2-15-S	BH2-16-S	BH2-17-S	BH2-18-S
Location:	BH2-01	BH2-02	BH2-03	BH2-04	BH2-04	BH2-04	BH2-05	BH2-06	BH2-07	BH2-08	BH2-09	BH2-10	BH2-11	BH2-12	BH2-13	BH2-14	BH2-15	BH2-16	BH2-17	BH2-18
Sample Date:	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-02	2019-07-01	2019-07-01	2019-07-01	2019-07-02	2019-07-01	2019-07-01
Depth Interval:	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10
Depth Units:	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
QA/QC:					Duplicate	Duplicate														
Analyte																				
Conventional Parameters																				
% Moisture (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
% Wood Debris (%)[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia (mg/kg)	16 U	18 U	28 U	22 U	20 U	21 U	24 U	**51 J**	**52 J**	**25 J**	**75 J**	13 U	**52 J**	28 U	27 U	24 U	14 U	31 U	27 U	18 U
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	14 U	9.5 UJ	**25**	12 U	11 U	11 U	13 U	**39 J**	**500**	8.6 U	**21**	**53**	**320**	**1100**	**140**	**570**	8.7 U	**790**	**740**	11 U
Total organic carbon (%)	**4**	**8.1**	**17**	**8.9**	**8.6**	**9.2**	**12**	**13**	**12**	**5.3**	**9.8**	**1.1**	**13**	**15**	**15**	**8.4**	**3.2**	**22**	**13**	**4.7**
Total organic carbon (mg/kg)	**40000**	**81000**	**170000**	**89000**	**86000**	**92000**	**120000**	**130000**	**120000**	**53000**	**98000**	**11000**	**130000**	**150000**	**150000**	**84000**	**32000**	**220000**	**130000**	**47000**
Total Solids (mg/kg)	**542000**	**453000**	**341000**	**461000**	**461000**	**472000**	**411000**	**411000**	**358000**	**605000**	**610000**	**741000**	**322000**	**345000**	**342000**	**405000**	**648000**	**310000**	**331000**	**481000**
Total volatile solids (mg/kg)	**44000**	**85000**	**63000**	**54000**	**65000**	**68000**	**60000**	**88000**	**58000**	**65000**	**91000**	**17000**	**70000**	**67000**	**87000**	**64000**	**33000**	**95000**	**66000**	**45000**
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	**4.5**	**5.5**	**8.4**	**5.6**	**5.4**	**8**	**5.9**	**10**	**7.7**	**2.3**	**3.5**	**2.3**	**7.1**	**5.2**	**6.3**	**5.6**	**2.7**	**7.4**	**7.3**	**5.1**
Particle/Grain Size, Gravel	**0.4**	**0.1**	**0.8**	**0.1**	**0.3**	**0.1**	**0.3**	**2.1**	**0.9**	**61**	**38**	--	**0.7**	**21**	**0.7**	**7.1**	**0.1**	**1.1**	**14**	**1.1**
Particle/Grain Size, Sand	**59**	**57**	**32**	**46**	**48**	**73**	**53**	**31**	**58**	**28**	**38**	**89**	**57**	**51**	**56**	**50**	**88**	**53**	**42**	**66**
Particle/Grain Size, Silt	**36**	**37**	**59**	**49**	**46**	**19**	**40**	**57**	**34**	**8.8**	**21**	**8.7**	**36**	**23**	**37**	**38**	**9.4**	**39**	**37**	**28**
Total Percent Fines	**40.5**	**42.5**	**67.4**	**54.6**	**51.4**	**27**	**45.9**	**67**	**41.7**	**11.1**	**24.5**	**11**	**43.1**	**28.2**	**43.3**	**43.6**	**12.1**	**46.4**	**44.3**	**33.1**
Metals (mg/kg, dw)																				
Arsenic	**9.3 B**	**11 B**	**14 B**	**9.1 B**	**10 B**	--	**10 B**	**13 B**	**14 B**	**8.3 B**	**11 B**	**3.8 B**	**15**	**16**	**16**	**15 B**	**13**	**22**	**17 B**	**14 B**
Cadmium	**0.47**	**0.5**	**0.45**	**0.32**	**0.31**	--	**0.46**	**0.6**	**1.2**	**0.33**	**0.4**	**0.16**	**1.4**	**1.2**	**1.7**	**1.7**	**0.79**	**2.2**	**2.5**	**1.4**
Chromium	**19 J**	**23 B**	**27 J**	**20 J**	**22 J**	--	**20 J**	**28 J**	**19 B**	**12 B**	**12 B**	**8.9 J**	**19**	**15**	**21**	**18 B**	**10**	**22**	**21 B**	**21 B**
Copper	**29**	**41**	**63**	**36**	**40**	--	**39**	**66**	**58**	**46**	**84**	**7.9**	**56**	**56**	**58**	**47**	**11**	**64**	**64**	**140**
Lead	**51 B**	**71 B**	**110 B**	**62 B**	**68 B**	--	**78 B**	**110 B**	**130 B**	**120 B**	**170 B**	**14 B**	**120**	**95**	**110**	**87 B**	**20**	**140**	**140 B**	**140 B**
Mercury	**0.11**	**0.17**	**0.22**	**0.15**	**0.14**	--	**0.15**	**0.17**	**0.12**	**0.045**	**0.092**	**0.019 J**	**0.1**	**0.08**	**0.18**	**0.12**	**0.072**	**0.21**	**0.23**	**0.38**
Silver	**0.12**	**0.17**	**0.25**	**0.15**	**0.17**	--	**0.16**	**0.26**	**0.21**	**0.096 J**	**0.12**	**0.037 J**	**0.28**	**0.14 J**	**0.22**	**0.17**	**0.06 J**	**0.27**	**0.23**	**0.24**
Zinc	**62**	**67**	**77**	**52**	**57**	--	**76**	**82**	**80**	**60**	**72**	**21**	**140**	**62**	**82**	**100**	**37**	**100**	**460**	**110**
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	16 U	**20 J**	**26 J**	17 U	17 U	--	**20 J**	21 U	**130 J**	66 U	70 U	10 U	51 U	46 U	**130 J**	**100 J**	25 U	**570**	**64 J**	**95 J**
Acenaphthene	**14 J**	**20 J**	**23 J**	**16 J**	**22 J**	--	**20 J**	12 U	**570**	**59 J**	**130 J**	**20 J**	**56 J**	**62 J**	**430**	**370**	**25 J**	**2500**	**260**	**310**
Acenaphthylene	**21 J**	**37 J**	**41 J**	**26 J**	**23 J**	--	**37 J**	**16 J**	67 U	**130 J**	**66 J**	**15 J**	**47 J**	**64 J**	**110 J**	**120**	**21 J**	**150 J**	**130**	**110 J**
Anthracene	**31 J**	**51 J**	**45 J**	**31 J**	**58**	--	**57**	**32 J**	**910**	**490**	**430**	**48**	**180**	**230**	**870**	**880**	**89**	**3300**	**620**	**600**
Fluorene	**16 J**	**30 J**	**26 J**	**18 J**	**26 J**	--	**29 J**	**15 J**	**470**	**130 J**	**140 J**	**22 J**	**73 J**	**87 J**	**490**	**430**	**42 J**	**1800**	**270**	**300**
Naphthalene	**79**	**180 J**	**380**	**140**	**120**	--	**200**	**48 J**	**200 J**	37 U	40 U	**25 J**	**66 J**	**42 J**	**330**	**220**	**48 J**	**1000**	**170**	**210 J**
Phenanthrene	**120**	**190 J**	**200**	**140**	**200**	--	**220**	**130 J**	**3500**	**1700**	**1700**	**170**	**680**	**830**	**4100**	**3500**	**260**	**14000**	**2100**	**2700**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**300**	**500**	**700**	**390**	**500**	--	**600**	**270**	**6000**	**2600**	**3000**	**300**	**1200**	**1400**	**6500**	**6000**	**510**	**20000**	**3600**	**4000**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	2.23 U	**0.247 J**	**0.153 J**	1.09 U	1.14 U	--	**0.167 J**	0.923 U	**1.08 J**	6.98 U	4.08 U	5.27 U	2.23 U	1.73 U	**0.867 J**	**1.19 J**	4.38 U	**2.59**	**0.492 J**	**2.02 J**
Acenaphthene	**0.35 J**	**0.247 J**	**0.135 J**	**0.18 J**	**0.256 J**	--	**0.167 J**	0.454 U	**4.75**	**1.11 J**	**1.33 J**	**1.82 J**	**0.431 J**	**0.413 J**	**2.87**	**4.4**	**0.781 J**	**11.4**	**2**	**6.6**
Acenaphthylene	**0.525 J**	**0.457 J**	**0.241 J**	**0.292 J**	**0.267 J**	--	**0.308 J**	**0.123 J**	2.75 U	**2.45 J**	**0.673 J**	**1.36 J**	**0.362 J**	**0.427 J**	**0.733 J**	**1.43**	**0.656 J**	**0.682 J**	**1**	**2.34 J**
Anthracene	**0.775 J**	**0.63 J**	**0.265 J**	**0.348 J**	**0.674**	--	**0.475**	**0.246 J**	**7.58**	**9.25**	**4.39**	**4.36**	**1.38**	**1.53**	**5.8**	**10.5**	**2.78**	**15**	**4.77**	**12.8**
Fluorene	**0.4 J**	**0.37 J**	**0.153 J**	**0.202 J**	**0.302 J**	--	**0.242 J**	**0.115 J**	**3.92**	**2.45 J**	**1.43 J**	**2 J**	**0.562 J**	**0.58 J**	**3.27**	**5.12**	**1.31 J**	**8.18**	**2.08**	**6.38**
Naphthalene	**1.98**	**2.22 J**	**2.24**	**1.57**	**1.4**	--	**1.67**	**0.369 J**	**1.67 J**	3.58 U	2.04 U	**2.27 J**	**0.508 J**	**0.28 J**	**2.2**	**2.62**	**1.5 J**	**4.55**	**1.31**	**4.47 J**
Phenanthrene	**3**	**2.35 J**	**1.18**	**1.57**	**2.33**	--	**1.83**	**1 J**	**29.2**	**32.1**	**17.3**	**15.5**	**5.23**	**5.53**	**27.3**	**41.7**	**8.13**	**63.6**	**16.2**	**57.4**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**9**	**6.52**	**4.36**	**5.26**	**6.36**	--	**4.86**	**3**	**50.9**	**57.9**	**31.3**	**30**	**10.7**	**11**	**43**	**66.9**	**20**	**110**	**30**	**92**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**82**	**130 J**	**110**	**86**	**110**	--	**150**	**110**	**1100**	**1200**	**970**	**81**	**440**	**540**	**1600**	**1700**	**160**	**5000**	**1400**	**1300**
Benzo(a)pyrene	**80 J**	**100 J**	**110 J**	**78 J**	**110 J**	--	**140**	**89 J**	**860**	**1000**	**820**	**73**	**420**	**430**	**1400**	**1500**	**130 J**	**3900**	**1200**	**1100**
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	**43 J**	**73 J**	**80 J**	**52 J**	**55 J**	--	**88 J**	**64 J**	**540 J**	**650**	**450 J**	**41 J**	**110 J**	**220 J**	**780**	**810**	**81 J**	**2000**	**630**	**550 J**
Benzo(j)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	**95 J**	**120 J**	**120 J**	**99 J**	**110 J**	--	**150**	**100 J**	**1100**	**1100**	**960**	**80**	**420**	**530**	**1600**	**1700**	**180**	**4900**	**1500**	**1400**
Dibenzo(a,h)anthracene	21 U	**26 J**	33 U	23 U	**27 J**	--	25 U	28 U	160 U	**160 J**	**130 J**	14 U	**83 J**	**64 J**	**200 J**	**180 J**	34 U	**380**	**130 J**	**170 J**
Fluoranthene	**190**	**310 J**	**290**	**220**	**250**	--	**320**	**230**	**3000**	**2900**	**2300**	**180**	**1000 B**	**1100 B**	**3800 B**	**3900**	**360 B**	**11000 B**	**2500**	**3100**
Indeno(1,2,3-c,d)pyrene	**61 J**	**84 J**	**110**	**66 J**	**87**	--	**110**	**86 J**	**570**	**720**	**550**	**56**	**320**	**300**	**860**	**870**	**120**	**2200**	**750**	**740**
Pyrene	**200**	**330 J**	**310**	**230**	**260**	--	**340**	**240**	**3200**	**3000**	**2500**	**210**	**1100**	**1200**	**4200**	**4400**	**420**	**12000**	**3100**	**3600**
Total Benzofluoranthenes	**100 J**	**150 J**	**55 J**	**120 J**	**50 J**	--	**200 J**	**57 J**	**420 J**	**490 J**	**350 J**	**25 J**	**250 J**	**190 J**	**530 J**	**590 J**	**66 J**	**1600**	**540 J**	**600 J**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**800**	**1000**	**1000**	**850**	**1000**	--	**1300**	**900**	**10000**	**10000**	**8700**	**700**	**4000**	**4000**	**10000**	**15000**	**1500**	**40000**	**11000**	**12000**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**2.05**	**1.6 J**	**0.647**	**0.966**	**1.28**	--	**1.25**	**0.846**	**9.17**	**22.6**	**9.9**	**7.36**	**3.38**	**3.6**	**10.7**	**20.2**	**5**	**22.7**	**10.8**	**27.7**
Benzo(a)pyrene	**2 J**	**1.23 J**	**0.647 J**	**0.876 J**	**1.28 J**	--	**1.17**	**0.685 J**	**7.17**	**18.9**	**8.37**	**6.64**	**3.23**	**2.87**	**9.33**	**17.9**	**4.06 J**	**17.7**	**9.23**	**23.4**
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	**1.08 J**	**0.901 J**	**0.471 J**	**0.584 J**	**0.64 J**	--	**0.733 J**	**0.492 J**	**4.5 J**	**12.3**	**4.59 J**	**3.73 J**	**0.846 J**	**1.47 J**	**5.2**	**9.64**	**2.53 J**	**9.09**	**4.85**	**11.7 J**
Benzo(j)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	**2.38 J**	**1.48 J**	**0.706 J**	**1.11 J**	**1.28 J**	--	**1.25**	**0.769 J**	**9.17**	**20.8**	**9.8**	**7.27**	**3.23**	**3.53**	**10.7**	**20.2**	**5.63**	**22.3**	**11.5**	**29.8**
Dibenzo(a,h)anthracene	2.23 U	**0.321 J**	0.824 U	1.09 U	**0.314 J**	--	0.917 U	0.923 U	5.58 U	**3.02 J**	**1.33 J**	5.27 U	**0.638 J**	**0.427 J**	**1.33 J**	**2.14 J**	4.38 U	**1.73**	**1 J**	**3.62 J**
Fluoranthene	**4.75**	**3.83 J**	**1.71**	**2.47**	**2.91**	--	**2.67**	**1.77**	**25**	**54.7**	**23.5**	**16.4**	**7.69 B**	**7.33 B**	**25.3 B**	**46.4**	**11.3 B**	**50 B**	**19.2**	**66**
Indeno(1,2,3-c,d)pyrene	**1.53 J**	**1.04 J**	**0.647**	**0.742 J**	**1.01**	--	**0.917**	**0.662 J**	**4.75**	**13.6**	**5.61**	**5.09**	**2.46**	**2**	**5.73**	**10.4**	**3.75**	**10**	**5.77**	**15.7**
Pyrene	**5**	**4.07 J**	**1.82**	**2.58**	**3.02**	--	**2.83**	**1.85**	**26.7**	**56.6**	**25.5**	**19.1**	**8.46**	**8**	**28**	**52.4**	**13.1**	**54.5**	**23.8**	**76.6**
Total Benzofluoranthenes	**2.5 J**	**1.85 J**	**0.324 J**	**1.35 J**	**0.581 J**	--	**1.67 J**	**0.438 J**	**3.5 J**	**9.25 J**	**3.57 J**	**2.27 J**	**1.92 J**	**1.27 J**	**3.53 J**	**7.02 J**	**2.06 J**	**7.27**	**4.15 J**	**12.8 J**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**20**	**14.5**	**7.47**	**10.4**	**11.7**	--	**11.7**	**7.99**	**92**	**202**	**88.6**	**70.8**	**29.9**	**30**	**96**	**179**	**50**	**200**	**90**	**254**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**100**	**100**	**140**	**96**	**130**	--	**170**	**100**	**1100**	**1000**	**990**	**90**	**510**	**500**	**2000**	**1800**	**160**	**5000**	**1400**	**1300**
Total cPAH TEQ (ND=0)[g]	**100**	**100**	**140**	**96**	**130**	--	**170**	**100**	**1100**	**1000**	**990**	**90**	**510**	**500**	**2000**	**1800**	**160**	**5000**	**1400**	**1300**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																				
1,2,4-Trichlorobenzene	11 U	13 UJ	17 U	12 U	12 U	--	13 U	14 U	80 U	45 U	48 U	6.9 U	35 U	32 U	35 U	28 U	17 U	39 U	29 U	59 U
1,2-Dichlorobenzene	21 U	26 UJ	33 U	23 U	24 U	--	25 U	28 U	160 U	90 U	95 U	14 U	69 U	63 U	70 U	55 U	34 U	77 U	59 U	120 U
1,4-Dichlorobenzene	15 U	18 UJ	23 U	16 U	16 U	--	18 U	20 U	110 U	62 U	66 U	9.6 U	48 U	44 U	48 U	38 U	24 U	53 U	41 U	81 U
Hexachlorobenzene	27 U	33 U	42 U	29 U	29 U	--	32 U	35 U	200 U	110 U	120 U	17 U	86 U	79 U	87 U	69 U	43 U	96 U	73 U	150 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	27 U	33 UJ	42 U	29 U	29 U	--	32 U	35 U	200 U	110 U	120 U	17 U	86 U	79 U	87 U	69 U	43 U	96 U	73 U	150 U
Chlorinated Organics (mg/kg, OC)																				
1,2,4-Trichlorobenzene	2.23 U	1.36 UJ	0.824 U	1.09 U	1.14 U	--	0.917 U	0.923 U	5.58 U	6.98 U	4.08 U	5.27 U	2.23 U	1.73 U	1.93 U	2.74 U	4.38 U	1.45 U	1.85 U	10.4 U
1,2-Dichlorobenzene	2.23 U	1.36 UJ	0.824 U	1.09 U	1.14 U	--	0.917 U	0.923 U	5.58 U	6.98 U	4.08 U	5.27 U	2.23 U	1.73 U	1.93 U	2.74 U	4.38 U	1.45 U	1.85 U	10.4 U
1,4-Dichlorobenzene	2.23 U	1.36 UJ	0.824 U	1.09 U	1.14 U	--	0.917 U	0.923 U	5.58 U	6.98 U	4.08 U	5.27 U	2.23 U	1.73 U	1.93 U	2.74 U	4.38 U	1.45 U	1.85 U	10.4 U
Hexachlorobenzene	2.23 U	1.36 U	0.824 U	1.09 U	1.14 U	--	0.917 U	0.923 U	5.58 U	6.98 U	4.08 U	5.27 U	2.23 U	1.73 U	1.93 U	2.74 U	4.38 U	1.45 U	1.85 U	10.4 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	2.23 U	1.36 UJ	0.824 U	1.09 U	1.14 U	--	0.917 U	0.923 U	5.58 U	6.98 U	4.08 U	5.27 U	2.23 U	1.73 U	1.93 U	2.74 U	4.38 U	1.45 U	1.85 U	10.4 U
Organic Chemicals/Phenols (µg/kg, dw)																				
2,4-Dimethylpheno	27 U	33 U	42 U	29 U	29 U	--	32 U	35 U	200 U	110 U	120 U	17 U	86 UJ	79 UJ	87 UJ	69 U	43 UJ	96 UJ	73 U	150 U
2-Methylphenol (o-Cresol)	17 U	21 U	27 U	19 U	19 U	--	21 U	23 U	130 U	73 U	78 U	11 U	56 U	51 U	57 U	45 U	28 U	63 U	48 U	96 U
4-Methylphenol (p-Cresol)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic acid	1000 U	1300 U	1600 U	1100 U	1100 U	--	1200 U	1400 U	7700 U	4300 U	4600 U	670 U	3300 U	3000 U	3400 U	2700 U	1600 U	3700 U	2800 U	5700 U
Benzyl alcoho	140 U	**170 REJ**	210 U	150 U	150 U	--	160 U	180 U	1000 U	580 U	610 U	89 U	440 U	400 U	450 U	350 U	220 U	490 U	380 U	760 U
Dibenzofuran	10 U	**23 J**	**22 J**	**17 J**	**17 J**	--	**22 J**	14 U	**220 J**	44 U	47 U	**11 J**	34 U	31 U	**240 J**	**150 J**	17 U	**770 J**	**94 J**	**120 J**
n-Nitrosodiphenylamine	14 U	17 U	22 U	15 U	16 U	--	17 U	19 U	110 U	60 U	63 U	9.2 U	46 U	42 U	46 U	37 U	23 U	**72 J**	39 U	79 U
Pentachloropheno	230 U	290 U	370 U	260 U	260 U	--	280 U	310 U	1800 U	990 U	1000 U	150 U	760 U	690 U	770 U	610 U	370 U	850 U	650 U	1300 U
Phenol	**170 J**	**1000**	**630**	**680**	**550**	--	**490**	**64 J**	**1400 J**	**630 J**	**1400**	**510**	130 U	120 U	130 U	**660 J**	65 U	150 U	**1000**	230 U
Organic Chemicals/Phenols (mg/kg, OC)																				
Dibenzofuran	6.75 U	**0.284 J**	**0.129 J**	**0.191 J**	**0.198 J**	--	**0.183 J**	2.69 U	**1.83 J**	20.8 U	12.2 U	**1 J**	6.62 U	5.27 U	**1.6 J**	**1.79 J**	13.4 U	**3.5 J**	**0.723 J**	**2.55 J**
N-Nitrosodiphenylamine	2.75 U	1.6 U	1 U	1.35 U	1.4 U	--	1.08 U	1.08 U	6.67 U	8.49 U	4.9 U	6.27 U	2.69 U	2.13 U	2.33 U	3.33 U	5.31 U	**0.327 J**	2.23 U	12.6 U
Phthalates (µg/kg, dw)																				
bis(2-Ethylhexyl)phthalate	130 U	150 U	200 U	140 U	140 U	--	150 U	170 U	950 U	530 U	560 U	82 U	410 U	370 U	410 U	**600 J**	200 U	460 U	350 U	700 U
Butylbenzyl phthalate	**100 J**	**160 J**	**180 J**	**120 J**	**100 J**	--	**120 J**	**130 J**	**690 J**	380 U	400 U	**69 J**	290 U	270 U	300 U	**230 J**	140 U	330 U	**290 J**	**510 J**
Diethyl phthalate	130 U	170 U	210 U	150 U	150 U	--	160 U	180 U	1000 U	570 U	600 U	88 U	440 U	400 U	440 U	350 U	220 U	490 U	370 U	750 U
Dimethyl phthalate	23 U	28 U	36 U	25 U	25 U	--	27 U	31 U	170 U	97 U	100 U	15 U	75 U	68 U	76 U	60 U	37 U	84 U	64 U	130 U
Di-n-butyl phthalate	100 U	120 U	160 U	110 U	110 U	--	120 U	130 U	760 U	430 U	450 U	66 U	330 U	300 U	330 U	260 U	160 U	370 U	280 U	560 U
Di-n-octyl phthalate	100 U	120 U	160 U	110 U	110 U	--	120 U	**150 J**	760 U	430 U	450 U	66 U	**380 J**	**350 J**	330 U	260 U	160 U	370 U	**320 J**	560 U
Phthalates (mg/kg, OC)																				
bis(2-Ethylhexyl)phthalate	27.5 U	16 U	10 U	13.5 U	14 U	--	10.8 U	10.8 U	66.7 U	84.9 U	49 U	62.7 U	26.9 U	21.3 U	23.3 U	**7.14 J**	53.1 U	17.7 U	22.3 U	126 U
Butyl benzyl phthalate	**2.5 J**	**1.98 J**	**1.06 J**	**1.35 J**	**1.16 J**	--	**1 J**	**1 J**	**5.75 J**	28.3 U	16.3 U	**6.27 J**	9.23 U	7.33 U	8 U	**2.74 J**	17.8 U	5.91 U	**2.23 J**	**10.9 J**
Diethyl phthalate	67.5 U	40.7 U	24.7 U	32.6 U	33.7 U	--	26.7 U	26.9 U	167 U	208 U	122 U	155 U	66.2 U	52.7 U	58 U	82.1 U	134 U	43.6 U	56.2 U	319 U
Dimethyl phthalate	6.75 U	4.07 U	2.47 U	3.26 U	3.37 U	--	2.67 U	2.69 U	16.7 U	20.8 U	12.2 U	15.5 U	6.62 U	5.27 U	5.8 U	8.21 U	13.4 U	4.36 U	5.62 U	31.9 U
Di-n-butyl phthalate	22.3 U	13.6 U	8.24 U	10.9 U	11.4 U	--	9.17 U	9.23 U	55.8 U	69.8 U	40.8 U	52.7 U	22.3 U	17.3 U	19.3 U	27.4 U	43.8 U	14.5 U	18.5 U	104 U
Di-n-Octyl Phthalate	6.75 U	4.07 U	2.47 U	3.26 U	3.37 U	--	2.67 U	**1.15 J**	16.7 U	20.8 U	12.2 U	15.5 U	**2.92 J**	**2.33 J**	5.8 U	8.21 U	13.4 U	4.36 U	**2.46 J**	31.9 U
Dioxin/Furans (ng/kg, dw)																				
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	19 UJ	**24 J**	**29 B**	21 UJ	--	--	23 UJ	**23 J**	--	**17 B**	12 U	14 UJ	--	--	28 UJ	27 UJ	--	**26 J**	--	12 U
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**590 J**	**630 J**	**1200 B**	**900 J**	--	--	**710 J**	**1000 B**	--	**260 B**	**300 B**	**190 J**	--	--	**1800 J**	**720 J**	--	**780 B**	--	**370 B**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	**9.8 J**	**24 J**	**27 B**	**17 J**	--	--	**23 J**	**26 B**	--	**5.5 J**	**15 B**	7.2 UJ	--	--	**33 J**	**16 J**	--	**21 B**	--	**7.2 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**69 J**	**82 J**	**140 B**	**100 J**	--	--	**94 J**	**120 B**	--	**24 B**	**34 B**	**21 J**	--	--	**140 J**	**79 J**	--	**95 B**	--	**54 B**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	9.3 UJ	9.7 UJ	**1 J**	10 UJ	--	--	11 UJ	**1.3 J**	--	0.37 U	**0.68 J**	0.068 UJ	--	--	14 UJ	14 UJ	--	**2.3 J**	--	**0.75 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	9.3 UJ	9.7 UJ	**11 J**	10 UJ	--	--	**11 J**	**10 J**	--	**1.9 J**	**2.7 J**	7.2 UJ	--	--	**14 J**	14 UJ	--	**8.7 J**	--	**2.9 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	9.3 UJ	9.7 UJ	**5.4 J**	10 UJ	--	--	11 UJ	**4.4 J**	--	**0.8 J**	**1.2 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**4.4 J**	--	**1.9 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	9.3 UJ	9.7 UJ	**3.5 J**	10 UJ	--	--	11 UJ	**3.1 J**	--	**0.7 J**	**2.2 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**3 J**	--	**1.2 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	9.3 UJ	9.7 UJ	**9.8 J**	10 UJ	--	--	11 UJ	**8.2 J**	--	**1.4 J**	**2.3 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**8.6 J**	--	**6.8 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	9.3 UJ	9.7 UJ	0.63 U	0.17 UJ	--	--	11 UJ	0.58 U	--	0.26 U	0.41 U	0.077 UJ	--	--	0.24 UJ	14 UJ	--	**1.1 J**	--	0.44 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	9.3 UJ	9.7 UJ	**13 J**	10 UJ	--	--	11 UJ	**11 J**	--	**1.7 J**	**3 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**10 J**	--	**7.6 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	9.3 UJ	9.7 UJ	**6 J**	10 UJ	--	--	11 UJ	**4.9 J**	--	**1.2 J**	**2.2 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**4.8 J**	--	**1.7 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	9.3 UJ	9.7 UJ	**4.6 J**	10 UJ	--	--	11 UJ	**3.4 J**	--	**0.55 J**	**0.98 J**	0.28 UJ	--	--	14 UJ	0.69 UJ	--	**3.9 J**	--	**1.2 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	9.3 UJ	9.7 UJ	**2.2 J**	10 UJ	--	--	11 UJ	**1.7 J**	--	**0.61 J**	**1.8 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**2.1 J**	--	**0.94 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	9.3 UJ	9.7 UJ	**4.3 J**	10 UJ	--	--	11 UJ	**3.4 J**	--	**0.95 J**	**2.9 J**	7.2 UJ	--	--	14 UJ	14 UJ	--	**4.1 J**	--	**1.6 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**2.5 J**	**3.9 J**	**9.7**	**3.8 J**	--	--	**6.2 J**	**7.3**	--	**1.5 J**	**3.2**	1.4 UJ	--	--	**6 J**	**3.3 J**	--	**8.6**	--	**1.5 J**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.68 UJ	0.68 UJ	**1.8 J**	0.99 UJ	--	--	1 UJ	**1.3 J**	--	0.17 U	**0.43 J**	0.38 UJ	--	--	1.2 UJ	0.8 UJ	--	**1.8 J**	--	0.36 U
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**11**	**12**	**20**	**10**	--	--	**10**	**10**	--	**2**	**5**	**4.1**	--	--	**20**	**10**	--	**10**	--	**5.2**
Total TCDD TEQ (ND=0)[h]	**1.2**	**1.6**	**20**	**2**	--	--	**3**	**10**	--	**2**	**5**	**0.27**	--	--	**4**	**1**	--	**10**	--	**5.2**

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH2-18-D	BH2-19-S	BH2-20-S	BH2-21-S	BH2-22-S	BH2-23-S	BH2-24-S	BH2-25-S	BH2-25-D	BH2-25-T	BH2-26-S	BH2-27-S	BH2-28-S	BH2-29-S	BH2-30-S	BH2-31-S	BH2-32-S	BH2-33-S	BH2-34-S	BH2-35-S
Location:	BH2-18	BH2-19	BH2-20	BH2-21	BH2-22	BH2-23	BH2-24	BH2-25	BH2-25	BH2-25	BH2-26	BH2-27	BH2-28	BH2-29	BH2-30	BH2-31	BH2-32	BH2-33	BH2-34	BH2-35
Sample Date:	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-01	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2019-07-01	2019-07-01	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2019-07-02
Depth Interval:	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10
Depth Units:	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
QA/QC:	Duplicate								Duplicate	Duplicate										
Analyte																				
Conventional Parameters																				
% Moisture (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
% Wood Debris (%)[b]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia (mg/kg)	--	13 U	33 U	19 U	18 U	12 U	15 U	19 U	19 U	20 U	21 U	15 U	13 U	14 U	14 U	12 U	33 U	14 U	12 U	14 U
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	--	6.8 U	17 U	11 U	**160**	**21**	**54**	**41**	**100**	**190**	**200**	8 U	7.8 U	**17**	7.9 U	7.1 U	**130**	**220**	7.2 U	7.8 U
Total organic carbon (%)	--	**0.59**	**17**	**4.2**	**7.1**	**0.45**	**3.7**	**5.6**	**5.8**	**5.9**	**9**	**1.4**	**1**	**3.5**	**1.8**	**0.99**	**16**	**1.6**	**0.95**	**1**
Total organic carbon (mg/kg)	--	**5900**	**170000**	**42000**	**71000**	**4500**	**37000**	**56000**	**58000**	**59000**	**90000**	**14000**	**10000**	**35000**	**18000**	**9900**	**160000**	**16000**	**9500**	**10000**
Total Solids (mg/kg)	--	**752000**	**291000**	**496000**	**476000**	**759000**	**570000**	**464000**	**461000**	**460000**	**472000**	**661000**	**708000**	**647000**	**703000**	**734000**	**282000**	**681000**	**737000**	**716000**
Total volatile solids (mg/kg)	--	**14000**	**77000**	**47000**	**54000**	**15000**	**37000**	**49000**	**46000**	**49000**	**69000**	**26000**	**19000**	**40000**	**25000**	**21000**	**70000**	**22000**	**17000**	**15000**
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	--	**2.3**	**6.5**	**3.3**	**4**	**2.5**	**3.3**	**4.1**	**3.9**	**4.4**	**4.1**	**2.9**	**3.3**	**3.9**	**2.8**	**2.9**	**7.8**	**2.9**	**3.6**	**3.2**
Particle/Grain Size, Gravel	--	--	**0.4**	**0.1**	**0.2**	**0.2**	**0.2**	--	--	**0.1**	**0.4**	--	--	**7.3**	**0.1**	**0.4**	**2.7**	**0.1**	--	--
Particle/Grain Size, Sand	--	**93**	**61**	**79**	**64**	**85**	**69**	**51**	**51**	**51**	**68**	**76**	**78**	**67**	**85**	**83**	**40**	**74**	**82**	**76**
Particle/Grain Size, Silt	--	**4.7**	**33**	**18**	**32**	**12**	**27**	**45**	**45**	**44**	**28**	**22**	**18**	**22**	**13**	**13**	**50**	**23**	**14**	**21**
Total Percent Fines	--	**7**	**39.5**	**21.3**	**36**	**14.5**	**30.3**	**49.1**	**48.9**	**48.4**	**32.1**	**24.9**	**21.3**	**25.9**	**15.8**	**15.9**	**57.8**	**25.9**	**17.6**	**24.2**
Metals (mg/kg, dw)																				
Arsenic	--	**4 B**	**24 B**	**13 B**	**18 B**	**4 B**	**10**	**13**	**14**	--	**19**	**8 B**	**4 B**	**8.2**	**8.8**	**5.5**	**22**	**7.4**	**4.1**	**4.5**
Cadmium	--	**0.15 J**	**2.8**	**1.2**	**1.8**	**0.18**	**1.3**	**1.8**	**1.7**	--	**1.8**	**0.93**	**0.44**	**0.84**	**0.64**	**0.33**	**2.2**	**0.75**	**0.32**	**0.41**
Chromium	--	**9.1 B**	**19 B**	**17 B**	**20 B**	**12 B**	**17**	**27**	**26**	--	**30**	**11 B**	**13 B**	**24**	**11**	**21**	**34**	**14**	**13**	**13**
Copper	--	**6.1**	**55**	**50**	**170**	**14**	**41**	**67**	**67**	--	**80**	**13**	**15**	**46**	**12**	**17**	**86**	**14**	**13**	**12**
Lead	--	**11 B**	**110 B**	**640 B**	**500 B**	**11 B**	**120**	**260**	**210**	--	**170**	**21 B**	**37 B**	**76**	**17**	**35**	**170**	**19**	**22**	**16**
Mercury	--	**0.016 J**	**2.2**	**0.2**	**0.62**	**0.014 J**	**0.21**	**0.74**	**0.81**	--	**0.35**	**0.1**	**0.19**	**0.19**	**0.071**	**0.088**	**0.6**	**0.086**	**0.075 J**	**0.062**
Silver	--	**0.027 J**	**0.25**	**0.14**	**0.2**	**0.033 J**	**0.14**	**0.25**	**0.25**	--	**0.22**	**0.078 J**	**0.071 J**	**0.14**	**0.067 J**	**0.074 J**	**0.35**	**0.085 J**	**0.073 J**	**0.073 J**
Zinc	--	**29**	**110**	**130**	**210**	**29**	**180**	**150**	**150**	--	**130**	**36**	**38**	**100**	**30**	**42**	**120**	**35**	**30**	**28**
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	--	21 U	140 U	86 U	**130 J**	21 U	**16 J**	**39 J**	37 U	--	**37 J**	23 U	22 U	**16 J**	12 U	23 U	**1500**	12 U	11 U	12 U
Acenaphthene	--	12 U	**110 J**	49 U	**540**	12 U	**35 J**	**78 J**	**64 J**	--	**77 J**	13 U	12 U	**62**	6.9 U	**33 J**	**3600**	6.9 U	**7.6 J**	6.8 U
Acenaphthylene	--	12 U	**110 J**	49 U	**270**	12 U	**37 J**	**60 J**	**62 J**	--	**63 J**	13 U	**12 J**	**37**	6.9 U	**36 J**	**1100**	**7.7 J**	**9.8 J**	**8.3 J**
Anthracene	--	12 U	**320 J**	49 U	**1100**	12 U	**84**	**170**	**190**	--	**240**	**26 J**	**41 J**	**130**	**14 J**	**100**	**5500**	**27 J**	**36**	**17 J**
Fluorene	--	12 U	**160 J**	**84 J**	**530**	12 U	**38 J**	**82 J**	**96 J**	--	**120**	**13 J**	**15 J**	**65**	**6.9 J**	**43 J**	**4200**	**9.8 J**	**11 J**	**7.7 J**
Naphthalene	--	12 U	**200 J**	**87 J**	**250**	12 U	**64**	**93 J**	**86 J**	--	**100**	13 U	**15 J**	**38**	**13 J**	**28 J**	**3200**	**11 J**	**15 J**	**9.7 J**
Phenanthrene	--	29 U	**1100**	**550 J**	**4600**	29 U	**370**	**650**	**730**	--	**900**	**92 J**	**120 J**	**530**	**28 J**	**380**	**24000**	**78 J**	**93**	**47 J**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	--	**110**	**2000**	**950**	**7400**	**110**	**640**	**1000**	**1300**	--	**2000**	**190**	**240**	**880**	**88**	**600**	**43000**	**150**	**180**	**110**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	--	20.3 U	4.65 U	11.7 U	**1.83 J**	26.7 U	**0.432 J**	**0.696 J**	3.62 U	--	**0.411 J**	9.29 U	12 U	**0.457 J**	3.83 U	13.1 U	**9.38**	4.31 U	6.84 U	6.8 U
Acenaphthene	--	10.2 U	**0.647 J**	5.71 U	**7.61**	13.3 U	**0.946 J**	**1.39 J**	**1.1 J**	--	**0.856 J**	4.64 U	6.2 U	**1.77**	1.89 U	**3.33 J**	**22.5**	2.19 U	**0.8 J**	3.4 U
Acenaphthylene	--	10.2 U	**0.647 J**	5.71 U	**3.8**	13.3 U	**1 J**	**1.07 J**	**1.07 J**	--	**0.7 J**	4.64 U	**1.2 J**	**1.06**	1.89 U	**3.64 J**	**6.88**	**0.481 J**	**1.03 J**	**0.83 J**
Anthracene	--	10.2 U	**1.88 J**	5.71 U	**15.5**	13.3 U	**2.27**	**3.04**	**3.28**	--	**2.67**	**1.86 J**	**4.1 J**	**3.71**	**0.778 J**	**10.1**	**34.4**	**1.69 J**	**3.79**	**1.7 J**
Fluorene	--	10.2 U	**0.941 J**	**2 J**	**7.46**	13.3 U	**1.03 J**	**1.46 J**	**1.66 J**	--	**1.33**	**0.929 J**	**1.5 J**	**1.86**	**0.383 J**	**4.34 J**	**26.3**	**0.613 J**	**1.16 J**	**0.77 J**
Naphthalene	--	10.2 U	**1.18 J**	**2.07 J**	**3.52**	13.3 U	**1.73**	**1.66 J**	**1.48 J**	--	**1.11**	4.64 U	**1.5 J**	**1.09**	**0.722 J**	**2.83 J**	**20**	**0.688 J**	**1.58 J**	**0.97 J**
Phenanthrene	--	23.7 U	**6.47**	**13.1 J**	**64.8**	31.1 U	**10**	**11.6**	**12.6**	--	**10**	**6.57 J**	**12 J**	**15.1**	**1.56 J**	**38.4**	**150**	**4.88 J**	**9.79**	**4.7 J**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	--	**94.9**	**16.4**	**50**	**105**	**124**	**20**	**20.9**	**24.8**	--	**20**	**32.6**	**39**	**25.1**	**11.1**	**75.8**	**300**	**14.8**	**20**	**19**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	--	**26 J**	**740**	**480**	**2500**	**14 J**	**210**	**440**	**620**	--	**720**	**63 J**	**87**	**330**	**21 J**	**200**	**9200**	**72**	**93**	**36**
Benzo(a)pyrene	--	31 U	**710 J**	**400 J**	**2000**	31 U	**210**	**430**	**580**	--	**520**	**64 J**	**89 J**	**300**	**23 J**	**160**	**7400**	**64 J**	**76 J**	**32 J**
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	--	22 U	**420 J**	**210 J**	**1100**	22 U	**130**	**240**	**320**	--	**310**	**33 J**	**59 J**	**160**	**13 J**	**100 J**	**3500**	**43 J**	**43 J**	**22 J**
Benzo(j)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	--	31 U	**760 J**	**520 J**	**2200**	31 U	**190**	**410**	**640**	--	**700**	**65 J**	**100 J**	**330**	**22 J**	**170**	**8900**	**59 J**	**110 J**	**37 J**
Dibenzo(a,h)anthracene	--	29 U	190 U	120 U	**310 J**	29 U	**42 J**	**85 J**	**73 J**	--	**74 J**	31 U	30 U	**39 J**	16 U	31 U	**980**	17 U	**16 J**	16 U
Fluoranthene	--	**56 J**	**1800**	**1100**	**4900**	**42 J**	**520 B**	**910 B**	**1200 B**	--	**1200 B**	**140**	**210**	**720 B**	**53 B**	**450 B**	**19000 B**	**150 B**	**170 J**	**87 B**
Indeno(1,2,3-c,d)pyrene	--	12 U	**540 J**	**330 J**	**1400**	12 U	**160**	**300**	**360**	--	**380**	**61 J**	**77 J**	**200**	**30 J**	**140**	**4000**	**55**	**55**	**33 J**
Pyrene	--	**52 J**	**1800**	**1200**	**5700**	**42 J**	**540**	**1100**	**1300**	--	**1400**	**160**	**240**	**810**	**59 J**	**470**	**23000**	**160**	**190 J**	**95**
Total Benzofluoranthenes	--	34 U	**330 J**	**590 J**	**1100 J**	34 U	**85 J**	**230 J**	**300 J**	--	**290 J**	37 U	**42 J**	**140 J**	19 U	**61 J**	**2900**	**26 J**	**110 J**	19 U
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	--	**260**	**7000**	**4000**	**20000**	**220**	**2000**	**4000**	**5100**	--	**5000**	**620**	**900**	**3000**	**200**	**2000**	**80000**	**620**	**750**	**360**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	--	**4.41 J**	**4.35**	**11.4**	**35.2**	**3.11 J**	**5.68**	**7.86**	**10.7**	--	**8**	**4.5 J**	**8.7**	**9.43**	**1.17 J**	**20.2**	**57.5**	**4.5**	**9.79**	**3.6**
Benzo(a)pyrene	--	23.7 U	**4.18 J**	**9.52 J**	**28.2**	31.1 U	**5.68**	**7.68**	**10**	--	**5.78**	**4.57 J**	**8.9 J**	**8.57**	**1.28 J**	**16.2**	**46.3**	**4 J**	**8 J**	**3.2 J**
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	--	23.7 U	**2.47 J**	**5 J**	**15.5**	31.1 U	**3.51**	**4.29**	**5.52**	--	**3.44**	**2.36 J**	**5.9 J**	**4.57**	**0.722 J**	**10.1 J**	**21.9**	**2.69 J**	**4.53 J**	**2.2 J**
Benzo(j)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	--	23.7 U	**4.47 J**	**12.4 J**	**31**	31.1 U	**5.14**	**7.32**	**11**	--	**7.78**	**4.64 J**	**10 J**	**9.43**	**1.22 J**	**17.2**	**55.6**	**3.69 J**	**11.6 J**	**3.7 J**
Dibenzo(a,h)anthracene	--	20.3 U	4.65 U	11.7 U	**4.37 J**	26.7 U	**1.14 J**	**1.52 J**	**1.26 J**	--	**0.822 J**	9.29 U	12 U	**1.11 J**	3.83 U	13.1 U	**6.13**	4.31 U	**1.68 J**	6.8 U
Fluoranthene	--	**9.49 J**	**10.6**	**26.2**	**69**	**9.33 J**	**14.1 B**	**16.3 B**	**20.7 B**	--	**13.3 B**	**10**	**21**	**20.6 B**	**2.94 B**	**45.5 B**	**119 B**	**9.38 B**	**17.9 J**	**8.7 B**
Indeno(1,2,3-c,d)pyrene	--	16.3 U	**3.18 J**	**7.86 J**	**19.7**	21.3 U	**4.32**	**5.36**	**6.21**	--	**4.22**	**4.36 J**	**7.7 J**	**5.71**	**1.67 J**	**14.1**	**25**	**3.44**	**5.79**	**3.3 J**
Pyrene	--	**8.81 J**	**10.6**	**28.6**	**80.3**	**9.33 J**	**14.6**	**19.6**	**22.4**	--	**15.6**	**11.4**	**24**	**23.1**	**3.28 J**	**47.5**	**144**	**10**	**20 J**	**9.5**
Total Benzofluoranthenes	--	61 U	**1.94 J**	**14 J**	**15.5 J**	80 U	**2.3 J**	**4.11 J**	**5.17 J**	--	**3.22 J**	27.9 U	**4.2 J**	**4 J**	11.7 U	**6.16 J**	**18.1**	**1.63 J**	**11.6 J**	20 U
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	--	**131**	**44.5**	**100**	**283**	**163**	**54.1**	**69.9**	**90**	--	**60**	**50**	**100**	**82.5**	**16.1**	**184**	**470**	**40**	**80**	**41**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	--	**38**	**860**	**500**	**2000**	**37**	**250**	**500**	**690**	--	**600**	**80**	**100**	**400**	**30**	**200**	**9000**	**79**	**93**	**41**
Total cPAH TEQ (ND=0)[g]	--	**38**	**860**	**500**	**2000**	**37**	**250**	**500**	**690**	--	**600**	**80**	**100**	**400**	**30**	**200**	**9000**	**79**	**93**	**41**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	--	14 U	95 U	59 U	56 U	14 U	10 U	24 U	25 U	--	24 U	16 U	15 U	8.8 U	8.2 U	16 U	42 U	8.3 U	7.8 UJ	8.1 U
1,2-Dichlorobenzene	--	29 U	190 U	120 U	110 U	29 U	20 U	48 U	51 U	--	49 U	31 U	30 U	18 U	16 U	31 U	84 U	17 U	16 UJ	16 U
1,4-Dichlorobenzene	--	20 U	130 U	81 U	78 U	20 U	14 U	33 U	35 U	--	34 U	22 U	21 U	12 U	11 U	22 U	58 U	11 U	11 UJ	11 U
Hexachlorobenzene	--	36 U	240 U	150 U	140 U	36 U	25 U	60 U	64 U	--	61 U	39 U	37 U	22 U	21 U	39 U	110 U	21 U	20 U	20 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	--	36 U	240 U	150 U	140 U	36 U	25 U	60 U	64 U	--	61 U	39 U	37 U	22 U	21 U	39 U	110 U	21 U	20 UJ	20 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	--	20.3 U	4.65 U	11.7 U	6.62 U	26.7 U	2.3 U	3.57 U	3.62 U	--	2.22 U	9.29 U	12 U	2.09 U	3.83 U	13.1 U	2.19 U	4.31 U	6.84 UJ	6.8 U
1,2-Dichlorobenzene	--	20.3 U	4.65 U	11.7 U	6.62 U	26.7 U	2.3 U	3.57 U	3.62 U	--	2.22 U	9.29 U	12 U	2.09 U	3.83 U	13.1 U	2.19 U	4.31 U	6.84 UJ	6.8 U
1,4-Dichlorobenzene	--	20.3 U	4.65 U	11.7 U	6.62 U	26.7 U	2.3 U	3.57 U	3.62 U	--	2.22 U	9.29 U	12 U	2.09 U	3.83 U	13.1 U	2.19 U	4.31 U	6.84 UJ	6.8 U
Hexachlorobenzene	--	20.3 U	4.65 U	11.7 U	6.62 U	26.7 U	2.3 U	3.57 U	3.62 U	--	2.22 U	9.29 U	12 U	2.09 U	3.83 U	13.1 U	2.19 U	4.31 U	6.84 U	6.8 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	--	20.3 U	4.65 U	11.7 U	6.62 U	26.7 U	2.3 U	3.57 U	3.62 U	--	2.22 U	9.29 U	12 U	2.09 U	3.83 U	13.1 U	2.19 U	4.31 U	6.84 UJ	6.8 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	--	36 U	240 U	150 U	140 U	36 U	25 UJ	60 UJ	64 UJ	--	61 UJ	39 U	37 U	22 UJ	21 UJ	39 UJ	110 UJ	21 UJ	20 UJ	20 UJ
2-Methylphenol (o-Cresol)	--	23 U	150 U	96 U	92 U	24 U	17 U	39 U	42 U	--	40 U	26 U	24 U	14 U	13 U	26 U	69 U	14 U	13 U	13 U
4-Methylphenol (p-Cresol)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic acid	--	1400 U	9100 U	5700 U	5400 U	1400 U	980 U	2300 U	2500 U	--	2300 U	1500 U	1400 U	850 U	790 U	1500 U	4100 U	800 U	760 U	790 U
Benzyl alcoho	--	180 U	1200 U	750 U	720 U	190 U	130 U	310 U	330 U	--	310 U	200 U	190 U	110 U	110 U	200 U	540 U	110 U	**100 REJ**	100 U
Dibenzofuran	--	14 U	93 U	58 U	**150 J**	14 U	**24 J**	**31 J**	**26 J**	--	**33 J**	15 U	15 U	**19 J**	8.1 U	**17 J**	**820 J**	8.1 U	7.7 U	8 U
n-Nitrosodiphenylamine	--	19 U	130 U	78 U	75 U	19 U	14 U	32 U	34 U	--	32 U	21 U	20 U	12 U	11 U	21 U	**89 J**	11 U	10 U	11 U
Pentachloropheno	--	320 U	2100 U	1300 U	1200 U	320 U	220 U	530 U	560 U	--	530 U	340 U	330 U	190 U	180 U	350 U	930 U	180 U	170 U	180 U
Phenol	--	**270 J**	**670 J**	**530 J**	**790 J**	**210 J**	39 U	92 U	98 U	--	93 U	**560**	57 U	34 U	32 U	60 U	160 U	32 U	30 U	31 U
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	--	61 U	14.1 U	35.7 U	**2.11 J**	80 U	**0.649 J**	**0.554 J**	**0.448 J**	--	**0.367 J**	27.9 U	37 U	**0.543 J**	11.7 U	**1.72 J**	**5.13 J**	13.1 U	21.1 U	20 U
N-Nitrosodiphenylamine	--	23.7 U	5.59 U	14 U	7.89 U	31.1 U	2.7 U	4.29 U	4.31 U	--	2.67 U	11.4 U	15 U	2.51 U	4.56 U	16.2 U	**0.556 J**	5.19 U	8.21 U	8.1 U
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	--	170 U	1100 U	690 U	670 U	170 U	120 U	280 U	300 U	--	290 U	190 U	180 U	100 U	97 U	190 U	500 U	98 U	93 U	96 U
Butylbenzyl phthalate	--	120 U	800 U	500 U	480 U	120 U	86 U	200 U	220 U	--	210 U	130 U	130 U	75 U	70 U	130 U	360 U	70 U	67 U	69 U
Diethyl phthalate	--	180 U	1200 U	740 U	710 U	180 U	130 U	300 U	320 U	--	310 U	200 U	190 U	110 U	100 U	200 U	530 U	100 U	99 U	100 U
Dimethyl phthalate	--	31 U	200 U	130 U	120 U	31 U	22 U	52 U	55 U	--	53 U	34 U	32 U	19 U	18 U	34 U	91 U	18 U	17 U	18 U
Di-n-butyl phthalate	--	140 U	900 U	560 U	540 U	140 U	97 U	230 U	240 U	--	230 U	150 U	140 U	83 U	78 U	150 U	400 U	79 U	74 U	77 U
Di-n-octyl phthalate	--	140 U	900 U	560 U	540 U	140 U	97 U	230 U	240 U	--	230 U	150 U	140 U	83 U	78 U	150 U	400 U	**89 J**	74 U	77 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	--	237 U	55.9 U	140 U	78.9 U	311 U	27 U	42.9 U	43.1 U	--	26.7 U	114 U	150 U	25.1 U	45.6 U	162 U	26.3 U	51.9 U	82.1 U	81 U
Butyl benzyl phthalate	--	81.4 U	18.8 U	47.6 U	26.8 U	107 U	9.19 U	14.3 U	14.7 U	--	9 U	37.1 U	49 U	8.29 U	15 U	52.5 U	8.75 U	17.5 U	27.4 U	27 U
Diethyl phthalate	--	610 U	141 U	357 U	197 U	800 U	67.6 U	107 U	110 U	--	67.8 U	279 U	370 U	62.9 U	117 U	394 U	68.8 U	131 U	211 U	200 U
Dimethyl phthalate	--	61 U	14.1 U	35.7 U	19.7 U	80 U	6.76 U	10.7 U	11 U	--	6.78 U	27.9 U	37 U	6.29 U	11.7 U	39.4 U	6.88 U	13.1 U	21.1 U	20 U
Di-n-butyl phthalate	--	203 U	46.5 U	117 U	66.2 U	267 U	23 U	35.7 U	36.2 U	--	22.2 U	92.9 U	120 U	20.9 U	38.3 U	131 U	21.9 U	43.1 U	68.4 U	68 U
Di-n-Octyl Phthalate	--	61 U	14.1 U	35.7 U	19.7 U	80 U	6.76 U	10.7 U	11 U	--	6.78 U	27.9 U	37 U	6.29 U	11.7 U	39.4 U	6.88 U	**5.56 J**	21.1 U	20 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	11 U	13 UJ	29 UJ	**15 J**	--	--	--	--	--	--	**65 J**	15 UJ	15 UJ	--	--	5.9 U	35 UJ	--	15 UJ	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	**350 B**	**310 J**	**640 J**	**410 B**	--	--	--	--	--	--	**500 J**	**200 J**	**210 J**	--	--	**170 B**	**980 J**	--	**210 J**	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	**8.3 J**	6.7 UJ	**33 J**	**9.2 J**	--	--	--	--	--	--	**22 J**	7.3 UJ	7.4 UJ	--	--	**2.5 J**	**18 J**	--	7.3 UJ	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**40 B**	**18 J**	**100 J**	**48 B**	--	--	--	--	--	--	**71 J**	**22 J**	**24 J**	--	--	**17 B**	**120 J**	--	**21 J**	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	**0.65 J**	6.7 UJ	14 UJ	**0.57 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	0.24 U	18 UJ	--	7.3 UJ	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	**4.6 J**	6.7 UJ	14 UJ	**4.5 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	**0.71 J**	18 UJ	--	7.3 UJ	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**1.5 J**	6.7 UJ	14 UJ	**1.5 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	0.55 U	18 UJ	--	7.3 UJ	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	**2 J**	6.7 UJ	14 UJ	**1.8 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	**0.3 J**	18 UJ	--	7.3 UJ	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**3.5 J**	6.7 UJ	14 UJ	**3.1 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	**0.94 J**	18 UJ	--	7.3 UJ	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	0.38 U	0.064 UJ	0.27 UJ	0.4 U	--	--	--	--	--	--	0.28 UJ	0.08 UJ	0.084 UJ	--	--	0.22 U	0.22 UJ	--	0.077 UJ	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**4.3 J**	6.7 UJ	14 UJ	**4.3 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	**1.2 J**	18 UJ	--	7.3 UJ	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	**2.5 J**	6.7 UJ	14 UJ	**2 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	**0.43 J**	18 UJ	--	7.3 UJ	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**1.3 J**	0.21 UJ	0.88 UJ	**1.1 J**	--	--	--	--	--	--	9.3 UJ	0.27 UJ	0.23 UJ	--	--	**0.31 J**	18 UJ	--	0.22 UJ	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	**1.2 J**	0.064 UJ	14 UJ	**1.5 J**	--	--	--	--	--	--	9.3 UJ	7.3 UJ	7.4 UJ	--	--	**0.22 J**	18 UJ	--	7.3 UJ	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	**2.2 J**	0.085 UJ	14 UJ	**2.4 J**	--	--	--	--	--	--	9.3 UJ	0.14 UJ	7.4 UJ	--	--	**0.36 J**	18 UJ	--	0.098 UJ	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**3.2**	1.3 UJ	**7 J**	**3.1**	--	--	--	--	--	--	**7 J**	1.5 UJ	1.5 UJ	--	--	**1 J**	**6.1 J**	--	1.5 UJ	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**0.66 J**	0.31 UJ	1.2 UJ	**0.69 J**	--	--	--	--	--	--	1.5 UJ	0.35 UJ	0.37 UJ	--	--	**0.13 J**	0.98 UJ	--	0.32 UJ	--
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**5**	**2.5**	**10**	**5**	--	--	--	--	--	--	**10**	**3**	**4.2**	--	--	**1**	**20**	--	**3.0**	--
Total TCDD TEQ (ND=0)[h]	**5**	**0.27**	**2**	**5**	--	--	--	--	--	--	**2**	**0.3**	**0.30**	--	--	**1**	**2.3**	--	**0.27**	--

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH2-36-S	BH2-37-S	BH2-38-S	BH2-39-S	BH2-40-S	BH-SC-03-0to1	BH-SC-03-1to3	BH-SC-03-3to5	BH-SC-03-5to7	BH-SC-03-7to10	BH-SC-04-0to1.3	BH-SC-04-1.3to3	BH-SC-04-3to4.2	BH-SC-05-0to1.6	BH-SC-05-1.6to3.2	BH-SC-05-1.6to3.2-D	BH-SC-05-3.2to5.2	BH-SC-07-0to2.5	BH-SC-07-2.5to4.2	BH-SC-07-4.2to6.2
Location:	BH2-36	BH2-37	BH2-38	BH2-39	BH2-40	SC-03	SC-03	SC-03	SC-03	SC-03	SC-04	SC-04	SC-04	SC-05	SC-05	SC-05	SC-05	SC-07	SC-07	SC-07
Sample Date:	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2019-07-02	2021-09-21	2021-09-21	2021-09-21	2021-09-21	2021-09-21	2021-09-20	2021-09-20	2021-09-20	2021-09-21	2021-09-21	2021-09-21	2021-09-21	2021-09-21	2021-09-21	2021-09-21
Depth Interval:	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	0 - 1	1 - 3	3 - 5	5 - 7	7 - 10	0 - 1.3	1.3 - 3	3 - 4.2	0 - 1.6	1.6 - 3.2	1.6 - 3.2	3.2 - 5.2	0 - 2.5	2.5 - 4.2	4.2 - 6.2
Depth Units:	cm	cm	cm	cm	cm	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:																Duplicate				
Analyte																				
Conventional Parameters																				
% Moisture (%)	--	--	--	--	--	**25.4**	**34.2**	**34.2**	**29.4**	**30.0**	**40.5**	**28.8**	**25.3**	**62.4**	**53.0**	**47.1**	**29.5**	**69.9**	**39.6**	**20.2**
% Wood Debris (%)[b]	--	--	--	--	--	**65**	**5**	**5**	**5**	**5**	**35**	**20**	**20**	**20**	**30**	--	**15**	**90**	**30**	**10**
Ammonia (mg/kg)	12 U	29 U	14 U	13 U	12 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	7.6 U	**500**	7.9 U	7.5 U	7.6 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (%)	**0.85**	**13**	**1.4**	**1**	**0.79**	**1.35**	**0.45**	**0.41**	**0.7**	**0.33**	**5**	**1.15**	**0.5**	**13.5**	**11.4**	--	**2.68**	**38.5 J**	**9.49**	**1.16**
Total organic carbon (mg/kg)	**8500**	**130000**	**14000**	**10000**	**7900**	**13500**	**4500**	**4100**	**7000**	**3300**	**50000**	**11500**	**5000**	**135000**	**114000**	--	**26800**	**385000 J**	**94900**	**11600**
Total Solids (mg/kg)	**722000**	**315000**	**655000**	**697000**	**708000**	**754400**	**715300**	**728000**	**729900**	**781300**	**559200**	**727800**	**752300**	**361500**	**455900**	**490300**	**683600**	**258300**	**569000**	**769600**
Total volatile solids (mg/kg)	**2400**	**71000**	**19000**	**17000**	**14000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	**3.3**	**7.4**	**3.8**	**3.9**	**3.4**	**2.80**	**9.80**	**9.40**	**6.50**	**7.80**	**2.70**	**2.80**	**4.20**	**12.3**	**6.60**	--	**3.20**	**6.80**	**3.00**	**1.40**
Particle/Grain Size, Gravel	--	**7.5**	--	**0.1**	--	**36.3**	**9.80**	**7.70**	**6.00**	**7.90**	**9.40**	**14.8**	**37.3**	**6.10**	**12.8**	--	**50.8**	**30.7**	**17.8**	**44.9**
Particle/Grain Size, Sand	**75**	**40**	**60**	**76**	**73**	**53.4**	**50.6**	**56.6**	**58.4**	**52.7**	**81.3**	**70.6**	**48.6**	**60.7**	**64.7**	--	**40.9**	**43.9**	**62.6**	**45.2**
Particle/Grain Size, Silt	**22**	**45**	**37**	**20**	**24**	**7.70**	**30.0**	**26.3**	**29.2**	**31.8**	**6.60**	**11.7**	**9.80**	**21.0**	**15.8**	--	**5.20**	**18.6**	**16.7**	**8.50**
Total Percent Fines	**25.3**	**52.4**	**40.8**	**23.9**	**27.4**	**10.5**	**39.8**	**35.7**	**35.7**	**39.6**	**9.3**	**14.5**	**14**	**33.3**	**22.4**	--	**8.4**	**25.4**	**19.7**	**9.9**
Metals (mg/kg, dw)																				
Arsenic	**4.2**	**22**	**5.7**	**4.3**	**4.1**	**15.1**	**12.2**	**11.2**	**10.5**	**7.34**	**10.8**	**6.19**	**6.53**	**10.4**	**7.45**	**7.55**	**12.5**	**4.65**	**7.99**	**12.0**
Cadmium	**0.28**	**1.7**	**0.58**	**0.33**	**0.34**	**0.21**	**0.52**	**0.30**	**0.18**	**0.27**	**0.44**	**0.28**	**0.26**	**1.08**	**0.70**	**0.64**	**0.25**	**0.96**	**0.56**	**0.20**
Chromium	**14**	**34**	**20**	**14**	**16**	**12.7**	**26.1**	**25.1**	**30.7**	**21.9**	**17.1**	**13.7**	**23.8**	**25.4**	**23.6**	**17.1**	**32.1**	**17.9**	**19.1**	**26.5**
Copper	**13**	**110**	**23**	**13**	**12**	**13.7**	**22.2**	**23.1**	**24.8**	**18.9**	**22.4**	**9.82**	**16.6**	**54.0**	**30.1**	**25.8**	**27.5**	**34.5**	**19.3**	**17.0**
Lead	**20**	**200**	**32**	**16**	**14**	**12.6**	**4.86**	**5.47**	**5.84**	**4.13**	**34.1**	**2.96**	**2.23**	**84.8**	**24.2**	**23.7**	**4.43**	**31.6**	**10.7**	**2.54**
Mercury	**0.069**	**0.57**	**0.36**	**0.063**	**0.057**	**0.0469**	**0.0305**	**0.0333**	**0.0344**	**0.0324**	**0.105**	**0.0308**	**0.0122 J**	**0.477**	**0.184**	**0.136**	**0.0206 J**	**0.188**	**0.0542**	**0.0179 J**
Silver	**0.069 J**	**0.39**	**0.12**	**0.077 J**	**0.071 J**	**0.11 J**	**0.12 J**	**0.12 J**	**0.12 J**	**0.09 J**	**0.13 J**	**0.07 J**	**0.09 J**	**0.26 J**	**0.11 J**	**0.10 J**	**0.08 J**	**0.13 J**	**0.08 J**	**0.06 J**
Zinc	**31**	**130**	**49**	**32**	**31**	**52.2**	**59.0**	**60.4**	**59.6**	**46.5**	**55.5**	**36.0**	**44.8**	**105**	**57.3**	**50.6**	**58.2**	**58.9**	**43.6**	**45.2**
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	12 U	**66 J**	13 U	24 U	12 U	**8.06**	1.15 U	1.1 U	1.1 U	1.1 U	**23.6**	**5.3**	1.1 U	**110**	**75.5 J**	**36.6 J**	**17.7**	**143**	**88.9**	**7.6**
Acenaphthene	**7 J**	**120 J**	**18 J**	13 U	6.7 U	**6.9**	0.6 U	0.57 U	0.57 U	0.57 U	**37.2**	4.98 U	0.57 U	**89.7**	**31.4 J**	**9.75 J**	**10.7**	**47.5**	**24.3**	4.99 U
Acenaphthylene	**10 J**	**120 J**	**14 J**	13 U	**7 J**	**12.5**	1.13 U	1.08 U	1.08 U	1.08 U	**37**	**7.42**	1.08 U	**131**	**98.3 J**	**43.5 J**	**32.8**	**188**	**60.8**	**10**
Anthracene	**28 J**	**450**	**50**	**21 J**	**16 J**	**10.1**	0.91 U	0.87 U	0.87 U	0.87 U	**60.8**	**4.72 J**	0.87 U	**124**	**79.8 J**	**31.2 J**	**14.1**	**124**	**40.6**	**4.31 J**
Fluorene	**12 J**	**180**	**29 J**	13 U	**9.1 J**	**6.86**	0.66 U	0.63 U	0.63 U	0.63 U	**38.5**	4.98 U	0.63 U	**143**	**70.7 J**	**28.7 J**	**12.7**	**142**	**48.1**	4.99 U
Naphthalene	**9.1 J**	**120 J**	**11 J**	13 U	6.7 U	**86.7**	**1.46 J**	**2.27 J**	**2.02 J**	**4.94 J**	**256**	**56.6**	**5.68**	**1630**	**739**	**463**	**180**	**1990**	**1320**	**85.4**
Phenanthrene	**83**	**1400**	**130**	**55 J**	**56 J**	**43.5**	0.75 U	0.72 U	0.72 U	0.72 U	**278**	**20**	**1.19 J**	**1240**	**424 J**	**145 J**	**64.8**	**661 J**	**220**	**18.8**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**200**	**2500**	**300**	**150**	**100**	**175**	**1.5**	**2.3**	**2**	**4.9**	**731**	**94**	**6.9**	**3500**	**1520**	**758**	**330**	**3300**	**1800**	**126**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	7.76 U	**0.508 J**	5.29 U	13 U	8.48 U	**0.597**	0.256 U	0.27 U	0.16 U	0.33 U	**0.472**	**0.461**	0.22 U	**0.81**	**0.662 J**	--	**0.66**	**0.371**	**0.937**	**0.655**
Acenaphthene	**0.824 J**	**0.923 J**	**1.29 J**	6.7 U	4.18 U	**0.511**	0.13 U	0.14 U	0.081 U	0.17 U	**0.744**	0.433 U	0.11 U	**0.664**	**0.275 J**	--	**0.399**	**0.123**	**0.256**	0.43 U
Acenaphthylene	**1.18 J**	**0.923 J**	**1 J**	6.7 U	**0.886 J**	**0.926**	0.251 U	0.263 U	0.154 U	0.327 U	**0.74**	**0.645**	0.216 U	**0.97**	**0.862 J**	--	**1.22**	**0.488**	**0.641**	**0.862**
Anthracene	**3.29 J**	**3.46**	**3.57**	**2.1 J**	**2.03 J**	**0.748**	0.2 U	0.21 U	0.12 U	0.26 U	**1.22**	**0.41 J**	0.17 U	**0.919**	**0.7 J**	--	**0.526**	**0.322**	**0.428**	**0.372 J**
Fluorene	**1.41 J**	**1.38**	**2.07 J**	6.7 U	**1.15 J**	**0.508**	0.15 U	0.15 U	0.09 U	0.19 U	**0.77**	0.433 U	0.13 U	**1.06**	**0.62 J**	--	**0.474**	**0.369**	**0.507**	0.43 U
Naphthalene	**1.07 J**	**0.923 J**	**0.786 J**	6.7 U	4.18 U	**6.42**	**0.324 J**	**0.554 J**	**0.289 J**	**1.5 J**	**5.12**	**4.92**	**1.14**	**12.1**	**6.48**	--	**6.7**	**5.17**	**13.9**	**7.36**
Phenanthrene	**9.76**	**10.8**	**9.29**	**5.5 J**	**7.09 J**	**3.22**	0.17 U	0.18 U	0.1 U	0.22 U	**5.56**	**1.74**	**0.238 J**	**9.19**	**3.72 J**	--	**2.42**	**1.72 J**	**2.3**	**1.62**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**25.3**	**18.9**	**20**	**47**	**28**	**12.9**	**0.32**	**0.55**	**0.29**	**1.5**	**14.6**	**8.18**	**1.4**	**26**	**13.3**	--	**12**	**8.56**	**19**	**10.9**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**66**	**1400**	**130**	**40 J**	**38**	**15.9**	0.86 U	**1.13 J**	0.82 U	0.82 U	**89.9**	**5.15**	0.82 U	**229**	**69.1 J**	**29.9 J**	**10.6**	**89.7**	**23.7**	**2.76 J**
Benzo(a)pyrene	**54 J**	**1400**	**110**	**45 J**	**40 J**	**18.8**	0.64 U	**1.23 J**	0.61 U	0.61 U	**112**	**6.77**	0.61 U	**299**	**73.5 J**	**38.1 J**	**12.7**	**91.2**	**26.5**	**3.2 J**
Benzo(b)fluoranthene	--	--	--	--	--	**16.5**	1.43 U	1.37 U	1.37 U	1.37 U	**73.5**	**5.78**	1.37 U	**267**	**62.4 J**	**33.3 J**	**10.3**	**98.2**	**22.3**	**3.16 J**
Benzo(g,h,i)perylene	**36 J**	**790**	**56 J**	**24 J**	**19 J**	**25.4**	1.11 U	**1.09 J**	1.06 U	1.06 U	**104**	**8.05**	1.06 U	**264**	**79.6**	**56.1**	**17.7**	**102**	**30**	**3.08 J**
Benzo(j)fluoranthene	--	--	--	--	--	**8.74**	0.71 U	0.68 U	0.68 U	0.68 U	**39.6**	**3.23 J**	0.68 U	**123**	**31.9 J**	**16.9 J**	**5.11**	**45.1**	**14.2 J**	**2.01 J**
Benzo(k)fluoranthene	--	--	--	--	--	**9.25**	0.79 U	0.76 U	0.76 U	0.76 U	**52.4**	**3.31 J**	0.76 U	**157**	**35.8 J**	**16.9 J**	**5.68**	**42.8**	**13.8 J**	**1.95 J**
Chrysene	**68 J**	**1600**	**130**	**38 J**	**42 J**	**21.1**	1.1 U	**2.28 J**	1.05 U	1.05 U	**112**	**6.77**	1.05 U	**347**	**89.1 J**	**38.3 J**	**15**	**97.1**	**33**	**3.34 J**
Dibenzo(a,h)anthracene	16 U	**280 J**	**21 J**	32 U	16 U	**2.97 J**	0.93 U	0.89 U	0.89 U	0.89 U	**22.8**	0.89 U	0.89 U	**47.7**	**12.9**	**8.76**	**2.1 J**	**14.1**	**3.47 J**	0.89 U
Fluoranthene	**120 B**	**2600 B**	**300 B**	**92 B**	**89 B**	**57.5**	0.49 U	**0.75 J**	0.47 U	0.47 U	**244**	**15.7**	**1.11 J**	**1050**	**317 J**	**109 J**	**42.5**	**457 J**	**120**	**11.1**
Indeno(1,2,3-c,d)pyrene	**51 J**	**770**	**75**	**47 J**	**38 J**	**15.5**	1.1 U	1.05 U	1.05 U	1.05 U	**85**	**5.98**	1.05 U	**224**	**57.9**	**36.9**	**9.97**	**72.4**	**20**	**2.02 J**
Pyrene	**160**	**2700**	**260**	**97 J**	**98**	**61.9**	0.65 U	**1.24 J**	0.63 U	0.63 U	**260**	**18.8**	**1.4 J**	**1250**	**397 J**	**139 J**	**48**	**542 J**	**145**	**14.8**
Total Benzofluoranthenes	**26 J**	**560 J**	**63 J**	38 U	**21 J**	**34.5**	5.22 U	4.98 U	5 U	4.99 U	**166**	**12.3**	4.98 U	**547**	**130**	**67.1**	**21.1**	**186**	**50.3**	**7.12**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**570**	**12000**	**1000**	**400**	**400**	**254**	5.22 U	**10**	5 U	4.99 U	**1200**	**80**	**6.7**	**4260**	**1230**	**523**	**180**	**1650**	**450**	**48**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**7.76**	**10.8**	**9.29**	**4 J**	**4.81**	**1.18**	0.19 U	**0.276 J**	0.12 U	0.25 U	**1.8**	**0.448**	0.16 U	**1.7**	**0.606 J**	--	**0.396**	**0.233**	**0.25**	**0.238 J**
Benzo(a)pyrene	**6.35 J**	**10.8**	**7.86**	**4.5 J**	**5.06 J**	**1.39**	0.14 U	**0.3 J**	0.087 U	0.18 U	**2.24**	**0.589**	0.12 U	**2.21**	**0.645 J**	--	**0.474**	**0.237**	**0.279**	**0.276 J**
Benzo(b)fluoranthene	--	--	--	--	--	**1.22**	0.318 U	0.334 U	0.196 U	0.415 U	**1.47**	**0.503**	0.274 U	**1.98**	**0.547 J**	--	**0.384**	**0.255**	**0.235**	**0.272 J**
Benzo(g,h,i)perylene	**4.24 J**	**6.08**	**4 J**	**2.4 J**	**2.41 J**	**1.88**	0.247 U	**0.266 J**	0.151 U	0.321 U	**2.08**	**0.7**	0.212 U	**1.96**	**0.698**	--	**0.66**	**0.265**	**0.316**	**0.266 J**
Benzo(j)fluoranthene	--	--	--	--	--	**0.647**	0.16 U	0.17 U	0.097 U	0.21 U	**0.792**	**0.281 J**	0.14 U	**0.911**	**0.28 J**	--	**0.191**	**0.117**	**0.15 J**	**0.173 J**
Benzo(k)fluoranthene	--	--	--	--	--	**0.685**	0.18 U	0.19 U	0.11 U	0.23 U	**1.05**	**0.288 J**	0.15 U	**1.16**	**0.314 J**	--	**0.212**	**0.111**	**0.145 J**	**0.168 J**
Chrysene	**8 J**	**12.3**	**9.29**	**3.8 J**	**5.32 J**	**1.56**	0.24 U	**0.556 J**	0.15 U	0.318 U	**2.24**	**0.589**	0.21 U	**2.57**	**0.782 J**	--	**0.56**	**0.252**	**0.348**	**0.288 J**
Dibenzo(a,h)anthracene	7.76 U	**2.15 J**	**1.5 J**	13 U	8.48 U	**0.22 J**	0.21 U	0.22 U	0.13 U	0.27 U	**0.456**	0.077 U	0.18 U	**0.353**	**0.113**	--	**0.0784 J**	**0.0366**	**0.0366 J**	0.077 U
Fluoranthene	**14.1 B**	**20 B**	**21.4 B**	**9.2 B**	**11.3 B**	**4.26**	0.11 U	**0.18 J**	0.067 U	0.14 U	**4.88**	**1.37**	**0.222 J**	**7.78**	**2.78 J**	--	**1.59**	**1.19 J**	**1.3**	**0.957**
Indeno(1,2,3-c,d)pyrene	**6 J**	**5.92**	**5.36**	**4.7 J**	**4.81 J**	**1.15**	0.24 U	0.256 U	0.15 U	0.318 U	**1.7**	**0.52**	0.21 U	**1.66**	**0.508**	--	**0.372**	**0.188**	**0.211**	**0.174 J**
Pyrene	**18.8**	**20.8**	**18.6**	**9.7 J**	**12.4**	**4.59**	0.14 U	**0.302 J**	0.09 U	0.19 U	**5.2**	**1.63**	**0.28 J**	**9.26**	**3.48 J**	--	**1.79**	**1.41 J**	**1.53**	**1.28**
Total Benzofluoranthenes	**3.06 J**	**4.31 J**	**4.5 J**	40 U	**2.66 J**	**2.55**	1.2 U	1.2 U	0.71 U	1.5 U	**3.31**	**1.07**	1 U	**4.05**	**1.14**	--	**0.787**	**0.483**	**0.53**	**0.613**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**70**	**90**	**80**	**50**	**54.6**	**18.8**	1.2 U	**2.5**	0.71 U	1.5 U	**24**	**7**	**1.3**	**31.5**	**10.8**	--	**6.71**	**4.29**	**4.8**	**4.1**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**68**	**1700**	**130**	**60**	**50**	**25**	5.22 U	**1.6**	5 U	4.99 U	**145**	**8.9**	4.98 U	**395**	**98.2**	**51.1**	**16.7**	**124**	**35.2**	**4.3**
Total cPAH TEQ (ND=0)[g]	**68**	**1700**	**130**	**60**	**50**	**25**	5.22 U	**1.4**	5 U	4.99 U	**145**	**8.9**	4.98 U	**395**	**98.2**	**51.1**	**16.7**	**124**	**35.2**	**4.2**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	7.9 U	36 U	8.9 U	16 U	8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.5 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	8.8 U	3.6 U	3.6 U
1,2-Dichlorobenzene	16 U	73 U	18 U	32 U	16 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	5.8 U	2.4 U	2.4 U
1,4-Dichlorobenzene	11 U	50 U	12 U	22 U	11 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	7.7 U	3.1 U	3.1 U
Hexachlorobenzene	20 U	91 U	22 U	40 U	20 U	13.5 U	13.4 U	13.5 U	13.5 U	13.4 U	13.4 U	13.4 U	13.5 U	13.5 U	13.5 U	13.5 U	13.5 U	33.3 U	13.5 U	13.4 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	20 U	91 U	22 U	40 U	20 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	11.9 U	4.8 U	4.8 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	7.76 U	2.31 U	5.29 U	13 U	8.48 U	0.27 U	0.8 U	0.88 U	0.51 U	1.1 U	0.072 U	0.3 U	0.72 U	0.027 U	0.032 U	--	0.13 U	0.023 U	0.038 U	0.31 U
1,2-Dichlorobenzene	7.76 U	2.31 U	5.29 U	13 U	8.48 U	0.18 U	0.53 U	0.59 U	0.34 U	0.73 U	0.048 U	0.21 U	0.48 U	0.018 U	0.021 U	--	0.09 U	0.015 U	0.025 U	0.21 U
1,4-Dichlorobenzene	7.76 U	2.31 U	5.29 U	13 U	8.48 U	0.23 U	0.69 U	0.76 U	0.44 U	0.94 U	0.062 U	0.27 U	0.62 U	0.023 U	0.027 U	--	0.12 U	0.02 U	0.033 U	0.27 U
Hexachlorobenzene	7.76 U	2.31 U	5.29 U	13 U	8.48 U	1 U	2.98 U	3.29 U	1.93 U	4.06 U	0.268 U	1.17 U	2.7 U	0.1 U	0.118 U	--	0.504 U	0.0865 U	0.142 U	1.16 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	7.76 U	2.31 U	5.29 U	13 U	8.48 U	0.36 U	1.1 U	1.2 U	0.69 U	1.5 U	0.096 U	0.42 U	0.96 U	0.036 U	0.042 U	--	0.18 U	0.0309 U	0.051 U	0.41 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	20 UJ	91 UJ	22 UJ	40 UJ	20 UJ	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	**11.2 J**	**15.7 J**	**17.4 J**	3.8 U	**29.9 J**	3.8 U	3.8 U
2-Methylphenol (o-Cresol)	13 U	60 U	14 U	26 U	13 U	6.6 U	6.6 U	6.6 U	6.7 U	6.6 U	6.6 U	6.6 U	6.7 U	**13.9 J**	**23.2**	**27**	6.7 U	**45.7 J**	**11.8 J**	6.6 U
4-Methylphenol (p-Cresol)	--	--	--	--	--	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	**24.9**	**12.5 J**	7.4 U	**91.9**	**84.7**	**127**	**38.2**	**303**	**43**	**14 J**
Benzoic acid	770 U	3500 U	860 U	1600 U	770 U	39 U	39 U	39 U	39 U	38.8 U	38.9 U	38.8 U	39 U	39 U	39 U	39 U	39 U	**126 J**	39 U	38.9 U
Benzyl alcoho	100 U	470 U	110 U	210 U	100 U	16.2 U	16.2 U	16.2 U	16.2 U	16.2 U	16.2 U	16.2 U	16.3 U	16.2 U	16.2 U	16.3 U	16.3 U	40.1 U	16.2 U	16.2 U
Dibenzofuran	7.8 U	**74 J**	**14 J**	16 U	7.8 U	14.1 U	14.1 U	14.1 U	14.1 U	14 U	**20.9**	14 U	14.1 U	**92.9**	**74.9**	**100**	**18.9 J**	**171**	14.1 U	14.1 U
n-Nitrosodiphenylamine	11 U	49 U	12 U	22 U	11 U	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	13.1 UJ	5.3 UJ	5.3 UJ
Pentachloropheno	170 U	800 U	190 U	350 U	180 U	31.2 U	31.2 U	31.2 U	31.2 U	31.1 U	31.2 U	31.1 U	31.3 U	31.2 U	31.2 U	31.2 U	31.2 U	77.1 U	31.2 U	31.1 U
Phenol	**270**	**2300**	**190 J**	**250 J**	31 U	**56**	4.4 U	4.4 U	4.4 U	4.4 U	**68.5**	**9.5 J**	**9.7 J**	**54.9**	4.4 UJ	**45 J**	**15.1 J**	**126**	**16.7 J**	**10 J**
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	23.5 U	**0.569 J**	**1 J**	40 U	25.3 U	1.04 U	3.13 U	3.44 U	2.01 U	4.2 U	**0.418**	1.2 U	2.82 U	**0.688**	**0.657**	--	**0.705 J**	**0.444**	0.149 U	1.22 U
N-Nitrosodiphenylamine	9.29 U	2.77 U	6.36 U	16 U	10.1 U	0.39 UJ	1.2 UJ	1.3 UJ	0.76 UJ	1.6 UJ	0.11 UJ	0.46 UJ	1.1 UJ	0.039 UJ	0.046 UJ	--	0.2 UJ	0.034 UJ	0.056 UJ	0.46 UJ
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	94 U	430 U	100 U	190 U	94 U	5.5 U	5.4 U	5.5 U	5.5 U	5.4 U	5.4 U	5.4 U	5.5 U	**22.6 J**	5.5 U	5.5 U	5.5 U	13.5 U	5.5 U	5.4 U
Butylbenzyl phthalate	67 U	310 U	75 U	140 U	68 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	23.2 U	9.4 U	9.4 U
Diethyl phthalate	100 U	460 U	110 U	200 U	100 U	19.7 U	19.7 U	19.7 U	19.7 U	19.6 U	19.7 U	19.6 U	19.7 U	**36.7 J**	**193 J**	19.7 UJ	**21.6 J**	48.6 U	19.7 U	19.6 U
Dimethyl phthalate	17 U	79 U	19 U	35 U	17 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	10.8 U	4.4 U	4.4 U
Di-n-butyl phthalate	75 U	350 U	84 U	150 U	76 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	13.8 U	5.6 U	5.6 U
Di-n-octyl phthalate	75 U	350 U	**96 J**	150 U	**87 J**	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	10.8 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	92.9 U	27.7 U	63.6 U	160 U	101 U	0.41 U	1.2 U	1.3 U	0.79 U	1.6 U	0.11 U	0.47 U	1.1 U	**0.167 J**	0.048 U	--	0.21 U	0.0351 U	0.058 U	0.47 U
Butyl benzyl phthalate	30.6 U	9.23 U	21.4 U	54 U	34.2 U	0.7 U	2.1 U	2.3 U	1.3 U	2.8 U	0.19 U	0.82 U	1.9 U	0.07 U	0.082 U	--	0.35 U	0.0603 U	0.099 U	0.81 U
Diethyl phthalate	235 U	70 U	157 U	400 U	253 U	1.46 U	4.38 U	4.8 U	2.81 U	5.94 U	0.394 U	1.7 U	3.94 U	**0.272 J**	**1.69 J**	--	**0.806 J**	0.126 U	0.208 U	1.69 U
Dimethyl phthalate	23.5 U	7 U	15.7 U	40 U	25.3 U	0.33 U	0.98 U	1.1 U	0.63 U	1.3 U	0.088 U	0.38 U	0.88 U	0.033 U	0.039 U	--	0.16 U	0.0281 U	0.046 U	0.38 U
Di-n-butyl phthalate	77.6 U	23.1 U	52.9 U	130 U	84.8 U	0.41 U	1.2 U	1.4 U	0.8 U	1.7 U	0.11 U	0.49 U	1.1 U	0.041 U	0.049 U	--	0.21 U	0.0358 U	0.059 U	0.48 U
Di-n-Octyl Phthalate	23.5 U	7 U	**6.86 J**	40 U	**11 J**	0.33 U	0.98 U	1.1 U	0.63 U	1.3 U	0.088 U	0.38 U	0.88 U	0.033 U	0.039 U	--	0.16 U	0.0281 U	0.046 U	0.38 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	**31 B**	15 UJ	6 U	--	5.12 UJ	4.75 UJ	0.221 UJ	4.86 UJ	4.67 UJ	4.87 UJ	4.77 UJ	4.76 UJ	**8.48 J**	**2.60 J**	**2.53 J**	**0.856 J**	**2.05 J**	4.86 UJ	**0.144 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	**920 B**	**290 J**	**250 B**	--	**247 J**	**1620 J**	**1170 J**	**1040 J**	**893 J**	**310 J**	**200 J**	**419 J**	**569 J**	**332 J**	**313 J**	**269 J**	**292 J**	**377 J**	**243 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	--	**17 B**	7.5 UJ	**2.6 J**	--	2.56 UJ	2.37 UJ	2.31 UJ	0.0486 UJ	0.0467 UJ	**5.65 J**	2.39 UJ	2.38 UJ	**10.5 J**	**4.91 J**	**3.96 J**	**1.04 J**	**3.61 J**	2.43 UJ	**0.219 J**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	--	**100 B**	**40 J**	**22 B**	--	**28.4 J**	**83.5 J**	**73.2 J**	**91.3 J**	**63.2 J**	**31.7 J**	**18.9 J**	**54.6 J**	**60.3 J**	**26.3 J**	**30.7 J**	**23.4 J**	**25.6 J**	**25.8 J**	**21.5 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	--	**0.73 J**	7.5 UJ	0.19 U	--	**0.0931 J**	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	**0.249 J**	**0.0822 J**	0.0476 UJ	**0.481 J**	**0.189 J**	**0.191 J**	**0.0845 J**	**0.221 J**	2.43 UJ	0.0460 UJ
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	--	**4.7 J**	7.5 UJ	**0.7 J**	--	**0.617 J**	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	**2.05 J**	**0.272 J**	0.0476 UJ	**4.28 J**	**1.99 J**	**1.61 J**	**0.487 J**	**1.91 J**	2.43 UJ	**0.0752 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	--	**2.1 J**	7.5 UJ	0.55 U	--	**0.772 J**	**1.11 J**	**0.927 J**	**1.42 J**	**0.963 J**	**1.14 J**	**0.413 J**	**0.815 J**	**2.20 J**	**1.07 J**	**1.11 J**	**0.506 J**	**1.45 J**	**0.820 J**	**0.592 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	--	**1.9 J**	7.5 UJ	**0.24 J**	--	**0.260 J**	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	**0.743 J**	**0.152 J**	0.0476 UJ	**1.73 J**	**0.859 J**	**0.615 J**	**0.240 J**	**0.995 J**	**0.408 J**	**0.0561 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	--	**5.9 J**	7.5 UJ	**1.2 J**	--	2.56 UJ	2.37 UJ	2.31 UJ	**6.05 J**	2.34 UJ	2.43 UJ	2.39 UJ	2.38 UJ	**4.64 J**	**1.94 J**	**2.14 J**	**1.08 J**	**2.73 J**	2.43 UJ	**1.33 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	--	0.57 U	0.079 UJ	0.33 U	--	0.0627 UJ	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	0.102 UJ	0.0477 UJ	0.0476 UJ	2.64 UJ	2.50 UJ	2.29 UJ	2.44 UJ	3.30 UJ	2.43 UJ	2.30 UJ
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	--	**5.3 J**	7.5 UJ	**1.4 J**	--	**1.92 J**	**4.69 J**	**3.37 J**	**6.29 J**	**3.36 J**	**2.22 J**	**1.26 J**	**3.03 J**	**4.47 J**	**2.20 J**	**2.36 J**	**1.88 J**	**2.59 J**	**1.99 J**	**2.13 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	--	**2.1 J**	7.5 UJ	**0.52 J**	--	2.56 UJ	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	2.43 UJ	2.39 UJ	0.0476 UJ	**2.83 J**	2.50 UJ	2.29 UJ	2.44 UJ	3.30 UJ	2.43 UJ	2.30 UJ
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	--	**1.7 J**	7.5 UJ	**0.35 J**	--	**0.558 J**	**0.479 J**	**0.430 J**	**1.09 J**	**0.473 J**	**0.972 J**	**0.318 J**	**0.366 J**	**2.42 J**	**1.26 J**	**1.15 J**	**0.612 J**	**2.40 J**	**0.958 J**	**0.615 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	--	**1.4 J**	7.5 UJ	**0.18 J**	--	2.56 UJ	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	2.43 UJ	2.39 UJ	0.0476 UJ	**1.23 J**	**0.494 J**	**0.436 J**	**0.129 J**	**0.701 J**	**0.286 J**	0.0460 UJ
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	--	**2.6 J**	7.5 UJ	**0.36 J**	--	**0.317 J**	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	**0.864 J**	**0.112 J**	0.0476 UJ	**2.42 J**	**0.903 J**	**0.817 J**	**0.269 J**	**1.52 J**	2.43 UJ	**0.0511 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	**4**	1.5 UJ	**0.96 J**	--	**0.514 J**	0.0475 UJ	0.0463 UJ	0.0486 UJ	0.0467 UJ	**1.65 J**	**0.207 J**	0.0476 UJ	**5.00 J**	**2.62 J**	**2.26 J**	**0.495 J**	**5.22 J**	**1.17 J**	**0.185 J**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	**0.49 J**	0.38 UJ	**0.16 J**	--	**0.292 J**	**0.307 J**	**0.324 J**	**0.591 J**	**0.309 J**	**0.393 J**	**0.210 J**	**0.227 J**	**1.10 J**	**0.657 J**	**0.727 J**	**0.344 J**	**1.45 J**	**0.491 J**	**0.355 J**
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	--	**7**	**8**	**2**	--	**2.02**	**2.84**	**2.41**	**4.30**	**2.25**	**3.16**	**1.33**	**1.80**	**7.70**	**3.88**	**3.77**	**2.00**	**6.46**	**3.08**	**1.86**
Total TCDD TEQ (ND=0)[h]	--	**7**	**0.5**	**2**	--	**1.71**	**2.69**	**2.27**	**4.28**	**2.11**	**2.88**	**1.04**	**1.65**	**7.57**	**3.72**	**3.62**	**1.84**	**6.25**	**2.29**	**1.71**

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH-SC-10-2to4	BH-SC-10-4to6	BH-SC-10-6to8	BH-SC-10-8to10	BH-SC-11-2to4	BH-SC-11-4to6	BH-SC-11-6to8	BH-SC-11-8to10	BH-SC-12-0to1.4	BH-SC-14-0to1.3	BH-SC-14-1.3to2.6	BH-SC-17-0to2	BH-SC-17-2to3	BH-SC-17-9to10	BH-SC-20-0to1.5	BH-SC-20-1.5to3	BH-SC-20-3to5	BH-SC-20-5to7	BH-SC-20-7to9	BH-SC-21-0to1.5
Location:	SC-10	SC-10	SC-10	SC-10	SC-11	SC-11	SC-11	SC-11	SC-12	SC-14	SC-14	SC-17	SC-17	SC-17	SC-20	SC-20	SC-20	SC-20	SC-20	SC-21
Sample Date:	2022-10-05	2022-10-05	2022-10-05	2022-10-05	2022-10-05	2022-10-05	2022-10-05	2022-10-05	2021-09-16	2021-09-16	2021-09-16	2022-10-05	2022-10-05	2022-10-05	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-17
Depth Interval:	2 - 4	4 - 6	6 - 8	8 - 10	2 - 4	4 - 6	6 - 8	8 - 10	0 - 1.4	0 - 1.3	1.3 - 2.6	0 - 2	2 - 3	9 - 10	0 - 1.5	1.5 - 3	3 - 5	5 - 7	7 - 9	0 - 1.5
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:																				
Analyte																				
Conventional Parameters																				
% Moisture (%)	**17.8**	**43.7**	**42.1**	**36.5**	**48.5**	**66.8**	**71.6**	**77.8**	**71.2**	**24.7**	**23.0**	**40.5**	**61.4**	**61.3**	--	--	--	--	--	--
% Wood Debris (%)[b]	**5**	**19.5**	**17.5**	**10**	**23.75**	**90**	**90**	**95**	**90**	**30**	**20**	**7.5**	**85**	**90**	**35**	**30**	**20**	**30**	**20**	**80**
Ammonia (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (%)	**0.43**	**7.03**	**5.22**	**5.91**	**8.64 J+**	**27.5**	**27.1**	**33.6**	**21.9**	**1.52**	**0.36**	**5.75**	**18.2**	**11.4**	**1.46**	**0.87**	**0.24 J**	**1.18**	**0.22**	**16.6**
Total organic carbon (mg/kg)	**4300**	**70300**	**52200**	**59100**	**86400 J+**	**275000**	**271000**	**336000**	**219000**	**15200**	**3600**	**57500**	**182000**	**114000**	**14600**	**8700**	**2400 J**	**11800**	**2200**	**166000**
Total Solids (mg/kg)	**838800**	**605100**	**582100**	**699600**	**524100**	**335600**	**276700**	**237700**	**228900**	**681600**	**777400**	**671000**	**380600**	**407000**	**681000**	**736000**	**760200**	**782600**	**877200**	**302800**
Total volatile solids (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	**5.30**	**8.10**	**8.10**	**8.40**	**7.20**	**11.3**	**8.90**	**15.9**	**5.10**	**2.30**	**1.00**	**6.30**	**16.0**	**7.00**	**2.10**	**1.40**	**2.80**	**1.30**	0.10 U	**6.70**
Particle/Grain Size, Gravel	**55.7**	**51.2**	**52.2**	**55.3**	**46.2**	**41.2**	**26.9**	**58.0**	**9.90**	**12.9**	**40.3**	**56.5**	**51.6**	**71.9**	**2.50**	**4.00**	**15.6**	**28.1**	**22.5**	**1.90**
Particle/Grain Size, Sand	**35.4**	**32.2**	**29.1**	**31.6**	**35.6**	**35.7**	**21.4**	**15.8**	**71.5**	**76.8**	**53.5**	**30.1**	**23.3**	**17.1**	**84.9**	**89.4**	**73.3**	**59.7**	**72.5**	**73.9**
Particle/Grain Size, Silt	**3.80 J**	**8.60**	**10.7**	**4.50**	**11.0**	**11.8**	**42.8**	**10.3**	**13.4**	**8.00**	**5.20**	**7.10**	**9.10**	**4.00**	**10.4**	**5.20**	**8.10**	**10.9**	**4.80**	**17.4**
Total Percent Fines	**9.1**	**16.7**	**18.8**	**12.9**	**18.2**	**23.1**	**51.7**	**26.2**	**18.5**	**10.3**	**6.2**	**13.4**	**25.1**	**11**	**12.5**	**6.6**	**10.9**	**12.2**	**4.85**	**24.1**
Metals (mg/kg, dw)																				
Arsenic	**15.1**	**16.4**	**10.6**	**6.26**	**37.0**	**37.3**	**22.6**	**3.85**	**18.2**	**4.54**	**5.83**	**66.3**	**40.5**	**11.7**	**4.40**	**5.89**	**5.80**	**5.47**	**3.45**	**12.1**
Cadmium	**0.11 J**	**0.24**	**0.30**	**0.40**	**0.40 J**	**0.48 J**	**0.76**	**1.47**	**1.06**	**0.13 J**	**0.10 J**	**0.24 J**	**0.41 J**	**0.63**	**0.23**	**0.44**	**0.30**	**0.29**	**0.07 J**	**1.66**
Chromium	**66.0**	**33.1**	**36.4**	**25.1**	**39.8**	**62.3**	**18.8**	**14.4**	**12.2**	**6.78**	**20.7**	**24.8**	**23.2**	**29.7 J**	**9.27**	**15.4**	**12.8**	**13.0**	**9.79**	**18.1**
Copper	**73.7**	**95.8**	**56.8**	**72.6**	**219**	**386**	**145**	**24.4**	**62.5**	**6.87**	**8.39**	**1660**	**758**	**73.9**	**8.82**	**8.45**	**8.65**	**5.84**	**4.61**	**70.3**
Lead	**176**	**160**	**95.3**	**17.1**	**469**	**513**	**251**	**25.6**	**599**	**7.06**	**3.23**	**3940**	**1990**	**112**	**12.4**	**9.23**	**1.69 J**	**2.13**	**1.33**	**155**
Mercury	**0.0109 J**	**0.0706**	**0.0718**	**0.0780**	**0.140**	**0.811**	**0.218**	**0.0833 J**	**0.184**	**0.0259 J**	**0.00757 J**	**0.184**	**0.187**	**0.167**	**0.0258 J**	**0.0378**	**0.00694 J**	**0.0226 J**	**0.0100 J**	**0.569**
Silver	**0.13 J**	**0.32 J**	**0.19 J**	**0.17 J**	**2.43**	**3.63**	**1.33 J**	**0.22 J**	**0.18 J**	**0.04 J**	**0.04 J**	**0.97**	**0.53 J**	**0.43 J**	**0.06 J**	**0.07 J**	**0.06 J**	**0.15 J**	**0.03 J**	**0.32 J**
Zinc	**111**	**135**	**89.2**	**54.6**	**242**	**240**	**128**	**76.7**	**72.6**	**19.3**	**34.9**	**554**	**176**	**106**	**24.8**	**26.6**	**23.0**	**23.7**	**19.9**	**95.2**
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	**48.5**	**31.1**	**18.5**	**83.3**	**167**	**83.8**	**27.8**	**8.3 J**	**44.8**	**10.6**	**1.65 J**	**87.1**	**99.5**	**18.9**	**14.1**	**11.7**	1.1 U	1.1 U	1.1 U	**60.2**
Acenaphthene	**167 J**	**52.5 J-**	**15.1 J-**	**52.2 J-**	**59.2 J-**	**32.4 J-**	**19.8 J**	**3.84 J**	**99.5**	**16.2**	5 U	**93.5 J-**	**3.29 J**	**123 J-**	**13.1**	**11**	0.57 U	0.57 U	0.57 U	**92.1**
Acenaphthylene	**17.8 J**	**32.3 J-**	**28.6 J-**	**215 J-**	**178 J-**	**103 J-**	**42.9 J-**	**4.28 J**	**99.7**	**9.48**	**1.4 J**	**44.9 J-**	1.08 UJ	**18.1 J-**	**14.1**	**13.7**	1.08 U	1.08 U	1.08 U	**144**
Anthracene	**262 J**	**101**	**34.3**	**50**	**73.8**	**43.8**	**69**	**6.11 J**	**341**	**30.5**	**3.66 J**	**154**	**8.86**	**177**	**24.2**	**34.7**	0.87 U	0.87 U	0.87 U	**670**
Fluorene	**123 J**	**49.3**	**17.5**	**46.4**	**45.2**	**30.3**	**34.8**	**5.09 J**	**133**	**17.4**	5 U	**88.2**	**12.9**	**114**	**15.3**	**13.5**	0.63 U	0.63 U	0.63 U	**203**
Naphthalene	**80.9 J**	**134**	**159**	**1070**	**1290**	**573**	**150**	**47.6**	**114**	**68.6**	**11.7**	**114**	**28.1**	**37**	**101**	**95.5**	**2.07 J**	1.27 U	1.27 U	**361**
Phenanthrene	**1100 J**	**430 J-**	**142 J-**	**267 J-**	**506 J-**	**254 J-**	**279 J-**	**24.6 J-**	**1680**	**121**	**15.6**	**834 J-**	**157 J-**	**865 J-**	**95.8**	**77.2**	**1.05 J**	0.72 U	0.72 U	**1980**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**1800**	**830**	**415**	**1780**	**2320**	**1120**	**620**	**99.8**	**2510**	**274**	**34**	**1420**	**310**	**1350**	**278**	**257**	**3.1**	5 U	4.98 U	**3500**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	**11.3**	**0.442**	**0.354**	**1.41**	**1.93**	**0.305**	**0.103**	**0.0247 J**	**0.205**	**0.697**	**0.458 J**	**1.51**	**0.547**	**0.166**	**0.966**	**1.34**	0.46 U	0.093 U	0.5 U	**0.363**
Acenaphthene	**38.8 J**	**0.747 J-**	**0.289 J-**	**0.883 J-**	**0.685 J-**	**0.118 J-**	**0.0731 J**	**0.0114 J**	**0.454**	**1.07**	1.4 U	**1.63 J-**	**0.0181 J**	**1.08 J-**	**0.897**	**1.26**	0.24 U	0.048 U	0.26 U	**0.555**
Acenaphthylene	**4.14 J**	**0.459 J-**	**0.548 J-**	**3.64 J-**	**2.06 J-**	**0.375 J-**	**0.158 J-**	**0.0127 J**	**0.455**	**0.624**	**0.389 J**	**0.781 J-**	0.00593 UJ	**0.159 J-**	**0.966**	**1.57**	0.45 U	0.0915 U	0.491 U	**0.867**
Anthracene	**60.9 J**	**1.44**	**0.657**	**0.846**	**0.854**	**0.159**	**0.255**	**0.0182 J**	**1.56**	**2.01**	**1.02 J**	**2.68**	**0.0487**	**1.55**	**1.66**	**3.99**	0.36 U	0.074 U	0.4 U	**4**
Fluorene	**28.6 J**	**0.701**	**0.335**	**0.785**	**0.523**	**0.11**	**0.128**	**0.0151 J**	**0.607**	**1.14**	1.4 U	**1.53**	**0.0709**	**1**	**1.05**	**1.55**	0.26 U	0.053 U	0.29 U	**1.22**
Naphthalene	**18.8 J**	**1.91**	**3.05**	**18.1**	**14.9**	**2.08**	**0.55**	**0.142**	**0.521**	**4.51**	**3.25**	**1.98**	**0.154**	**0.325**	**6.92**	**11**	**0.863 J**	0.108 U	0.577 U	**2.17**
Phenanthrene	**260 J**	**6.1 J-**	**2.72 J-**	**4.52 J-**	**5.86 J-**	**0.924 J-**	**1.03 J-**	**0.0732 J-**	**7.67**	**7.96**	**4.33**	**14.5 J-**	**0.863 J-**	**7.59 J-**	**6.56**	**8.87**	**0.438 J**	0.061 U	0.33 U	**11.9**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**420**	**12**	**7.95**	**30.2**	**26.8**	**4.07**	**2.3**	**0.297**	**11.5**	**18**	**9.4**	**24.6**	**1.7**	**11.9**	**19**	**29.6**	**1.3**	0.42 U	2.3 U	**21**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**419 J**	**183**	**66.8**	**28.8**	**75.4**	**55.7**	**124**	**4.91 J**	**1140**	**56.7**	**5.79**	**379**	**26.4**	**299**	**33.6**	**40.1**	0.82 U	0.82 U	0.82 U	**929**
Benzo(a)pyrene	**407 J**	**213 J**	**67.3 J**	**28.7 J**	**86 J**	**80.7 J**	**119 J**	**5.83 J**	**1300**	**62.9**	**6.4**	**351 J**	**23.9 J**	**282 J**	**37.5**	**38.9**	0.61 U	**1.31 J**	0.61 U	**978**
Benzo(b)fluoranthene	**256 J**	**139**	**44**	**24.5**	**84.7**	**65.6**	**75.1**	**2.63 J**	**775**	**38.9**	**4.25 J**	**244**	**25.4**	**177**	**33.4**	**29.2**	1.37 U	**2.06 J**	1.37 U	**663**
Benzo(g,h,i)perylene	**281 J**	**178**	**63.6**	**35.7**	**263**	**347**	**247**	**6.54 J**	**1070**	**41.7**	**4.76 J**	**313**	**33**	**188**	**29**	**28.9**	1.06 U	1.06 U	1.06 U	**791**
Benzo(j)fluoranthene	**189 J**	**99.9**	**34.5**	**18.2**	**52.9**	**46**	**61.7**	**3.54 J**	**291**	**19.9**	**2.51 J**	**168**	**11.3**	**130**	**15.8**	**14.1**	0.68 U	0.68 U	0.68 U	**317**
Benzo(k)fluoranthene	**168 J**	**97.4**	**26.3**	**13.8**	**42.8**	**34.8**	**49.7**	**2.84 J**	**355**	**25.8**	**2.18 J**	**150**	**9.02**	**108**	**20.4**	**19.2**	0.76 U	**1.22 J**	0.76 U	**402**
Chrysene	**478 J**	**224**	**78.1**	**36.6**	**102**	**77.1**	**139**	**5.96 J**	**1200**	**60.1**	**6.5**	**474**	**68.1**	**334**	**42.9**	**45.9**	1.05 U	1.05 U	1.05 U	**1080**
Dibenzo(a,h)anthracene	**67**	**38.9**	**11.4 J**	**3.07 J**	**19**	**18.3 J**	**23.6 J**	**1.92 J**	**138**	**7.45**	**0.93 J**	**70.7**	**7.77**	**47.1**	**7.21**	**8.13**	0.89 U	0.89 U	0.89 U	**143 J**
Fluoranthene	**1060 J**	**450**	**208**	**191**	**381**	**205**	**306**	**19.1**	**2460**	**131**	**15.2**	**879**	**45.3**	**758**	**100**	**89.4**	**1.01 J**	0.47 U	0.47 U	**2510**
Indeno(1,2,3-c,d)pyrene	**246 J**	**148 J-**	**48.7 J-**	**21.3 J-**	**124 J-**	**154 J-**	**131 J-**	**4.54 J**	**479**	**33**	**3.23 J**	**250 J-**	**22.1 J-**	**165 J-**	**23.8**	**28.2**	1.05 U	1.05 U	1.05 U	**629**
Pyrene	**1000 J**	**446 J-**	**198 J-**	**179 J-**	**366 J-**	**205 J-**	**293 J-**	**18.7 J-**	**2520**	**120**	**13.8**	**855 J-**	**51.6 J-**	**685 J-**	**131**	**129**	**1.53 J**	**1.44 J**	0.62 U	**2840**
Total Benzofluoranthenes	**613**	**336**	**105**	**56.5**	**180**	**146**	**186**	**9.01**	**1420**	**84.6**	**8.94**	**560**	**45.7**	**410**	**69.6**	**62.5**	5 U	**3.6**	4.98 U	**1380**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL[e,f]	**5000**	**2200**	**847**	**581**	**1600**	**1290**	**1570**	**76.5**	**12000**	**600**	**66**	**4100**	**324**	**3200**	**470**	**471**	**6.7**	**9**	4.98 U	**11300**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**97.4 J**	**2.6**	**1.28**	**0.487**	**0.873**	**0.203**	**0.458**	**0.0146 J**	**5.21**	**3.73**	**1.61**	**6.59**	**0.145**	**2.62**	**2.3**	**4.61**	0.34 U	0.069 U	0.37 U	**5.6**
Benzo(a)pyrene	**94.7 J**	**3.03 J**	**1.29 J**	**0.486 J**	**0.995 J**	**0.293 J**	**0.439 J**	**0.0174 J**	**5.9**	**4.14**	**1.78**	**6.1 J**	**0.131 J**	**2.47 J**	**2.57**	**4.47**	0.25 U	**0.111 J**	0.28 U	**5.89**
Benzo(b)fluoranthene	**59.5 J**	**1.98**	**0.843**	**0.415**	**0.98**	**0.239**	**0.277**	**0.00783 J**	**3.54**	**2.56**	**1.18 J**	**4.24**	**0.14**	**1.55**	**2.29**	**3.36**	0.571 U	**0.175 J**	0.623 U	**3.99**
Benzo(g,h,i)perylene	**65.3 J**	**2.53**	**1.22**	**0.604**	**3.04**	**1.26**	**0.911**	**0.0195 J**	**4.89**	**2.74**	**1.32 J**	**5.44**	**0.181**	**1.65**	**1.99**	**3.32**	0.442 U	0.0898 U	0.482 U	**4.77**
Benzo(j)fluoranthene	**44 J**	**1.42**	**0.661**	**0.308**	**0.612**	**0.167**	**0.228**	**0.0105 J**	**1.33**	**1.31**	**0.697 J**	**2.92**	**0.0621**	**1.1**	**1.08**	**1.62**	0.28 U	0.058 U	0.31 U	**1.91**
Benzo(k)fluoranthene	**39.1 J**	**1.39**	**0.504**	**0.234**	**0.495**	**0.127**	**0.183**	**0.00845 J**	**1.62**	**1.7**	**0.606 J**	**2.6**	**0.0496**	**0.947**	**1.4**	**2.21**	0.32 U	**0.103 J**	0.35 U	**2.42**
Chrysene	**111 J**	**3.19**	**1.5**	**0.619**	**1.18**	**0.28**	**0.513**	**0.0177 J**	**5.5**	**3.95**	**1.81**	**8.24**	**0.374**	**2.93**	**2.94**	**5.28**	0.438 U	0.089 U	0.477 U	**6.51**
Dibenzo(a,h)anthracene	**15.6**	**0.553**	**0.218 J**	**0.0519 J**	**0.22**	**0.0665 J**	**0.0871 J**	**0.00571 J**	**0.63**	**0.49**	**0.26 J**	**1.23**	**0.0427**	**0.413**	**0.494**	**0.934**	0.37 U	0.075 U	0.4 U	**0.861 J**
Fluoranthene	**247 J**	**6.4**	**3.98**	**3.23**	**4.41**	**0.745**	**1.13**	**0.0568**	**11.2**	**8.62**	**4.22**	**15.3**	**0.249**	**6.65**	**6.8**	**10.3**	**0.421 J**	0.04 U	0.21 U	**15.1**
Indeno(1,2,3-c,d)pyrene	**57.2 J**	**2.11 J-**	**0.933 J-**	**0.36 J-**	**1.44 J-**	**0.56 J-**	**0.483 J-**	**0.0135 J**	**2.19**	**2.17**	**0.897 J**	**4.3 J-**	**0.121 J-**	**1.45 J-**	**1.63**	**3.24**	0.438 U	0.089 U	0.477 U	**3.79**
Pyrene	**200 J**	**6.34 J-**	**3.79 J-**	**3.03 J-**	**4.24 J-**	**0.745 J-**	**1.08 J-**	**0.0557 J-**	**11.5**	**7.9**	**3.83**	**14.9 J-**	**0.284 J-**	**6.01 J-**	**8.97**	**14.8**	**0.637 J**	**0.122 J**	0.28 U	**17.1**
Total Benzofluoranthenes	**143**	**4.79**	**2.01**	**0.957**	**2.09**	**0.533**	**0.688**	**0.0268**	**6.49**	**5.57**	**2.48**	**9.8**	**0.252**	**3.6**	**4.77**	**7.19**	2.1 U	**0.31**	2.3 U	**8.32**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**1000**	**32**	**16.2**	**9.82**	**18.5**	**4.69**	**5.79**	**0.228**	**54**	**39**	**18**	**72**	**1.78**	**28**	**32**	**54.1**	**2.8**	**0.77**	2.3 U	**67.9**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**527**	**276**	**87.8**	**38.2**	**122**	**114**	**161**	**7.57**	**1600**	**79.7**	**8.1**	**470**	**33.6**	**365**	**49.8**	**51.8**	5 U	**1.8**	4.98 U	**1270**
Total cPAH TEQ (ND=0)[g]	**527**	**276**	**87.8**	**38.2**	**122**	**114**	**161**	**7.57**	**1600**	**79.7**	**8.1**	**470**	**33.6**	**365**	**49.8**	**51.8**	5 U	**1.6**	4.98 U	**1270**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	5.6 U	6.2 U	6.1 U	2.7 U	2.7 U	2.7 U	3.6 U	3.6 U	3.6 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
1,2-Dichlorobenzene	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	3.7 U	4.1 U	4.1 U	0.7 U	0.7 U	0.7 U	2.4 U	2.4 U	2.4 U	0.7 U	0.7 U	0.7 U	0.7 U	**2.7 J**
1,4-Dichlorobenzene	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	4.9 U	5.5 U	5.4 U	0.6 U	0.6 U	0.6 U	3.1 U	3.1 U	3.1 U	0.6 U	0.6 U	0.6 U	0.6 U	**6**
Hexachlorobenzene	13.5 U	13.5 U	13.4 U	13.4 U	13.5 U	21.1 U	23.6 U	23.2 U	0.7 U	0.7 U	0.7 U	13.5 U	13.5 U	13.5 U	0.7 U	0.7 U	0.7 U	**1.2 J**	0.7 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	7.5 U	8.4 U	8.3 U	0.7 U	0.7 U	0.7 U	4.8 U	4.8 U	4.8 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	0.84 U	0.051 U	0.069 U	0.061 U	0.042 U	0.02 U	0.023 U	0.018 U	0.012 U	0.18 U	0.75 U	0.063 U	0.02 U	0.032 U	0.18 U	0.31 U	1.1 U	0.23 U	1.2 U	0.016 U
1,2-Dichlorobenzene	0.56 U	0.034 U	0.046 U	0.041 U	0.028 U	0.013 U	0.015 U	0.012 U	0.0032 U	0.046 U	0.19 U	0.042 U	0.013 U	0.021 U	0.048 U	0.08 U	0.29 U	0.059 U	0.32 U	**0.016 J**
1,4-Dichlorobenzene	0.72 U	0.044 U	0.059 U	0.052 U	0.036 U	0.018 U	0.02 U	0.016 U	0.0027 U	0.039 U	0.17 U	0.054 U	0.017 U	0.027 U	0.041 U	0.069 U	0.25 U	0.051 U	0.27 U	**0.036**
Hexachlorobenzene	3.14 U	0.192 U	0.257 U	0.227 U	0.156 U	0.0767 U	0.0871 U	0.069 U	0.0032 U	0.046 U	0.19 U	0.235 U	0.0742 U	0.118 U	0.048 U	0.08 U	0.29 U	**0.1 J**	0.32 U	0.0042 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	1.1 U	0.068 U	0.092 U	0.081 U	0.056 U	0.027 U	0.031 U	0.025 U	0.0032 U	0.046 U	0.19 U	0.083 U	0.026 U	0.042 U	0.048 U	0.08 U	0.29 U	0.059 U	0.32 U	0.0042 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	3.8 U	3.8 U	3.8 U	**5.3 J**	3.8 U	5.9 U	6.6 U	6.5 U	2.2 U	2.2 U	2.2 U	**5.3 J**	3.8 U	3.8 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	**9 J**
2-Methylphenol (o-Cresol)	6.7 U	6.7 U	6.6 U	**6.8 J**	**8.7 J**	10.4 U	11.7 U	11.5 U	**5.4**	1.1 U	1.1 U	**6.9 J**	6.7 U	6.6 U	1.1 U	1.1 U	**2.2 J**	1.1 U	1.1 U	**10.6**
4-Methylphenol (p-Cresol)	7.4 U	**18.4 J**	7.4 U	**36.9**	**28.4**	**27.1 J**	**16.1 J**	**2480 J**	**85.6**	**41**	**4.3 J**	**24.9**	**36.5**	**49.2**	**23.2**	**18.4**	**1.2 J**	0.9 U	0.9 U	**198**
Benzoic acid	39 UJ	39 UJ	38.9 UJ	38.9 UJ	**105 J**	**97.7 J**	68.3 UJ	**1140 J**	**38.4 J**	13.4 U	13.3 U	**79.5 J**	**77.4 J**	39 UJ	13.3 U	13.4 U	**38.9 R**	**18.6 J**	13.4 U	**40.3 J**
Benzyl alcoho	16.2 U	**59.1**	16.2 U	**22.8**	**54.4**	**72.3**	28.5 U	28 U	**7.9 J**	2.5 U	2.5 U	16.3 U	16.3 U	16.2 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Dibenzofuran	14.1 U	**28.6**	14.1 U	**60.4**	**103**	**53.7**	24.7 U	24.3 U	**55.9**	**18.7 J**	14.1 U	**51.3**	14.1 U	**14.6 J**	**23.6**	**14.9 J**	14.1 U	14 U	14.1 U	**202**
n-Nitrosodiphenylamine	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	8.3 UJ	9.3 UJ	9.2 U,R	1.3 U	1.3 U	1.3 U	5.3 UJ	5.3 UJ	5.3 UJ	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Pentachloropheno	31.2 UJ	31.3 UJ	31.1 UJ	31.2 UJ	31.2 UJ	49 UJ	54.7 UJ	53.7 UJ	2.1 U	2.1 U	2.1 U	31.2 UJ	31.2 UJ	31.2 UJ	2.1 U	2.1 U	2.1 U	**2.1 J**	2.1 U	**5.1 J**
Phenol	4.4 U	**13.9 J**	**11 J**	**21.5**	**30.7**	**30.5 J**	**25.1 J**	**194**	**67.2**	**106**	**6.5**	**20 J**	**9.9 J**	**12 J**	**11.6**	**9.6**	**4.2 J**	**4.7 J**	**3.8 J**	**105**
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	3.28 U	**0.407**	0.27 U	**1.02**	**1.19**	**0.195**	0.0911 U	0.0723 U	**0.255**	**1.23 J**	3.92 U	**0.892**	0.0775 U	**0.128 J**	**1.62**	**1.71 J**	5.88 U	1.2 U	6.41 U	**1.22**
N-Nitrosodiphenylamine	1.2 UJ	0.075 UJ	0.1 UJ	0.09 UJ	0.061 UJ	0.03 UJ	0.034 UJ	0.027 U,R	0.0059 U	0.086 U	0.36 U	0.092 UJ	0.029 UJ	0.046 UJ	0.089 U	0.15 U	0.54 U	0.11 U	0.59 U	0.0078 U
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	49.9 U	50 U	49.8 U	49.8 U	49.9 U	78.4 U	87.5 U	9.4 U	**1900**	49.9 U	49.8 U	50 U	50 U	**55.9 J**	**15.7 J**	5.5 U	**16.8 J**	**10 J**	**11.9 J**	**28.7 J**
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	14.8 U	16.5 U	16.2 U	**3.4 J**	0.7 U	0.7 U	9.4 U	9.4 U	9.4 U	0.7 U	0.7 U	**5.8**	**4.6 J**	0.7 U	**14.3**
Diethyl phthalate	19.7 U	19.7 U	**27.5 J**	**28.7 J**	19.7 U	30.9 U	34.5 U	33.9 U	**25.5**	19.9 U	19.9 U	19.7 U	**27.6 J**	**28 J**	19.9 U	20 U	19.9 U	19.9 U	19.9 U	20 U
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	6.9 U	7.7 U	**101**	1 U	1 U	1 U	4.4 U	4.4 U	4.4 U	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	8.8 U	9.8 U	9.6 UJ	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	**112**	5.6 U	**43 J**	**44.8**	**45**	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	6.9 U	**15.4 J**	7.6 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	11.6 U	0.711 U	0.954 U	0.843 U	0.578 U	0.285 U	0.323 U	0.028 U	**8.7**	3.28 U	13.8 U	0.87 U	0.275 U	**0.49 J**	**1.08 J**	0.63 U	**7 J**	**0.847 J**	**5.41 J**	**0.173 J**
Butyl benzyl phthalate	2.2 U	0.13 U	0.18 U	0.16 U	0.11 U	0.0538 U	0.0609 U	0.0482 U	**0.016 J**	0.046 U	0.19 U	0.16 U	0.052 U	0.082 U	0.048 U	0.08 U	**2.4**	**0.39 J**	0.32 U	**0.0861**
Diethyl phthalate	4.58 U	0.28 U	**0.527 J**	**0.486 J**	0.228 U	0.112 U	0.127 U	0.101 U	**0.116**	1.31 U	5.53 U	0.343 U	**0.152 J**	**0.246 J**	1.36 U	2.3 U	8.29 U	1.69 U	9.05 U	0.12 U
Dimethyl phthalate	1 U	0.063 U	0.084 U	0.074 U	0.051 U	0.025 U	0.028 U	**0.301**	0.0046 U	0.066 U	0.28 U	0.077 U	0.024 U	0.039 U	0.068 U	0.11 U	0.42 U	0.085 U	0.45 U	0.006 U
Di-n-butyl phthalate	1.3 U	0.08 U	0.11 U	0.095 U	0.065 U	0.032 U	0.036 U	0.029 UJ	0.026 U	0.37 U	1.6 U	0.097 U	0.031 U	0.049 U	**7.67**	0.64 U	**17.9 J**	**3.8**	**20.5**	0.034 U
Di-n-Octyl Phthalate	1 U	0.063 U	0.084 U	0.074 U	0.051 U	0.025 U	**0.0568 J**	0.023 U	0.02 U	0.29 U	1.2 U	0.077 U	0.024 U	0.039 U	0.3 U	0.51 U	1.8 U	0.37 U	2 U	0.027 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	**118**	**86.6**	**39.1**	4.87 U	**22.2**	**10.9**	**5.39**	5.96 U	**23.0 J**	4.65 UJ	4.94 UJ	**5.46**	5.17 U	**4.79**	--	--	--	--	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	**439**	**534**	**317**	**148**	**125**	**116**	**51.7**	**72.2**	**804 J**	**237 J**	**257 J**	**102**	**43.0**	**58.7**	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	**301**	**140**	**59.8**	2.44 U	**46.3**	**20.7**	**12.8**	2.98 U	**28.6 J**	**2.84 J**	2.47 UJ	**9.32**	**5.06**	**7.86**	--	--	--	--	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**160**	**139**	**61.3**	**18.9**	**56.0**	**27.6**	**13.0**	**8.51**	**136 J**	**30.2 J**	**25.5 J**	**17.5**	**8.15**	**18.7**	--	--	--	--	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	**7.18**	**3.86**	2.21 U	2.44 U	**2.90**	2.35 U	2.34 U	2.98 U	3.45 UJ	2.32 UJ	2.47 UJ	2.40 U	2.59 U	2.11 U	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	**149**	**51.1**	**22.3**	2.44 U	**21.7**	**10.2**	**4.82**	2.98 U	**10.3 J**	**1.14 J**	**0.174 J**	**3.00**	2.59 U	**6.49**	--	--	--	--	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**23.5**	**9.08**	**3.89**	**0.481 J**	**5.68**	**3.91**	**1.54 J**	**0.261 J**	**4.63 J**	**0.766 J**	**0.456 J**	**1.13 J**	**0.950 J**	**1.36 J**	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	**34.4**	**11.2**	**5.47**	2.44 U	**6.88**	**3.70**	2.34 U	2.98 U	**3.98 J**	**0.350 J**	**0.0766 J**	2.40 U	2.59 U	**2.18**	--	--	--	--	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**52.6**	**17.6**	**7.44**	2.44 U	**11.8**	**7.30**	**3.37**	2.98 U	**11.5 J**	**1.73 J**	**1.03 J**	2.40 U	2.59 U	**3.10**	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	2.43 U	2.53 U	2.21 U	0.0489 U	2.25 U	2.35 U	2.34 U	0.0596 U	**0.236 J**	**0.0535 J**	**0.0822 J**	2.40 U	2.59 U	2.11 U	--	--	--	--	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**37.8**	**17.5**	**6.39**	**1.73 J**	**10.9**	**9.00 J**	**4.02 J**	**0.979 J**	**26.7 J**	**1900 J**	**1340 J**	**2.58 J**	**1.93 J**	**3.46 J**	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	**60.3**	**21.5**	**8.26**	2.44 U	**13.0**	**7.23**	**3.70**	2.98 U	**4.99 J**	**0.556 J**	**0.141 J**	**2.70**	2.59 U	**2.94**	--	--	--	--	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**52.7**	**9.73**	**3.87**	2.44 U	**10.8**	**8.68**	**3.63**	2.98 U	**5.48 J**	**0.584 J**	**0.380 J**	2.40 U	2.59 U	2.11 U	--	--	--	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	**9.21**	**4.01**	**2.04 J**	**0.237 J**	**3.23**	**1.93 J**	**1.34 J**	**0.217 J**	3.45 UJ	**0.213 J**	**0.103 J**	**1.69 J**	**1.42 J**	**0.999 J**	--	--	--	--	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	**18.4**	**6.94**	**3.29**	2.44 U	**5.98**	**4.22**	2.34 U	2.98 U	**3.92 J**	**0.394 J**	**0.131 J**	**2.75**	2.59 U	2.11 U	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	**38.6**	**12.0**	**5.43**	**0.722**	**15.8**	**11.4**	**5.55**	**0.490 J**	**5.12 J**	**770 J**	**152 J**	**4.60**	**2.46**	**3.09**	--	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	**14.2**	**2.46**	**1.08**	**0.240 J**	**4.04**	**3.08**	**1.32**	**0.175 J**	**1.54 J**	**0.275 J**	**0.187 J**	**0.757 J**	**0.581 J**	**0.813**	--	--	--	--	--	--
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**114**	**30.3**	**12.9**	**2.81**	**25.8**	**18.6**	**8.00**	**2.94**	**16.7**	**269**	**150**	**4.84**	**3.66**	**4.74**	--	--	--	--	--	--
Total TCDD TEQ (ND=0)[h]	**114**	**30.2**	**12.8**	**0.790**	**25.7**	**18.5**	**7.40**	**0.476**	**16.5**	**269**	**150**	**3.26**	**1.40**	**3.25**	--	--	--	--	--	--

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH-SC-21-1.5to3.7	BH-SC-21-3.7to5.8	BH-SC-21-5.8to8	BH-SC-21-8to10	BH-SC-24-0to2	BH-SC-24-2to3.8	BH-SC-24-3.8to5.9	BH-SC-24-3.8to5.9-D	BH-SC-24-5.9to7.7	BH-SC-26-0to2	BH-SC-26-2to4	BH-SC-26-4to6	BH-SC-26-4to6-D	BH-SC-26-6to7.9	BH-SC-27-0to1.7	BH-SC-27-1.7to3.7	BH-SC-27-3.7to5.2	BH-SC-27-5.2to6.7	BH-SC-29-0to2	BH-SC-29-2to4
Location:	SC-21	SC-21	SC-21	SC-21	SC-24	SC-24	SC-24	SC-24	SC-24	SC-26	SC-26	SC-26	SC-26	SC-26	SC-27	SC-27	SC-27	SC-27	SC-29	SC-29
Sample Date:	2021-09-17	2021-09-17	2021-09-17	2021-09-17	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-15	2021-09-16
Depth Interval:	1.5 - 3.7	3.7 - 5.8	5.8 - 8	8 - 10	0 - 2	2 - 3.8	3.8 - 5.9	3.8 - 5.9	5.9 - 7.7	0 - 2	2 - 4	4 - 6	4 - 6	6 - 7.9	0 - 1.7	1.7 - 3.7	3.7 - 5.2	5.2 - 6.7	0 - 2	2 - 4
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:								Duplicate					Duplicate							
Analyte																				
Conventional Parameters																				
% Moisture (%)	**50.0**	**22.4**	**31.6**	**25.3**	**49.5**	**19.3**	**40.6**	**39.4**	**7.33**	--	--	--	--	--	**32.7**	**16.1**	**17.2**	**17.5**	--	--
% Wood Debris (%)[b]	**32.5**	**20**	**5**	**10.67**	**40**	**30**	**40**	--	**0**	**25**	**15**	**17.5**	--	**35**	**20**	**5**	**0**	**0**	**35**	**2.5**
Ammonia (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (%)	**9.45**	**0.33**	**0.29**	**0.48**	**7.01**	**0.89**	**4.05 J**	**7.14 J**	**0.13**	**0.46 J**	**0.39**	**0.33**	**0.21**	**0.34**	**1.14**	**0.13**	**0.68**	**0.24**	**0.52**	**0.42**
Total organic carbon (mg/kg)	**94500**	**3300**	**2900**	**4800**	**70100**	**8900**	**40500 J**	**71400 J**	**1300**	**4600 J**	**3900**	**3300**	**2100**	**3400**	**11400**	**1300**	**6800**	**2400**	**5200**	**4200**
Total Solids (mg/kg)	**464400**	**804800**	**750800**	**754500**	**481200**	**765400**	**680200**	**614400**	**914700**	**734900**	**800800**	**800700**	**823500**	**803300**	**656300**	**835700**	**837000**	**833300**	**729500**	**760900**
Total volatile solids (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	**3.90**	**2.70**	**3.10**	**3.70**	**4.20**	**1.90**	**3.00**	--	0.10 U	**0.90**	**1.50**	**1.30**	--	**2.10**	**3.30**	**1.50**	**4.40**	**3.40**	**3.60**	**7.80**
Particle/Grain Size, Gravel	**3.80**	**27.7**	**62.7**	**41.7**	**24.5**	**45.4**	**68.5**	--	**98.9**	**12.4**	**15.2**	**15.5**	--	**13.0**	**11.8**	**69.3**	**41.5**	**37.2**	**10.8**	**0.90**
Particle/Grain Size, Sand	**79.3**	**62.2**	**18.8**	**40.2**	**60.5**	**47.1**	**18.1**	--	**0.80**	**82.1**	**74.3**	**74.8**	--	**76.3**	**79.7**	**23.2**	**46.5**	**53.3**	**71.7**	**74.6**
Particle/Grain Size, Silt	**12.9**	**7.50**	**15.5**	**14.3**	**10.7**	**5.50**	**10.3**	--	**0.40**	**4.60**	**8.80**	**8.30**	--	**8.70**	**5.10**	**6.00**	**7.30**	**6.00**	**14.0**	**16.8**
Total Percent Fines	**16.8**	**10.2**	**18.6**	**18**	**14.9**	**7.4**	**13.3**	--	**0.45**	**5.5**	**10.3**	**9.6**	--	**10.8**	**8.4**	**7.5**	**11.7**	**9.4**	**17.6**	**24.6**
Metals (mg/kg, dw)																				
Arsenic	**5.94**	**7.78**	**18.8**	**12.9**	**5.74**	**4.70**	**9.59**	**10.0**	**6.69**	**6.42 J**	**7.66**	**7.24**	**4.84**	**6.84**	**5.32**	**5.80**	**6.73**	**8.21**	**4.38**	**3.45**
Cadmium	**1.16**	**0.23**	**0.17**	**0.28**	**0.68**	**0.33**	**0.74**	**0.98**	**0.10 J**	**0.36**	**0.13**	**0.16**	**0.12**	**0.20**	**0.32**	**0.16**	**0.21**	**0.23**	**0.45**	**0.32**
Chromium	**13.4**	**17.4**	**23.9**	**29.5**	**13.5**	**24.8**	**26.8**	**19.5**	**15.1**	**10.2**	**13.5**	**20.4 J**	**11.2 J**	**13.1**	**10.2**	**16.4**	**18.3**	**25.0**	**11.8**	**14.8**
Copper	**48.2**	**9.32**	**31.4**	**26.8**	**38.8**	**43.8**	**53.9**	**65.7**	**52.7**	**8.43**	**8.56**	**12.9 J**	**7.61 J**	**8.26**	**13.1**	**13.3**	**10.9**	**13.1**	**8.38**	**9.77**
Lead	**109**	**3.23**	**5.53**	**4.85**	**152**	**111**	**231**	**244**	**3.62**	**9.46**	**2.53**	**2.37**	**2.25**	**2.98**	**45.3**	**2.15**	**2.36**	**2.40**	**6.71**	**2.05**
Mercury	**0.271**	**0.00856 J**	0.00619 U	**0.0114 J**	**0.517**	**0.445**	**0.609**	**0.564**	**0.00693 J**	**0.0324**	**0.0118 J**	**0.0107 J**	**0.0130 J**	**0.0155 J**	**0.0928**	0.0059 U	**0.0172 J**	**0.0137 J**	**0.0527**	**0.0260 J**
Silver	**0.16 J**	**0.07 J**	**0.10 J**	**0.11 J**	**0.18 J**	**0.07 J**	**0.13 J**	**0.15 J**	**0.05 J**	**0.06 J**	**0.10 J**	**0.06 J**	**0.05 J**	**0.07 J**	**0.05 J**	**0.06 J**	**0.07 J**	**0.09 J**	**0.05 J**	**0.07 J**
Zinc	**88.4**	**34.2**	**66.7**	**56.1**	**62.4**	**47.3**	**81.1**	**91.6**	**31.1**	**27.2**	**37.2**	**36.5**	**27.1**	**28.4**	**26.6**	**33.0**	**34.2**	**44.7**	**22.0**	**26.1**
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	**49.2**	4.99 U	1.1 U	4.99 U	**56.1**	**16.3**	**41**	**53.8**	1.1 U	**3.61 J**	1.1 U	1.1 U	1.1 U	1.1 U	**6.17**	1.1 U	1.1 U	1.1 U	**3.6 J**	1.1 U
Acenaphthene	**59.2**	0.57 U	0.57 U	0.57 U	**37**	**14.3**	**21.5**	**24.6**	0.57 U	5 U	0.57 U	0.57 U	0.57 U	0.57 U	**10.2**	0.57 U	0.57 U	0.57 U	4.99 U	0.57 U
Acenaphthylene	**122**	**1.9 J**	1.08 U	1.08 U	**65.8**	**16.3**	**58.5**	**53.7**	1.08 U	**4.51 J**	1.08 U	1.08 U	1.08 U	1.08 U	**6.98**	1.08 U	1.08 U	1.08 U	**4.85 J**	1.08 U
Anthracene	**544**	**2.05 J**	0.87 U	0.87 U	**90.2**	**41.9**	**227 J**	**118 J**	**1.96 J**	**8.68**	0.87 U	0.87 U	0.87 U	0.87 U	**27**	0.87 U	0.87 U	0.87 U	**8.97**	0.87 U
Fluorene	**98.1**	4.99 U	0.63 U	0.63 U	**61.2**	**19.5**	**83.4**	**69.6**	**0.72 J**	5 U	0.63 U	0.63 U	0.63 U	0.63 U	**14**	0.63 U	0.63 U	0.63 U	**5.69**	0.63 U
Naphthalene	**375**	**7.47**	1.27 U	4.99 U	**414**	**85.4**	**161**	**217**	**2.59 J**	**17.6**	1.27 U	1.28 U	1.27 U	1.27 U	**26.1**	1.27 U	**1.5 J**	1.27 U	**19**	1.28 U
Phenanthrene	**893**	**4.72 J**	0.72 U	**1.56 J**	**505**	**141**	**272**	**335**	**3.96 J**	**22.2**	0.72 U	0.72 U	0.72 U	0.72 U	**78.5**	**1.04 J**	**1.2 J**	**1.19 J**	**29.1**	**1.16 J**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**2140**	**16**	5 U	**1.6**	**1230**	**335**	**864**	**872**	**9.2**	**57**	4.99 U	5 U	4.99 U	5 U	**169**	**1**	**2.7**	**1.2**	**71.2**	**1.2**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	**0.521**	1.51 U	0.38 U	1.04 U	**0.8**	**1.83**	**1.01**	**0.754**	0.85 U	**0.785 J**	0.28 U	0.33 U	0.52 U	0.32 U	**0.541**	0.85 U	0.16 U	0.46 U	**0.692 J**	0.26 U
Acenaphthene	**0.626**	0.17 U	0.2 U	0.12 U	**0.528**	**1.61**	**0.531**	**0.345**	0.44 U	1.1 U	0.15 U	0.17 U	0.27 U	0.17 U	**0.895**	0.44 U	0.084 U	0.24 U	0.96 U	0.14 U
Acenaphthylene	**1.29**	**0.576 J**	0.372 U	0.225 U	**0.939**	**1.83**	**1.44**	**0.752**	0.831 U	**0.98 J**	0.277 U	0.327 U	0.514 U	0.318 U	**0.612**	0.831 U	0.159 U	0.45 U	**0.933 J**	0.257 U
Anthracene	**5.76**	**0.621 J**	0.3 U	0.18 U	**1.29**	**4.71**	**5.6 J**	**1.65 J**	**1.51 J**	**1.89**	0.22 U	0.26 U	0.41 U	0.26 U	**2.37**	0.67 U	0.13 U	0.36 U	**1.73**	0.21 U
Fluorene	**1.04**	1.51 U	0.22 U	0.13 U	**0.873**	**2.19**	**2.06**	**0.975**	**0.55 J**	1.1 U	0.16 U	0.19 U	0.3 U	0.19 U	**1.23**	0.48 U	0.093 U	0.26 U	**1.09**	0.15 U
Naphthalene	**3.97**	**2.26**	0.438 U	1.04 U	**5.91**	**9.6**	**3.98**	**3.04**	**1.99 J**	**3.83**	0.326 U	0.388 U	0.605 U	0.374 U	**2.29**	0.977 U	**0.221 J**	0.529 U	**3.65**	0.305 U
Phenanthrene	**9.45**	**1.43 J**	0.25 U	**0.325 J**	**7.2**	**15.8**	**6.72**	**4.69**	**3.05 J**	**4.83**	0.18 U	0.22 U	0.34 U	0.21 U	**6.89**	**0.8 J**	**0.176 J**	**0.496 J**	**5.6**	**0.276 J**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**22.7**	**4.9**	1.7 U	**0.33**	**17.5**	**37.6**	**21.3**	**12.2**	**7.1**	**12**	1.3 U	1.5 U	2.4 U	1.5 U	**14.8**	**0.8**	**0.4**	**0.5**	**13.7**	**0.28**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**580**	**1.88 J**	0.82 U	0.82 U	**190**	**63.8**	**280**	**227**	**3.05 J**	**10.3**	0.82 U	0.82 U	0.82 U	0.82 U	**42.9**	0.82 U	0.82 U	0.82 U	**15.5**	0.82 U
Benzo(a)pyrene	**689**	**0.8 J**	0.61 U	0.61 U	**210**	**80.5**	**276**	**231**	**4.23 J**	**9.73**	0.61 U	0.61 U	0.61 U	0.61 U	**52.8**	0.61 U	0.61 U	0.61 U	**17**	0.61 U
Benzo(b)fluoranthene	**440**	**2.02 J**	1.37 U	1.37 U	**163**	**68.8**	**244**	**224**	**5.63**	**7.97**	1.37 U	1.37 U	1.37 U	1.37 U	**31.9**	1.37 U	1.37 U	1.37 U	**10.2**	1.37 U
Benzo(g,h,i)perylene	**440**	**1.26 J**	1.06 U	1.06 U	**152**	**75.5**	**201**	**210**	**3.43 J**	**10.2**	**3.05 J**	1.07 U	1.06 U	1.06 U	**39.2**	1.06 U	1.07 U	1.06 U	**13.4**	1.07 U
Benzo(j)fluoranthene	**242**	**1.24 J**	0.68 U	0.68 U	**81.3**	**32.6**	**128**	**110**	**3.31 J**	**4.26 J**	0.68 U	0.68 U	0.68 U	0.68 U	**17.8**	0.68 U	0.68 U	0.68 U	**5.52**	0.68 U
Benzo(k)fluoranthene	**301**	**2.08 J**	0.76 U	0.76 U	**106**	**43**	**154**	**134**	**3.6 J**	**5.21**	0.76 U	0.76 U	0.76 U	0.76 U	**21.1**	0.76 U	0.76 U	0.76 U	**6.55**	0.76 U
Chrysene	**633**	**2.23 J**	1.05 U	1.05 U	**250**	**78.7**	**299**	**254**	**3.47 J**	**15.5**	1.05 U	1.05 U	1.05 U	1.05 U	**45.5**	1.05 U	1.05 U	1.05 U	**14.9**	1.05 U
Dibenzo(a,h)anthracene	**95.1 J**	0.89 U	0.89 U	0.89 U	**37.4**	**17.7**	**55.1**	**57.4**	0.89 U	**2.42 J**	0.89 U	0.89 U	0.89 U	0.89 U	**9.77**	0.89 U	0.89 U	0.89 U	**2.84 J**	0.89 U
Fluoranthene	**1170**	**4.62 J**	0.47 U	**1.11 J**	**438**	**130**	**303**	**358**	**5.86**	**32.1**	0.47 U	0.47 U	0.47 U	0.47 U	**94.9**	**0.95 J**	**0.78 J**	**0.83 J**	**35.2**	**0.87 J**
Indeno(1,2,3-c,d)pyrene	**361**	1.05 U	1.05 U	1.05 U	**126**	**58.3**	**188**	**183**	**3.06 J**	**6.6**	1.05 U	1.05 U	1.05 U	1.05 U	**29.2**	1.05 U	1.05 U	1.05 U	**10.7**	1.05 U
Pyrene	**1360**	**7.35**	0.63 U	**1.17 J**	**604**	**207**	**483**	**554**	**8.45**	**29.7**	4.99 U	0.63 U	4.99 U	0.63 U	**97.9**	4.99 U	5 U	0.62 U	**38.3**	5 U
Total Benzofluoranthenes	**980**	**5.34**	5 U	4.99 U	**350**	**144**	**526**	**470**	**12.5**	**17.4**	4.99 U	5 U	4.99 U	5 U	**70.8**	4.99 U	5 U	4.99 U	**22.3**	5 U
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL[e,f]	**6300**	**24**	5 U	**6.4**	**2400**	**860**	**2600**	**2500**	**45**	**134**	**9.4**	5 U	4.99 U	5 U	**483**	**7.6**	**7.4**	**5.3**	**170**	**7.5**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**6.1**	**0.57 J**	0.28 U	0.17 U	**2.7**	**7.17**	**6.9**	**3.18**	**2.35 J**	**2.24**	0.21 U	0.25 U	0.39 U	0.24 U	**3.76**	0.63 U	0.12 U	0.34 U	**2.98**	0.2 U
Benzo(a)pyrene	**7.29**	**0.24 J**	0.21 U	0.13 U	**3**	**9.04**	**6.81**	**3.24**	**3.25 J**	**2.12**	0.16 U	0.18 U	0.29 U	0.18 U	**4.63**	0.47 U	0.09 U	0.25 U	**3.27**	0.15 U
Benzo(b)fluoranthene	**4.7**	**0.612 J**	0.472 U	0.285 U	**2.33**	**7.73**	**6.02**	**3.14**	**4.33**	**1.73**	0.351 U	0.415 U	0.652 U	0.403 U	**2.8**	1.05 U	0.201 U	0.571 U	**1.96**	0.326 U
Benzo(g,h,i)perylene	**4.7**	**0.382 J**	0.366 U	0.221 U	**2.17**	**8.48**	**4.96**	**2.9**	**2.64 J**	**2.22**	**0.782 J**	0.324 U	0.505 U	0.312 U	**3.44**	0.815 U	0.157 U	0.442 U	**2.58**	0.255 U
Benzo(j)fluoranthene	**2.56**	**0.376 J**	0.23 U	0.14 U	**1.16**	**3.66**	**3.16**	**1.5**	**2.55 J**	**0.926 J**	0.17 U	0.21 U	0.32 U	0.2 U	**1.56**	0.52 U	0.1 U	0.28 U	**1.06**	0.16 U
Benzo(k)fluoranthene	**3.19**	**0.63 J**	0.26 U	0.16 U	**1.51**	**4.83**	**3.8**	**1.88**	**2.77 J**	**1.13**	0.19 U	0.23 U	0.36 U	0.22 U	**1.85**	0.58 U	0.11 U	0.32 U	**1.26**	0.18 U
Chrysene	**6.7**	**0.676 J**	0.362 U	0.219 U	**3.6**	**8.84**	**7.38**	**3.56**	**2.67 J**	**3.37**	0.269 U	0.318 U	0.5 U	0.309 U	**3.99**	0.808 U	0.154 U	0.438 U	**2.87**	0.25 U
Dibenzo(a,h)anthracene	**1.01 J**	0.27 U	0.31 U	0.19 U	**0.534**	**1.99**	**1.36**	**0.804**	0.68 U	**0.526 J**	0.23 U	0.27 U	0.42 U	0.26 U	**0.857**	0.68 U	0.13 U	0.37 U	**0.546 J**	0.21 U
Fluoranthene	**12.4**	**1.4 J**	0.16 U	**0.231 J**	**6.25**	**15**	**7.48**	**5.01**	**4.51**	**6.98**	0.12 U	0.14 U	0.22 U	0.14 U	**8.32**	**0.73 J**	**0.11 J**	**0.35 J**	**6.77**	**0.21 J**
Indeno(1,2,3-c,d)pyrene	**3.82**	0.318 U	0.362 U	0.219 U	**1.8**	**6.55**	**4.64**	**2.56**	**2.35 J**	**1.43**	0.269 U	0.318 U	0.5 U	0.309 U	**2.56**	0.808 U	0.154 U	0.438 U	**2.06**	0.25 U
Pyrene	**14.4**	**2.23**	0.22 U	**0.244 J**	**8.62**	**23.3**	**11.9**	**7.76**	**6.5**	**6.46**	1.28 U	0.19 U	2.38 U	0.19 U	**8.59**	3.84 U	0.74 U	0.26 U	**7.37**	1.2 U
Total Benzofluoranthenes	**10**	**1.62**	1.7 U	1 U	**5**	**16.2**	**13**	**6.5**	**9.65**	**3.79**	1.3 U	1.5 U	2.4 U	1.5 U	**6.21**	3.8 U	0.74 U	2.1 U	**4.28**	1.2 U
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**67**	**7.4**	1.7 U	**1.3**	**34**	**97**	**64**	**36**	**34**	**29.1**	**2.4**	1.5 U	2.4 U	1.5 U	**42.4**	**5.8**	**1.1**	**2.2**	**32.7**	**1.8**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**870**	**1.5**	5 U	4.99 U	**270**	**106**	**370**	**316**	**5.8**	**13.1**	4.99 U	5 U	4.99 U	5 U	**66.7**	4.99 U	5 U	4.99 U	**21.7**	5 U
Total cPAH TEQ (ND=0)[g]	**870**	**1.4**	5 U	4.99 U	**270**	**106**	**370**	**316**	**5.8**	**13.1**	4.99 U	5 U	4.99 U	5 U	**66.7**	4.99 U	5 U	4.99 U	**21.7**	5 U

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Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	0.03 U	2.7 U	2.7 U	2.7 U	2.7 U
1,2-Dichlorobenzene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.007 U	0.7 U	0.7 U	0.7 U	0.7 U
1,4-Dichlorobenzene	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	**1.2 J**	0.6 UJ	0.6 U	0.6 U	0.006 U	0.6 U	0.6 U	0.6 U	0.6 U
Hexachlorobenzene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	**1.2 J**	0.7 UJ	0.7 U	0.7 U	0.007 U	0.7 U	0.7 U	0.7 U	0.7 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.007 U	0.7 U	0.7 U	0.7 U	0.7 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	0.029 U	0.82 U	0.93 U	0.56 U	0.039 U	0.3 U	0.067 U	0.038 U	2.1 U	0.59 U	0.69 U	0.82 U	1.3 U	0.79 U	0.24 U	0.02 U	0.4 U	1.1 U	0.52 U	0.64 U
1,2-Dichlorobenzene	0.0074 U	0.21 U	0.24 U	0.15 U	0.01 U	0.079 U	0.017 U	0.0098 U	0.54 U	0.15 U	0.18 U	0.21 U	0.33 U	0.21 U	0.061 U	0.005 U	0.1 U	0.29 U	0.13 U	0.17 U
1,4-Dichlorobenzene	0.0063 U	0.18 U	0.21 U	0.13 U	0.0086 U	0.067 U	0.015 U	0.0084 U	0.46 U	0.13 U	0.15 U	**0.36 J**	0.29 UJ	0.18 U	0.053 U	0.005 U	0.088 U	0.25 U	0.12 U	0.14 U
Hexachlorobenzene	0.0074 U	0.21 U	0.24 U	0.15 U	0.01 U	0.079 U	0.017 U	0.0098 U	0.54 U	0.15 U	0.18 U	**0.36 J**	0.33 UJ	0.21 U	0.061 U	0.005 U	0.1 U	0.29 U	0.13 U	0.17 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.0074 U	0.21 U	0.24 U	0.15 U	0.01 U	0.079 U	0.017 U	0.0098 U	0.54 U	0.15 U	0.18 U	0.21 U	0.33 U	0.21 U	0.061 U	0.005 U	0.1 U	0.29 U	0.13 U	0.17 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	**15.9 J**	2.2 U	2.2 U	2.2 U	**8.5 J**	**3.2 J**	**30.6 J**	**17.1 J**	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	0.02 U	2.2 U	2.2 U	2.2 U	2.2 U
2-Methylphenol (o-Cresol`	**16.2**	1.1 U	1.1 U	1.1 U	**10.2**	1.1 U	**36 J**	**19.1 J**	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.01 U	1.1 U	1.1 U	1.1 U	1.1 U
4-Methylphenol (p-Cresol`	**136**	**1.1 J**	0.9 U	0.9 U	**71.3**	**47.8**	**308**	**214**	**2 J**	**4.7 J**	0.9 U	0.9 U	0.9 U	0.9 U	**14.4**	0.009 U	0.9 U	0.9 U	**15.7**	0.9 U
Benzoic acid	**25.1 J**	**15.4 J**	13.3 U	13.4 U	**20.8 J**	**14.4 J**	**17.7 J**	**20.2 J**	13.3 U	**13.4 R**	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	0.1 U	13.4 U	13.4 U	13.4 U	13.4 U
Benzyl alcoho	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	0.02 U	2.5 U	2.5 U	2.5 U	2.5 U
Dibenzofuran	**216**	14.1 U	14.1 U	14.1 U	**77.1**	**19.4 J**	**169 J**	**75.9 J**	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	0.1 U	14.1 U	14.1 U	14.1 U	14.1 U
n-Nitrosodiphenylamine	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 UJ	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	0.01 U	1.3 U	1.3 U	1.3 U	1.3 U
Pentachloropheno	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	0.02 U	2.1 U	2.1 U	2.1 U	2.1 U
Phenol	**63.9**	**5.4**	**5.4**	**5.3**	**43**	**13.9**	**108**	**85.7**	**6.8**	**6.4**	5 U	5 U	5 U	5 U	**10.5**	0.05 U	5 U	5 U	**7**	5 U
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	**2.29**	4.27 U	4.86 U	2.94 U	**1.1**	**2.18 J**	**4.17 J**	**1.06 J**	10.8 U	3.07 U	3.62 U	4.27 U	6.71 U	4.15 U	1.24 U	0.08 U	2.07 U	5.88 U	2.71 U	3.36 U
N-Nitrosodiphenylamine	0.014 U	0.39 U	0.45 U	0.27 U	0.019 U	0.15 U	0.032 U	0.018 U	1 U	0.28 UJ	0.33 U	0.39 U	0.62 U	0.38 U	0.11 U	0.008 U	0.19 U	0.54 U	0.25 U	0.31 U
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	5.4 U	**5.6 J**	**6.6 J**	5.5 U	**23.1 J**	**17.1 J**	5.4 UJ	**26.7 J**	**14.3 J**	49.9 U	5.4 U	5.5 U	50 U	5.5 U	50 U	0.05 U	5.4 U	49.9 U	5.5 U	5.4 U
Butylbenzyl phthalate	0.7 U	0.7 U	0.7 U	0.7 U	**4.9 J**	**1.8 J**	0.7 U	0.7 U	0.7 U	0.7 U	**3.4 J**	**1 J**	**1.4 J**	**1.7 J**	**1.6 J**	0.007 U	0.7 U	0.7 U	**2 J**	0.7 U
Diethyl phthalate	19.9 U	20 U	19.9 U	20 U	20 U	19.9 U	19.9 U	19.9 U	**28.8**	20 U	19.9 U	20 U	20 U	20 U	20 U	0.2 U	19.9 U	4.8 U	20 U	20 U
Dimethyl phthalate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.01 U	1 U	1 U	1 U	1 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	**65.8**	**70.2**	**69.8**	**62.8**	**45**	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	0.06 U	5.6 U	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	0.04 U	4.4 U	4.4 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	0.057 U	**1.7 J**	**2.3 J**	1.1 U	**0.33 J**	**1.92 J**	0.13 UJ	**0.374 J**	**11 J**	10.8 U	1.4 U	1.7 U	24 U	1.6 U	4.4 U	0.04 U	0.79 U	20.8 U	1.1 U	1.3 U
Butyl benzyl phthalate	0.0074 U	0.21 U	0.24 U	0.15 U	**0.07 J**	**0.2 J**	0.017 U	0.0098 U	0.54 U	0.15 U	**0.87 J**	**0.3 J**	**0.67 J**	**0.5 J**	**0.14 J**	0.005 U	0.1 U	0.29 U	**0.38 J**	0.17 U
Diethyl phthalate	0.211 U	6.1 U	6.86 U	4.2 U	0.29 U	2.24 U	0.491 U	0.279 U	**22.2**	4.3 U	5.1 U	6.1 U	9.5 U	5.9 U	1.8 U	0.15 U	2.93 U	2 U	3.8 U	4.8 U
Dimethyl phthalate	0.011 U	0.3 U	0.34 U	0.21 U	0.014 U	0.11 U	0.025 U	0.014 U	0.77 U	0.22 U	0.26 U	0.3 U	0.48 U	0.29 U	0.088 U	0.008 U	0.15 U	0.42 U	0.19 U	0.24 U
Di-n-butyl phthalate	0.059 U	1.7 U	1.9 U	1.2 U	**0.939**	**7.89**	**1.72**	**0.88**	**34.6**	1.2 U	1.4 U	1.7 U	2.7 U	1.6 U	0.49 U	0.05 U	0.82 U	2.3 U	1.1 U	1.3 U
Di-n-Octyl Phthalate	0.047 U	1.3 U	1.5 U	0.92 U	0.063 U	0.49 U	0.11 U	0.062 U	3.4 U	0.96 U	1.1 U	1.3 U	2.1 U	1.3 U	0.39 U	0.03 U	0.65 U	1.8 U	0.85 U	1 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF`	4.75 UJ	3.26 UJ	0.0533 UJ	0.0471 UJ	**2.65 J**	**1.54 J**	**12.2**	**12.5**	2.50 U	--	--	--	--	--	4.94 UJ	4.77 UJ	4.77 UJ	4.84 UJ	--	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD`	**273 J**	**624 J**	**943 J**	**716 J**	**122**	**126**	**227 J**	**130 J**	**16.6**	--	--	--	--	--	**177 J**	**200 J**	**269 J**	**1060 J**	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	2.37 UJ	1.63 UJ	0.0478 UJ	2.35 UJ	**6.73**	**3.98**	**41.5**	**40.8**	**0.409**	--	--	--	--	--	**2.83 J**	2.38 UJ	2.39 UJ	0.0484 UJ	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**25.2 J**	**29.6 J**	**59.3 J**	**37.4 J**	**19.7**	**12.5**	**65.6**	**56.2**	**1.94**	--	--	--	--	--	**18.2 J**	**15.7 J**	**22.8 J**	**38.1 J**	--	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	**0.175 J**	0.0326 UJ	0.0478 UJ	0.0471 UJ	**0.588 J**	**0.307 J**	**2.63**	**3.00**	1.25 U	--	--	--	--	--	2.47 UJ	0.0477 UJ	0.0477 UJ	**0.0662 J**	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	**1.08 J**	**0.0406 J**	0.0478 UJ	0.0471 UJ	**3.75**	**1.36 J**	**17.9**	**16.3**	1.25 U	--	--	--	--	--	2.47 UJ	0.0477 UJ	0.0477 UJ	0.0484 UJ	--	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**0.849 J**	**0.531 J**	**0.767 J**	**0.554 J**	**1.62 J**	**0.578 J**	**5.38**	**4.43**	1.25 U	--	--	--	--	--	**0.454 J**	**0.381 J**	**0.442 J**	**0.530 J**	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	**0.780 J**	0.0326 UJ	0.0478 UJ	0.0471 UJ	**2.28 J**	**0.876 J**	**9.45**	**8.54**	1.25 U	--	--	--	--	--	2.47 UJ	0.0477 UJ	0.0477 UJ	0.0484 UJ	--	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	2.37 UJ	1.63 UJ	2.39 UJ	2.35 UJ	**2.90**	**1.10 J**	**12.2**	**9.92**	1.25 U	--	--	--	--	--	2.47 UJ	2.38 UJ	2.39 UJ	**0.967 J**	--	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	0.0795 UJ	0.0326 UJ	0.0478 UJ	0.0471 UJ	2.46 U	2.33 U	2.26 U	2.29 U	1.25 U	--	--	--	--	--	**0.0898 J**	0.0477 UJ	**0.0559 J**	2.42 UJ	--	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**1.85 J**	**1.66 J**	**3.32 J**	**2.12 J**	**2.39 J**	**1.25 J**	**10.3**	**7.82**	**0.204 J**	--	--	--	--	--	2.47 UJ	2.38 UJ	**2.12 J**	**1.44 J**	--	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	2.37 UJ	1.63 UJ	0.0478 UJ	0.0471 UJ	**2.55**	**1.20 J**	**10.2**	**8.28**	1.25 U	--	--	--	--	--	2.47 UJ	2.38 UJ	0.0477 UJ	2.42 UJ	--	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**0.987 J**	**0.280 J**	**0.318 J**	**0.276 J**	**2.21 J**	**0.703 J**	**6.65**	**5.17**	**0.0982 J**	--	--	--	--	--	**0.413 J**	**0.233 J**	**0.273 J**	**0.292 J**	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	2.37 UJ	0.0326 UJ	0.0478 UJ	0.0471 UJ	**2.00 J**	**0.847 J**	**6.13**	**6.62**	1.25 U	--	--	--	--	--	2.47 UJ	0.0477 UJ	0.0477 UJ	0.0484 UJ	--	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF`	**1.09 J**	0.0326 UJ	0.0478 UJ	0.0471 UJ	**3.05**	**1.02 J**	**7.88**	**6.86**	1.25 U	--	--	--	--	--	**0.418 J**	0.0477 UJ	0.0477 UJ	0.0484 UJ	--	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF`	**1.96 J**	**0.0361 J**	0.0478 UJ	0.0471 UJ	**3.63**	**1.36**	**10.0**	**7.77**	**0.126**	--	--	--	--	--	**0.680 J**	0.0477 UJ	0.0477 UJ	0.0484 UJ	--	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD`	**0.496 J**	**0.195 J**	**0.219 J**	**0.177 J**	**1.01 J**	**0.345 J**	**1.39**	**1.67**	**0.0416 J**	--	--	--	--	--	**0.238 J**	**0.209 J**	**0.170 J**	**0.182 J**	--	--
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**3.09**	**1.31**	**1.96**	**1.46**	**6.50**	**2.45**	**19.1**	**16.4**	**0.789**	--	--	--	--	--	**1.83**	**1.00**	**1.16**	**1.64**	--	--
Total TCDD TEQ (ND=0)[h]	**2.80**	**1.18**	**1.82**	**1.31**	**6.38**	**2.33**	**19.0**	**16.3**	**0.201**	--	--	--	--	--	**1.16**	**0.697**	**1.01**	**1.47**	--	--

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Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH-SC-29-4to6	BH-SC-29-6to7.9	BH-SC-32-0to2	BH-SC-32-2to4	BH-SC-32-2to4-D	BH-SC-32-4to5.5	BH-SC-34-0to1.5	BH-SC-34-1.5to3.3	BH-SC-34-1.5to3.3-D	BH-SC-34-3.3to4.8	BH-SC-34-4.8to5.6	BH-SC-37-0to2	BH-SC-37-2to4	BH-SC-37-4to6	BH-SC-37-6to8	BH-SC-38-0to1.8	BH-SC-38-1.8to3.8	BH-SC-38-3.8to5.8	BH-SC-38-5.8to7.9	BH-SC-40-0to2
Location:	SC-29	SC-29	SC-32	SC-32	SC-32	SC-32	SC-34	SC-34	SC-34	SC-34	SC-34	SC-37	SC-37	SC-37	SC-37	SC-38	SC-38	SC-38	SC-38	SC-40
Sample Date:	2021-09-16	2021-09-16	2021-09-16	2021-09-16	2021-09-16	2021-09-16	2021-09-17	2021-09-17	2021-09-17	2021-09-17	2021-09-17	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2021-09-14	2021-09-14	2021-09-14	2021-09-14	2021-09-13
Depth Interval:	4 - 6	6 - 7.9	0 - 2	2 - 4	2 - 4	4 - 5.5	0 - 1.5	1.5 - 3.3	1.5 - 3.3	3.3 - 4.8	4.8 - 5.6	0 - 2	2 - 4	4 - 6	6 - 8	0 - 1.8	1.8 - 3.8	3.8 - 5.8	5.8 - 7.9	0 - 2
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:					Duplicate				Duplicate											
Analyte																				
Conventional Parameters																				
% Moisture (%)	--	--	19.4	21.0	20.5	23.2	68.1	46.7	45.2	18.8	11.9	--	--	--	--	44.1	28.1	25.8	20.5	--
% Wood Debris (%)[b]	5	2.5	5	0	--	0	90	40	--	0	0	20	5	3	5	70	5	0	0	5
Ammonia (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (%)	0.34	0.31	0.43	0.17	0.2	0.09	16.5 J	4.02	5.19 J	0.32	0.1	0.56	0.46	0.41	0.35	3.45	0.75	0.09	0.08	0.81
Total organic carbon (mg/kg)	3400	3100	4300	1700	2000	900	165000 J	40200	51900 J	3200	1000	5600	4600	4100	3500	34500	7500	900	800	8100
Total Solids (mg/kg)	760300	748700	752900	801800	795500	772500	254200	526800	498200	770700	821800	744800	738200	754900	760000	495500	703700	811100	865700	713300
Total volatile solids (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	7.10	8.70	0.90	2.80	--	5.00	7.30	5.80	--	2.50	3.90	3.60	9.30	7.60	7.40	9.30	5.00	3.20	2.40	5.10
Particle/Grain Size, Gravel	10.4	8.10	71.8	50.5	--	41.3	27.6	12.6	--	74.1	69.3	8.00	1.60	5.10	12.4	10.6	64.4	76.0	73.7	1.20
Particle/Grain Size, Sand	56.8	49.6	24.5	39.8	--	42.0	37.2	55.1	--	18.9	22.9	83.0	60.3	61.9	26.5	55.5	24.5	15.4	18.2	81.2
Particle/Grain Size, Silt	25.7	33.8	2.70	7.00	--	11.6	27.9	26.6	--	4.60	3.90	5.20	28.9	25.4	53.6	24.5	6.10	5.40	5.70	12.5
Total Percent Fines	32.8	42.5	3.6	9.8	--	16.6	35.2	32.4	--	7.1	7.8	8.8	38.2	33	61	33.8	11.1	8.6	8.1	17.6
Metals (mg/kg, dw)																				
Arsenic	3.30	5.93	6.00	6.07	6.00	2.84	14.3	7.58	9.83	8.76	7.30	4.02	3.80	3.61	5.49	8.38	3.44	3.38	4.57	4.97
Cadmium	0.40	0.49	0.21	0.16	0.15	0.07 J	4.56	0.96	0.66	0.21	0.08 J	0.20	0.25	0.32	0.45	0.79	0.20	0.08 J	0.11 J	0.43
Chromium	15.1	19.2	22.5	33.1	42.2	62.3	23.8	18.1	14.9	13.0	44.3	13.9	18.1	16.3	19.7	19.8	18.6	10.2	23.9	16.2
Copper	9.92	14.2	21.1	48.0	32.6	60.1	229 J	97.9	60.2	15.8	24.2	11.3	12.3	10.3	13.2	56.6	19.4	49.5	44.6	16.7
Lead	1.94	2.76	14.2	2.65	2.95	2.54	1190	414 J	201 J	6.30	1.41	13.1	2.44	1.91	2.30	183	6.96	0.86	1.25	36.8 J
Mercury	0.0232 J	0.0254 J	0.0432	0.0200 J	0.0205 J	0.0254 J	0.148 J	0.617	0.418	0.00784 J	0.00468 U	0.147	0.0348	0.0218 J	0.0299	0.376	0.0217 J	0.0114 J	0.0114 J	0.114
Silver	0.08 J	0.09 J	0.08 J	0.10 J	0.09 J	0.08 J	0.47 J-	0.14 J	0.10 J	0.06 J	0.05 J	0.07 J	0.08 J	0.08 J	0.09 J	0.19 J	0.07 J	0.08 J	0.13 J	0.11 J-
Zinc	25.4	36.7	41.3	65.0	56.9	67.1	545 J	107	68.9	35.5	29.7	25.8	30.9	26.5	31.7	124	27.6	22.0	50.4	39.1
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	1.1 U	1.1 U	5.18	1.1 U	1.1 U	1.1 U	103	37.6	44.9	3.3 U	1.1 U	4.27 J	1.1 U	1.1 U	1.1 U	50.6	5.36	1.1 U	1.1 U	6.44
Acenaphthene	0.57 U	0.57 U	5.93	0.57 U	0.57 U	0.57 U	223	41.3	66.3	1.71 U	0.57 U	3.39 J	0.57 U	0.57 U	0.57 U	73.6	1.34 J	0.57 U	0.57 U	8.6
Acenaphthylene	1.08 U	1.08 U	5.66	1.08 U	1.08 U	1.08 U	156 J	77.1	71.7	3.25 U	1.08 U	6.82	1.08 U	1.08 U	1.08 U	62.9	2.28 J	1.08 U	1.08 U	13
Anthracene	0.87 U	0.87 U	19	0.87 U	0.87 U	0.87 U	555	141	158	2.61 U	0.87 U	12.6	0.87 U	0.87 U	0.87 U	257	4.29 J	0.87 U	0.87 U	23.8
Fluorene	0.63 U	0.63 U	8.43	0.63 U	0.63 U	0.63 U	264	66.1	72.4	1.89 U	0.63 U	5.94	0.63 U	0.63 U	0.63 U	117	1.97 J	0.63 U	0.63 U	11.8
Naphthalene	1.27 U	1.28 U	14.5	1.27 U	1.28 U	1.27 U	508	167	119	3.82 U	4.99 U	18.3	1.28 U	1.28 U	1.27 U	142	9.84	1.27 U	1.27 U	28.6
Phenanthrene	0.72 U	0.72 U	57.2	0.72 UJ	0.86 J	0.72 U	2290	386	446	6.87 J	2.05 J	39.8	2.92 J	1.26 J	0.73 J	896	8.99	0.93 J	0.72 U	79.7
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	4.99 U	5 U	116	4.99 U	0.86	4.99 U	4100	916	978	6.9	2.1	91.1	2.9	1.3	0.73	1600	34.1	0.93	5 U	172
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	0.32 U	0.35 U	1.2	0.65 U	0.55 U	1.2 U	0.624	0.935	0.865	1 U	1.1 U	0.762 J	0.24 U	0.27 U	0.31 U	1.47	0.715	1.2 U	1.4 U	0.795
Acenaphthene	0.17 U	0.18 U	1.38	0.34 U	0.28 U	0.63 U	1.35	1.03	1.28	0.534 U	0.57 U	0.605 J	0.12 U	0.14 U	0.16 U	2.13	0.179 J	0.63 U	0.71 U	1.06
Acenaphthylene	0.318 U	0.348 U	1.32	0.635 U	0.54 U	1.2 U	0.945 J	1.92	1.38	1.02 U	1.08 U	1.22	0.235 U	0.263 U	0.309 U	1.82	0.304 J	1.2 U	1.35 U	1.6
Anthracene	0.26 U	0.28 U	4.42	0.51 U	0.43 U	0.97 U	3.36	3.51	3.04	0.816 U	0.87 U	2.25	0.19 U	0.21 U	0.25 U	7.45	0.572 J	0.97 U	1.1 U	2.94
Fluorene	0.19 U	0.2 U	1.96	0.37 U	0.32 U	0.7 U	1.6	1.64	1.39	0.591 U	0.63 U	1.06	0.14 U	0.15 U	0.18 U	3.39	0.263 J	0.7 U	0.79 U	1.46
Naphthalene	0.374 U	0.413 U	3.37	0.747 U	0.64 U	1.41 U	3.08	4.15	2.29	1.19 U	4.99 U	3.27	0.278 U	0.312 U	0.363 U	4.12	1.31	1.41 U	1.59 U	3.53
Phenanthrene	0.21 U	0.23 U	13.3	0.42 UJ	0.43 J	0.8 U	13.9	9.6	8.59	2.15 J	2.05 J	7.11	0.635 J	0.307 J	0.21 J	26	1.2	1 J	0.9 U	9.84
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	1.5 U	1.6 U	26.9	2.9 U	0.43	5.5 U	24.9	22.8	18.8	2.1	2	16.3	0.64	0.31	0.21	46.4	4.54	1	6.3 U	21.2
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	0.82 U	0.82 U	53	0.82 U	0.82 U	0.82 U	1170	492	331	3.63 J	1.04 J	26.2	1.4 J	0.82 U	0.82 U	880	5.79	0.82 U	0.82 U	42.9
Benzo(a)pyrene	0.61 U	0.61 U	53.5	0.61 U	0.61 U	0.61 U	1440	493	451	6.38 J	2.48 J	35.3	1.74 J	0.61 U	0.61 U	479	8.67	0.61 U	0.61 U	55.2
Benzo(b)fluoranthene	1.37 U	1.37 U	32.2	1.37 U	1.37 U	1.37 U	947	374	482	6.54 J	1.37 U	37.7	2.04 J	1.37 U	1.37 U	458	8.55	1.37 U	1.37 U	41.4
Benzo(g,h,i)perylene	1.06 U	1.07 U	34.7	1.06 U	1.07 U	1.06 U	950	414	318	3.19 U	1.41 J	33.3	1.38 J	1.07 U	1.06 U	216	6.26	1.06 U	1.06 U	44
Benzo(j)fluoranthene	0.68 U	0.68 U	16.9	0.68 U	0.68 U	0.68 U	476	260	236	2.04 U	0.68 U	18.7	0.7 J	0.68 U	0.68 U	196	3.55 J	0.68 U	0.68 U	21.6
Benzo(k)fluoranthene	0.76 U	0.76 U	21	0.76 U	0.76 U	0.76 U	641	353	296	3.29 J	0.76 U	21.8	0.87 J	0.76 U	0.76 U	253	4.89 J	0.76 U	0.76 U	26.4
Chrysene	1.05 U	1.05 U	54.4	1.05 U	1.05 U	1.05 U	1240	403	360	5.69 J	1.06 J	35.4	2.26 J	1.05 U	1.05 U	969	7.66	1.05 U	1.05 U	55.5 J
Dibenzo(a,h)anthracene	0.89 U	0.89 U	7.24	0.89 U	0.89 U	0.89 U	268 J	141 J	92.4 J	2.67 U	0.89 U	7.23	0.89 U	0.89 U	0.89 U	77.6	1.43 J	0.89 U	0.89 U	12.8
Fluoranthene	0.47 U	0.47 U	95.1	0.47 U	0.47 U	0.47 U	2510 J	592 J	654 J	9.41 J	1.82 J	46.4	2.64 J	0.47 J	0.69 J	2300	13.3	1.18 J	0.47 U	85.6
Indeno(1,2,3-c,d)pyrene	1.05 U	1.05 U	27.7	1.05 U	1.05 U	1.05 U	860	389	308	3.46 J	1.05 U	29.1	1.05 U	1.05 U	1.05 U	228	5.85	1.05 U	1.05 U	37.2
Pyrene	0.62 U	0.63 U	97.1	0.63 U	0.63 U	0.62 U	3150	1150	1110	11.6 J	1.87 J	69.7	3.58 J	0.7 J	0.78 J	1970	20.8	1.03 J	0.63 U	133
Total Benzofluoranthenes	4.99 U	5 U	70.1	4.99 U	5 U	4.99 U	2060	990	1010	10.9	4.99 U	78.2	3.6	5 U	5 U	907	17	4.98 U	5 U	89.4
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	4.99 U	5 U	493	4.99 U	5 U	4.99 U	14000	5100	4600	53.9	12	361	18	5.3	5.6	8000	86.7	6.4	5 U	556
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	0.24 U	0.26 U	12.3	0.48 U	0.41 U	0.91 U	7.09	12.2	6.38	1.13 J	1.04 J	4.68	0.304 J	0.2 U	0.23 U	26	0.772	0.91 U	1 U	5.3
Benzo(a)pyrene	0.18 U	0.2 U	12.4	0.36 U	0.3 U	0.68 U	8.73	12.3	8.69	1.99 J	2.48 J	6.3	0.378 J	0.15 U	0.17 U	13.9	1.16	0.68 U	0.76 U	6.81
Benzo(b)fluoranthene	0.403 U	0.442 U	7.49	0.806 U	0.685 U	1.52 U	5.74	9.3	9.29	2.04 J	1.37 U	6.73	0.443 J	0.334 U	0.391 U	13.3	1.14	1.52 U	1.71 U	5.11
Benzo(g,h,i)perylene	0.312 U	0.345 U	8.07	0.624 U	0.535 U	1.18 U	5.8	10.3	6.13	0.997 U	1.41 J	5.95	0.3 J	0.261 U	0.303 U	6.26	0.835	1.18 U	1.32 U	5.43
Benzo(j)fluoranthene	0.2 U	0.22 U	3.93	0.4 U	0.34 U	0.76 U	2.88	6.5	4.55	0.637 U	0.68 U	3.34	0.15 J	0.17 U	0.19 U	5.68	0.473 J	0.76 U	0.85 U	2.67
Benzo(k)fluoranthene	0.22 U	0.25 U	4.88	0.45 U	0.38 U	0.84 U	3.88	8.78	5.7	1.03 J	0.76 U	3.89	0.19 J	0.19 U	0.22 U	7.33	0.652 J	0.84 U	0.95 U	3.26
Chrysene	0.309 U	0.339 U	12.7	0.618 U	0.525 U	1.17 U	7.52	10	6.9	1.78 J	1.06 J	6.32	0.491 J	0.256 U	0.3 U	28.1	1.02	1.17 U	1.31 U	6.85 J
Dibenzo(a,h)anthracene	0.26 U	0.29 U	1.68	0.52 U	0.45 U	0.99 U	1.62 J	3.51 J	1.78 J	0.834 U	0.89 U	1.29	0.19 U	0.22 U	0.25 U	2.25	0.191 J	0.99 U	1.1 U	1.58
Fluoranthene	0.14 U	0.15 U	22.1	0.28 U	0.23 U	0.52 U	15.2 J	14.7 J	12.6 J	2.94 J	1.82 J	8.29	0.574 J	0.11 J	0.2 J	67	1.77	1.31 J	0.59 U	10.6
Indeno(1,2,3-c,d)pyrene	0.309 U	0.339 U	6.44	0.618 U	0.525 U	1.17 U	5.2	9.68	5.93	1.08 J	1.05 U	5.2	0.228 U	0.256 U	0.3 U	6.61	0.78	1.17 U	1.31 U	4.59
Pyrene	0.18 U	0.2 U	22.6	0.37 U	0.32 U	0.69 U	19.1	28.6	21.4	3.63 J	1.87 J	12.4	0.778 J	0.17 J	0.22 J	57.1	2.77	1.14 J	0.79 U	16.4
Total Benzofluoranthenes	1.5 U	1.6 U	16.3	2.9 U	2.5 U	5.5 U	12.5	25	19.5	3.39	5 U	14	0.78	1.2 U	1.4 U	26.3	2.27	5.5 U	6.3 U	11
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	1.5 U	1.6 U	115	2.9 U	2.5 U	5.5 U	83	130	89	16.9	12	64.4	3.8	1.3	1.6	230	11.6	7.1	6.3 U	68.6
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	4.99 U	5 U	68.2	4.99 U	5 U	4.99 U	1800	672	610	8.26	2.8	47.9	2.3	5 U	5 U	680	11.4	4.98 U	5 U	71.8
Total cPAH TEQ (ND=0)[g]	4.99 U	5 U	68.2	4.99 U	5 U	4.99 U	1800	672	610	8.13	2.6	47.9	2.2	5 U	5 U	680	11.4	4.98 U	5 U	71.8

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	9.6 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
1,2-Dichlorobenzene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	2.6 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	**1 J**	**0.9 J**
1,4-Dichlorobenzene	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	**5.2 J**	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	**1.6 J**	0.6 U	**1.3 J**	**1.5 J**
Hexachlorobenzene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	2.5 U	**0.9 J**	0.7 UJ	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	**1.4 J**	0.7 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	2.6 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	0.79 U	0.87 U	0.63 U	1.6 U	1.4 U	3 U	0.058 U	0.067 U	0.052 U	0.84 U	2.7 U	0.48 U	0.59 U	0.66 U	0.77 U	0.078 U	0.36 U	3 U	3.4 U	0.33 U
1,2-Dichlorobenzene	0.21 U	0.23 U	0.16 U	0.41 U	0.35 U	0.78 U	0.016 U	0.017 U	0.013 U	0.22 U	0.7 U	0.13 U	0.15 U	0.17 U	0.2 U	0.02 U	0.093 U	0.78 U	**1.3 J**	**0.11 J**
1,4-Dichlorobenzene	0.18 U	0.19 U	0.14 U	0.35 U	0.3 U	0.67 U	**0.032 J**	0.015 U	0.012 U	0.19 U	0.6 U	0.11 U	0.13 U	0.15 U	0.17 U	**0.046 J**	0.08 U	0.67 U	**1.6 J**	**0.19 J**
Hexachlorobenzene	0.21 U	0.23 U	0.16 U	0.41 U	0.35 U	0.78 U	0.015 U	**0.022 J**	0.013 UJ	0.22 U	0.7 U	0.13 U	0.15 U	0.17 U	0.2 U	0.02 U	0.093 U	0.78 U	**1.8 J**	0.086 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.21 U	0.23 U	0.16 U	0.41 U	0.35 U	0.78 U	0.016 U	0.017 U	0.013 U	0.22 U	0.7 U	0.13 U	0.15 U	0.17 U	0.2 U	0.02 U	0.093 U	0.78 U	0.88 U	0.086 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	**30.6 J**	**23.6**	**13.1 J**	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	**3.4 J**	2.2 U	2.2 U	2.2 U
2-Methylphenol (o-Cresol)	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**31.1**	**21.5 J**	**11.7 J**	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**4.8 J**	1.1 U	1.1 U	**1.7 J**
4-Methylphenol (p-Cresol)	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	**224**	**108**	**115**	**1.7 J**	0.9 U	**8.9**	0.9 U	0.9 U	0.9 U	**47.1**	0.9 U	0.9 U	**7.1**
Benzoic acid	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	13.4 U	**73.7 J**	**20.6 J**	**21.3 J**	13.4 U	13.4 U	**20.8 J**	13.4 U	13.4 U	13.4 U	**49.1 J**	13.4 U	**38.6 J**	**86.5 J**
Benzyl alcoho	**11.1 J**	2.5 U	2.5 U	2.5 UJ	**10.7 J**	2.5 U	8.9 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	**9.7 J**	2.5 U	2.5 U	2.5 U	2.5 U	**10.9 J**
Dibenzofuran	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	**291**	14.1 UJ	**72.1 J**	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	**83**	14.1 U	14.1 U	14.1 U
n-Nitrosodiphenylamine	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	4.7 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Pentachloropheno	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	7.6 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	**3.3 J**
Phenol	5 U	5 U	**5.9**	5 UJ	**6.3 J**	5 U	**118**	**83.6**	**118**	**17.1**	**14.5**	**17.1 J+**	7.7 U	6.2 U	5.9 U	**43.9**	**9.2 J+**	7.2 U	**5.2**	**26.2**
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	4.15 U	4.55 U	3.28 U	8.29 U	7.05 U	15.7 U	**1.76**	0.351 UJ	**1.39 J**	4.41 U	14.1 U	2.52 U	3.07 U	3.44 U	4.03 U	**2.41**	1.88 U	15.7 U	17.6 U	1.74 U
N-Nitrosodiphenylamine	0.38 U	0.42 U	0.3 U	0.76 U	0.65 U	1.4 U	0.028 U	0.032 U	0.025 U	0.41 U	1.3 U	0.23 U	0.28 U	0.32 U	0.37 U	0.038 U	0.17 U	1.4 U	1.6 U	0.16 U
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	5.5 U	5.4 U	5.4 U	5.4 U	5.4 U	5.5 U	**23.3 J**	5.5 U	5.4 U	**7.3 J**	**9.2 J**	5.4 U	50 U	5.5 U	5.4 U	49.9 U	5.5 U	50 U	**13.9 J**	50 U
Butylbenzyl phthalate	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	2.4 U	**9.1**	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Diethyl phthalate	20 U	20 U	20 U	20 U	19.9 U	20 U	71.4 U	20 U	20 U	19.9 U	19.9 U	20 U	20 U	20 U	20 U	**33.9**	**24.4**	**20.9**	19.9 U	20 U
Dimethyl phthalate	1 U	1 U	1 U	1 U	1 U	1 U	3.6 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	20 U	5.6 U	5.6 U	5.6 U	5.6 U	**7.1 J**	**9.2 J**	5.6 U	5.6 U	5.6 U	5.6 U	**53.3**	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	15.7 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	1.6 U	1.7 U	1.3 U	3.2 U	2.7 U	6.1 U	**0.141 J**	0.14 U	0.1 U	**2.3 J**	**9.2 J**	0.96 U	11 U	1.3 U	1.5 U	1.45 U	0.73 U	56 U	**17.4 J**	6.2 U
Butyl benzyl phthalate	0.21 U	0.23 U	0.16 U	0.41 U	0.35 U	0.78 U	0.015 U	**0.23**	0.013 U	0.22 U	0.7 U	0.13 U	0.15 U	0.17 U	0.2 U	0.02 U	0.093 U	0.78 U	0.88 U	0.086 U
Diethyl phthalate	5.9 U	6.5 U	4.7 U	12 U	9.95 U	22 U	0.433 U	0.5 U	0.39 U	6.22 U	19.9 U	3.6 U	4.3 U	4.9 U	5.7 U	**0.983**	**3.25**	**23.2**	24.9 U	2.5 U
Dimethyl phthalate	0.29 U	0.32 U	0.23 U	0.59 U	0.5 U	1.1 U	0.022 U	0.025 U	0.019 U	0.31 U	1 U	0.18 U	0.22 U	0.24 U	0.29 U	0.029 U	0.13 U	1.1 U	1.3 U	0.12 U
Di-n-butyl phthalate	1.6 U	1.8 U	1.3 U	3.3 U	2.8 U	6.2 U	0.12 U	0.14 U	0.11 U	1.8 U	5.6 U	**1.3 J**	**2 J**	1.4 U	1.6 U	0.16 U	0.75 U	6.2 U	**66.6**	0.69 U
Di-n-Octyl Phthalate	1.3 U	1.4 U	1 U	2.6 U	2.2 U	4.9 U	0.0952 U	0.11 U	0.085 U	1.4 U	4.4 U	0.79 U	0.96 U	1.1 U	1.3 U	0.13 U	0.59 U	4.9 U	5.5 U	0.54 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	--	4.37 UJ	4.84 UJ	4.79 UJ	4.80 UJ	**9.23 J**	**5.62 J**	**6.01 J**	1.97 UJ	0.0468 UJ	--	--	--	--	**9.45**	**0.532 J**	0.0480 U	**0.150 J**	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	--	--	**213 J**	**457 J**	**434 J**	**938 J**	**466 J**	**423 J**	**490 J**	**62.2 J**	**175 J**	--	--	--	--	**273**	**211**	**229**	**232**	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	--	--	2.19 UJ	2.42 UJ	2.39 UJ	0.0480 UJ	**18.1 J**	**14.0 J**	**15.8 J**	0.985 UJ	0.0468 UJ	--	--	--	--	**6.73**	2.48 U	2.40 U	2.39 U	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	--	--	**19.6 J**	**32.6 J**	**28.9 J**	**43.8 J**	**48.3 J**	**35.0 J**	**37.5 J**	**5.12 J**	**12.6 J**	--	--	--	--	**31.0**	**15.4**	**15.5**	**15.4**	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	--	--	2.19 UJ	0.0484 UJ	0.0479 UJ	0.0480 UJ	2.32 UJ	2.40 UJ	2.36 UJ	0.985 UJ	0.0468 UJ	--	--	--	--	**0.368 J**	0.0497 U	0.0480 U	0.0479 U	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	--	--	2.19 UJ	0.0484 UJ	0.0479 UJ	0.0480 UJ	**7.70 J**	**9.01 J**	**9.90 J**	**0.159 J**	0.0468 UJ	--	--	--	--	**1.45 J**	**0.0866 J**	0.0480 U	0.0479 U	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	--	--	**0.414 J**	**0.474 J**	**0.592 J**	**0.630 J**	**2.77 J**	**2.05 J**	**2.22 J**	**0.142 J**	**0.301 J**	--	--	--	--	**0.684 J**	**0.283 J**	**0.326 J**	**0.261 J**	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	--	--	2.19 UJ	0.0484 UJ	0.0479 UJ	0.0480 UJ	**6.30 J**	**6.78 J**	**7.63 J**	**0.124 J**	0.0468 UJ	--	--	--	--	**1.00 J**	0.0497 U	0.0480 U	0.0479 U	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	--	--	2.19 UJ	2.42 UJ	2.39 UJ	2.40 UJ	**5.13 J**	**3.93 J**	**4.14 J**	**0.238 J**	**0.484 J**	--	--	--	--	**1.83 J**	**0.557 J**	**0.573 J**	**0.510 J**	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	--	--	**0.0553 J**	**0.0568 J**	**0.0628 J**	**0.0545 J**	**0.499 J**	**0.569 J**	**0.672 J**	0.0197 UJ	0.0468 UJ	--	--	--	--	1.84 U	2.48 U	2.40 U	0.0479 U	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	--	--	**1.52 J**	**2.14 J**	**2.11 J**	**2.61 J**	**4130 J**	**3410 J**	**3690 J**	**363 J**	**0.853 J**	--	--	--	--	**1.50 J**	**0.971 J**	**0.748 J**	**1.16 J**	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	--	--	2.19 UJ	0.0484 UJ	0.0479 UJ	2.40 UJ	**7.57 J**	**8.58 J**	**9.69 J**	**0.165 J**	2.34 UJ	--	--	--	--	**0.848 J**	**0.0649 J**	0.0480 U	0.0479 U	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	--	--	**0.473 J**	**0.418 J**	**0.491 J**	**0.411 J**	**3.92 J**	**3.12 J**	**3.41 J**	**0.142 J**	2.34 UJ	--	--	--	--	**0.639 J**	**0.215 J**	**0.166 J**	**0.118 J**	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	--	--	2.19 UJ	0.0484 UJ	0.0479 UJ	0.0480 UJ	**5.88 J**	**5.25 J**	**6.43 J**	**0.115 J**	0.0468 UJ	--	--	--	--	**1.03 J**	0.0497 U	0.0480 U	0.0479 U	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	--	--	**0.199 J**	0.0484 UJ	0.0479 UJ	0.0480 UJ	**8.51 J**	**9.54 J**	**10.8 J**	**0.197 J**	0.0468 UJ	--	--	--	--	**1.15 J**	0.0497 U	0.0480 U	0.0479 U	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	--	**0.383 J**	0.0484 UJ	0.0479 UJ	0.0480 UJ	**9490 J**	**9400 J**	**9960 J**	**163 J**	0.0468 UJ	--	--	--	--	**1.19**	**0.0750 J**	0.0480 U	0.0479 U	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	**0.297 J**	**0.157 J**	**0.236 J**	**0.168 J**	**1.55 J**	**1.10 J**	**1.25 J**	**0.0754 J**	**0.103 J**	--	--	--	--	**0.233 J**	**0.130 J**	**0.102 J**	**0.107 J**	--
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	--	--	**1.82**	**1.46**	**1.57**	**1.80**	**1370**	**1290**	**1380**	**53.0**	**1.67**	--	--	--	--	**2.67**	**0.911**	**0.806**	**0.674**	--
Total TCDD TEQ (ND=0)[h]	--	--	**1.33**	**1.31**	**1.42**	**1.63**	**1370**	**1290**	**1380**	**53.0**	**0.445**	--	--	--	--	**2.58**	**0.762**	**0.656**	**0.642**	--

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH-SC-40-2to4	BH-SC-40-4to6	BH-SC-40-6to8	BH-SC-40-8to9	BH-SC-49-0to0.7	BH-SC-49-0.7to2.8	BH-SC-49-0.7to2.8-D	BH-SC-51-0to2	BH-SC-51-2to4	BH-SC-51-4to5.2	BH-SC-51-5.2to7.2	BH-SC-51-7.2to9.4	BH-SC-52-0to1.8	BH-SC-52-0to1.8-D	BH-SC-52-1.8to2.8	BH-SC-53-0to1	BH-SC-53-1to2.4	BH-SC-53-1to2.4-D	BH-SC-53-2.4to4.4	BH-SC-54-0to1
Location:	SC-40	SC-40	SC-40	SC-40	SC-49	SC-49	SC-49	SC-51	SC-51	SC-51	SC-51	SC-51	SC-52	SC-52	SC-52	SC-53	SC-53	SC-53	SC-53	SC-54
Sample Date:	2021-09-13	2021-09-13	2021-09-13	2021-09-13	2022-10-11	2022-10-11	2022-10-11	2022-10-10	2022-10-10	2022-10-10	2022-10-10	2022-10-10	2022-10-11	2022-10-11	2022-10-11	2022-10-11	2022-10-11	2022-10-11	2022-10-11	2022-10-12
Depth Interval:	2 - 4	4 - 6	6 - 8	8 - 9	0 - 0.7	0.7 - 2.8	0.7 - 2.8	0 - 2	2 - 4	4 - 5.2	5.2 - 7.2	7.2 - 9.4	0 - 1.8	0 - 1.8	1.8 - 2.8	0 - 1	1 - 2.4	1 - 2.4	2.4 - 4.4	0 - 1
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:							Duplicate							Duplicate				Duplicate		
Analyte																				
Conventional Parameters																				
% Moisture (%)	--	--	--	--	24.1	29.7	27.2	58.5	62.6	44.5	19.0	18.1	31.2	27.1	51.0	26.3	19.6	22.6	23.3	34.5
% Wood Debris (%)[b]	0	10.625	37.5	8.75	35	39	39	39.33	19.17	46.67	6.33	21.33	5	5	31.67	5	5	5	5	15
Ammonia (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total organic carbon (%)	0.44	0.34	0.45	0.36	0.95	3.97	5.55	11.5 J+	9.32	4.06	0.33	0.34	2.34 J	1.38 J	4.94	0.56	0.39	0.47	0.48	2.17
Total organic carbon (mg/kg)	4400	3400	4500	3600	9500	39700	55500	115000 J+	93200	40600	3300	3400	23400 J	13800 J	49400	5600	3900	4700	4800	21700 J
Total Solids (mg/kg)	725800	769700	784300	785100	752500	551400	661500	372600	368500	517200	807300	863700	759900	767200	508600	732800	778500	790300	746200	606900
Total volatile solids (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Particle/Grain Size, Clay	10.0	7.40	7.40	5.90	4.80	5.40	--	8.60	10.8	5.20	8.20	6.30	4.10	--	10.5	5.60	4.30	--	5.10	10.2
Particle/Grain Size, Gravel	0.70	1.70	3.80	4.70	20.4	6.20	--	17.4	7.30	47.2	10.3	29.7	81.3	--	51.2	33.6	72.0	--	67.0	13.7
Particle/Grain Size, Sand	52.8	59.4	69.1	56.9	72.4	82.8	--	51.4	53.9	36.3	69.9	55.2	5.30	--	28.2	56.9	22.6	--	21.8	64.6
Particle/Grain Size, Silt	36.4	31.6	19.6	32.5	2.30	5.60	--	22.5	27.8	11.2	11.5	8.80	9.40	--	10.1	3.90	1.10	--	6.10	11.5
Total Percent Fines	46.4	39	27	38.4	7.1	11	--	31.1	38.6	16.4	19.7	15.1	13.5	--	20.6	9.5	5.4	--	11.2	21.7
Metals (mg/kg, dw)																				
Arsenic	4.46	3.79	3.89	4.11	6.91	5.53	4.86	15.9	14.7	13.6	5.37	8.49	4.13	3.65	4.69	5.25 J	10.3 J	5.77 J	6.57	9.85
Cadmium	0.29	0.29	0.37	0.43	0.15	0.58	0.48	1.18	1.32	0.72	0.21	0.26	0.29	0.39	0.63	0.13 J	0.18 J	0.10 J	0.15	0.52
Chromium	20.4	18.8	20.7	19.1	14.1	13.8	13.7	21.0	21.1	17.5	20.2	26.1	18.8	16.5	26.5	28.2	35.8	31.8	28.0	29.0
Copper	13.4	12.1	13.2	13.3	11.4	15.8	16.0	177	197	741	14.1	17.0	45.9	53.0	94.3	67.2	104	62.9	47.4	41.8
Lead	2.66	2.06	1.76	1.94	22.8	15.1	17.0	988	801	380	4.48	4.47	43.2	61.5	74.1	62.0 J	85.7 J	42.5 J	20.7	46.3
Mercury	0.0407	4.7E-05 J+	0.0341	0.0281 U	0.0343	0.118	0.101	1.96	2.04	1.21	0.0395	0.0254	0.0521 J+	0.0632	0.436	0.150 J	0.152	0.129	0.244	0.247 J
Silver	0.09 J	0.09 J	0.08 J	0.09 J	0.07 J	0.08 J	0.08 J	0.32 J	0.35 J	0.39	0.08 J	0.09 J	0.15 J	0.14 J	0.17 J	0.12 J	0.14 J	0.11 J	0.11 J	0.21 J
Zinc	35.5	31.0	30.6	32.8	41.2	35.1	32.0	289	295	170	33.7	42.2	61.2	62.7	118	79.1 J	101	85.4	55.0	66.7
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	2.53 J	2.01 J	1.1 U	1.1 U	8.98	158 J	53.1 J	131	152	341	1.1 U	1.1 U	9.58 J	9.7 J	47.3	15.7	2.21 J	3.27 J	7.39	15 UJ
Acenaphthene	0.59 J	0.81 J	0.57 U	1 J	11.9	175 J	65.9 J	108	142	214	5 U	0.57 U	19.3 J	13.6 J	89.3	28.2	2.25 J	3.13 J	4.62 J	15 UJ
Acenaphthylene	1.08 U	1.08 U	1.08 U	1.08 U	9.59	122 J	37.1 J	114	179	145	1.08 U	1.08 U	12 J	11.5 J	49.3	16.6	3.45 J	7.6 J	4.37 J	20.9 J
Anthracene	1.47 J	1.32 J	0.87 U	1 J	20.7	194 J	98.5 J	176	445	513	1.64 J	0.87 U	39.8	32.4	177	60.2	9.16	7.56	8.57	50.4 J-
Fluorene	0.96 J	0.63 U	0.63 U	0.63 U	11.2	177 J	76.9 J	156	320	370	0.82 J	0.63 U	19.5	16.4	93.6	34.2	2.9 J	3.91 J	4.01 J	20.7 J-
Naphthalene	1.41 J	1.27 U	1.27 U	1.27 U	65.7	1620 J	514 J	787	643	767	2.48 J	1.27 U	32.8	35.3	211	22.7	5.31	8.34	14.5	51.4 J
Phenanthrene	2.85 J	3.1 J	0.72 U	0.79 J	88.3	1130 J	355 J	604	2220	1520	2.55 J	0.98 J	161	132	736	323	31.6	46.5	28.6	122 J-
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	9.8	7.2	4.99 U	2.8	216	3580	1200	2080	4100	3900	7.5	0.98	294	251	1400	501	56.9	80.3	72.1	265
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	0.575 J	0.591 J	0.24 U	0.31 U	0.945	3.98 J	0.957 J	1.14	1.63	8.4	0.333 U	0.324 U	0.409 J	0.703 J	0.957	2.8	0.567 J	0.696 J	1.54	0.691 UJ
Acenaphthene	0.13 J	0.24 J	0.13 U	0.278 J	1.25	4.41 J	1.19 J	0.939	1.52	5.27	1.5 U	0.17 U	0.825 J	0.986 J	1.81	5.04	0.577 J	0.666 J	0.963 J	0.691 UJ
Acenaphthylene	0.245 U	0.318 U	0.24 U	0.3 U	1.01	3.07 J	0.668 J	0.991	1.92	3.57	0.327 U	0.318 U	0.513 J	0.833 J	0.998	2.96	0.885 J	1.62 J	0.91 J	0.963 J
Anthracene	0.334 J	0.388 J	0.19 U	0.278 J	2.18	4.89 J	1.77 J	1.53	4.77	12.6	0.497 J	0.26 U	1.7	2.35	3.58	10.8	2.35	1.61	1.79	2.32 J-
Fluorene	0.22 J	0.19 U	0.14 U	0.17 U	1.18	4.46 J	1.39 J	1.36	3.4	9.1	0.25 J	0.19 U	0.833	1.19	1.89	6.11	0.744 J	0.832 J	0.835 J	0.954 J-
Naphthalene	0.32 J	0.374 U	0.282 U	0.353 U	6.92	40.8 J	9.26 J	6.84	6.9	18.9	0.752 J	0.374 U	1.4	2.56	4.27	4.05	1.36	1.77	3.02	2.37 J
Phenanthrene	0.648 J	0.912 J	0.16 U	0.22 J	9.29	28.5 J	6.4 J	5.25	23.8	37.4	0.773 J	0.29 J	6.88	9.57	14.9	57.7	8.1	9.89	5.96	5.62 J-
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	2.2	2.1	1.1 U	0.78	22.8	90.1	21.6	18.1	44	95	2.3	0.29	12.6	18.2	28.4	89.5	14.6	17.1	15	12.2
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	1.12 J	0.89 J	0.82 U	0.82 U	48.2	231	139	213	844	763	2.16 J	0.82 U	78	68.8	380	135	33.5	25.3	21.1	91.4
Benzo(a)pyrene	1.64 J	0.61 U	0.61 U	0.61 U	48.2 J	196 J	124 J	231 J	838 J	956 J	1.98 J	0.87 J	76.2 J	70.5 J	363 J	135 J	34.6 J	28.6 J	21.4 J	109 J
Benzo(b)fluoranthene	1.47 J	1.37 U	1.37 U	1.37 U	31.7	132	83.9	154	536	417	1.62 J	1.37 U	52.5	45.9	237	89.4	24.9 J	21.4	16.4	89.6 J-
Benzo(g,h,i)perylene	3.21 J	2.68 J	1.06 U	1.06 U	44.8	176	108	195	634	649	2.2 J	1.06 U	62.2	57.8	286	111	29.2	25.4	18.6	71.4
Benzo(j)fluoranthene	0.71 J	0.68 U	0.68 U	0.68 U	22.3	103 J	56.6 J	110	386	240	1.05 J	0.68 U	34.5	32	164	62.4	16.9	13.9	10.7	51.3
Benzo(k)fluoranthene	1.12 J	0.76 U	0.76 U	0.76 U	21	87.4 J	51.2 J	101	352	193	1.08 J	0.76 U	33.2	30.2	154	58	16.1	13.4	10.7	51.3
Chrysene	1.98 J	1.21 J	1.05 U	1.05 U	56.1	282 J	139 J	257	978	812	2.49 J	1.05 U	93.2	81.3	458	165	44.9	36.5	25.6	126
Dibenzo(a,h)anthracene	0.89 U	0.89 U	0.89 U	0.89 U	9.22	30.9	23.2	41.2	156	200	0.89 U	0.89 U	16.2	15	63.8	21.7	6.84 J	6.89	4.83 J	16.8 J-
Fluoranthene	1.85 J	2.89 J	0.47 U	0.47 U	137	836 J	388 J	577	2330	1080	4.87 J	1.45 J	188	176	1070	336	74.8	66.4	50.4	187
Indeno(1,2,3-c,d)pyrene	1.89 J	1.05 U	1.05 U	1.05 U	37.2	133	83.8	154	551	360	1.54 J	1.05 U	54.1	47.5	252	89.9	23.5 J	21.9	15.6	62.3 J-
Pyrene	2.83 J	4.16 J	0.62 U	1.46 J	141	805 J	338 J	712	2150	1440	5.38	1.75 J	206	185	1070	356	77.8	69.3	49.1	201 J-
Total Benzofluoranthenes	3.3	5 U	4.99 U	4.99 U	75	322	192	360	1270	850	3.75	4.98 U	120	108	555	210	57.9	48.7	37.8	192
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL[e,f]	18	15	4.99 U	5.8	597	3010	1530	2700	9760	7000	25	7.9	894	810	4500	1560	383	329	244	1060
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	0.255 J	0.26 J	0.18 U	0.23 U	5.07	5.82	2.5	1.85	9.06	18.8	0.655 J	0.24 U	3.33	4.99	7.7	24.1	8.59	5.38	4.4	4.21
Benzo(a)pyrene	0.373 J	0.18 U	0.14 U	0.17 U	5.07 J	4.94 J	2.23 J	2.01 J	8.99 J	23.5 J	0.6 J	0.26 J	3.26 J	5.11 J	7.35 J	24.1 J	8.87 J	6.09 J	4.46 J	5.02 J
Benzo(b)fluoranthene	0.334 J	0.403 U	0.304 U	0.381 U	3.34	3.32	1.51	1.34	5.75	10.3	0.491 J	0.403 U	2.24	3.33	4.8	16	6.38 J	4.55	3.42	4.13 J-
Benzo(g,h,i)perylene	0.73 J	0.788 J	0.236 U	0.294 U	4.72	4.43	1.95	1.7	6.8	16	0.667 J	0.312 U	2.66	4.19	5.79	19.8	7.49	5.4	3.88	3.29
Benzo(j)fluoranthene	0.16 J	0.2 U	0.15 U	0.19 U	2.35	2.59 J	1.02 J	0.96	4.14	5.9	0.318 J	0.2 U	1.47	2.32	3.32	11.1	4.33	2.96	2.23	2.36
Benzo(k)fluoranthene	0.255 J	0.22 U	0.17 U	0.21 U	2.21	2.2 J	0.923 J	0.878	3.78	4.75	0.327 J	0.22 U	1.42	2.19	3.12	10.4	4.13	2.85	2.23	2.36
Chrysene	0.45 J	0.356 J	0.233 U	0.292 U	5.91	7.1 J	2.5 J	2.23	10.5	20	0.755 J	0.309 U	3.98	5.89	9.27	29.5	11.5	7.77	5.33	5.81
Dibenzo(a,h)anthracene	0.2 U	0.26 U	0.2 U	0.25 U	0.971	0.778	0.418	0.358	1.67	5	0.27 U	0.26 U	0.692	1.09	1.29	3.88	1.75 J	1.47	1.01 J	0.774 J-
Fluoranthene	0.42 J	0.85 J	0.1 U	0.13 U	14.4	21.1 J	6.99 J	5.02	25	26.6	1.48 J	0.426 J	8.03	12.8	21.7	60	19.2	14.1	10.5	8.62
Indeno(1,2,3-c,d)pyrene	0.43 J	0.309 U	0.233 U	0.292 U	3.92	3.35	1.51	1.34	5.91	8.9	0.467 J	0.309 U	2.31	3.44	5.1	16.1	6.03 J	4.66	3.25	2.87 J-
Pyrene	0.643 J	1.22 J	0.14 U	0.406 J	14.8	20.3 J	6.09 J	6.19	23.1	35.5	1.63	0.515 J	8.8	13.4	21.7	63.6	19.9	14.7	10.2	9.26 J-
Total Benzofluoranthenes	0.75	1.5 U	1.1 U	1.4 U	7.9	8.11	3.45	3.2	13.7	21	1.14	1.5 U	5.13	7.84	11.2	37.5	14.8	10.4	7.88	8.85
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	4.2	4.3	1.1 U	1.6	62.8	75.9	27.6	24	105	200	7.5	2.3	38.2	58.8	91	279	98.2	69.9	50.9	48.7
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	2.3	0.61	4.99 U	4.99 U	63.5	260	164	300	1090	1000	2.7	1.1	101	92.1	480	176	45.5	37.9	28.5	141
Total cPAH TEQ (ND=0)[g]	2.2	0.1	4.99 U	4.99 U	63.5	260	164	300	1090	1000	2.6	0.87	101	92.1	480	176	45.5	37.9	28.5	141

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Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	2.7 U	2.7 U	2.7 U	2.7 U	3.6 U	3.6 U	1.2 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
1,2-Dichlorobenzene	0.7 U	0.7 U	0.7 U	0.7 U	2.4 U	2.4 U	0.8 U	2.3 U	2.3 U	2.4 U	2.3 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
1,4-Dichlorobenzene	0.6 U	0.6 U	0.6 U	0.6 U	3.1 U	3.1 U	1.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Hexachlorobenzene	0.7 U	0.7 U	0.7 U	0.7 U	13.5 U	13.5 U	4.6 U	13.3 U	13.4 U	13.4 U	13.3 U	13.4 U	13.4 U	13.5 U	13.5 U	13.5 U	13.5 U	13.5 U	13.4 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.7 U	0.7 U	0.7 U	0.7 U	4.8 U	4.8 U	1.7 U	4.7 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	0.61 U	0.79 U	0.6 U	0.75 U	0.38 U	0.091 U	0.022 U	0.03 U	0.038 U	0.086 U	1.1 U	1 U	0.15 U	0.26 U	0.073 U	0.64 U	0.92 U	0.77 U	0.75 U	0.17 U
1,2-Dichlorobenzene	0.16 U	0.21 U	0.16 U	0.19 U	0.25 U	0.06 U	0.01 U	0.02 U	0.025 U	0.059 U	0.7 U	0.71 U	0.1 U	0.17 U	0.049 U	0.43 U	0.62 U	0.51 U	0.5 U	0.11 U
1,4-Dichlorobenzene	0.14 U	0.18 U	0.13 U	0.17 U	0.33 U	0.078 U	0.02 U	0.027 U	0.033 U	0.076 U	0.94 U	0.91 U	0.13 U	0.22 U	0.063 U	0.55 U	0.79 U	0.66 U	0.65 U	0.14 U
Hexachlorobenzene	0.16 U	0.21 U	0.16 U	0.19 U	1.42 U	0.34 U	0.083 U	0.116 U	0.144 U	0.33 U	4.03 U	3.94 U	0.573 U	0.978 U	0.273 U	2.41 U	3.46 U	2.87 U	2.81 U	0.618 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.16 U	0.21 U	0.16 U	0.19 U	0.51 U	0.12 U	0.031 U	0.041 U	0.052 U	0.12 U	1.5 U	1.4 U	0.21 U	0.35 U	0.097 U	0.86 U	1.2 U	1 U	1 U	0.22 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	2.2 U	2.2 U	2.2 U	2.2 U	3.8 U	3.8 U	1.3 U	3.7 U	3.7 U	3.8 U	3.7 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
2-Methylphenol (o-Cresol)	1.1 U	1.1 U	1.1 U	1.1 U	6.7 UJ	6.6 UJ	2.3 UJ	6.6 UJ	6.6 UJ	6.6 UJ	6.6 UJ	6.6 UJ	6.6 UJ	6.7 UJ	6.7 UJ	6.7 UJ	6.7 UJ	6.6 UJ	6.7 UJ	6.6 U
4-Methylphenol (p-Cresol)	0.9 U	0.9 U	0.9 U	0.9 U	7.4 U	7.4 U	2.5 U	**331**	**724**	**593**	7.3 U	7.3 U	7.4 UJ	**43 J**	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	**7.4 J**
Benzoic acid	**35.7 J**	**18.6 J**	**18.3 J**	13.4 U	39 UJ	39 UJ	13.5 UJ	**317 J**	**163 J**	**86.6 J**	38.6 UJ	38.8 UJ	38.9 UJ	39 UJ	39 UJ	**157 J**	39 UJ	39 UJ	39.1 UJ	38.9 UJ
Benzyl alcoho	2.5 U	2.5 U	2.5 U	2.5 U	16.3 U	16.2 U	5.6 U	16 U	16.1 U	16.1 U	16.1 U	16.2 U	16.2 U	16.2 U	16.3 U	16.3 U	16.3 U	16.2 U	16.3 U	16.2 U
Dibenzofuran	14.1 U	14.1 U	14.1 U	14.1 U	**21.2 J+**	**33.8 J**	**16.7 J**	**223**	**168**	**132**	14 U	14 U	14.1 UJ	**17.5 J**	**31.5**	14.1 U	14.1 UJ	**105 J**	14.1 U	**19.9 J**
n-Nitrosodiphenylamine	1.3 U	1.3 U	1.3 U	1.3 U	5.3 UJ	5.3 UJ	1.8 UJ	5.2 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 UJ	5.3 U
Pentachloropheno	**2.8 J**	2.1 U	2.1 U	2.1 U	31.2 UJ	31.2 UJ	10.8 UJ	30.8 UJ	31 UJ	31 UJ	30.9 UJ	31.1 UJ	31.1 UJ	31.2 UJ	31.2 UJ	31.2 UJ	31.2 UJ	31.2 UJ	31.3 UJ	31.1 UJ
Phenol	**10.4 J+**	5.7 U	7.2 U	6.9 U	**699**	**17.2 J**	**7.9 J**	**139**	**207**	**100**	4.3 U	**8.2 J**	4.4 UJ	**20.8 J**	**34.6**	**130**	4.4 UJ	**18.6 J**	4.4 U	**20.5 J+**
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	3.2 U	4.15 U	3.13 U	3.92 U	**2.23 J+**	**0.851 J**	**0.301 J**	**1.94**	**1.8**	**3.25**	4.24 U	4.12 U	0.603 UJ	**1.27 J**	**0.638**	2.52 U	3.62 UJ	**22.3 J**	2.94 U	**0.917 J**
N-Nitrosodiphenylamine	0.3 U	0.38 U	0.29 U	0.36 U	0.56 UJ	0.13 UJ	0.032 UJ	0.045 U	0.057 U	0.13 U	1.6 U	1.6 U	0.23 UJ	0.38 UJ	0.11 UJ	0.95 UJ	1.4 UJ	1.1 UJ	1.1 UJ	0.24 U
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	50 U	5.5 U	50 U	50 U	5.5 U	5.4 U	1.9 U	5.4 U	5.4 U	5.4 U	5.4 U	**8.3 J**	5.4 U	5.5 U	5.5 U	**45.4 J**	**39.5 J**	5.4 UJ	5.5 U	49.8 U
Butylbenzyl phthalate	0.7 U	0.7 U	0.7 U	0.7 U	9.4 U	9.4 U	3.2 U	9.3 U	9.3 U	9.3 U	9.3 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U
Diethyl phthalate	**35.8**	20 U	20 U	20 U	**36 J**	**22.3 J**	**14.2 J**	19.4 U	19.5 U	19.6 U	19.5 U	**22.7 J**	**21.9 J**	**29.5 J**	**26.3 J**	19.7 U	19.7 U	19.7 U	**33.8 J**	49.8 U
Dimethyl phthalate	1 U	1 U	1 U	1 U	4.4 U	4.4 U	1.5 U	4.3 U	4.3 U	4.4 U	4.3 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Di-n-butyl phthalate	5.6 U	**6.4 J**	5.6 U	**8.3 J**	**32.5 J**	5.6 U	1.9 U	5.5 U	5.6 U	5.6 U	5.5 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	1.5 U	4.3 U	4.3 U	4.4 U	4.3 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	11 U	1.6 U	11 U	14 U	0.58 U	0.14 U	0.034 U	0.047 U	0.058 U	0.13 U	1.6 U	**2.4 J**	0.23 U	0.4 U	0.11 U	**8.11 J**	**10.1 J**	1.1 UJ	1.1 U	2.29 U
Butyl benzyl phthalate	0.16 U	0.21 U	0.16 U	0.19 U	0.99 U	0.24 U	0.058 U	0.081 U	0.1 U	0.23 U	2.8 U	2.8 U	0.4 U	0.68 U	0.19 U	1.7 U	2.4 U	2 U	2 U	0.43 U
Diethyl phthalate	**8.14**	5.9 U	4.4 U	5.6 U	**3.79 J**	**0.562 J**	**0.256 J**	0.169 U	0.209 U	0.483 U	5.91 U	**6.68 J**	**0.936 J**	**2.14 J**	**0.532 J**	3.52 U	5.05 U	4.19 U	**7.04 J**	2.29 U
Dimethyl phthalate	0.23 U	0.29 U	0.22 U	0.28 U	0.46 U	0.11 U	0.027 U	0.037 U	0.046 U	0.11 U	1.3 U	1.3 U	0.19 U	0.32 U	0.089 U	0.79 U	1.1 U	0.94 U	0.92 U	0.2 U
Di-n-butyl phthalate	1.3 U	**1.9 J**	1.2 U	**2.3 J**	**3.42 J**	0.14 U	0.034 U	0.048 U	0.06 U	0.14 U	1.7 U	1.6 U	0.24 U	0.41 U	0.11 U	1 U	1.4 U	1.2 U	1.2 U	0.26 U
Di-n-Octyl Phthalate	1 U	1.3 U	0.98 U	1.2 U	0.46 U	0.11 U	0.027 U	0.037 U	0.046 U	0.11 U	1.3 U	1.3 U	0.19 U	0.32 U	0.089 U	0.79 U	1.1 U	0.94 U	0.92 U	0.2 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	--	--	--	--	**3.04 J**	**0.836 J**	**1.27 J**	**27.1**	**3.59 J**	**2.29 J**	0.0574 UJ	**0.0579 J**	**6.98 J**	**4.49 J**	**19.7**	**8.44**	**6.49**	**6.71**	**2.68 J**	**20.9**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	--	--	--	--	**226**	**255**	**194**	**410**	**292**	**210**	**303**	**435**	**294 J**	**162 J**	**799**	**470**	**360**	**302**	**142**	**583**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	--	--	--	--	**3.28**	**2.00 J**	**2.31 J**	**29.1**	**10.8**	**6.17**	**0.0771 J**	0.0468 UJ	**4.52**	**2.98**	**14.0**	**4.89**	**3.58**	**3.81 J**	**1.95 J**	**9.88**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	--	--	--	--	**30.3**	**27.2**	**22.0**	**75.7**	**33.0**	**21.8**	**22.3**	**27.8**	**30.1**	**19.5**	**95.0**	**49.2**	**38.4**	**35.8**	**17.9**	**70.6**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	--	--	--	--	**0.152 J**	**0.129 J**	**0.186 J**	**5.22**	**0.835 J**	**0.511 J**	0.0473 UJ	0.0468 UJ	**0.253 J**	**0.183 J**	**0.810 J**	**0.277 J**	**0.244 J**	**0.250 J**	**0.127 J**	**0.640 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	--	--	--	--	**1.19 J**	**0.767 J**	**0.857 J**	**6.91**	**3.46**	**2.08 J**	0.0473 UJ	0.0468 UJ	**0.953 J**	**0.631 J**	**3.35**	**0.645 J**	**0.485 J**	**0.464 J**	**0.266 J**	**1.37 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	--	--	--	--	**0.739 J**	**0.632 J**	**0.674 J**	**2.43**	**1.85 J**	**1.02 J**	**0.401 J**	**0.414 J**	**0.498 J**	**0.395 J**	**1.65 J**	**0.668 J**	**0.506 J**	**0.512 J**	**0.288 J**	**0.860 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	--	--	--	--	**0.390 J**	**0.447 J**	**0.593 J**	**5.37**	**3.29**	**1.90 J**	0.0473 UJ	0.0468 UJ	**0.509 J**	**0.342 J**	**1.73 J**	**0.497 J**	**0.368 J**	**0.347 J**	**0.191 J**	**0.698 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	--	--	--	--	**1.69 J**	**1.39 J**	**1.30 J**	**5.29**	**3.49**	**1.91 J**	**0.768 J**	**0.760 J**	**1.46 J**	**0.960 J**	**4.47**	**1.97 J**	**1.64 J**	**1.53 J**	**0.860 J**	**2.91**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	--	--	--	--	0.0472 UJ	0.0497 UJ	**0.0684 J**	**0.824 J**	**0.219 J**	**0.140 J**	0.0473 UJ	0.0468 UJ	0.0454 UJ	0.0509 UJ	**0.128 J**	0.0483 UJ	**0.0477 J**	0.0476 UJ	0.0478 UJ	**0.0763 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	--	--	--	--	**1.92 J**	**2.01 J**	**1.22 J**	**4.95**	**3.29**	**2.11 J**	**1.47 J**	**1.51 J**	**0.910 J**	**0.839 J**	**2.80**	**1.96 J**	**1.62 J**	**1.64 J**	**0.897 J**	**2.10 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	--	--	--	--	**0.542 J**	**0.473 J**	**0.622 J**	**4.12**	**3.17**	**1.65 J**	0.0473 UJ	0.0468 UJ	**0.537 J**	**0.362 J**	**1.79 J**	**0.419 J**	**0.384 J**	**0.306 J**	**0.183 J**	**0.679 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	--	--	--	--	**0.635 J**	**0.652 J**	**0.683 J**	**2.71**	**2.62**	**1.27 J**	**0.323 J**	**0.265 J**	**0.462 J**	**0.372 J**	**1.55 J**	**0.611 J**	**0.503 J**	**0.502 J**	**0.265 J**	**0.741 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	--	--	--	--	**0.245 J**	**0.415 J**	**0.560 J**	**6.06**	**3.37**	**1.95 J**	0.0473 UJ	0.0468 UJ	**0.433 J**	**0.293 J**	**1.39 J**	**0.501 J**	**0.343 J**	**0.339 J**	**0.207 J**	**0.650 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF	--	--	--	--	**0.373 J**	**0.513 J**	**0.711 J**	**4.76**	**4.04**	**2.04 J**	0.0473 UJ	0.0468 UJ	**0.586 J**	**0.312 J**	**1.71 J**	**0.582 J**	**0.495 J**	**0.361 J**	**0.186 J**	**0.721 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	--	--	--	--	**0.564**	**0.770**	**0.867**	**4.77**	**4.61**	**1.96**	0.0473 UJ	0.0468 UJ	**0.750 J**	**0.493 J**	**2.48**	**0.530**	**0.560 J**	**0.375 J**	**0.200 J**	**0.943**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	--	--	--	--	**0.292 J**	**0.348 J**	**0.324 J**	**0.973**	**1.06**	**0.446 J**	**0.260 J**	**0.165 J**	**0.153 J**	**0.138 J**	**0.526 J**	**0.171 J**	**0.185 J**	**0.137 J**	**0.0884 J**	**0.273 J**
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	--	--	--	--	**2.14**	**2.18**	**2.16**	**10.1**	**7.88**	**4.03**	**1.18**	**1.13**	**1.80**	**1.29**	**5.79**	**2.34**	**1.94**	**1.77**	**0.951**	**3.20**
Total TCDD TEQ (ND=0)[h]	--	--	--	--	**2.13**	**2.18**	**2.16**	**10.1**	**7.88**	**4.03**	**1.16**	**1.11**	**1.80**	**1.29**	**5.79**	**2.33**	**1.94**	**1.77**	**0.949**	**3.20**

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH-SC-54-1to2.8	BH-SC-54-2.8to4	BH-SC-54-4to6.6	BH-SC-54-4to6.6-D	BH-SC-54-6.6to8.8	BH-SC-54-6.6to8.8-D	SED1-0-10	SED2-0-10	SED3-0-10	SED4-0-10	SED5-0-10	SED6-0-10	SG-01-0to10	SG-02-0to10	SG-03-0to10	SG-03-0to10	SG-04-0to10	SG-04-0to10	SG-05-0to10	SG-06-0to10
Location:	SC-54	SC-54	SC-54	SC-54	SC-54	SC-54	SED-1	SED-2	SED-3	SED-4	SED-5	SED-6	SG-01	SG-02	SG-03	SG-03	SG-04	SG-04	SG-05	SG-06
Sample Date:	2022-10-12	2022-10-12	2022-10-12	2022-10-12	2022-10-12	2022-10-12	2019-06-05	2019-06-05	2019-06-05	2019-06-05	2019-06-05	2019-06-05	2021-08-23	2021-08-24	2021-08-26	2021-08-27	2021-08-26	2021-08-27	2021-08-26	2021-08-23
Depth Interval:	1 - 2.8	2.8 - 4	4 - 6.6	4 - 6.6	6.6 - 8.8	6.6 - 8.8	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:				Duplicate		Duplicate														
Analyte																				
Conventional Parameters																				
% Moisture (%)	**19.8**	**15.9**	**21.0**	**20.3**	**21.7**	**17.8**	--	--	--	--	--	--	--	**35.2**	**29.5**	--	**37.3**	--	**58.3**	**61.1**
% Wood Debris (%)[b]	**5**	**5.17**	**5**	**5**	**12.08**	**12.08**	--	--	--	--	--	--	**40**	**20**	--	**29.4**	--	**75**	**10**	**5**
Ammonia (mg/kg)	--	--	--	--	--	--	**2.84 J**	**11.9 J**	0.47 U	**27.5 J**	0.42 U	**7.45 J**	**1.21**	**14.7**	--	**6.04**	--	**13.7**	**10.1**	**3.00**
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	--	--	--	--	--	--	**105 J**	**348 J**	1.17 U	**1110 J**	1.29 U	**341 J**	**4.46 J**	**390 J**	--	**4.74 J**	--	**7.65 J**	**112 J**	**1330 J**
Total organic carbon (%)	**0.17**	**0.06**	**0.14**	**0.18**	**0.14 J**	**0.08 J**	**5.14**	**6.88**	**0.47**	**4.09**	**16.8**	**6.07**	**0.31**	**2.1**	--	**2**	--	**4.95**	**8.64**	**9.95**
Total organic carbon (mg/kg)	**1700**	**600**	**1400**	**1800**	**1400 J**	**800 J**	**51400**	**68800**	**4700**	**40900**	**168000**	**60700**	**3100**	**21000**	--	**20000**	--	**49500**	**86400**	**99500**
Total Solids (mg/kg)	**805000**	**885300**	**795800**	**864200**	**806100**	**891900**	**551800**	**455900**	**846200**	**526500**	**689900**	**609400**	**797900**	**623900**	--	**725000**	--	**591400**	**405100**	**432700**
Total volatile solids (mg/kg)	--	--	--	--	--	--	**86600 J**	**146900 J**	**32000 J**	**92000 J**	**222700 J**	**99700 J**	**20500 J**	**53600 J**	--	**42500 J**	--	**73000 J**	**175600 J**	**162600 J**
Preserved Total Solids (%)	--	--	--	--	--	--	--	--	--	--	--	--	**79.06**	**62.67**	--	**61.93**	--	**53.66**	**36.19**	**38.09**
Grain Size (%)																				
Particle/Grain Size, Clay	**5.80**	**3.60**	**3.40**	--	**5.80**	--	--	--	--	--	--	--	**0.60**	**2.00**	--	**5.80**	--	**4.60**	**10.6**	**12.9**
Particle/Grain Size, Gravel	**70.2**	**82.1**	**66.5**	--	**30.0**	--	--	--	--	--	--	--	**58.9**	**0.30**	--	**0.70**	--	**0.30**	**0.70**	**14.5**
Particle/Grain Size, Sand	**18.5 J**	**11.3**	**26.2**	--	**48.3**	--	--	--	--	--	--	--	**37.1**	**90.1**	--	**88.6**	--	**88.3**	**61.1**	**28.5**
Particle/Grain Size, Silt	**5.70**	**3.10**	**4.10**	--	**15.8**	--	--	--	--	--	--	--	**3.30**	**7.70**	--	**5.10**	--	**6.70**	**27.6**	**44.1**
Total Percent Fines	**11.5**	**6.7**	**7.5**	--	**21.6**	--	--	--	--	--	--	--	**3.9**	**9.7**	--	**10.9**	--	**11.3**	**38.2**	**57**
Metals (mg/kg, dw)																				
Arsenic	**3.81**	**6.18**	**5.99**	**4.52**	**4.51**	**7.40**	**20.2**	**9.62**	**9.18**	**9.01**	**30.1**	**16**	**8.97**	**5.22**	--	**5.99**	--	**5.86**	**9.05**	**8.33**
Cadmium	**0.22**	**0.06 J**	**0.19**	**0.15**	**0.18**	**0.19**	**0.29**	**0.72**	**0.07 J**	**0.59**	**0.2**	**0.21**	**0.13**	**0.22**	--	**0.11 J**	--	**0.18**	**0.44**	**0.43**
Chromium	**21.5**	**29.2**	**50.3**	**41.8**	**45.4**	**35.0**	**15.6**	**26.4**	**35.3**	**11.4**	**22.3**	**23.4**	**42.2**	**14.1**	--	**12.6**	--	**13.6**	**22.1**	**23.1**
Copper	**21.2**	**50.8**	**78.3**	**86.0**	**53.5**	**41.8**	**52.3**	**59.1**	**77.6**	**53.3**	**1010**	**118**	**42.4**	**16.9**	--	**11.3**	--	**15.0**	**43.0**	**51.4**
Lead	**3.09**	**1.74**	**2.25**	**1.84**	**1.96**	**2.03**	**45.8**	**98.5**	**55.6**	**90**	**757**	**544**	**149**	**34.8**	--	**24.6**	--	**32.9**	**83.2**	**73.1**
Mercury	**0.0307 J+**	0.0226 U	0.0285 U	**0.0251 J+**	0.0262 U	0.0244 U	**0.115**	**0.329**	0.0213 U	**0.0602**	**0.15**	**0.0479**	**0.0156 J**	**0.0467**	--	**0.0548**	--	**0.0876**	**0.475**	**0.223**
Silver	**0.07 J**	**0.09 J**	**0.08 J**	**0.08 J**	**0.10 J**	**0.06 J**	**0.17 J**	**0.29 J**	**0.1 J**	**0.13 J**	**0.2 J**	**0.17 J**	**0.07 J**	**0.09 J**	--	**0.07 J**	--	**0.09 J**	**0.20 J**	**0.23 J**
Zinc	**34.6**	**65.2**	**80.3**	**78.3**	**62.9**	**58.9**	**77.1**	**138**	**176**	**79.2**	**301**	**202**	**80.7**	**36.7**	--	**29.5**	--	**34.8**	**63.7**	**81.6**
AVS/SEM[c] (µmoles/g)																				
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	**0.020 J**	**0.020 J**	--	0.010 U	--	0.020 U	**0.060 J**	**0.080**
Copper	--	--	--	--	--	--	--	--	--	--	--	--	**1.32**	**0.74**	--	**0.51 J**	--	**0.63**	**1.73**	**2.50**
Lead	--	--	--	--	--	--	--	--	--	--	--	--	**6.67**	**8.28**	--	**5.23**	--	**7.34**	**18.1**	**18.9**
Silver	--	--	--	--	--	--	--	--	--	--	--	--	0.0080 U	0.010 U	--	0.0090 U	--	0.010 U	0.020 U	0.020 U
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	**3.5 J+**	**2.6 J+**	--	**1.9 J+**	--	**2.1 J+**	**4.0 J+**	**7.7 J+**
Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	**0.0348 R**	**13.8 J**	--	**0.0814 J-**	--	**0.123**	**2.77 J**	**26.4 J**
∑SEM–AVS	--	--	--	--	--	--	--	--	--	--	--	--	--	**-2.15**	--	**7.58**	--	**9.98**	**21.1**	**2.80**
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	--	--	--	--	--	--	--	--	--	--	--	--	--	**-0.0102**	--	**0.0379**	--	**0.0202**	**0.0245**	**0.00281**
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	**81.7**	**97.7**	**1.36**	**53.2**	**380**	**115**	1.1 U	**36.9 J+**	--	**16.8**	--	**16.4**	**47.6 J+**	**30.7**
Acenaphthene	4.98 UJ	0.57 UJ	0.57 UJ	0.57 UJ	0.57 UJ	0.57 UJ	**77.8**	**62.2**	**0.74**	**78**	**128**	**144**	5 U	**103 J+**	--	**15.1**	--	**27.4**	**35.7 J+**	**16.8**
Acenaphthylene	**1.2 J**	1.08 UJ	1.08 UJ	1.08 UJ	1.08 UJ	1.08 UJ	**98.7**	**140**	**1.79**	**60.3**	**101**	**51.7**	1.08 U	**20.4 J+**	--	**25.3**	--	**19.2**	**44 J+**	**41**
Anthracene	**2.55 J**	0.87 UJ	0.87 UJ	0.87 UJ	0.87 UJ	0.87 UJ	**165**	**133**	**3.35**	**188**	**406**	**371**	**1.14 J**	**237 J+**	--	**30.1**	--	**40.5**	**89.3 J+**	**46.8**
Fluorene	4.98 UJ	0.63 UJ	0.63 UJ	0.63 UJ	0.63 UJ	0.63 UJ	**76.5**	**73.5**	**0.97**	**107**	**148**	**153**	0.63 U	**103 J+**	--	**16**	--	**24.8**	**55.4 J+**	**26.7**
Naphthalene	4.98 UJ	1.27 UJ	1.27 UJ	1.28 UJ	1.27 UJ	1.27 UJ	**845**	**990**	6.4 U	**154**	**209**	**178**	**2.13 J**	**82.6 J+**	--	**158**	--	**145**	**270 J+**	**316**
Phenanthrene	**12.7 J-**	0.72 UJ	0.72 UJ	0.72 UJ	0.72 UJ	0.72 UJ	**752**	**818**	**16.7**	**1190**	**2000**	**1640**	**4.49 J**	**1040 J+**	--	**143**	--	**225**	**397 J+**	**244**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**16.4**	4.99 U	4.99 U	5 U	4.99 U	4.99 U	**2100**	**2300**	**31**	**1800**	**3000**	**2650**	**7.8**	**1620**	--	**404**	--	**498**	**940**	**722**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	0.647 UJ	1.83 UJ	0.786 UJ	0.611 UJ	0.786 UJ	1.38 UJ	**1.59**	**1.42**	**0.289**	**1.3**	**2.26**	**1.89**	0.35 U	**1.76 J+**	--	**0.84**	--	**0.331**	**0.551 J+**	**0.309**
Acenaphthene	2.93 UJ	0.95 UJ	0.41 UJ	0.32 UJ	0.41 UJ	0.71 UJ	**1.51**	**0.904**	**0.157**	**1.91**	**0.762**	**2.37**	1.6 U	**4.9 J+**	--	**0.755**	--	**0.554**	**0.413 J+**	**0.169**
Acenaphthylene	**0.706 J**	1.8 UJ	0.771 UJ	0.6 UJ	0.771 UJ	1.35 UJ	**1.92**	**2.03**	**0.381**	**1.47**	**0.601**	**0.852**	0.348 U	**0.971 J+**	--	**1.26**	--	**0.388**	**0.509 J+**	**0.412**
Anthracene	**1.5 J**	1.4 UJ	0.62 UJ	0.48 UJ	0.62 UJ	1.1 UJ	**3.21**	**1.93**	**0.713**	**4.6**	**2.42**	**6.11**	**0.368 J**	**11.3 J+**	--	**1.5**	--	**0.818**	**1.03 J+**	**0.47**
Fluorene	2.93 UJ	1.1 UJ	0.45 UJ	0.35 UJ	0.45 UJ	0.79 UJ	**1.49**	**1.07**	**0.206**	**2.62**	**0.881**	**2.52**	0.2 U	**4.9 J+**	--	**0.8**	--	**0.501**	**0.641 J+**	**0.268**
Naphthalene	2.93 UJ	2.12 UJ	0.907 UJ	0.711 UJ	0.907 UJ	1.59 UJ	**16.4**	**14.4**	1.36 U	**3.77**	**1.24**	**2.93**	**0.687 J**	**3.93 J+**	--	**7.9**	--	**2.93**	**3.1 J+**	**3.18**
Phenanthrene	**7.47 J-**	1.2 UJ	0.51 UJ	0.4 UJ	0.51 UJ	0.9 UJ	**14.6**	**11.9**	**3.55**	**29.1**	**11.9**	**27**	**1.45 J**	**49.5 J+**	--	**7.15**	--	**4.55**	**4.59 J+**	**2.45**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**9.68**	8.3 U	3.6 U	2.8 U	3.6 U	6.2 U	**40.8**	**33.6**	**6.66**	**44.8**	**20.1**	**43.7**	**2.5**	**77.3**	--	**20.2**	--	**10.1**	**11**	**7.26**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**5.1**	0.82 U	0.82 U	0.82 UJ	0.82 U	0.82 U	**228**	**223**	**13.3**	**412**	**691**	**725**	**2 J**	**352 J+**	--	**57.2**	--	**77**	**200 J+**	**108**
Benzo(a)pyrene	**4.89 J**	0.61 UJ	0.61 UJ	0.61 UJ	0.61 UJ	0.61 UJ	**210**	**277**	**13**	**463**	**651**	**707**	**3.08 J**	**393 J+**	--	**67.6**	--	**75.8**	**211 J+**	**128**
Benzo(b)fluoranthene	**3.56 J**	1.37 UJ	1.37 UJ	1.37 UJ	1.37 UJ	1.37 UJ	--	--	--	--	--	--	**2.38 J**	**244 J+**	--	**50.6**	--	**54.3**	**131 J+**	**100**
Benzo(g,h,i)perylene	**3.83 J**	1.06 U	1.06 U	1.07 UJ	1.06 U	1.06 U	**178**	**341**	**17.2**	**311**	**468**	**534**	**4.96 J**	**254 J+**	--	**65**	--	**72.8**	**168 J+**	**146**
Benzo(j)fluoranthene	**2.77 J**	0.68 U	0.68 U	0.68 U	0.68 U	0.68 U	--	--	--	--	--	--	**1.23 J**	**130 J+**	--	**25.5**	--	**27.5**	**65 J+**	**47.8**
Benzo(k)fluoranthene	**2.39 J**	0.76 U	0.76 U	0.76 U	0.76 U	0.76 U	--	--	--	--	--	--	**1.54 J**	**159 J+**	--	**29.9**	--	**33.5**	**82 J+**	**60.9**
Chrysene	**6.65**	1.05 U	1.05 U	1.05 UJ	1.05 U	1.05 U	**246**	**316**	**13.6**	**510**	**921**	**793**	**3.29 J**	**420 J+**	--	**71.5**	--	**90.4**	**210 J+**	**139**
Dibenzo(a,h)anthracene	**1.04 J**	0.89 UJ	0.89 UJ	0.89 UJ	0.89 UJ	0.89 UJ	**48.6 J**	**62.2**	**3.23**	**105**	**157**	**164**	0.89 U	**67.6 J+**	--	**13.2**	--	**15.9**	**38.4 J+**	**28.6**
Fluoranthene	**11.9**	0.47 U	0.47 U	0.47 UJ	0.47 U	0.47 U	**573**	**740**	**23.1**	**1090**	**1240**	**1510**	**6.16**	**784 J+**	--	**172 J**	--	**202**	**470 J+**	**385**
Indeno(1,2,3-c,d)pyrene	**3.28 J**	1.05 UJ	1.05 UJ	1.05 UJ	1.05 UJ	1.05 UJ	**193**	**243**	**13.3**	**276**	**402**	**458**	**2.58 J**	**246 J+**	--	**51.2**	--	**57.2**	**122 J+**	**113**
Pyrene	**12.7 J-**	0.63 UJ	0.62 UJ	0.63 UJ	0.62 UJ	0.63 UJ	**557**	**697**	**21.5**	**1140**	**1400**	**1590**	**6.92**	**1060 J+**	--	**203 J**	--	**252**	**455 J+**	**459**
Total Benzofluoranthenes	**8.72**	4.99 U	4.99 U	5 U	4.99 U	4.99 U	**246**	**364**	**18.4**	**534**	**746**	**956**	**5.15**	**530**	--	**106**	--	**115**	**278**	**210**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**58.1**	4.99 U	4.99 U	5 U	4.99 U	4.99 U	**2200**	**2900**	**120**	**4300**	**5900**	**6480**	**35**	**4100**	--	**807**	--	**958**	**2200**	**1700**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**3**	1.4 U	0.59 U	0.46 UJ	0.59 U	1 U	**4.44**	**3.24**	**2.83**	**10.1**	**4.11**	**11.9**	**0.645 J**	**16.8 J+**	--	**2.86**	--	**1.56**	**2.3 J+**	**1.09**
Benzo(a)pyrene	**2.88 J**	1 UJ	0.44 UJ	0.34 UJ	0.44 UJ	0.76 UJ	**4.09**	**4.03**	**2.77**	**11.3**	**3.88**	**11.6**	**0.994 J**	**18.7 J+**	--	**3.38**	--	**1.53**	**2.44 J+**	**1.29**
Benzo(b)fluoranthene	**2.09 J**	2.28 UJ	0.979 UJ	0.761 UJ	0.979 UJ	1.71 UJ	--	--	--	--	--	--	**0.768 J**	**11.6 J+**	--	**2.53**	--	**1.1**	**1.52 J+**	**1**
Benzo(g,h,i)perylene	**2.25 J**	1.77 U	0.757 U	0.594 UJ	0.757 U	1.32 U	**3.46**	**4.96**	**3.66**	**7.6**	**2.79**	**8.8**	**1.6 J**	**12.1 J+**	--	**3.25**	--	**1.47**	**1.94 J+**	**1.47**
Benzo(j)fluoranthene	**1.63 J**	1.1 U	0.49 U	0.38 U	0.49 U	0.85 U	--	--	--	--	--	--	**0.397 J**	**6.2 J+**	--	**1.27**	--	**0.556**	**0.752 J+**	**0.48**
Benzo(k)fluoranthene	**1.41 J**	1.3 U	0.54 U	0.42 U	0.54 U	0.95 U	--	--	--	--	--	--	**0.497 J**	**7.57 J+**	--	**1.5**	--	**0.677**	**0.949 J+**	**0.612**
Chrysene	**3.91**	1.75 U	0.75 U	0.583 UJ	0.75 U	1.31 U	**4.79**	**4.59**	**2.89**	**12.5**	**5.48**	**13.1**	**1.06 J**	**20 J+**	--	**3.58**	--	**1.83**	**2.4 J+**	**1.4**
Dibenzo(a,h)anthracene	**0.612 J**	1.5 UJ	0.64 UJ	0.49 UJ	0.64 UJ	1.1 UJ	**0.946 J**	**0.904**	**0.687**	**2.57**	**0.935**	**2.7**	0.29 U	**3.22 J+**	--	**0.66**	--	**0.321**	**0.444 J+**	**0.287**
Fluoranthene	**7**	0.78 U	0.34 U	0.26 UJ	0.34 U	0.59 U	**11.1**	**10.8**	**4.91**	**26.7**	**7.38**	**24.9**	**1.99**	**37.3 J+**	--	**8.6 J**	--	**4.08**	**5.4 J+**	**3.87**
Indeno(1,2,3-c,d)pyrene	**1.93 J**	1.75 UJ	0.75 UJ	0.583 UJ	0.75 U	1.31 UJ	**3.75**	**3.53**	**2.83**	**6.75**	**2.39**	**7.55**	**0.832 J**	**11.7 J+**	--	**2.56**	--	**1.16**	**1.41 J+**	**1.14**
Pyrene	**7.47 J-**	1.1 UJ	0.44 UJ	0.35 UJ	0.44 UJ	0.79 UJ	**10.8**	**10.1**	**4.57**	**27.9**	**8.33**	**26.2**	**2.23**	**50.5 J+**	--	**10.2 J**	--	**5.09**	**5.27 J+**	**4.61**
Total Benzofluoranthenes	**5.13**	8.3 U	3.6 U	2.8 U	3.6 U	6.2 U	**4.79**	**5.29**	**3.91**	**13.1**	**4.44**	**15.7**	**1.66**	**25**	--	**5.3**	--	**2.33**	**3.22**	**2.1**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**34.2**	8.3 U	3.6 U	2.8 U	3.6 U	6.2 U	**43.5**	**42.1**	**25.2**	**105**	**35.3**	**107**	**11**	**200**	--	**40.4**	--	**19.4**	**25**	**17**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**6.49**	4.99 U	4.99 U	5 U	4.99 U	4.99 U	**260**	**333**	**16**	**550**	**785**	**850**	**4**	**500**	--	**88.5**	--	**100**	**270**	**170**
Total cPAH TEQ (ND=0)[g]	**6.49**	4.99 U	4.99 U	5 U	4.99 U	4.99 U	**260**	**333**	**16**	**550**	**785**	**850**	**4**	**500**	--	**88.5**	--	**100**	**270**	**170**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																			
1,2,4-Trichlorobenzene	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	--	--	--	20 U	20 U	19.9 U	2.7 U	2.7 UJ	--	2.7 U	--	2.7 U	2.7 UJ	2.7 U
1,2-Dichlorobenzene	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	--	--	--	5 U	5 U	5 U	0.7 U	0.7 UJ	--	**2.6 J**	--	**2.9 J**	**1.7 J**	0.7 U
1,4-Dichlorobenzene	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	--	--	--	20 U	20 U	19.9 U	0.6 U	0.6 UJ	--	**5.6 J**	--	**6.6**	**5.6 J+**	**1.2 J**
Hexachlorobenzene	13.4 U	13.5 U	13.5 U	13.4 U	13.5 U	13.5 U	--	--	--	5 U	5 U	5 U	0.7 U	0.7 UJ	--	**10.6**	--	0.7 U	0.7 UJ	**2.2 J**
Hexachlorobutadiene (Hexachloro-1,3-butadiene	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	--	--	--	5 U	5 U	5 U	0.7 U	0.7 UJ	--	0.7 U	--	0.7 U	0.7 UJ	0.7 U
Chlorinated Organics (mg/kg, OC)																			
1,2,4-Trichlorobenzene	2.1 U	6 U	2.6 U	2 U	2.6 U	4.5 U	--	--	--	0.489 U	0.119 U	0.328 U	0.87 U	0.13 UJ	--	0.14 U	--	0.055 U	0.031 UJ	0.027 U
1,2-Dichlorobenzene	1.4 U	4 U	1.7 U	1.3 U	1.7 U	3 U	--	--	--	0.122 U	0.0298 U	0.0824 U	0.23 U	0.033 UJ	--	**0.13 J**	--	**0.059 J**	**0.02 J**	0.007 U
1,4-Dichlorobenzene	1.8 U	5.2 U	2.2 U	1.7 U	2.2 U	3.9 U	--	--	--	0.489 U	0.119 U	0.328 U	0.19 U	0.029 UJ	--	**0.28 J**	--	**0.13**	**0.065 J+**	**0.012 J**
Hexachlorobenzene	7.88 U	22.5 U	9.64 U	7.44 U	9.64 U	16.9 U	--	--	--	0.122 U	0.0298 U	0.0824 U	0.23 U	0.033 UJ	--	**0.53**	--	0.014 U	0.0081 UJ	**0.022 J**
Hexachlorobutadiene (Hexachloro-1,3-butadiene	2.8 U	8 U	3.4 U	2.7 U	3.4 U	6 U	--	--	--	0.122 U	0.0298 U	0.0824 U	0.23 U	0.033 UJ	--	0.035 U	--	0.014 U	0.0081 UJ	0.007 U
Organic Chemicals/Phenols (µg/kg, dw)																			
2,4-Dimethylpheno	3.8 U	3.8 UJ	3.8 U	3.8 U	3.8 U	3.8 U	--	--	--	**8.5 J**	20 U	**4.5 J**	2.2 U	2.2 UJ	--	**4.1 J**	--	2.2 U	2.2 UJ	**5.9 J**
2-Methylphenol (o-Cresol`	6.6 U	6.7 UJ	6.7 U	6.6 U	6.7 U	6.7 U	--	--	--	**9.2 J**	20 U	19.9 U	1.1 U	1.1 UJ	--	**4.8 J**	--	**7.6**	**3.6 J**	**5.1**
4-Methylphenol (p-Cresol`	7.4 U	7.4 UJ	7.4 U	7.4 U	7.4 U	7.4 U	--	--	--	**84.9**	**31.2 J**	**28.5**	0.9 U	**118 J+**	--	**42.4**	--	**186**	**98.8 J+**	**54.5**
Benzoic acid	38.9 UJ	39 U,R	39.1 UJ	38.9 UJ	39 UJ	39 UJ	--	--	--	**111 J**	**230 J**	199 U	**30.3 J**	**16.9 J**	--	**153 J**	--	**231 J**	**21 J**	**197**
Benzyl alcoho	16.2 U	16.3 U	16.3 U	16.2 U	16.3 U	16.3 U	--	--	--	20 U	20 U	19.9 U	2.5 U	2.5 UJ	--	**14 J**	--	**33.9 J**	**17.7 J**	2.5 U
Dibenzofuran	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	14.1 U	--	--	--	**89.3**	**183**	**82.5**	14 U	14.1 U	--	**88.2**	--	**91.7**	**73.2**	14.1 U
n-Nitrosodiphenylamine	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	--	--	--	20 U	20 U	19.9 U	1.3 U	1.3 UJ	--	1.3 U	--	1.3 U	1.3 UJ	1.3 U
Pentachloropheno	31.2 UJ	31.3 UJ	31.3 UJ	31.2 UJ	31.2 UJ	31.2 UJ	--	--	--	**7.2 J**	20 U	**2.1 J**	2.1 U	2.1 UJ	--	**8.6 J**	--	**9 J**	2.1 UJ	**6.3 J**
Phenol	4.4 U	20 UJ	20 U	20 U	4.4 U	20 U	--	--	--	**1670**	**31.7**	**107**	**5.4**	**130 J+**	--	**398 J**	--	**1250 J**	**98.6 J**	**93.2**
Organic Chemicals/Phenols (mg/kg, OC)																			
Dibenzofuran	8.29 U	23.5 U	10.1 U	7.83 U	10.1 U	17.6 U	--	--	--	**2.18**	**1.09**	**1.36**	4.5 U	0.671 U	--	**4.41**	--	**1.85**	**0.847**	0.142 U
N-Nitrosodiphenylamine	3.1 U	8.8 U	3.8 U	2.9 U	3.8 U	6.6 U	--	--	--	0.489 U	0.119 U	0.328 U	0.42 U	0.062 UJ	--	0.065 U	--	0.026 U	0.015 UJ	0.013 U
Phthalates (µg/kg, dw)																			
bis(2-Ethylhexyl)phthalate	50 U	5.5 U	50 U	50 U	5.5 U	50 U	--	--	--	**30.9 J**	49.9 U	**29.3 J**	49.6 U	5.4 U	--	**6.5 J**	--	**9 J**	5.5 U	49.8 U
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	--	--	--	20 U	20 U	19.9 U	**1.1 J**	0.7 UJ	--	**2.3 J**	--	**8.2**	**5.5 J+**	**3 J**
Diethyl phthalate	19.7 U	19.7 U	19.7 U	19.6 U	50 UJ	**128 J**	--	--	--	20 U	20 U	19.9 U	**22.4 J**	**28 J+**	--	**65**	--	20 U	**20.1 J+**	**30.7 J**
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	--	--	--	20 U	20 U	19.9 U	1 U	1 UJ	--	1 U	--	1 U	1 UJ	1 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	--	--	--	**9.4 J**	**5.8 J**	19.9 U	5.6 U	5.6 U	--	5.6 U	--	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	--	--	--	20 U	20 U	19.9 U	4.4 U	4.4 U	--	4.4 U	--	4.4 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																			
bis(2-Ethylhexyl)phthalate	29 U	9.2 U	36 U	28 U	3.9 U	63 U	--	--	--	**0.756 J**	0.297 U	**0.483 J**	16 U	0.26 U	--	**0.33 J**	--	**0.18 J**	0.064 U	0.501 U
Butyl benzyl phthalate	5.5 U	16 U	6.7 U	5.2 U	6.7 U	12 U	--	--	--	0.489 U	0.119 U	0.328 U	**0.35 J**	0.033 UJ	--	**0.12 J**	--	**0.17**	**0.064 J+**	**0.03 J**
Diethyl phthalate	11.6 U	32.8 U	14.1 U	10.9 U	35.7 UJ	**160 J**	--	--	--	0.489 U	0.119 U	0.328 U	**7.23 J**	**1.33 J+**	--	**3.25**	--	0.4 U	**0.233 J+**	**0.309 J**
Dimethyl phthalate	2.6 U	7.3 U	3.1 U	2.4 U	3.1 U	5.5 U	--	--	--	0.489 U	0.119 U	0.328 U	0.32 U	0.048 UJ	--	0.05 U	--	0.02 U	0.012 UJ	0.01 U
Di-n-butyl phthalate	3.3 U	9.3 U	4 U	3.1 U	4 U	7 U	--	--	--	**0.23 J**	**0.0345 J**	0.328 U	1.8 U	0.27 U	--	0.28 U	--	0.11 U	0.065 U	0.056 U
Di-n-Octyl Phthalate	2.6 U	7.3 U	3.1 U	2.4 U	3.1 U	5.5 U	--	--	--	0.489 U	0.119 U	0.328 U	1.4 U	0.21 U	--	0.22 U	--	0.089 U	0.051 U	0.044 U
Dioxin/Furans (ng/kg, dw)																			
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF`	4.55 U	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	4.78 U	**10.5 J**	**11.5 J**	**2.58 J**	**6.15 J**	**14.3 J**	**10.7 J**	--	**5.21**	**5.32 J**	--	**8.52 J**	--	**16.1**	**11.8**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD`	**166**	**164**	**277**	**273**	**406**	**267**	**236 J**	**986 J**	**80.8**	**409 J**	**78.4**	**175**	--	**457**	**416 J**	--	**737 J**	--	**738**	**994**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	**0.229 J**	**0.0598 J**	**0.0553 J**	**0.0515 J**	0.0492 UJ	**0.0678 J**	**20.7 J**	**18.7 J**	**5.1**	**5.55 J**	**15.2**	**23.8**	--	**4.77**	**6.13 J**	--	**11.1 J**	--	**22.8**	**13.0**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**13.4**	**16.2**	**22.3**	**19.2**	**27.7**	**20.6**	**34.3 J**	**129 J**	**8.59**	**29.7 J**	**15.1**	**56.7**	--	**34.9**	**46.9 J**	--	**61.3 J**	--	**93.4**	**69.7**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**1.61 J**	**0.99 J**	**0.204 J**	**0.414 J**	**1.4**	**1.23**	--	**0.341 J**	**0.253 J**	--	**0.470 J**	--	**0.713 J**	**0.523 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**4.77 J**	**6.17 J**	**1.67**	**1.02 J**	**2.49**	**6**	--	**1.85 J**	**2.14 J**	--	**4.00 J**	--	**8.54**	**4.36**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**0.256 J**	**0.323 J**	**0.427 J**	**0.344 J**	**0.442 J**	**0.421 J**	**1.6 J**	**4.61 J**	**0.375 J**	**0.886 J**	**1.12**	**4.86**	--	**1.03 J**	**1.35 J**	--	**1.85 J**	--	**3.48**	**2.51 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**3.62 J**	**2.64 J**	0.634 U	0.992 UJ	**3.21**	**3.6**	--	**0.820 J**	**0.750 J**	--	**1.25 J**	--	**2.78**	**1.64 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**0.461 J**	**0.779 J**	**1.03 J**	**0.822 J**	**1.10 J**	**0.843 J**	**2.46 J**	**8.62 J**	0.789 U	**2.03 J**	**1.87**	**8.66**	--	**2.26 J**	**2.71 J**	--	**3.72 J**	--	**6.75**	**4.50**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**0.689 J**	**0.542 J**	0.191 U	**0.324 J**	**0.985 J**	**0.886 J**	--	**0.153 J**	2.54 UJ	--	2.62 UJ	--	**0.220 J**	**0.165 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**0.763 J**	**1.44 J**	**2.29 J**	**1.81 J**	**2.53 J**	**1.69 J**	**3.21 J**	**10.7 J**	1.17 U	**2.44 J**	**1.68**	**7.86**	--	**2.85 J**	**2.72 J**	--	**3.45 J**	--	**7.06**	**4.82**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	**0.0542 J**	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**2.9 J**	**5.16 J**	**1.1 J**	**0.988 J**	**2.56 J**	**4.72 J**	--	2.32 U	2.54 UJ	--	2.62 UJ	--	**4.22**	2.51 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**0.188 J**	**0.301 J**	**0.467 J**	**0.372 J**	**0.486 J**	**0.410 J**	**2.22 J**	**6.22 J**	0.839 U	**1.01 J**	**1.96**	**5.88**	--	**1.02 J**	**1.08 J**	--	**1.62 J**	--	**3.12**	**2.32 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**4.22 J**	**2.27 J**	**0.532 J**	0.992 UJ	**2.86**	**3.6**	--	**0.629 J**	**0.528 J**	--	**0.773 J**	--	**1.55 J**	**0.934 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF`	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**3.38 J**	**3.09 J**	**0.72 J**	**0.816 J**	**2.98**	**3.58**	--	**1.18 J**	**0.806 J**	--	**1.19 J**	--	**2.70**	**1.56 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF`	0.0455 UJ	0.0476 UJ	0.0482 UJ	0.0480 UJ	0.0492 UJ	0.0478 UJ	**2.98 J**	**6.55 J**	**1.25 J**	**1.47 J**	**3.6 J**	**4.87 J**	--	**2.82**	**1.42 J**	--	**2.06 J**	--	**5.20**	**3.16**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD`	**0.145 J**	**0.154 J**	**0.196 J**	**0.139 J**	**0.191 J**	**0.181 J**	**0.738 J**	**1.58 J**	0.387 U	**0.53 J**	0.712 U	1.14 U	--	**0.521 J**	**0.402 J**	--	**0.517 J**	--	**1.23 J**	**1.01**
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**0.688**	**0.941**	**1.36**	**1.10**	**1.50**	**1.19**	**7.1**	**15**	**2.3**	**3.2**	**5.8**	**10**	--	**3.71**	**3.71**	--	**5.33**	--	**10.2**	**7.18**
Total TCDD TEQ (ND=0)[h]	**0.669**	**0.921**	**1.34**	**1.08**	**1.48**	**1.17**	**7.1**	**15**	**2.3**	**3.1**	**5.8**	**10**	--	**3.67**	**3.54**	--	**5.16**	--	**10.2**	**7.14**

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	SG-08-0to10	SG-09-0to10	SG-10-0to10	BH-SG-10A-0to10	BH-SG-10A-0to10-D	BH-SG-10A-0to10	BH-SG-10A-0to10-D	SG-11-0to10	BH-SG-11A-0to10	BH-SG-11A-0to10	SG-13-0to10	SG-15-0to10	SG-15-0to10-D	SG-18-0to10	SG-19-0to10	SG-22-0to10	SG-22-0to10-D	SG-23-0to10	SG-25-0to10	SG-26-0to10
Location:	SG-08	SG-09	SG-10	SG-10A	SG-10A	SG-10A	SG-10A	SG-11	SG-11A	SG-11A	SG-13	SG-15	SG-15	SG-18	SG-19	SG-22	SG-22	SG-23	SG-25	SG-26
Sample Date:	2021-08-24	2021-08-24	2021-08-24	2022-09-22	2022-09-22	2022-10-10	2022-10-10	2021-08-24	2022-09-22	2022-10-10	2021-08-23	2021-08-24	2021-08-24	2021-08-25	2021-08-25	2021-08-25	2021-08-25	2021-08-25	2021-08-25	2021-08-25
Depth Interval:	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:					Duplicate		Duplicate						Duplicate				Duplicate			
Analyte																				
Conventional Parameters																				
% Moisture (%)	**18.8**	**22.6**	**9.14**	**6.02**	**6.25**	--	--	**15.0**	**11.1**	--	**26.4**	**38.0**	**39.9**	--	--	**59.9**	**60.2**	**68.7**	**12.5**	--
% Wood Debris (%)[b]	**0**	**0**	**0**	**5**	**5**	**5**	**5**	**5**	**0**	**0**	**22.5**	**7.5**	--	**0**	**0**	**80**	--	**20**	**0**	**5**
Ammonia (mg/kg)	**3.04**	0.45 U	0.47 U	**0.66**	**0.56**	--	--	0.47 U	**3.18**	--	**3.63**	**12.7 J**	0.43 UJ	**10.3**	**7.59**	**14.5**	**15.6**	**18.3**	0.45 U	**6.51**
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	**105 J**	**1.18 R**	**1.13 R**	--	--	1.03 U,R	1.15 U,R	**1.36 R**	--	1.05 U,R	**28.1 J**	**383 J**	**1.20 R**	**196 J**	**182 J**	**245 J**	**356 J**	**1020 J**	**1.18 R**	**133 J**
Total organic carbon (%)	**3.86**	**0.73**	**0.24**	**0.15**	**0.1**	--	--	**0.77**	**0.72**	--	**1.26**	**2.15 J**	**0.82 J**	**4.2**	**0.49**	**20.7**	**18.2**	**19.4**	**0.24**	**0.8**
Total organic carbon (mg/kg)	**38600**	**7300**	**2400**	**1500**	**1000**	--	--	**7700**	**7200**	--	**12600**	**21500 J**	**8200 J**	**42000**	**4900**	**207000**	**182000**	**194000**	**2400**	**8000**
Total Solids (mg/kg)	**688100**	**847700**	**804000**	**936200**	**937900**	**903900**	**876500**	**856400**	**889200**	**810800**	**733100**	**603400**	**854500**	**576500**	**726400**	**339900**	**338900**	**316300**	**874900**	**727000**
Total volatile solids (mg/kg)	**64500 J**	**24100 J**	**21600 J**	**13600**	**13700**	--	--	**28600 J**	**25600**	--	**33100 J**	**54700 J**	**25300 J**	**86400 J**	**18500 J**	**265100 J**	**276700 J**	**298500 J**	**27300 J**	**24100 J**
Preserved Total Solids (%)	**63.68**	**83.23**	**85.67**	**91.43**	**90.88**	**90.25**	**86.91**	**73.07**	**92.72**	**82.66**	**66.19**	**64.05**	**81.13**	**49.83**	**70.49**	**29.84**	**35.49**	**27.89**	**84.73**	**70.25**
Grain Size (%)																				
Particle/Grain Size, Clay	**1.90**	0.10 U	0.10 U	**2.00**	--	--	--	**0.30**	**3.30**	--	**2.80**	**3.60**	**0.90**	**5.00**	**1.90**	**6.10**	**6.90**	**8.60**	**0.80**	**2.10**
Particle/Grain Size, Gravel	**25.6**	**43.2**	**40.5**	**4.50 J**	--	--	--	**46.4**	**69.9**	--	**0.80**	**0.80**	**1.20**	**0.80**	0.10 U	**2.50**	**2.70**	**1.60**	**43.5**	**0.30**
Particle/Grain Size, Sand	**64.2**	**53.8**	**57.6**	**93.3**	--	--	--	**49.4**	**25.7**	--	**84.0**	**84.6**	**95.5**	**78.7**	**92.5**	**76.4**	**73.6**	**57.1**	**53.3**	**89.0**
Particle/Grain Size, Silt	**8.40**	**2.80**	**1.80**	**0.20 J**	--	--	--	**3.80**	**1.20**	--	**12.3**	**11.0**	**2.40**	**15.6**	**5.70**	**14.9**	**16.7**	**32.9**	**2.40**	**8.70**
Total Percent Fines	**10.3**	**2.85**	**1.85**	**2.2**	--	--	--	**4.1**	**4.5**	--	**15.1**	**14.6**	**3.3**	**20.6**	**7.6**	**21**	**23.6**	**41.5**	**3.2**	**10.8**
Metals (mg/kg, dw)																				
Arsenic	**4.64**	**8.80**	**15.1**	**8.02**	**8.80**	--	--	**9.29**	**11.4**	--	**3.56**	**4.57 J**	**8.92 J**	**8.33**	**3.32**	**12.8**	**13.8**	**18.5**	**7.26**	**4.88**
Cadmium	**0.19**	**0.16**	**0.12**	**0.07 J**	**0.14 J**	--	--	**0.08 J**	**0.13**	--	**0.11 J**	**0.21 J**	**0.08 J**	**0.73**	**0.15**	**1.33**	**1.58**	**1.72**	**0.13**	**0.36**
Chromium	**22.7**	**58.9**	**24.4**	**15.9**	**16.3**	--	--	**19.0**	**21.3**	--	**10.9**	**13.0**	**13.7**	**11.7**	**10.8**	**14.4**	**17.7**	**18.7**	**26.4**	**8.96**
Copper	**29.6**	**36.9**	**76.6**	**105**	**64.1**	--	--	**77.1**	**61.5**	--	**8.25**	**15.7**	**10.4**	**18.1**	**6.40**	**35.2**	**40.0**	**115**	**60.4**	**8.81**
Lead	**31.9**	**7.68**	**309**	**175**	**259**	--	--	**138**	**165**	--	**14.9**	**31.9 J**	**11.3 J**	**24.3**	**11.5**	**83.1**	**94.8**	**210**	**105**	**13.5**
Mercury	**0.166**	**0.0134 J**	**0.0134 J**	0.00468 U	0.00407 U	--	--	**0.0258**	**0.0114 J**	--	**0.0277 J**	**0.0568 J**	**0.0231 J**	**0.0892**	**0.0321**	**0.270**	**0.233**	**0.459**	**0.0519**	**0.0717**
Silver	**0.10 J**	**0.07 J**	**0.08 J**	**0.06 J**	**0.07 J**	--	--	**0.12 J**	**0.10 J**	--	**0.06 J**	**0.08 J**	**0.07 J**	**0.10 J**	**0.04 J**	**0.17 J**	**0.51 J**	**0.29 J**	**0.08 J**	**0.05 J**
Zinc	**70.1**	**64.4**	**122**	**89.6**	**142**	--	--	**102**	**106**	--	**31.3**	**35.0**	**41.0**	**39.2**	**34.6**	**58.4**	**71.9**	**127**	**94.3**	**29.8**
AVS/SEM[c] (µmoles/g)																				
Cadmium	**0.030 J**	0.010 U	**0.010 J**	--	--	0.011 U	**0.016 J**	0.010 U	--	0.011 U	**0.010 J**	**0.020 J**	0.010 UJ	**0.080**	**0.020 J**	**0.19**	**0.18**	**0.25**	**0.010 J**	**0.030 J**
Copper	**0.92**	**0.50**	**3.64**	--	--	**5.85 J**	**1.90 J**	**3.93**	--	**5.59**	**0.42**	**0.84 J**	**0.50 J**	**0.32**	**0.21**	**0.61**	**0.56**	**1.81**	**2.58**	**0.20**
Lead	**6.48**	**1.83**	**47.9**	--	--	**23.7**	**27.8**	**89.0**	--	**27.6**	**3.92**	**8.31 J**	**2.35 J**	**4.31**	**2.25**	**18.1**	**17.5**	**50.5**	**17.2**	**2.48**
Silver	0.010 U	0.0080 U	0.0080 U	--	--	0.0070 U	0.0070 U	0.0080 U	--	0.0080 U	0.0090 U	0.010 U	0.0080 U	0.010 U	0.010 U	0.020 U	0.020 U	0.020 U	0.0080 U	0.010 U
Zinc	**3.1 J+**	**1.4 J+**	**5.2 J+**	--	--	**2.99**	**3.18**	**3.5 J+**	--	**7.70**	**2.8 J+**	**2.6 J+**	**1.9 J+**	**2.5 J+**	**1.2 J+**	**5.3 J+**	**4.2 J+**	**9.6 J+**	**3.8 J+**	**1.7 J+**
Sulfide	**0.891 J**	**0.0359 R**	**0.0383 R**	--	--	0.0675 U	0.0714 U	**0.0367 R**	--	0.0702 U	**0.215 J**	**18.8 J**	**0.0375 R**	**12.1 J**	**2.11 J**	**11.9 J**	**14.6 J**	**33.4 J**	**0.0348 R**	**5.69 J**
∑SEM–AVS	**9.65**	--	--	--	--	**32.5**	**32.8**	--	--	**40.8**	**6.94**	**-7.02**	--	**-4.88**	**1.58**	**12.3**	**7.86**	**28.8**	--	**-1.27**
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	**0.0250**	--	--	--	--	**2.17**	**3.28**	--	--	**0.567**	**0.0551**	**-0.0327**	--	**-0.0116**	**0.0322**	**0.00595**	**0.00432**	**0.0148**	--	**-0.0159**
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	**38.1 J+**	**2.93 J**	**379 J+**	1.01 U	1.03 U	--	--	**4.16 J**	**1.14 J**	--	**10.9**	**5.68 J**	**11 J**	**19.2 J+**	**3.32 J**	**95.7 J+**	**70.4 J+**	**308 J+**	**2.29 J**	**3.89 J**
Acenaphthene	**27.1 J+**	4.99 UJ	**550 J+**	0.52 U	0.53 U	--	--	**6.41 J+**	**0.8 J**	--	**11**	**10.3 J**	**60.3 J**	**21.1 J+**	4.98 UJ	**268 J+**	**133 J+**	**1040 J+**	4.98 UJ	5 UJ
Acenaphthylene	**82.2 J+**	**2.96 J**	**29.4 J+**	0.99 U	1.01 U	--	--	**5.87 J+**	**2.57 J**	--	**9.15**	**10.2 J**	**3.18 J**	**22.1 J+**	**3.6 J**	**129 J+**	**96.1 J+**	**275 J+**	**4.09 J**	**6.63 J+**
Anthracene	**112 J+**	**2.83 J**	**690 J+**	0.8 UJ	**0.93 J**	--	--	**11.3 J+**	**4.14 J**	--	**23.7**	**24.1 J**	**83.4 J**	**44.8 J+**	**7.28 J+**	**520 J+**	**351 J+**	**1720 J+**	**7.76 J+**	**13.3 J+**
Fluorene	**65.8 J+**	**1.39 J**	**472 J+**	0.58 U	0.59 U	--	--	**6.45 J+**	**1.01 J**	--	**12.5**	**10.2 J**	**45 J**	**28 J+**	**5.1 J+**	**279 J+**	**171 J+**	**1060 J+**	4.98 UJ	**7.13 J+**
Naphthalene	**361 J+**	**16.1 J+**	**376 J+**	1.17 UJ	**1.4 J**	--	--	**7.86 J+**	**5.78**	--	**55**	**33.2 J**	**17.8 J**	**122 J+**	**18.3 J+**	**473 J+**	**425 J+**	**536 J+**	**3.14 J**	**25.1 J+**
Phenanthrene	**600 J+**	**13.6 J+**	**4630 J+**	**5.82**	**3.66 J**	--	--	**65.6 J+**	**16.6**	--	**115**	**99.1 J**	**429 J**	**170 J**	**25.9 J+**	**1920 J+**	**1020 J+**	**7770 J+**	**34.3 J+**	**44.5 J+**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**1300**	**39.8**	**7100**	**5.8**	**6**	--	--	**108**	**32**	--	**237**	**193**	**650**	**430**	**63.5**	**3700**	**2270**	**12700**	**51.6**	**100**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	**0.987 J+**	**0.401 J**	**158 J+**	0.673 U	1.03 U	--	--	**0.54 J**	**0.158 J**	--	**0.865**	**0.264 J**	**1.34 J**	**0.457 J+**	**0.678 J**	**0.462 J+**	**0.387 J+**	**1.59 J+**	**0.954 J**	**0.486 J**
Acenaphthene	**0.702 J+**	0.684 UJ	**230 J+**	0.35 U	0.53 U	--	--	**0.832 J+**	**0.11 J**	--	**0.873**	**0.479 J**	**7.35 J**	**0.502 J+**	1.02 UJ	**1.29 J+**	**0.731 J+**	**5.36 J+**	2.08 UJ	0.63 UJ
Acenaphthylene	**2.13 J+**	**0.405 J**	**12.3 J+**	0.66 U	1.01 U	--	--	**0.762 J+**	**0.357 J**	--	**0.726**	**0.474 J**	**0.388 J**	**0.526 J+**	**0.735 J**	**0.623 J+**	**0.528 J+**	**1.42 J+**	**1.7 J**	**0.829 J+**
Anthracene	**2.9 J+**	**0.388 J**	**290 J+**	0.53 UJ	**0.93 J**	--	--	**1.47 J+**	**0.575 J**	--	**1.88**	**1.12 J**	**10.2 J**	**1.07 J+**	**1.49 J+**	**2.5 J+**	**1.93 J+**	**8.87 J+**	**3.23 J+**	**1.66 J+**
Fluorene	**1.7 J+**	**0.19 J**	**197 J+**	0.39 U	0.59 U	--	--	**0.838 J+**	**0.14 J**	--	**0.992**	**0.474 J**	**5.49 J**	**0.667 J+**	**1.04 J+**	**1.35 J+**	**0.94 J+**	**5.46 J+**	2.08 UJ	**0.891 J+**
Naphthalene	**9.35 J+**	**2.21 J+**	**157 J+**	0.78 UJ	**1.4 J**	--	--	**1.02 J+**	**0.803**	--	**4.37**	**1.54 J**	**2.17 J**	**2.9 J+**	**3.73 J+**	**2.29 J+**	**2.34 J+**	**2.76 J+**	**1.31 J**	**3.14 J+**
Phenanthrene	**16 J+**	**1.86 J+**	**1930 J+**	**3.88**	**3.66 J**	--	--	**8.52 J+**	**2.31**	--	**9.13**	**4.61 J**	**52.3 J**	**4 J**	**5.29 J+**	**9.28 J+**	**5.6 J+**	**40.1 J+**	**14.3 J+**	**5.56 J+**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**34**	**5.45**	**3000**	**3.9**	**6**	--	--	**14**	**4.5**	--	**18.8**	**8.96**	**79.2**	**10**	**13**	**18**	**12.5**	**65.6**	**21.5**	**13**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**271 J+**	**4.98 J**	**1180 J+**	**5.99 J**	**2.34 J**	--	--	**24.2 J+**	**21**	--	**49**	**59.6 J**	**113 J**	**106 J+**	**12.4 J+**	**1070 J+**	**637 J+**	**3190 J+**	**29.3 J+**	**25.8 J+**
Benzo(a)pyrene	**415 J+**	**8.02 J+**	**1310 J+**	**5.78 J**	**3.1 J**	--	--	**30 J+**	**23 J**	--	**61**	**67.5 J**	**128 J**	**112 J+**	**14.4 J+**	**1140 J+**	**625 J+**	**3380 J+**	**33.1 J+**	**29.8 J+**
Benzo(b)fluoranthene	**260 J+**	**4.67 J**	**856 J+**	**4.5 J**	**2.53 J**	--	--	**21.1 J+**	**15**	--	**39.9**	**46.2 J**	**82.1 J**	**78.2 J**	**10.3 J+**	**655 J+**	**452 J+**	**1880 J+**	**21.8 J+**	**19.3 J+**
Benzo(g,h,i)perylene	**328 J+**	**14.4 J+**	**830 J+**	**6.05 J**	**4.23 J**	--	--	**37.1 J+**	**21.7**	--	**93.8**	**54.4 J+**	**87.7 J**	**93.7 J+**	**18.5 J+**	**832 J+**	**452 J+**	**2260 J+**	**24.8 J+**	**25.9 J+**
Benzo(j)fluoranthene	**126 J+**	**2.56 J**	**430 J+**	**3.43 J**	**1.68 J**	--	--	**12.4 J+**	**10.7**	--	**21.3**	**24.3 J**	**47.7 J**	**39.1 J+**	**5.14 J+**	**345 J+**	**201 J+**	**946 J+**	**10.7 J+**	**8.69 J+**
Benzo(k)fluoranthene	**161 J+**	**3.15 J**	**542 J+**	**3.05 J**	**1.61 J**	--	--	**13.7 J+**	**10.2**	--	**25.2**	**28.9 J**	**55 J**	**45.9 J+**	**6.19 J+**	**415 J+**	**242 J+**	**1260 J+**	**13 J+**	**11.3 J+**
Chrysene	**345 J+**	**6.31 J+**	**1440 J+**	**8.34 J**	**3.64 J**	--	--	**31.9 J+**	**26.5**	--	**61.9**	**74 J**	**145 J**	**119 J**	**13.7 J+**	**1030 J+**	**711 J+**	**3180 J+**	**31.1 J+**	**26 J+**
Dibenzo(a,h)anthracene	**77.8 J+**	**1 J**	**281 J+**	**1.26 J**	0.83 UJ	--	--	**5.87 J+**	**4.52**	--	**12.2**	**13.8 J+**	**22.4 J**	**16.7 J+**	**2.59 J**	**150 J+**	**107 J+**	**418 J+**	**5.88 J+**	**4.23 J**
Fluoranthene	**669 J+**	**15.1 J+**	**3070 J+**	**12.3 J**	**5.65 J**	--	--	**55.4 J+**	**49.5**	--	**140**	**155 J**	**305 J**	**224 J**	**39.2 J+**	**2260 J+**	**1280 J+**	**7050 J+**	**55 J+**	**73.1 J+**
Indeno(1,2,3-c,d)pyrene	**285 J+**	**6.13 J+**	**780 J+**	**4.77**	**3.35 J**	--	--	**25.9 J+**	**19.1**	--	**60.6**	**47.8 J+**	**73.9 J**	**66.1 J**	**12.2 J+**	**616 J+**	**326 J+**	**1740 J+**	**20.9 J+**	**18.5 J+**
Pyrene	**814 J+**	**19.1 J+**	**3930 J+**	**11.2 J**	**5.04 J**	--	--	**80.4 J+**	**48.8**	--	**165**	**217 J+**	**349 J**	**260 J**	**36.6 J+**	**2360 J+**	**1360 J+**	**7110 J+**	**54.7 J+**	**70.2 J+**
Total Benzofluoranthenes	**550**	**10.4**	**1800**	**11**	**5.82**	--	--	**47.2**	**35.9**	--	**86.4**	**99.4**	**185**	**163**	**21.6**	**1420**	**895**	**4090**	**45.5**	**39.3**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL[e,f]	**3800**	**85.4**	**15000**	**66.7**	**34**	--	--	**338**	**250**	--	**730**	**788**	**1410**	**1200**	**171**	**11000**	**6390**	**32400**	**300**	**313**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**7.02 J+**	**0.682 J**	**492 J+**	**3.99 J**	**2.34 J**	--	--	**3.14 J+**	**2.92**	--	**3.89**	**2.77 J**	**13.8 J**	**2.52 J+**	**2.53 J+**	**5.17 J+**	**3.5 J+**	**16.4 J+**	**12.2 J+**	**3.23 J+**
Benzo(a)pyrene	**10.8 J+**	**1.1 J+**	**546 J+**	**3.85 J**	**3.1 J**	--	--	**3.9 J+**	**3.19 J**	--	**4.84**	**3.14 J**	**15.6 J**	**2.67 J+**	**2.94 J+**	**5.51 J+**	**3.43 J+**	**17.4 J+**	**13.8 J+**	**3.73 J+**
Benzo(b)fluoranthene	**6.7 J+**	**0.64 J**	**357 J+**	**3 J**	**2.53 J**	--	--	**2.74 J+**	**2.08**	--	**3.17**	**2.15 J**	**10 J**	**1.86 J**	**2.1 J+**	**3.16 J+**	**2.48 J+**	**9.69 J+**	**9.08 J+**	**2.41 J+**
Benzo(g,h,i)perylene	**8.5 J+**	**1.97 J+**	**350 J+**	**4.03 J**	**4.23 J**	--	--	**4.82 J+**	**3.01**	--	**7.44**	**2.53 J+**	**10.7 J**	**2.23 J+**	**3.78 J+**	**4.02 J+**	**2.48 J+**	**11.6 J+**	**10.3 J+**	**3.24 J+**
Benzo(j)fluoranthene	**3.26 J+**	**0.351 J**	**180 J+**	**2.29 J**	**1.68 J**	--	--	**1.61 J+**	**1.49**	--	**1.69**	**1.13 J**	**5.82 J**	**0.931 J+**	**1.05 J+**	**1.67 J+**	**1.1 J+**	**4.88 J+**	**4.46 J+**	**1.09 J+**
Benzo(k)fluoranthene	**4.17 J+**	**0.432 J**	**226 J+**	**2.03 J**	**1.61 J**	--	--	**1.78 J+**	**1.42**	--	**2**	**1.34 J**	**6.71 J**	**1.09 J+**	**1.26 J+**	**2 J+**	**1.33 J+**	**6.49 J+**	**5.42 J+**	**1.41 J+**
Chrysene	**8.94 J+**	**0.864 J+**	**600 J+**	**5.56 J**	**3.64 J**	--	--	**4.14 J+**	**3.68**	--	**4.91**	**3.44 J**	**17.7 J**	**2.83 J**	**2.8 J+**	**4.98 J+**	**3.91 J+**	**16.4 J+**	**13 J+**	**3.25 J+**
Dibenzo(a,h)anthracene	**2.02 J+**	**0.137 J**	**117 J+**	**0.84 J**	0.83 UJ	--	--	**0.762 J+**	**0.628**	--	**0.968**	**0.642 J+**	**2.73 J**	**0.398 J+**	**0.529 J**	**0.72 J+**	**0.588 J+**	**2.15 J+**	**2.45 J+**	**0.529 J**
Fluoranthene	**17.3 J+**	**2.07 J+**	**1280 J+**	**8.2 J**	**5.65 J**	--	--	**7.19 J+**	**6.88**	--	**11**	**7.21 J**	**37.2 J**	**5.33 J**	**8 J+**	**10.9 J+**	**7.03 J+**	**36.3 J+**	**22.9 J+**	**9.14 J+**
Indeno(1,2,3-c,d)pyrene	**7.38 J+**	**0.84 J+**	**330 J+**	**3.18**	**3.35 J**	--	--	**3.36 J+**	**2.65**	--	**4.81**	**2.22 J+**	**9.01 J**	**1.57 J**	**2.49 J+**	**2.98 J+**	**1.79 J+**	**8.97 J+**	**8.71 J+**	**2.31 J+**
Pyrene	**21.1 J+**	**2.62 J+**	**1640 J+**	**7.47 J**	**5.04 J**	--	--	**10.4 J+**	**6.78**	--	**13.1**	**10.1 J+**	**42.6 J**	**6.2 J**	**7.47 J+**	**11.4 J+**	**7.47 J+**	**36.6 J+**	**22.8 J+**	**8.78 J+**
Total Benzofluoranthenes	**14**	**1.42**	**760**	**7.32**	**5.82**	--	--	**6.13**	**4.99**	--	**6.86**	**4.62**	**22.5**	**3.88**	**4.41**	**6.83**	**4.91**	**21.1**	**19**	**4.91**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**97**	**11.7**	**6100**	**44.4**	**34**	--	--	**43.8**	**34.7**	--	**58**	**36.7**	**172**	**28**	**34.9**	**53**	**35.1**	**167**	**125**	**39.1**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**520**	**10.1**	**1700**	**7.82**	**4.2**	--	--	**39.4**	**30.2**	--	**80.3**	**87.9**	**164**	**144**	**18.9**	**1400**	**809**	**4260**	**42.5**	**38**
Total cPAH TEQ (ND=0)[g]	**520**	**10.1**	**1700**	**7.82**	**4.1**	--	--	**39.4**	**30.2**	--	**80.3**	**87.9**	**164**	**144**	**18.9**	**1400**	**809**	**4260**	**42.5**	**38**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																				
1,2,4-Trichlorobenzene	2.7 UJ	2.7 UJ	2.6 UJ	3.5 U	3.5 U	--	--	2.7 UJ	3.5 U	--	2.7 U	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ	2.7 UJ
1,2-Dichlorobenzene	0.7 UJ	0.7 UJ	0.7 UJ	2.4 U	2.3 U	--	--	0.7 UJ	2.4 U	--	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	**2.2 J**	**1.7 J**	**2.5 J**	0.7 UJ	0.7 UJ
1,4-Dichlorobenzene	0.6 UJ	0.6 UJ	0.6 UJ	3.1 U	3.1 U	--	--	0.6 UJ	3.1 U	--	0.6 U	0.6 UJ	0.6 UJ	**4.1 J**	0.6 UJ	**7.8 J+**	**5.7 J+**	**8 J+**	0.6 UJ	0.6 UJ
Hexachlorobenzene	0.7 UJ	0.7 UJ	0.7 UJ	13.4 U	13.3 U	--	--	0.7 UJ	13.4 U	--	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.7 UJ	0.7 UJ	0.7 UJ	4.8 U	4.8 U	--	--	0.7 UJ	4.8 U	--	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ
Chlorinated Organics (mg/kg, OC)																				
1,2,4-Trichlorobenzene	0.07 UJ	0.37 UJ	1.1 UJ	2.3 U	3.5 U	--	--	0.35 UJ	0.49 U	--	0.21 U	0.13 UJ	0.33 UJ	0.064 UJ	0.55 UJ	0.013 UJ	0.015 UJ	0.014 UJ	1.1 UJ	0.34 UJ
1,2-Dichlorobenzene	0.018 UJ	0.096 UJ	0.29 UJ	1.6 U	2.3 U	--	--	0.091 UJ	0.33 U	--	0.056 U	0.033 UJ	0.085 UJ	0.017 UJ	0.14 UJ	**0.011 J**	**0.0093 J**	**0.013 J**	0.29 UJ	0.087 UJ
1,4-Dichlorobenzene	0.016 UJ	0.082 UJ	0.25 UJ	2.1 U	3.1 U	--	--	0.078 UJ	0.43 U	--	0.048 U	0.028 UJ	0.073 UJ	**0.098 J**	0.12 UJ	**0.038 J+**	**0.031 J+**	**0.041 J+**	0.25 UJ	0.075 UJ
Hexachlorobenzene	0.018 UJ	0.096 UJ	0.29 UJ	8.93 U	13.3 U	--	--	0.091 UJ	1.86 U	--	0.056 U	0.033 UJ	0.085 UJ	0.017 UJ	0.14 UJ	0.0034 UJ	0.0038 UJ	0.0036 UJ	0.29 UJ	0.087 UJ
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.018 UJ	0.096 UJ	0.29 UJ	3.2 U	4.8 U	--	--	0.091 UJ	0.67 U	--	0.056 U	0.033 UJ	0.085 UJ	0.017 UJ	0.14 UJ	0.0034 UJ	0.0038 UJ	0.0036 UJ	0.29 UJ	0.087 UJ
Organic Chemicals/Phenols (µg/kg, dw)																				
2,4-Dimethylpheno	**4.7 J**	2.2 UJ	2.1 UJ	3.8 UJ	3.7 UJ	--	--	2.2 UJ	3.7 U	--	2.2 U	2.2 UJ	2.2 UJ	**4.8 J**	2.2 UJ	**14.6 J**	**11.4 J**	**69.6 J+**	2.2 UJ	2.2 UJ
2-Methylphenol (o-Cresol`	**6.4 J+**	1.1 UJ	1.1 UJ	6.6 UJ	6.6 UJ	--	--	1.1 UJ	6.6 U	--	1.1 U	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	**11 J+**	**8.8 J+**	**46.5 J+**	1.1 UJ	**1.7 J**
4-Methylphenol (p-Cresol`	**72.1 J+**	0.9 UJ	0.9 UJ	7.3 UJ	7.3 UJ	--	--	0.9 UJ	7.3 U	--	**19.4**	**51.9 J**	**1.1 J**	**134 J+**	**3.3 J**	**176 J**	**98 J**	**221 J+**	0.9 UJ	**15.2 J+**
Benzoic acid	**35.6 J**	13.4 UJ	13.2 UJ	38.8 UJ	38.6 UJ	--	--	13.3 UJ	38.7 UJ	--	**23.6 J**	**17.9 J**	13.4 UJ	**110 J**	13.4 UJ	13.4 UJ	**38.9 J**	**98.8 J**	13.4 UJ	13.4 UJ
Benzyl alcoho	2.5 UJ	2.5 UJ	2.4 UJ	16.2 U	16.1 U	--	--	2.5 UJ	16.1 U	--	**15 J**	2.5 UJ	2.5 UJ	**9 J**	2.5 UJ	**25.3 J+**	**25.2 J+**	**21.7 J+**	2.5 UJ	**2.8 J**
Dibenzofuran	**27.7**	14.1 U	13.9 U	1.26 U	1.29 U	--	--	14 U	**1.34 J**	--	14.1 U	**65.1 J**	14.1 UJ	**37.6**	14.1 U	**515 J**	**292 J**	**766**	14.1 U	14.1 U
n-Nitrosodiphenylamine	1.3 UJ	1.3 UJ	1.3 UJ	5.3 UJ	5.3 U,R	--	--	1.3 UJ	5.3 UJ	--	1.3 U	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ	1.3 UJ
Pentachloropheno	2.1 UJ	**7.6 J**	2.1 UJ	31.1 UJ	30.9 UJ	--	--	2.1 UJ	31 UJ	--	2.1 U	2.1 UJ	2.1 UJ	**9.4 J**	2.1 UJ	2.1 UJ	**83.4 J**	**18 J**	2.1 UJ	2.1 UJ
Phenol	**30.5 J+**	**3 J**	**2.4 J**	4.4 UJ	4.3 UJ	--	--	**3.5 J**	4.4 U	--	**23.6**	**85 J**	**3.3 J**	**39.5 J+**	**9.6 J+**	**79.6 J+**	**73.1 J+**	**137 J+**	5 UJ	**15.7 J+**
Organic Chemicals/Phenols (mg/kg, OC)																				
Dibenzofuran	**0.718**	1.93 U	5.79 U	0.84 U	1.29 U	--	--	1.8 U	**0.186 J**	--	1.12 U	**3.03 J**	1.72 UJ	**0.895**	2.88 U	**2.49 J**	**1.6 J**	**3.95**	5.88 U	1.76 U
N-Nitrosodiphenylamine	0.034 UJ	0.18 UJ	0.54 UJ	3.5 UJ	5.3 U,R	--	--	0.17 UJ	0.74 UJ	--	0.1 U	0.06 UJ	0.16 UJ	0.031 UJ	0.27 UJ	0.0063 UJ	0.0071 UJ	0.0067 UJ	0.54 UJ	0.16 UJ
Phthalates (µg/kg, dw)																				
bis(2-Ethylhexyl)phthalate	5.5 U	50 U	49.4 U	5.4 U	5.4 U	--	--	49.6 U	5.4 U	--	5.4 U	5.5 U	5.4 U	**12.9 J**	**5.8 J**	**47.3 J**	**71 J**	**197**	5.4 U	5.5 U
Butylbenzyl phthalate	**3.3 J**	0.7 UJ	0.7 UJ	9.4 U	9.3 U	--	--	0.7 UJ	9.3 U	--	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ	0.7 UJ
Diethyl phthalate	**38.5 J+**	20 UJ	19.7 UJ	19.6 U	19.5 U	--	--	19.8 UJ	19.5 U	--	18.1 UJ	**28.9 J+**	**46.3 J+**	20 UJ	**22.4 J+**	20 UJ	20 UJ	20 UJ	19.9 UJ	**21.8 J+**
Dimethyl phthalate	1 UJ	1 UJ	1 UJ	4.4 U	4.3 U	--	--	1 UJ	4.4 U	--	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	**7.9 J+**	**81.1 J+**	1 UJ
Di-n-butyl phthalate	5.6 U	5.6 U	5.5 U	5.6 U	5.5 U	--	--	5.6 U	5.6 U	--	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.3 U	4.4 U	4.3 U	--	--	4.4 U	4.4 U	--	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 UJ	**7.6 J**	4.4 U	4.4 U	4.4 U
Phthalates (mg/kg, OC)																				
bis(2-Ethylhexyl)phthalate	0.14 U	6.8 U	20.6 U	3.6 U	5.4 U	--	--	6.44 U	0.75 U	--	0.43 U	0.26 U	0.66 U	**0.307 J**	**1.2 J**	**0.229 J**	**0.39 J**	**1.02**	2.3 U	0.69 U
Butyl benzyl phthalate	**0.085 J**	0.096 UJ	0.29 UJ	6.3 U	9.3 U	--	--	0.091 UJ	1.3 U	--	0.056 U	0.033 UJ	0.085 UJ	0.017 UJ	0.14 UJ	0.0034 UJ	0.0038 UJ	0.0036 UJ	0.29 UJ	0.087 UJ
Diethyl phthalate	**0.997 J+**	2.7 UJ	8.21 UJ	13.1 U	19.5 U	--	--	2.57 UJ	2.71 U	--	1.44 UJ	**1.34 J+**	**5.65 J+**	0.48 UJ	**4.57 J+**	0.097 UJ	0.11 UJ	0.1 UJ	8.29 UJ	**2.73 J+**
Dimethyl phthalate	0.026 UJ	0.14 UJ	0.42 UJ	2.9 U	4.3 U	--	--	0.13 UJ	0.61 U	--	0.079 U	0.047 UJ	0.12 UJ	0.024 UJ	0.2 UJ	0.0048 UJ	0.0055 UJ	**0.041 J+**	**33.8 J+**	0.13 UJ
Di-n-butyl phthalate	0.15 U	0.77 U	2.3 U	3.7 U	5.5 U	--	--	0.73 U	0.78 U	--	0.44 U	0.26 U	0.68 U	0.13 U	1.1 U	0.027 U	0.031 U	0.029 U	2.3 U	0.7 U
Di-n-Octyl Phthalate	0.11 U	0.6 U	1.8 U	2.9 U	4.3 U	--	--	0.57 U	0.61 U	--	0.35 U	0.2 U	0.54 U	0.1 U	0.9 U	0.021 UJ	**0.042 J**	0.023 U	1.8 U	0.55 U
Dioxin/Furans (ng/kg, dw)																				
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF`	4.95 UJ	4.75 UJ	**605**	**192**	**235**	--	--	**1550**	**270**	--	5.13 UJ	**11.9**	**8.79**	--	--	**8.71**	**11.0**	**42.4**	**5.87**	--
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD	**252 J**	**429 J**	**863**	**378**	**416**	--	--	**1020**	**535**	--	**890 J**	**528**	**445**	--	--	**381**	**536**	**874**	**177**	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	2.48 UJ	2.37 UJ	**2470**	**422**	**436**	--	--	**1010**	**433**	--	**5.13 J**	**16.4**	**11.9**	--	--	**10.2**	**11.3**	**20.5**	**3.88**	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**26.8 J**	**52.2 J**	**695**	**245**	**338**	--	--	**437**	**530**	--	**45.2 J**	**53.7**	**50.2**	--	--	**52.8**	**71.1**	**108**	**25.2**	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	0.0495 UJ	2.37 UJ	**43.8**	**10.3**	**15.4**	--	--	**24.9**	**16.3**	--	**0.198 J**	**0.406 J**	**0.445 J**	--	--	**0.499 J**	**0.511 J**	**1.50 J**	**0.159 J**	--
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	**0.111 J**	**0.183 J**	**579**	**155 J**	**261 J**	--	--	**316**	**237**	--	**1.61 J**	**6.94**	**4.28**	--	--	**3.56**	**3.51**	**4.58**	**0.623 J**	--
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**0.529 J**	**1.08 J**	**32.8**	**24.0**	**30.7**	--	--	**38.5**	**51.7**	--	**1.06 J**	**1.97 J**	**1.45 J**	--	--	**1.55 J**	**2.36 J**	**3.05 J**	**0.602 J**	--
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	**0.0623 J**	**0.0857 J**	**83.7**	**35.3**	**51.2**	--	--	**66.8**	**48.7**	--	**0.508 J**	**1.52 J**	**1.10 J**	--	--	**1.40 J**	**1.52 J**	**2.97 J**	**0.393 J**	--
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**0.901 J**	**1.88 J**	**92.3**	**48.2**	**51.0**	--	--	**75.2**	**98.3**	--	**2.20 J**	**3.73**	**2.85**	--	--	**4.23**	**5.26**	**6.96**	**1.73 J**	--
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	0.0495 UJ	0.0475 UJ	**3.11**	**1.31 J**	**1.98 J**	--	--	**2.91**	**2.55**	--	0.0513 UJ	**0.154 J**	**0.108 J**	--	--	**0.133 J**	**0.140 J**	**0.346 J**	**0.0764 J**	--
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**1.23 J**	**2400 J**	**57.7**	**42.6**	**37.6**	--	--	**55.7**	**62.5**	--	**2.35 J**	**4.59**	**2.96**	--	--	**4.11**	**5.08**	**5.30**	**1.71 J**	--
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	2.48 UJ	**0.147 J**	**172**	**53.5**	**75.2**	--	--	**98.8**	**93.0**	--	2.56 UJ	2.60 U	2.52 U	--	--	2.41 U	2.50 U	**3.39**	2.36 U	--
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**0.270 J**	**0.475 J**	**33.8**	**21.0 J**	**18.6**	--	--	**32.6**	**39.3**	--	**0.755 J**	**1.52 J**	**1.06 J**	--	--	**1.95 J**	**2.36 J**	**3.11 J**	**0.533 J**	--
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	0.0495 UJ	**0.0880 J**	**26.5**	**18.4**	**19.5**	--	--	**23.4**	**16.3**	--	**0.363 J**	**0.735 J**	**0.595 J**	--	--	**0.970 J**	**1.27 J**	**2.49 J**	**0.327 J**	--
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF`	**0.0596 J**	**0.0858 J**	**40.3**	**23.5**	**28.0**	--	--	**33.3**	**30.5**	--	**0.466 J**	**0.948 J**	**0.863 J**	--	--	**1.76 J**	**2.16 J**	**3.65**	**0.345 J**	--
2,3,7,8-Tetrachlorodibenzofuran (TCDF`	**0.101 J**	**147 J**	**78.6**	**37.2**	**27.9**	--	--	**62.5**	**44.7**	--	**0.681 J**	**1.62**	**1.39**	--	--	**3.68**	**4.57**	**6.88**	**0.488**	--
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD`	**0.145 J**	**0.307 J**	**16.8**	**7.05 J**	**2.79 J**	--	--	**9.77**	**10.2**	--	**0.285 J**	**0.558 J**	**0.507 J**	--	--	**0.740 J**	**0.887 J**	**1.37**	**0.266 J**	--
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**1.13**	**257**	**196**	**79.8**	**88.2**	--	--	**135**	**128**	--	**2.87**	**5.39**	**4.10**	--	--	**5.97**	**7.30**	**10.5**	**1.88**	--
Total TCDD TEQ (ND=0)[h]	**1.07**	**256**	**196**	**79.8**	**88.2**	--	--	**135**	**128**	--	**2.83**	**5.36**	**4.06**	--	--	**5.93**	**7.26**	**10.5**	**1.84**	--

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	SG-27-0to10	SG-28-0to10	SG-30-0to10	SG-31-0to10	SG-33-0to10	SG-35-0to10	SG-36-0to10	SG-37-0to10	SG-37-0to10-D	SG-39-0to10	SG-41-0to10	SG-42-0to10	BH-SG-43-0to10	BH-SG-43-0to10	BH-SG-44-0to10	BH-SG-44-0to10	BH-SG-45-0to10	BH-SG-45-0to10	BH-SG-46-0to10	BH-SG-47-0to10
Location:	SG-27	SG-28	SG-30	SG-31	SG-33	SG-35	SG-36	SG-37	SG-37	SG-39	SG-41	SG-42	SG-43	SG-43	SG-44	SG-44	SG-45	SG-45	SG-46	SG-47
Sample Date:	2021-08-25	2021-08-25	2021-08-25	2021-08-26	2021-08-25	2021-08-24	2021-08-24	2021-08-26	2021-08-26	2021-08-24	2021-08-24	2021-08-24	2022-09-22	2022-10-10	2022-09-22	2022-10-10	2022-09-22	2022-10-10	2022-10-13	2022-10-13
Depth Interval:	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:									Duplicate											
Analyte																				
Conventional Parameters																				
% Moisture (%)	**32.8**	--	--	--	**47.3**	**40.9**	**56.3**	**21.6**	**21.0**	**44.5**	--	--	**20.3**	--	**15.5**	--	**26.0**	--	**55.3**	**55.3**
% Wood Debris (%)[b]	**5**	**10**	**17.5**	**10**	**12.9**	**50**	**10**	**15**	--	**52.5**	**12.5**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**35**
Ammonia (mg/kg)	**9.23**	**7.79**	**10.4**	**6.18**	**20.5**	**5.54**	**14.1**	**3.88 J**	**8.05 J**	**15.4**	**12.2**	**3.64**	**1.47**	--	**1.84**	--	**3.88**	--	**10.4**	**19.9**
Nitrogen as Ammonia (NH3)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfide (mg/kg)	**211 J**	**427 J**	**134 J**	**150 J**	**871 J**	**131 J**	**728 J**	**53.7 J**	**82.9 J**	**951 J**	**785 J**	**46.4 J**	--	1.03 U,R	--	1.19 U,R	--	1.13 U,R	**459**	**564**
Total organic carbon (%)	**2.56**	**2.05**	**1.66**	**1.07**	**2.54**	**3.11 J**	**4.43**	**0.62**	**0.74**	**1.6**	**6.83**	**0.66**	**0.21**	--	**0.29**	--	**1.13**	--	**8**	**14**
Total organic carbon (mg/kg)	**25600**	**20500**	**16600**	**10700**	**25400**	**31100 J**	**44300**	**6200**	**7400**	**16000**	**68300**	**6600**	**2100**	--	**2900**	--	**11300**	--	**80000**	**140000**
Total Solids (mg/kg)	**628300**	**659600**	**665800**	**685200**	**472100**	**581900**	**465000**	**762300**	**737900**	**568600**	**437400**	**708700**	**800100**	**855400**	**847500**	**802700**	**757600**	**860700**	**452800**	**382700**
Total volatile solids (mg/kg)	**47500 J**	**43600 J**	**38700 J**	**35000 J**	**82300 J**	**60600 J**	**112800 J**	**20500 J**	**20100 J**	**54300 J**	**111700 J**	**25800 J**	**16700**	--	**29700**	--	**50800**	--	**128100**	**184600**
Preserved Total Solids (%)	**66.37**	**60.98**	**64.21**	**62.38**	**47.98**	**57.21**	**48.08**	**71.97**	**70.21**	**59.34**	**43.01**	**69.08**	**94.10**	**80.90**	**81.21**	**73.95**	**72.24**	**86.69**	**43.71**	**38.58**
Grain Size (%)																				
Particle/Grain Size, Clay	**3.00**	**3.30**	**1.80**	**3.90**	**7.60**	**7.40**	**8.20**	**3.90**	**2.70**	**4.20**	**7.80**	**3.90**	**2.30**	--	**3.40**	--	**3.70**	--	**12.0**	**13.1**
Particle/Grain Size, Gravel	**0.80**	**0.70**	**0.80**	0.10 U	**1.50**	**5.20**	**27.2**	**0.50**	0.10 U	**9.90**	**18.0**	**0.70**	**75.7**	--	**69.0**	--	**67.8**	--	**5.80 J**	**5.70**
Particle/Grain Size, Sand	**86.1**	**86.9**	**86.9**	**83.1**	**47.1**	**66.6**	**52.1**	**88.4**	**84.3**	**75.5**	**62.7**	**82.3**	**20.8**	--	**26.6**	--	**23.1**	--	**64.1**	**50.8**
Particle/Grain Size, Silt	**10.1**	**9.00**	**10.7**	**13.1**	**43.7**	**20.8**	**12.7**	**7.40**	**12.9**	**10.6**	**11.5**	**13.0**	**1.30**	--	**0.80**	--	**5.20**	--	**18.2 J**	**30.4**
Total Percent Fines	**13.1**	**12.3**	**12.5**	**17**	**51.3**	**28.2**	**20.9**	**11.3**	**15.6**	**14.8**	**19.3**	**16.9**	**3.6**	--	**4.2**	--	**8.9**	--	**30.2**	**43.5**
Metals (mg/kg, dw)																				
Arsenic	**7.38**	**7.94**	**7.34**	**3.72**	**12.1**	**5.83**	**9.02**	**2.82**	**2.25**	**7.79**	**9.06**	**3.83**	**11.6**	--	**7.68 J**	--	**5.69**	--	**14.0**	**11.9**
Cadmium	**0.52**	**0.67**	**0.64**	**0.43**	**1.11**	**0.49**	**1.07**	**0.18**	**0.19**	**0.73**	**1.00**	**0.30**	**0.29**	--	**0.16**	--	**0.14**	--	**0.69**	**0.66**
Chromium	**10.0**	**11.6**	**10.0**	**10.8**	**34.8**	**17.6**	**42.3**	**12.9**	**9.88**	**20.3**	**16.9**	**15.0**	**38.5**	--	**36.6 J+**	--	**30.3**	--	**26.5**	**27.1**
Copper	**15.8**	**13.1**	**9.78**	**12.7**	**75.0**	**31.0**	**44.1**	**10.8**	**8.31**	**67.6**	**57.5**	**13.9**	**32.3**	--	**33.7 J+**	--	**33.1**	--	**52.9**	**60.5**
Lead	**38.4**	**19.4**	**16.4**	**22.5**	**104**	**48.3**	**68.6**	**15.8**	**12.7**	**63.8**	**68.9**	**17.7**	**41.5**	--	**23.4 J+**	--	**41.5**	--	**86.1**	**105**
Mercury	**0.0976**	**0.122**	**0.0987**	**0.0799**	**0.247**	**0.231 J**	**0.484**	**0.0645**	**0.0487**	**0.306**	**0.767**	**0.0632**	**0.00669 J**	--	**0.0154 J**	--	**0.0887**	--	**0.353**	**0.278**
Silver	**0.07 J**	**0.08 J**	**0.06 J**	**0.07 J**	**0.23 J**	**0.16 J-**	**0.18 J**	**0.07 J**	**0.05 J**	**0.14 J**	**0.17 J**	**0.08 J**	**0.08 J**	--	**0.09 J**	--	**0.09 J**	--	**0.36 J**	**0.25 J**
Zinc	**32.5**	**31.8**	**29.6**	**28.8**	**99.1**	**54.6**	**69.5**	**25.7**	**22.3**	**80.8**	**87.4**	**34.9**	**62.3**	--	**67.8**	--	**91.9**	--	**94.6**	**102**
AVS/SEM[c] (µmoles/g)																				
Cadmium	**0.070**	**0.080**	**0.090**	**0.070**	**0.13**	**0.060**	**0.11**	**0.030 J**	**0.030 J**	**0.10**	**0.12**	**0.040 J**	--	**0.018 J**	--	0.012 U	--	**0.013 J**	**0.080**	**0.070 J**
Copper	**1.16**	**0.27**	**0.20**	**0.42**	**2.17**	**1.44**	**1.71**	**0.40**	**0.37**	**3.03**	**1.90**	**0.60**	--	**0.997**	--	**1.29**	--	**1.92**	**1.55**	**0.88 J**
Lead	**8.38**	**3.22**	**3.58**	**5.51**	**22.4**	**12.6 J+**	**15.8**	**3.52**	**3.29**	**19.2**	**14.7**	**4.28**	--	**5.03**	--	**6.76**	--	**6.81**	**15.2**	**16.6 J**
Silver	0.010 U	0.010 U	0.010 U	0.0090 U	0.020 U	0.010 U	0.020 U	0.0090 U	0.0090 U	0.010 U	0.020 U	0.010 U	--	0.0080 U	--	0.0090 U	--	0.0080 U	0.0080 U	0.0080 U
Zinc	**3.1 J+**	**1.7 J+**	**1.9 J+**	**1.9 J+**	**6.2 J+**	**3.5 J+**	**4.4 J+**	**1.5 J+**	**1.3 J+**	**206 J+**	**6.7 J+**	**3.5 J+**	--	**2.45**	--	**2.84**	--	**5.18**	**4.4**	**5.6 J**
Sulfide	**10.4 J**	**10.1 J**	**6.48 J**	**7.71 J**	**27.4 J**	**8.05 J**	**37.9 J**	**2.30 J**	**2.94 J**	**29.2 J**	**21.0 J**	**2.39 J**	--	0.0720 UJ	--	0.0786 U	--	0.0723 U	**2.75**	**10.4**
∑SEM–AVS	**2.32**	**-4.82**	**-0.7**	**0.199**	**3.52**	**9.56**	**-15.9**	**3.16**	**2.06**	**199**	**2.44**	**6.04**	--	**8.43**	--	**10.8**	--	**13.9**	**18.5**	**12.8**
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	**0.00906**	**-0.0235**	**-0.00422**	**0.00186**	**0.0139**	**0.0307**	**-0.0358**	**0.0510**	**0.0278**	**1.24**	**0.00357**	**0.0915**	--	**0.401**	--	**0.374**	--	**0.123**	**0.0231**	**0.00911**
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
2-Methylnaphthalene	**16.2 J+**	**5.35 J+**	**8.31 J+**	**7.99**	**59 J+**	**24.7 J+**	**54.1 J+**	**4.28 J**	**4.26 J**	**11.7 J+**	**36**	**4.98 J**	0.85 U	--	0.93 U	--	**5.32**	--	**82.9 J**	**27.1 J**
Acenaphthene	**20.7 J+**	**7.3 J+**	**8.97 J+**	**12.4**	**158 J+**	**42.1 J**	**110 J+**	4.91 U	4.99 U	**30.1 J+**	**47.2**	4.99 U	0.44 U	--	**0.61 J**	--	**13.2**	--	**47.8 J**	**18.1 J**
Acenaphthylene	**21.8 J+**	**6.63 J+**	**9.44 J+**	**12.9**	**68.9 J+**	**29.8 J+**	**80.8 J+**	**7.32**	**6.08**	**25.6 J+**	**75.8**	**7.77**	0.84 U	--	0.92 U	--	**6.52**	--	**192 J**	**35.1 J**
Anthracene	**49.8 J+**	**17.8 J+**	**22.1 J+**	**31.7**	**318 J+**	**99.8 J**	**390 J+**	**15.6**	**14.9**	**93.2 J+**	**324**	**17.7**	0.67 U	--	**1.58 J**	--	**29.7**	--	**109 J**	**31.9 J**
Fluorene	**27.8 J+**	**9.21 J+**	**13.1 J+**	**17.5**	**195 J+**	**49.9 J**	**174 J+**	**7.44**	**7.62**	**37.2 J+**	**100**	**7.99**	0.49 U	--	0.53 U	--	**11.1**	--	**67.2 J**	**22.9 J**
Naphthalene	**90 J+**	**29.2 J+**	**39 J+**	**35.3**	**116 J+**	**97.8 J**	**131 J+**	**19**	**16.7**	**28.9 J+**	**121**	**12.5**	0.99 U	--	**2.47 J**	--	**23.2**	--	**781 J**	**300 J**
Phenanthrene	**185 J+**	**48 J+**	**79 J+**	**116**	**1500 J+**	**365 J**	**1260 J+**	**50.8**	**50.7**	**391 J+**	**738**	**60**	**0.97 J**	--	**3.33 J**	--	**129**	--	**430 J**	**165 J**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**411**	**123**	**180**	**234**	**2400**	**709**	**2200**	**104**	**100**	**618**	**1400**	**111**	**0.97**	--	**8**	--	**218**	--	**1700**	**600**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
2-Methylnaphthalene	**0.633 J+**	**0.261 J+**	**0.501 J+**	**0.747**	**2.32 J+**	**0.794 J+**	**1.22 J+**	**0.69 J**	**0.576 J**	**0.731 J+**	**0.527**	**0.755 J**	0.4 U	--	0.32 U	--	**0.471**	--	**1.04 J**	**0.194 J**
Acenaphthene	**0.809 J+**	**0.356 J+**	**0.54 J+**	**1.16**	**6.22 J+**	**1.35 J**	**2.5 J+**	0.792 U	0.674 U	**1.88 J+**	**0.691**	0.756 U	0.21 U	--	**0.21 J**	--	**1.17**	--	**0.598 J**	**0.129 J**
Acenaphthylene	**0.852 J+**	**0.323 J+**	**0.569 J+**	**1.21**	**2.71 J+**	**0.958 J+**	**1.82 J+**	**1.18**	**0.822**	**1.6 J+**	**1.11**	**1.18**	0.4 U	--	0.32 U	--	**0.577**	--	**2.4 J**	**0.251 J**
Anthracene	**1.95 J+**	**0.868 J+**	**1.33 J+**	**2.96**	**12.5 J+**	**3.21 J**	**8.8 J+**	**2.52**	**2.01**	**5.83 J+**	**4.74**	**2.68**	0.32 U	--	**0.545 J**	--	**2.63**	--	**1.36 J**	**0.228 J**
Fluorene	**1.09 J+**	**0.449 J+**	**0.789 J+**	**1.64**	**7.68 J+**	**1.6 J**	**3.93 J+**	**1.2**	**1.03**	**2.33 J+**	**1.5**	**1.21**	0.23 U	--	0.18 U	--	**0.982**	--	**0.84 J**	**0.164 J**
Naphthalene	**3.52 J+**	**1.42 J+**	**2.35 J+**	**3.3**	**4.57 J+**	**3.14 J**	**2.96 J+**	**3.06**	**2.26**	**1.81 J+**	**1.77**	**1.89**	0.47 U	--	**0.852 J**	--	**2.05**	--	**9.76 J**	**2 J**
Phenanthrene	**7.23 J+**	**2.34 J+**	**4.76 J+**	**10.8**	**59 J+**	**11.7 J**	**28.4 J+**	**8.19**	**6.85**	**24.4 J+**	**10.8**	**9.09**	**0.46 J**	--	**1.15 J**	--	**11.4**	--	**5.4 J**	**1.18 J**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**16.1**	**6.02**	**10.8**	**21.8**	**95**	**22.8**	**50**	**16.8**	**13.5**	**38.6**	**21**	**16.8**	**0.46**	--	**2.8**	--	**19.3**	--	**21**	**4**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Benzo(a)anthracene	**94.5 J+**	**30.1 J+**	**35.9 J+**	**59**	**833 J+**	**174 J**	**711 J+**	**31.7**	**33.2**	**242 J+**	**511**	**39**	**0.7 J**	--	**2.03 J**	--	**75.8**	--	**189**	**56.6**
Benzo(a)pyrene	**104 J+**	**35.2 J+**	**33.3 J+**	**58.5**	**970 J+**	**191 J**	**782 J+**	**36.8**	**36.3**	**294 J+**	**621**	**47.8**	**1.19 J**	--	**2.98 J**	--	**80.2 J**	--	**573 J**	**68.6 J**
Benzo(b)fluoranthene	**69.2 J+**	**25.4 J+**	**22.5 J+**	**42.1**	**537 J+**	**150 J**	**571 J+**	**27.1**	**27.6**	**227 J+**	**443**	**39.9**	1.06 U	--	**1.73 J**	--	**46.9**	--	**297 J**	**45.6 J**
Benzo(g,h,i)perylene	**85.3 J+**	**25.6 J+**	**22.7 J+**	**42.4**	**705 J+**	**120 J**	**447 J+**	**27.1**	**25.9**	**179 J+**	**374**	**43.6**	**1.46 J**	--	**2.66 J**	--	**64.3**	--	**515**	**86.9**
Benzo(j)fluoranthene	**34 J+**	**11.5 J+**	**11.6 J+**	**19.2**	**282 J+**	**70.4 J**	**306 J+**	**12.5**	**11.7**	**104 J+**	**247**	**18.6**	**0.56 J**	--	**1.32 J**	--	**32.5**	--	**170**	**31.4**
Benzo(k)fluoranthene	**39.8 J+**	**14.3 J+**	**13.3 J+**	**25.1**	**301 J+**	**90.9 J+**	**386 J+**	**15.3**	**16.4**	**138 J+**	**328**	**24.6**	0.59 U	--	**1.24 J**	--	**30.7**	--	**140**	**29.5**
Chrysene	**96.8 J+**	**30.2 J+**	**35.9 J+**	**59.8**	**854 J+**	**208 J**	**909 J+**	**36.1**	**36.4**	**326 J+**	**638**	**50.8**	**0.96 J**	--	**2.77 J**	--	**88.8**	--	**268**	**72.4**
Dibenzo(a,h)anthracene	**18.5 J+**	**6.48 J+**	**5.32 J+**	**10.6**	**150 J+**	**39.6 J**	**156 J+**	**6.18 J**	**4.35 J**	**59.8 J+**	**129**	**10.4**	0.69 U	--	0.75 U	--	**11.6**	--	**100 J**	**12.6 J**
Fluoranthene	**235 J+**	**65.5 J+**	**86.1 J+**	**143**	**1650 J+**	**360 J+**	**1420 J+**	**77.4**	**75.8**	**532 J+**	**957**	**94.2**	**1.46 J**	--	**5.69**	--	**180**	--	**519**	**185**
Indeno(1,2,3-c,d)pyrene	**62.6 J+**	**19.8 J+**	**19.3 J+**	**33.8**	**471 J+**	**121 J**	**460 J+**	**21.5**	**19.4**	**179 J+**	**380**	**34.5**	**0.94 J**	--	**1.96 J**	--	**53.4**	--	**441 J**	**61.8 J**
Pyrene	**268 J+**	**85 J+**	**112 J+**	**157**	**1810 J+**	**557 J+**	**2260 J+**	**82.5**	**78.7**	**703 J+**	**1600**	**136**	**1.32 J**	--	**5.53**	--	**180**	--	**476 J**	**176 J**
Total Benzofluoranthenes	**143**	**51.2**	**47.4**	**86.4**	**1120**	**310**	**1260**	**54.9**	**55.7**	**469**	**1020**	**83.1**	**1.4**	--	**4.29**	--	**110**	--	**610**	**106**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**1110**	**349**	**398**	**650**	**8600**	**2100**	**8400**	**374**	**366**	**2980**	**6200**	**539**	**9.8**	--	**28**	--	**840**	--	**4000**	**826**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)																				
Benzo(a)anthracene	**3.69 J+**	**1.47 J+**	**2.16 J+**	**5.51**	**32.8 J+**	**5.59 J**	**16 J+**	**5.11**	**4.49**	**15.1 J+**	**7.48**	**5.91**	**0.33 J**	--	**0.7 J**	--	**6.71**	--	**2.36**	**0.404**
Benzo(a)pyrene	**4.06 J+**	**1.72 J+**	**2.01 J+**	**5.47**	**38 J+**	**6.14 J**	**17.7 J+**	**5.94**	**4.91**	**18.4 J+**	**9.09**	**7.24**	**0.567 J**	--	**1.03 J**	--	**7.1 J**	--	**7.16 J**	**0.49 J**
Benzo(b)fluoranthene	**2.7 J+**	**1.24 J+**	**1.36 J+**	**3.93**	**21.1 J+**	**4.8 J**	**12.9 J+**	**4.37**	**3.73**	**14.2 J+**	**6.49**	**6.05**	0.505 U	--	**0.597 J**	--	**4.15**	--	**3.71 J**	**0.326 J**
Benzo(g,h,i)perylene	**3.33 J+**	**1.25 J+**	**1.37 J+**	**3.96**	**27.8 J+**	**3.9 J**	**10.1 J+**	**4.37**	**3.5**	**11.2 J+**	**5.48**	**6.61**	**0.695 J**	--	**0.917 J**	--	**5.69**	--	**6.44**	**0.621**
Benzo(j)fluoranthene	**1.33 J+**	**0.561 J+**	**0.699 J+**	**1.79**	**11.1 J+**	**2.26 J**	**6.91 J+**	**2.02**	**1.58**	**6.5 J+**	**3.62**	**2.82**	**0.27 J**	--	**0.455 J**	--	**2.88**	--	**2.1**	**0.224**
Benzo(k)fluoranthene	**1.55 J+**	**0.698 J+**	**0.801 J+**	**2.35**	**11.9 J+**	**2.92 J+**	**8.71 J+**	**2.47**	**2.22**	**8.63 J+**	**4.8**	**3.73**	0.28 U	--	**0.428 J**	--	**2.72**	--	**1.8**	**0.211**
Chrysene	**3.78 J+**	**1.47 J+**	**2.16 J+**	**5.59**	**33.6 J+**	**6.69 J**	**20.5 J+**	**5.82**	**4.92**	**20.4 J+**	**9.34**	**7.7**	**0.46 J**	--	**0.955 J**	--	**7.86**	--	**3.35**	**0.517**
Dibenzo(a,h)anthracene	**0.723 J+**	**0.316 J+**	**0.32 J+**	**0.991**	**5.9 J+**	**1.27 J**	**3.52 J+**	**0.997 J**	**0.588 J**	**3.74 J+**	**1.89**	**1.58**	0.33 U	--	0.26 U	--	**1.03**	--	**1 J**	**0.09 J**
Fluoranthene	**9.18 J+**	**3.2 J+**	**5.19 J+**	**13.4**	**65 J+**	**12 J+**	**32.1 J+**	**12.5**	**10.2**	**33.3 J+**	**14**	**14.3**	**0.695 J**	--	**1.96**	--	**16**	--	**6.49**	**1.32**
Indeno(1,2,3-c,d)pyrene	**2.45 J+**	**0.966 J+**	**1.16 J+**	**3.16**	**18.5 J+**	**3.89 J**	**10 J+**	**3.47**	**2.62**	**11.2 J+**	**5.6**	**5.23**	**0.45 J**	--	**0.676 J**	--	**4.73**	--	**5.51 J**	**0.441 J**
Pyrene	**10.5 J+**	**4.15 J+**	**6.75 J+**	**14.7**	**71.3 J+**	**17.9 J+**	**51 J+**	**13.3**	**10.6**	**43.9 J+**	**23**	**20.6**	**0.629 J**	--	**1.91**	--	**16**	--	**5.95 J**	**1.26 J**
Total Benzofluoranthenes	**5.58**	**2.5**	**2.86**	**8.07**	**44.1**	**10**	**28.5**	**8.86**	**7.53**	**29.3**	**14.9**	**12.6**	**0.66**	--	**1.48**	--	**9.75**	--	**7.6**	**0.761**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**43.3**	**17**	**24**	**60.9**	**340**	**67**	**190**	**60.4**	**49.4**	**187**	**91**	**81.8**	**4.7**	--	**9.8**	--	**75**	--	**50**	**5.9**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)																				
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**133**	**45.1**	**43.3**	**76.2**	**1200**	**250**	**1000**	**47.3**	**46.8**	**382**	**810**	**63.1**	**1.5**	--	**3.7**	--	**103**	--	**700**	**89.9**
Total cPAH TEQ (ND=0)[g]	**133**	**45.1**	**43.3**	**76.2**	**1200**	**250**	**1000**	**47.3**	**46.8**	**382**	**810**	**63.1**	**1.4**	--	**3.7**	--	**103**	--	**700**	**89.9**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)																				
1,2,4-Trichlorobenzene	2.7 UJ	2.7 UJ	2.7 UJ	2.7 U	2.7 UJ	2.7 UJ	2.7 UJ	2.7 U	2.7 U	2.7 UJ	2.7 U	2.7 U	3.4 U	--	3.5 U	--	3.6 U	--	3.6 U	3.6 U
1,2-Dichlorobenzene	0.7 UJ	0.7 UJ	0.7 UJ	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	0.7 U	0.7 U	0.7 UJ	0.7 U	0.7 U	2.3 U	--	2.4 U	--	2.4 U	--	2.4 U	2.4 U
1,4-Dichlorobenzene	**2 J**	0.6 UJ	0.6 UJ	**1.2 J**	0.6 UJ	0.6 UJ	0.6 UJ	0.6 U	0.6 U	0.6 UJ	**1.5 J**	0.6 U	3 U	--	3.1 U	--	3.1 U	--	3.1 U	3.1 U
Hexachlorobenzene	0.7 UJ	0.7 UJ	0.7 UJ	0.7 U	0.7 UJ	0.7 UJ	**57.2 J+**	0.7 U	0.7 U	0.7 UJ	0.7 U	**2.2 J**	12.9 U	--	13.4 U	--	13.5 U	--	13.5 U	13.5 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.7 UJ	0.7 UJ	0.7 UJ	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	0.7 U	0.7 U	0.7 UJ	0.7 U	0.7 U	4.6 U	--	4.8 U	--	4.8 U	--	4.8 U	4.8 U
Chlorinated Organics (mg/kg, OC)																				
1,2,4-Trichlorobenzene	0.11 UJ	0.13 UJ	0.16 UJ	0.25 U	0.11 UJ	0.087 UJ	0.061 UJ	0.44 U	0.36 U	0.17 UJ	0.04 U	0.41 U	1.6 U	--	1.2 U	--	0.32 U	--	0.045 U	0.026 U
1,2-Dichlorobenzene	0.027 UJ	0.034 UJ	0.042 UJ	0.065 U	0.028 UJ	0.023 UJ	0.016 UJ	0.11 U	0.095 U	0.044 UJ	0.01 U	0.11 U	1.1 U	--	0.83 U	--	0.21 U	--	0.03 U	0.017 U
1,4-Dichlorobenzene	**0.078 J**	0.029 UJ	0.036 UJ	**0.11 J**	0.024 UJ	0.019 UJ	0.014 UJ	0.097 U	0.081 U	0.037 UJ	**0.022 J**	0.091 U	1.4 U	--	1.1 U	--	0.27 U	--	0.039 U	0.022 U
Hexachlorobenzene	0.027 UJ	0.034 UJ	0.042 UJ	0.065 U	0.028 UJ	0.023 UJ	**1.29 J+**	0.11 U	0.095 U	0.044 UJ	0.01 U	**0.33 J**	6.14 U	--	4.62 U	--	1.19 U	--	0.169 U	0.0964 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.027 UJ	0.034 UJ	0.042 UJ	0.065 U	0.028 UJ	0.023 UJ	0.016 UJ	0.11 U	0.095 U	0.044 UJ	0.01 U	0.11 U	2.2 U	--	1.7 U	--	0.42 U	--	0.06 U	0.034 U
Organic Chemicals/Phenols (µg/kg, dw)																				
2,4-Dimethylpheno	2.2 UJ	2.2 UJ	2.2 UJ	2.2 U	**11.9 J**	**3.4 J**	**11.3 J**	2.2 U	2.2 U	**2.6 J**	**15.4 J**	2.2 U	3.6 U	--	3.8 U	--	3.8 U	--	3.8 U	3.8 U
2-Methylphenol (o-Cresol`	**2.3 J**	**2 J**	1.1 UJ	1.1 U	**7.3 J+**	**2.4 J**	**7.9 J+**	1.1 U	1.1 U	**2.3 J**	**8.8**	1.1 U	6.4 U	--	6.6 U	--	6.6 U	--	6.7 U	**7.5 J**
4-Methylphenol (p-Cresol`	**19 J+**	**20.3 J+**	**18.8 J+**	**5.5**	**45.6 J+**	**20.2 J+**	**42.8 J+**	**1.5 J**	**5.8**	**18 J+**	**107**	0.9 U	7.1 U	--	7.3 U	--	7.4 U	--	**523**	**123**
Benzoic acid	13.4 UJ	**23.2 J**	13.4 UJ	13.4 U	**45.9 J**	**16.2 J**	**21.2 J**	13.4 U	13.4 U	**26 J**	**47.3 J**	**38.8 J**	37.4 UJ	--	38.8 UJ	--	39 UJ	--	**139 J**	**39.7 J**
Benzyl alcoho	**3.4 J**	**3.5 J**	2.5 UJ	2.5 U	**4.1 J**	2.5 UJ	2.5 UJ	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 U	15.6 U	--	16.1 U	--	16.2 U	--	16.3 U	16.2 U
Dibenzofuran	**22.6**	14.1 U	14.1 U	**16.4 J**	**70.8**	**31.2**	**87.8**	14.1 U	14.1 U	**17.3 J**	**90.1**	14 U	1.07 U	--	1.17 U	--	**9.93 J**	--	**137**	**75.9**
n-Nitrosodiphenylamine	1.3 UJ	1.3 UJ	1.3 UJ	1.3 U	1.3 UJ	1.3 UJ	1.3 UJ	1.3 U	1.3 U	1.3 UJ	1.3 U	1.3 U	5.1 UJ	--	5.3 UJ	--	5.3 UJ	--	5.3 U	5.3 U
Pentachloropheno	2.1 UJ	2.1 UJ	2.1 UJ	2.1 U	2.2 UJ	2.1 UJ	2.1 UJ	2.1 U	2.1 U	**2.8 J**	2.1 U	2.1 U	30 UJ	--	31 UJ	--	31.2 UJ	--	31.2 UJ	31.2 UJ
Phenol	**27 J+**	**15.5 J+**	**14.4 J+**	**11.2 J**	**29.9 J+**	**11.8 J+**	**22.2 J+**	**8.1 J**	**12 J**	**10.5 J+**	**35**	**13.8**	4.2 U	--	4.4 U	--	**7.2 J**	--	**134**	**123**
Organic Chemicals/Phenols (mg/kg, OC)																				
Dibenzofuran	**0.883**	0.688 U	0.849 U	**1.53 J**	**2.79**	**1**	**1.98**	2.27 U	1.91 U	**1.08 J**	**1.32**	2.1 U	0.51 U	--	0.403 U	--	**0.879 J**	--	**1.71**	**0.542**
N-Nitrosodiphenylamine	0.051 UJ	0.063 UJ	0.078 UJ	0.12 U	0.051 UJ	0.042 UJ	0.029 UJ	0.21 U	0.18 U	0.081 UJ	0.019 U	0.2 U	2.4 UJ	--	1.8 UJ	--	0.47 UJ	--	0.066 U	0.038 U
Phthalates (µg/kg, dw)																				
bis(2-Ethylhexyl)phthalate	5.5 U	5.5 U	**13.4 J**	**18.8 J**	**41.8 J**	50 U	5.5 U	5.4 U	5.5 U	50 U	5.4 U	5.4 U	5.2 U	--	5.4 U	--	5.4 U	--	**8.5 J**	**11.3 J**
Butylbenzyl phthalate	0.7 UJ	0.7 UJ	0.7 UJ	0.7 U	0.7 UJ	0.7 UJ	0.7 UJ	**20.9 J**	0.7 UJ	0.7 UJ	0.7 U	0.7 U	9 U	--	9.3 U	--	9.4 U	--	9.4 U	9.4 U
Diethyl phthalate	20 UJ	20 UJ	20 UJ	20 U	20.3 UJ	18.5 UJ	16.4 UJ	19.9 U	20 U	19 UJ	19.7 UJ	**27.7 J**	18.9 U	--	19.6 U	--	19.7 U	--	50 U	49.9 U
Dimethyl phthalate	1 UJ	1 UJ	1 UJ	1 U	1 UJ	**1.6 J**	1 UJ	1 U	1 U	1 UJ	1 U	1 U	4.2 U	--	4.4 U	--	4.4 U	--	4.4 U	4.4 U
Di-n-butyl phthalate	5.6 U	5.6 U	5.6 U	5.6 U	5.7 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.4 U	--	5.6 U	--	5.6 U	--	5.6 U	5.6 U
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.2 U	--	4.4 U	--	4.4 U	--	4.4 U	4.4 U
Phthalates (mg/kg, OC)																				
bis(2-Ethylhexyl)phthalate	0.21 U	0.27 U	**0.807 J**	**1.76 J**	**1.65 J**	1.6 U	0.12 U	0.87 U	0.74 U	3.1 U	0.079 U	0.82 U	2.5 U	--	1.9 U	--	0.48 U	--	**0.11 J**	**0.0807 J**
Butyl benzyl phthalate	0.027 UJ	0.034 UJ	0.042 UJ	0.065 U	0.028 UJ	0.023 UJ	0.016 UJ	**3.37 J**	0.095 UJ	0.044 UJ	0.01 U	0.11 U	4.3 U	--	3.2 U	--	0.83 U	--	0.12 U	0.067 U
Diethyl phthalate	0.78 UJ	0.98 UJ	1.2 UJ	1.9 U	0.799 UJ	0.595 UJ	0.37 UJ	3.21 U	2.7 U	1.19 UJ	0.288 UJ	**4.2 J**	9 U	--	6.76 U	--	1.74 U	--	0.625 U	0.356 U
Dimethyl phthalate	0.039 UJ	0.049 UJ	0.06 UJ	0.093 U	0.039 UJ	**0.051 J**	0.023 UJ	0.16 U	0.14 U	0.063 UJ	0.015 U	0.15 U	2 U	--	1.5 U	--	0.39 U	--	0.055 U	0.031 U
Di-n-butyl phthalate	0.22 U	0.27 U	0.34 U	0.52 U	0.22 U	0.18 U	0.13 U	0.9 U	0.76 U	0.35 U	0.082 U	0.85 U	2.6 U	--	1.9 U	--	0.5 U	--	0.07 U	0.04 U
Di-n-Octyl Phthalate	0.17 U	0.21 U	0.27 U	0.41 U	0.17 U	0.14 U	0.099 U	0.71 U	0.59 U	0.28 U	0.064 U	0.67 U	2 U	--	1.5 U	--	0.39 U	--	0.055 U	0.031 U
Dioxin/Furans (ng/kg, dw)																				
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF`	**18.9**	--	--	--	**18.0**	**15.8**	**20.0**	**7.12 J**	**6.80 J**	**14.0**	--	--	**1.28 J**	--	**1.10 J**	--	**9.73**	--	**10.6**	**20.5**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD`	**421**	--	--	--	**596**	**498**	**577**	**785 J**	**273 J**	**645**	--	--	**68.5**	--	**111**	--	**345**	--	**545**	**690**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	**7.10**	--	--	--	**9.77**	**9.06**	**10.3**	**3.46 J**	**3.36 J**	**7.29**	--	--	**0.517 J**	--	**0.440 J**	--	**3.79**	--	**14.3**	**46.1**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**33.1**	--	--	--	**63.0**	**52.3**	**63.5**	**27.2 J**	**24.4 J**	**61.4**	--	--	**5.75**	--	**8.58 J**	--	**29.1**	--	**71.7**	**95.2**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	**0.360 J**	--	--	--	**0.636 J**	**0.811 J**	**0.798 J**	**0.231 J**	**0.209 J**	**0.339 J**	--	--	0.0475 U	--	0.0479 U	--	**0.215 J**	--	**0.651 J**	**4.94**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	**1.74 J**	--	--	--	**2.21 J**	**1.96 J**	**2.00 J**	**0.653 J**	**0.537 J**	**1.22 J**	--	--	**0.0607 J**	--	**0.105 J**	--	**0.751 J**	--	**5.83**	**19.0**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**0.824 J**	--	--	--	**1.25 J**	**1.15 J**	**1.05 J**	**0.503 J**	**0.431 J**	**0.786 J**	--	--	**0.127 J**	--	**0.220 J**	--	**0.705 J**	--	**2.59**	**5.89**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	**0.655 J**	--	--	--	**1.26 J**	**1.22 J**	**1.12 J**	**0.277 J**	**0.260 J**	**0.603 J**	--	--	**0.0601 J**	--	**0.0581 J**	--	**0.441 J**	--	**1.94 J**	**14.3**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**1.96 J**	--	--	--	**3.03**	**3.21**	**3.62**	**1.25 J**	**1.17 J**	**2.33 J**	--	--	**0.280 J**	--	**0.447 J**	--	**1.44 J**	--	**5.34**	**10.1**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	**0.115 J**	--	--	--	**0.225 J**	**0.380 J**	**0.149 J**	0.0505 UJ	2.51 UJ	**0.137 J**	--	--	0.0485 U	--	0.0479 U	--	0.0472 U	--	**0.126 J**	**0.967 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**1.66 J**	--	--	--	**2.54**	**2.64**	**3.38**	**1.13 J**	**1.17 J**	**1.72 J**	--	--	**0.372 J**	--	**0.810 J**	--	**1.76 J**	--	**5.82 J**	**11.1 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	2.45 U	--	--	--	2.50 U	2.42 U	2.70 U	2.52 UJ	2.51 UJ	2.57 U	--	--	**0.0631 J**	--	**0.101 J**	--	**0.557 J**	--	**2.98**	**8.41**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**0.723 J**	--	--	--	**1.12 J**	**1.16 J**	**1.29 J**	**0.434 J**	**0.452 J**	**0.639 J**	--	--	**0.105 J**	--	**0.210 J**	--	**0.597 J**	--	**2.56**	**7.21**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	**0.521 J**	--	--	--	**1.46 J**	**1.12 J**	**0.944 J**	**0.242 J**	**0.228 J**	**0.569 J**	--	--	**0.0515 J**	--	**0.0524 J**	--	**0.377 J**	--	**1.18 J**	**15.1**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF`	**0.692 J**	--	--	--	**1.31 J**	**1.35 J**	**1.42 J**	**0.294 J**	**0.263 J**	**0.745 J**	--	--	**0.0536 J**	--	**0.0746 J**	--	**0.589 J**	--	**1.93 J**	**11.9**
2,3,7,8-Tetrachlorodibenzofuran (TCDF`	**1.19**	--	--	--	**1.72**	**1.63**	**3.43**	**0.426 J**	**0.504 J**	**1.03**	--	--	**0.0861 J**	--	**0.142 J**	--	**0.950**	--	**3.65**	**5.73**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD`	**0.383 J**	--	--	--	**0.469 J**	**0.441 J**	**0.459 J**	**0.400 J**	**0.291 J**	**0.206 J**	--	--	**0.0641 J**	--	**0.134 J**	--	**0.525 J**	--	**0.909**	**1.52**
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**2.75**	--	--	--	**4.31**	**4.15**	**4.71**	**1.96**	**1.78**	**2.83**	--	--	**0.377**	--	**0.679**	--	**2.40**	--	**7.82**	**22.4**
Total TCDD TEQ (ND=0)[h]	**2.72**	--	--	--	**4.27**	**4.11**	**4.67**	**1.92**	**1.62**	**2.80**	--	--	**0.374**	--	**0.677**	--	**2.40**	--	**7.82**	**22.4**

Geosyntec consultants

Table M-3. Blakely Harbor Analytical Summary - Sediment

Sample[a]:	BH-SG-48-0to10	BH-SG-49-0to10	BH-SG-53-0to10	BH-SG-54-0to10	BH-SG-55-0to10	BH-SG-56-0to10	BH-SG-56-0to10-D	BH-SG-57-0to10
Location:	SG-48	SG-49	SG-53	SG-54	SG-55	SG-56	SG-56	SG-57
Sample Date:	2022-10-13	2022-10-12	2022-10-11	2022-10-13	2022-10-13	2023-12-14	2023-12-14	2023-12-14
Depth Interval:	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33	0 - 0.33
Depth Units:	ft	ft	ft	ft	ft	ft	ft	ft
QA/QC:							Duplicate	
Analyte								
Conventional Parameters								
% Moisture (%)	**51.8**	**21.6**	**27.2**	**42.2**	**38.4**	--	--	--
% Wood Debris (%)[b]	**60**	**8.33**	**0**	**35**	**10**	--	--	--
Ammonia (mg/kg)	**17.1**	**14.9**	**4.40**	**8.84**	**20.4**	--	--	--
Nitrogen as Ammonia (NH3)	--	--	--	--	--	**26.7**	**21.3**	**7.84**
Sulfide (mg/kg)	**431**	**22.3 J**	**13.7**	**378**	**387**	**560 J-**	**752**	**164**
Total organic carbon (%)	**9.1**	**0.35**	**0.41**	**1.62**	**1.07**	**5.25 J**	**4.47**	**1.18**
Total organic carbon (mg/kg)	**91000**	**3500**	**4100**	**16200**	**10700**	**52500 J**	**44700**	**11800**
Total Solids (mg/kg)	**437900**	**706100**	**811100**	**553100**	**719500**	**551600**	**581800**	**626400**
Total volatile solids (mg/kg)	**144800**	**18500**	**48300 J**	**55900**	**36800**	**73500**	**89900**	**46900**
Preserved Total Solids (%)	**49.14**	**72.41**	**82.80**	**54.91**	**61.20**	**56.64**	**63.84**	**61.96**
Grain Size (%)								
Particle/Grain Size, Clay	**6.20**	**3.40**	**2.40**	**8.80**	**4.80**	**7.6**	--	**8.9**
Particle/Grain Size, Gravel	**0.90**	**14.3**	**95.1**	**2.40**	**72.0**	**23.5**	--	**7.4**
Particle/Grain Size, Sand	**63.6**	**81.2**	**1.20 J**	**72.2**	**20.7**	**63.5**	--	**76.3**
Particle/Grain Size, Silt	**23.4**	**1.10**	**1.50 J**	**16.5**	**2.60**	**5.6**	--	**7.5**
Total Percent Fines	**29.6**	**4.5**	**3.9**	**25.3**	**7.4**	**13.2**	--	**16.4**
Metals (mg/kg, dw)								
Arsenic	**10.3**	**10.1**	**5.26**	**7.93**	**7.32**	**9.75 J**	**6.84**	**4.67**
Cadmium	**0.54**	**0.08 J**	**0.10 J**	**0.60**	**0.63**	**0.87**	**0.55**	**0.36**
Chromium	**26.1**	**20.3**	**38.0**	**28.2**	**17.2**	**19.6 J**	**14.0**	**18.7**
Copper	**48.7**	**13.8**	**52.2**	**44.5**	**97.6**	**200**	**141**	**23.0**
Lead	**87.8**	**21.4**	**26.5**	**50.9**	**52.2**	**169 J**	**142**	**23.9**
Mercury	**0.382**	**0.0276 J**	**0.0336**	**0.827**	**0.203**	**0.616 J**	**0.276 J**	**0.168**
Silver	**0.22 J**	**0.05 J**	**0.11 J**	**0.22 J**	**0.53**	**0.23 J**	**0.17 J**	**0.13 J**
Zinc	**78.8**	**40.9**	**56.3**	**74.4**	**70.6**	**143 J**	**111**	**49.8**
AVS/SEM[c] (µmoles/g)								
Cadmium	**0.060**	0.0070 U	0.010 U	**0.060**	**0.050**	**0.08 J**	**0.10**	**0.04**
Copper	**1.57**	**0.32**	**2.05**	**1.52**	**1.49**	**4.17 J**	**5.17**	**0.82**
Lead	**16.0**	**4.37**	**5.96**	**9.85**	**6.89**	**29.9 J**	**29.5**	**5.57**
Silver	0.0070 U	0.0050 U	0.0080 UJ	0.0070 U	0.0050 U	0.002 U	0.002 U	0.02 U
Zinc	**4.0**	**13.9**	**2.8**	**3.8**	**2.9**	**9.9 J**	**8.8 J+**	**2.4 J+**
Sulfide	**2.98**	**0.0631**	**0.621**	**6.34**	**12.0**	**17.3 J**	**14.8 J-**	**6.09 J-**
∑SEM–AVS	**18.7**	**18.5**	**10.2**	**8.90**	**-0.665**	**26.8**	**28.8**	**2.76**
(∑SEM–AVS)/fOC ratio (µmoles/g, OC)	**0.0205**	**0.530**	**0.249**	**0.0549**	**-0.00621**	**0.0510**	**0.0644**	**0.0234**
Low Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)								
2-Methylnaphthalene	**57.5 J**	4.99 UJ	1.1 U	15 UJ	15 UJ	**168**	**81**	**21**
Acenaphthene	**42.7 J**	4.99 UJ	0.57 U	**16.3 J**	**16.5 J**	**166**	**235**	**10.9**
Acenaphthylene	**65.9 J**	**2.39 J**	**1.61 J**	**23.1 J**	**18.5 J**	**119**	**677**	**16.6**
Anthracene	**78.3 J**	**4.19 J**	**2.25 J**	**42 J**	**44.7 J**	**525**	**1960**	**46.7**
Fluorene	**47.4 J**	4.99 UJ	**0.75 J**	**22.4 J**	**18.7 J**	**238**	**914**	**14.7**
Naphthalene	**581 J**	**14.2 J**	**2.33 J**	**60.6 J**	**27.2 J**	**207**	**156**	**30.5**
Phenanthrene	**368 J**	**16.5 J**	**6.74**	**124 J**	**148 J**	**1780**	**4800**	**132**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**1240**	**37.3**	**14**	**288**	**274**	**3200**	**8800**	**272**
Low Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)								
2-Methylnaphthalene	**0.632 J**	1.43 UJ	0.268 U	0.926 UJ	1.4 UJ	**3.2**	**1.81**	**1.78**
Acenaphthene	**0.469 J**	1.43 UJ	0.14 U	**1.01 J**	**1.54 J**	**3.16**	**5.26**	**0.924**
Acenaphthylene	**0.724 J**	**0.683 J**	**0.393 J**	**1.43 J**	**1.73 J**	**2.27**	**15.1**	**1.41**
Anthracene	**0.86 J**	**1.2 J**	**0.549 J**	**2.59 J**	**4.18 J**	**10**	**43.8**	**3.96**
Fluorene	**0.521 J**	1.43 UJ	**0.18 J**	**1.38 J**	**1.75 J**	**4.53**	**20.4**	**1.25**
Naphthalene	**6.38 J**	**4.06 J**	**0.568 J**	**3.74 J**	**2.54 J**	**3.94**	**3.49**	**2.58**
Phenanthrene	**4.04 J**	**4.71 J**	**1.64**	**7.65 J**	**13.8 J**	**33.9**	**110**	**11.2**
Low Molecular Polycyclic Aromatic Hydrocarbons[d,e] (ND=0)	**13.6**	**10.7**	**3.3**	**17.8**	**25.5**	**61**	**200**	**23.1**
High Molecular Polycyclic Aromatic Hydrocarbons (µg/kg, dw)								
Benzo(a)anthracene	**100**	**11.1**	**7.19**	**74.4**	**121**	**692**	**2340**	**75.5**
Benzo(a)pyrene	**102 J**	**16.3 J**	**8.55 J**	**83.6 J**	**130 J**	**752**	**2230**	**88.8**
Benzo(b)fluoranthene	**66.5 J**	**10 J**	**5.82**	**62.6 J**	**89.2 J**	**490**	**1360**	**80.6**
Benzo(g,h,i)perylene	**107**	**17.8**	**8.47**	**62.5**	**90.7**	**382**	**999**	**62.7**
Benzo(j)fluoranthene	**46.9**	**7**	**4.35 J**	**40.9**	**57.2**	**310**	**959**	**45.8**
Benzo(k)fluoranthene	**42.2**	**6.14**	**3.39 J**	**38.3**	**54.8**	**276**	**926**	**44.6**
Chrysene	**126**	**12.8**	**9.09**	**97.1**	**155**	**754**	**2290**	**101**
Dibenzo(a,h)anthracene	**17.4 J**	**3.73 J**	**1.85 J**	**14.2 J**	**21.1 J**	**99**	**290**	**13.9**
Fluoranthene	**408**	**24.5**	**16.1**	**189**	**301**	**1670**	**5610**	**200**
Indeno(1,2,3-c,d)pyrene	**79.6 J**	**13.1 J**	**6.92**	**54.6 J**	**76.4 J**	**334**	**854**	**53.6**
Pyrene	**349 J**	**22.1 J**	**18.2**	**191 J**	**281 J**	**2210**	**5020**	**339**
Total Benzofluoranthenes	**156**	**23.1**	**13.6**	**142**	**201**	**1100**	**3250**	**171**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL[e,f]	**1000**	**145**	**89.9**	**908**	**1400**	**8000**	**23000**	**1100**
High Molecular Polycyclic Aromatic Hydrocarbons (mg/kg, OC)								
Benzo(a)anthracene	**1**	**3.17**	**1.75**	**4.59**	**11.3**	**13.2**	**52.3**	**6.4**
Benzo(a)pyrene	**1.12 J**	**4.66 J**	**2.09 J**	**5.16 J**	**12 J**	**14.3**	**49.9**	**7.53**
Benzo(b)fluoranthene	**0.731 J**	**2.86 J**	**1.42**	**3.86 J**	**8.34 J**	**9.3**	**30.4**	**6.83**
Benzo(g,h,i)perylene	**1.18**	**5.09**	**2.07**	**3.86**	**8.48**	**7.28**	**22.3**	**5.31**
Benzo(j)fluoranthene	**0.515**	**2**	**1.06 J**	**2.52**	**5.35**	**5.9**	**21.5**	**3.88**
Benzo(k)fluoranthene	**0.464**	**1.75**	**0.827 J**	**2.36**	**5.12**	**5.26**	**20.7**	**3.78**
Chrysene	**1.38**	**3.66**	**2.22**	**5.99**	**14.5**	**14.4**	**51.2**	**8.56**
Dibenzo(a,h)anthracene	**0.191 J**	**1.07 J**	**0.451 J**	**0.877 J**	**1.97 J**	**1.89**	**6.5**	**1.18**
Fluoranthene	**4.48**	**7**	**3.93**	**11.7**	**28.1**	**31.8**	**126**	**20**
Indeno(1,2,3-c,d)pyrene	**0.875 J**	**3.74 J**	**1.69**	**3.37 J**	**7.14 J**	**6.36**	**19.1**	**4.54**
Pyrene	**3.84 J**	**6.31 J**	**4.44**	**11.8 J**	**26.3 J**	**42.1**	**112**	**28.7**
Total Benzofluoranthenes	**1.71**	**6.61**	**3.31**	**8.74**	**18.8**	**20**	**72.6**	**14.5**
High Molecular Polycyclic Aromatic Hydrocarbons (ND=1/2 MDL/PQL)[e,f]	**20**	**41.3**	**21.9**	**56.1**	**130**	**150**	**510**	**97**
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg, dw)								
Total cPAH TEQ (ND=1/2 MDL/PQL)[g]	**100**	**20.8**	**11.2**	**109**	**170**	**950**	**2800**	**117**
Total cPAH TEQ (ND=0)[g]	**100**	**20.8**	**11.2**	**109**	**170**	**950**	**2800**	**117**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Chlorinated Organics (µg/kg, dw)								
1,2,4-Trichlorobenzene	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	8.5 U	8.2 U	8.5 U
1,2-Dichlorobenzene	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	6.1 UJ	5.9 UJ	6.1 UJ
1,4-Dichlorobenzene	**4 J**	3.1 U	3.1 U	3.1 U	3.1 U	6.3 UJ	6.1 UJ	6.3 UJ
Hexachlorobenzene	13.5 U	13.5 U	13.5 U	13.5 U	13.5 U	13.4 U	13 U	13.4 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.6 U	4.8 U
Chlorinated Organics (mg/kg, OC)								
1,2,4-Trichlorobenzene	0.04 U	1 U	0.88 U	0.22 U	0.34 U	0.16 U	0.18 U	0.72 U
1,2-Dichlorobenzene	0.026 U	0.69 U	0.59 U	0.15 U	0.22 U	0.12 UJ	0.13 UJ	0.52 UJ
1,4-Dichlorobenzene	**0.044 J**	0.89 U	0.76 U	0.19 U	0.29 U	0.12 UJ	0.14 UJ	0.53 UJ
Hexachlorobenzene	0.148 U	3.86 U	3.29 U	0.833 U	1.26 U	0.255 U	0.291 U	1.14 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene	0.053 U	1.4 U	1.2 U	0.3 U	0.45 U	0.091 U	0.1 U	0.41 U
Organic Chemicals/Phenols (µg/kg, dw)								
2,4-Dimethylpheno	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	8.9 UJ	8.6 UJ	8.9 UJ
2-Methylphenol (o-Cresol`	6.7 U	6.7 U	6.7 UJ	6.7 U	6.7 U	**7.5 J**	6.4 U	6.6 U
4-Methylphenol (p-Cresol`	**92.8**	**195**	7.4 U	**14 J**	**75**	**21**	**17.7 J**	7.3 U
Benzoic acid	39 UJ	39 UJ	39 UJ	39 UJ	39 UJ	**58.9 J**	37.7 UJ	38.7 UJ
Benzyl alcoho	16.2 U	16.3 U	16.3 U	16.3 U	16.3 U	16.2 U	15.7 U	16.1 U
Dibenzofuran	**86.5**	14.1 U	14.1 U	**25.8**	**15.7 J**	**36.8 J**	**60.9 J**	14 UJ
n-Nitrosodiphenylamine	5.3 U	5.3 U	5.3 UJ	5.3 U	5.3 U	5.3 U	5.1 U	5.3 U
Pentachloropheno	31.2 UJ	31.2 UJ	31.2 UJ	31.3 UJ	31.3 UJ	31.1 UJ	30.2 UJ	31 UJ
Phenol	**264**	**407**	**10.4 J**	**27.8 J+**	**39.7 J+**	**32.7 J**	**21.2 J**	9.4 U
Organic Chemicals/Phenols (mg/kg, OC)								
Dibenzofuran	**0.951**	4.03 U	3.44 U	**1.59**	**1.47 J**	**0.701 J**	**1.36 J**	1.19 UJ
N-Nitrosodiphenylamine	0.058 U	1.5 U	1.3 UJ	0.33 U	0.5 U	0.1 U	0.11 U	0.45 U
Phthalates (µg/kg, dw)								
bis(2-Ethylhexyl)phthalate	**14.2 J**	**9.1 J**	**15.4 J**	5.5 U	**7.9 J**	14 U	13.6 U	14 U
Butylbenzyl phthalate	9.4 U	9.4 U	9.4 U	9.4 U	9.4 U	9.4 UJ	9.1 UJ	9.3 UJ
Diethyl phthalate	49.9 U	50 U	**35.2 J**	50 U	50 U	19.6 U	**31.9 J**	**28 J**
Dimethyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 UJ	4.2 UJ	4.4 UJ
Di-n-butyl phthalate	5.6 U	5.6 U	**20.6 J**	5.6 U	5.6 U	5.6 UJ	5.4 UJ	5.6 UJ
Di-n-octyl phthalate	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.2 U	4.4 U
Phthalates (mg/kg, OC)								
bis(2-Ethylhexyl)phthalate	**0.156 J**	**2.6 J**	**3.76 J**	0.34 U	**0.74 J**	0.267 U	0.304 U	1.19 U
Butyl benzyl phthalate	0.1 U	2.7 U	2.3 U	0.58 U	0.88 U	0.18 UJ	0.2 UJ	0.79 UJ
Diethyl phthalate	0.548 U	14.3 U	**8.59 J**	3.09 U	4.67 U	0.373 U	**0.714 J**	**2.37 J**
Dimethyl phthalate	0.048 U	1.3 U	1.1 U	0.27 U	0.41 U	0.084 UJ	0.094 UJ	0.37 UJ
Di-n-butyl phthalate	0.062 U	1.6 U	**5.02 J**	0.35 U	0.52 U	0.11 UJ	0.12 UJ	0.47 UJ
Di-n-Octyl Phthalate	0.048 U	1.3 U	1.1 U	0.27 U	0.41 U	0.084 U	0.094 U	0.37 U
Dioxin/Furans (ng/kg, dw)								
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF`	**12.4**	**42.6**	**2.76 J**	**18.9**	**14.2**	**70.3 J**	**10 J**	**9.07**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD`	**489**	**156**	**197**	**564**	**634**	**2850 J**	**318 J**	**337 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF	**16.6**	**38.5**	**1.55 J**	**9.12**	**6.92**	**14.3 J**	**6.84 J**	**4.07**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD	**71.3**	**27.4**	**21.2**	**65.8**	**72.3**	**244 J**	**37.2 J**	**33.1**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF	**0.753 J**	**1.45 J**	**0.127 J**	**0.585 J**	**0.421 J**	**0.88 J**	**0.52 J**	0.272 U
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF	**8.85**	**5.74**	**0.199 J**	**1.26 J**	**1.08 J**	**0.983 J**	**1.72 J**	**0.859 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**2.88**	**1.50 J**	**0.293 J**	**0.968 J**	**0.704 J**	2.46 U	2.45 U	2.45 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF	**2.57**	**2.17 J**	**0.120 J**	**0.670 J**	**0.608 J**	**0.336 J**	**1.37 J**	**0.369 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD	**5.45**	**3.33**	**0.776 J**	**3.21**	**2.31 J**	**4.96 J**	**1.95 J**	**1.61 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF	**0.138 J**	**0.178 J**	0.0525 UJ	**0.0743 J**	**0.0594 J**	0.216 U	0.256 U	0.297 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD	**5.94 J**	**2.65**	**0.832 J**	**2.36 J**	**1.60 J**	**1.1 J**	**1.08 J**	**0.886 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF	**3.90**	**3.79**	**0.154 J**	**0.717 J**	**0.633 J**	0.414 UJ	**0.771 J**	0.419 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD	**2.66**	**1.48 J**	**0.251 J**	**0.806 J**	**0.593 J**	**0.564 J**	**0.564 J**	0.333 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF	**1.36 J**	**1.20 J**	**0.109 J**	**0.573 J**	**0.571 J**	**0.688 J**	**1.42 J**	**0.438 J**
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF`	**2.38 J**	**1.33 J**	**0.125 J**	**0.735 J**	**0.611 J**	**0.963 J**	**1.71 J**	**0.422 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF`	**4.13**	**1.87**	**0.170 J**	**1.23**	**0.713**	**0.94**	**0.739 J**	**0.652**
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD`	**0.871**	**0.484 J**	0.0525 UJ	**0.323 J**	**0.185 J**	0.548 U	0.785 U	0.523 U
Total TCDD TEQ (ND=1/2 MDL/PQL)[h]	**8.53**	**5.07**	**0.861**	**3.34**	**2.74**	**5.6**	**3**	**1.66**
Total TCDD TEQ (ND=0)[h]	**8.53**	**5.07**	**0.832**	**3.34**	**2.74**	**5.2**	**2**	**1.08**

Table M-3. Blakely Harbor Analytical Summary - Sediment

Bold indicates that the analyte was detected.

Notes:
1. Analytes reported as per the RI Work Plan (Geosyntec, 2022)
2. Non detect values are reported to the MDL or PQL. The default is MDL but may be adjusted based on results of the data validation (see section 6.4).
3. Sample depth reported as recovered.
4. Results were validated following level IV guidance for dioxin and furans and level 2B guidance for conventional parameters, grain size, metals, PAHs, SVOCs, and TPHs.
5. Results are presented to the same number of significant digits as reported by the Analytical Laboratory Reports.

Notes:
J indicates values qualified as**J flag**, analytes detected below the method reporting limit, result is an estimate.
J+ indicates values qualified as**J+ flag**, analytes were estimated with high biases in the sample.
J- indicates values qualified as**J- flag**, analytes were estimated with low biases in the sample.
U indicates values qualified as**U flag**, analytes not detected or below the method reporting limit.
UJ indicates values qualified as**UJ flag**, analytes were estimated less than the method detection limit.
R indicates values qualified as**R flag**, analytes result was rejected.
"--" indicates either not applicable or not analyzed

Footnotes:
a. 2021 Surface sediment locations SG-03 and SG-04 were sampled twice to collect additional sample volumes for analysis of dioxin and furans. 2022 Surface sediment locations SG-10A, SG-11A, SG-43, SG-44, SG-45 were sampled twice to analyze sulfide and SEM metals because of expired holding times for the first batch of samples.
b. The visual wood waste assessment is a semiquantitative field assessment; assessment was performed in triplicate for each sample by different field staff, averages are reported.
c. SEM-AVS results for Phase 2021 samples are considered qualitative as AVS were analyzed out of hold time and consequently, recommended data validation qualifiers for AVS data are J-flags/estimates for detects or R-flags/rejects for non-detects.
d. The Low Molecular Weight Polycyclic Aromatic Hydrocarbon value is calculated by summing the following chemicals: Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene (Ecology, 2021).
e. For results that were not detected, one-half the reporting limit was OC normalized.
f. The High Molecular Weight Polycyclic Aromatic Hydrocarbon value is calculated by summing the following chemicals: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b+j+k)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, and Pyrene (Ecology, 2021)
g. The total cPAH TEQ were calculated by summing the product of the TEFs referenced from SCUM (Ecology, 2015) for following chemicals: Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, and Indeno(1,2,3-cd)pyrene
h. The total TCDD TEQ were calculated by summing the products of the mammal TEF referenced from the Implementation Memorandum #13 (Ecology, 2016) with the 17 Dioxin/Furan congeners listed in the table.

Acronyms:
% - percent
∑ - summation
µg/kg – micrograms per kilogram
µmoles – micromoles
AVS - Acid Volatile Sulfide
cm - centimeters
cPAH - carcinogenic polycyclic aromatic hyd
dw – dry weight
fOC – fraction of organic carbon
ft - feet
g – grams
MDL – method detection limit
mg/kg – milligrams per kilogram
ND – nondetect
ng/kg – nanograms per kilogram
OC – organic carbon
PAH - Polycyclic aromatic hydrocarbons
PQL – practical quantitation limit
QA/QC – quality assurance/quality control
SEM/AVS – simultaneously extracted metals/acid volatile sulfide
TCDD - 2,3,7,8 Tetrachlorodibenzodioxin
TEF - Toxicity Equivalency Factors
TEQ - toxicity equivalent

References:
Ecology. 2015. *Implementation Memorandum #10: Evaluating the Human Health Toxicity of Carcinogenic PAHs (cPAHs) using Toxicity Equivalency Factors (TEFs)* Toxics Cleanup Program. Publication # 15-09-049. April.
Ecology. 2016. *Implementation Memorandum #13: Dioxins, Furans, and Dioxin-Like PCB Congeners: Ecological Risk Calculation Methodology for Upland Soil* Toxics Cleanup Program. Publication # 16-09-044. July.
Washington Department of Ecology (Ecology), 2021. "Sediment Cleanup User's Manual (SCUM) Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC". Publication No. 12-09-057. December.
Geosyntec, 2022. *Final Remedial Investigation/Feasibility Study Work Plan Blakely Harbor Park Site*. January.

APPENDIX N

Laboratory Reports and Chains of Custody
(provided under separate cover)

APPENDIX O
Data Quality Assessment

Table 1. DVR and Lab Report Key

DVR File Name	Sampling Round	Lab Report	Lab	DVR Date
01_P1_Axys_20220214	1	DPWG79106	SGS AXYS	2/14/2022
01_P1_Axys_20220214	1	DPWG79150	SGS AXYS	2/14/2022
01_P1_Axys_20220214	1	DPWG79307	SGS AXYS	2/14/2022
01_P1_Axys_20220214	1	DPWG79323	SGS AXYS	2/14/2022
01_P1_Axys_20220214	1	DPWG79361	SGS AXYS	2/14/2022
01_P1_Axys_20220214	1	DPWG79423	SGS AXYS	2/14/2022
02_P1_Alpha_ARI_20220317	1	21H0321	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21H0340	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21H0343	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21H0357	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21H0371	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0190	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0192	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0214	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0225	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0246	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0278	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0301	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21I0325	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21J0204	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	21L0075	ARI	3/17/2022
02_P1_Alpha_ARI_20220317	1	L2148255	Alpha	3/17/2022
03_P1-P2_Axys_20230510	1	DPWG83098	SGS AXYS	5/10/2023
03_P1-P2_Axys_20230510	1	DPWG83139	SGS AXYS	5/10/2023
03_P1-P2_Axys_20230510	1	DPWG84500	SGS AXYS	5/10/2023
03_P1-P2_Axys_20230510	2	DPWG84506	SGS AXYS	5/10/2023
03_P1-P2_Axys_20230510	2	DPWG84843	SGS AXYS	5/10/2023
03_P1-P2_Axys_20230510	2	DPWG84852	SGS AXYS	5/10/2023
04_P2_Axys_20230512	2	DPWG85160	SGS AXYS	5/12/2023
05_P2_Axys_20230515	2	DPWG85162	SGS AXYS	5/15/2023
05_P2_Axys_20230515	2	DPWG85180	SGS AXYS	5/15/2023
06_P2_ARI_20230302	2	22I0263	ARI	3/2/2023
07_P2_ARI_20230605	2	22I0398	ARI	6/5/2023
08_P2-ARI_20230301	2	22J0008	ARI	3/1/2023
09_P2-ARI_20230301	2	22J0052	ARI	3/1/2023
10_P2-ARI_20230222	2	22J0098	ARI	2/22/2023
11_P2-ARI_20230301	2	22J0132	ARI	3/1/2023
12_P2-ARI_20230301	2	22J0134	ARI	3/1/2023
13_P2_ARI_20230524	2	22J0136	ARI	5/24/2023
14_P2_ARI_20230223	2	22J0140	ARI	2/23/2023
14_P2_ARI_20230223	2	22J0170	ARI	2/23/2023
15_P2_ARI_20230524	2	22J0154	ARI	5/24/2023
16_P2_ARI_20230524	2	22J0156	ARI	5/24/2023
17_P2_ARI_20230524	2	22J0194	ARI	5/24/2023
18_P2_ARI_20230524	2	22J0195	ARI	5/24/2023
19_P2_ARI_20230524	2	22J0225	ARI	5/24/2023
20_P2_ARI_20230524	2	22J0226	ARI	5/24/2023
21_P1_Axys_20231029	1	22B0254	ARI	10/29/2023
22_P2_Axys_20231007	2	23B0020	ARI	10/7/2023
23_P2_Axys_20231007	2	23D0598	ARI	10/7/2023
24_P2_Axys_20231007	2	23H0049	ARI	10/7/2023
25_P3_SGS_20240308	3	B8937	SGS AXYS	3/8/2024
25_P3_SGS_20240308	3	B8939	SGS AXYS	3/8/2024
25_P3_SGS_20240308	3	B8940	SGS AXYS	3/8/2024
26_P2_SGS_20231103	2	DPWG85402	SGS AXYS	11/3/2023
26_P2_SGS_20231103	2	DPWG85506	SGS AXYS	11/3/2023
26_P2_SGS_20231103	2	DPWG85511	SGS AXYS	11/3/2023
27_P2_SGS_20231024	2	B7580	SGS AXYS	10/24/2023
27_P2_SGS_20231024	2	B7853	SGS AXYS	10/24/2023
27_P2_SGS_20231024	2	B8229	SGS AXYS	10/24/2023
28_P2_SGS_20231018	2	B8295	SGS AXYS	10/18/2023
29_P1_SGS_20231103	1	DPWG80813	SGS AXYS	11/3/2023
29_P1_SGS_20231103	1	DPWG80837	SGS AXYS	11/3/2023
29_P1_SGS_20231103	1	DPWG81471	SGS AXYS	11/3/2023
30_P2_SGS_20231027	2	DPWG86484	SGS AXYS	10/27/2023
30_P2_SGS_20231027	2	DPWG85531	SGS AXYS	10/27/2023
30_P2_SGS_20231027	2	DPWG85766	SGS AXYS	10/27/2023
31_P3_ 23L0430 23L0435 23L0493	3	23L0430	ARI	8/4/2024
31_P3_ 23L0430 23L0435 23L0493	3	23L0435	ARI	8/4/2024
31_P3_ 23L0430 23L0435 23L0493	3	23L0493	ARI	8/4/2024
32_P1_ECO_20211020	1	EcoAnalysts Blakely Bioassay Report_11232021_	Ecoanalysts	10/20/2021
33_P1_ECO_20220208	1	EcoAnalysts Blakely Bioassay Report_11232021_	Ecoanalysts	2/8/2022
34_P2_ECO_20221208	2	EcoAnalysts Geosyntec Blakely Bioassay Report_120822	Ecoanalysts	12/8/2022

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	14 February 2022
To:	Cindy Bartlett
From:	Kristoffer Henderson
CC:	J. Klens Caprio
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGX AXYS Analytical Services Data Package Identification DPWG79106, DPWG79150, DPWG79307, DPWG79323, DPWG79361 and DPWG79423**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of five water samples, seventy solid samples, one water field duplicate sample, nine solid field duplicate samples and four equipment blanks, collected on 19 August – 21 September 2021, as part of the Remedial Investigation and Feasibility Study (RI/FS) for Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification.

It was noted that sample BH-SC-24-5.9to7.7 was mistakenly not analyzed by the laboratory. Therefore, the requested analysis was not performed.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, June 18, 2021;

- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);
- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L35487-1	HA-01-0to12
L35487-3	HA-06-0to12
L35487-4	HA-06-0to12-D
L35487-6	HA-05-0to12
L35487-8	HA-03-0to12
L35487-10	HA-02-0to12
L35487-12	HA-04-0to12
L35487-14	HA-16-0to12
L35487-16	HA-12-0to12
L35487-19	HA-11-0to12
L35487-21	HA-15-0to12
L35487-23	HA-13-0to12
L35487-25	HA-14-0to12
L35487-27	HA-10-0to12
L35487-30	HA-09-0to12
L35487-32	HA-08-0to12
L35487-34	HA-07-0to12
L35487-35	HA-07-0to12-D
L35514-1	SG-06-0to10
L35514-2	SG-39-0to10
L35514-3	SG-36-0to10
L35514-4	SG-35-0to10
L35514-5	SG-11-0to10
L35514-6	SG-10-0to10
L35514-7	SG-02-0to10
L35514-8	SG-15-0to10
L35514-9	SG-15-0to10-D
L35514-10	SG-33-0to10
L35514-11	SG-25-0to10
L35514-12	SG-22-0to10
L35514-13	SG-22-0to10-D
L35514-14	SG-05-0to10
L35514-15	SG-23-0to10
L35514-16	SG-27-0to10
L35623-1	BH-SB-21-0to2

Laboratory ID	Client ID
L35623-2	BH-SB-21-2to4
L35623-3	BH-SB-21-4to6
L35623-4	BH-SB-20-0to3
L35623-5	BH-SB-20-3to5
L35623-6	BH-SB-18-0to2
L35623-7	BH-SB-18-2to4
L35623-8	BH-SB-18-4to6
L35623-9	BH-SB-19-0to2
L35623-10	BH-SB-19-2to6
L35623-11	BH-SB-19-2to6-DUP
L35623-12	BH-SC-38-0to1.8
L35623-13	BH-SC-38-1.8to3.8
L35623-14	BH-SC-38-3.8to5.8
L35623-15	BH-SC-38-5.8to7.9
L35623-16	BH-SC-24-0to2
L35623-17	BH-SC-24-2to3.8
L35623-18	BH-SC-24-3.8to5.9
L35623-19	BH-SC-24-3.8to5.9-D
L35625-1	BH-SC-EB-CP
L35625-2	BH-SC-EB-CC
L35691-1	BH-EB-GW-210916-1500
L35691-2	BH-EB-SB-210916
L35691-3	BH-GW-17-210916
L35691-4	BH-GW-18-210916
L35691-5	BH-GW-20-210917
L35691-6	BH-GW-21-210917
L35691-7	BH-GW-21-210917-D
L35691-8	BH-GW-19-210917
L35700-1	BH-SC-27-0to1.7
L35700-2	BH-SC-27-1.7To3.7
L35700-3	BH-SC-27-3.7To5.2
L35700-4	BH-SC-27-5.2to6.7
L35700-5	BH-SC-32-0to2
L35700-6	BH-SC-32-2to4
L35700-7	BH-SC-32-2to4-D

Laboratory ID	Client ID
L35700-8	BH-SC-32-4to5.5
L35700-9	BH-SC-12-0to1.4
L35700-10	BH-SB-23-0to2
L35700-11	BH-SB-23-2to4
L35700-12	BH-SB-23-4to6
L35700-16	BH-SB-22-0to2
L35700-17	BH-SB-22-2to4
L35700-18	BH-SB-22-4to6
L35700-22	BH-SB-17-0to2
L35700-23	BH-SB-17-0to2-D

Laboratory ID	Client ID
L35700-24	BH-SB-17-2to4
L35700-25	BH-SB-17-4to6
L35737-1	BH-SC-05-0to1.6
L35737-2	BH-SC-05-1.6to3.2
L35737-3	BH-SC-05-1.6to3.2-D
L35737-4	BH-SC-05-3.2to5.2
L35737-5	BH-SC-07-0to2.5
L35737-6	BH-SC-07-2.5to4.2
L35737-7	BH-SC-07-4.2to6.2

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C), with the following exceptions.

- DP2G79361_2 – The samples were received at 7.6°C. See qualifications in section 1.1 below.
- DP2G79423 – The samples were received at 18°C. See qualifications in section 1.1 below.

No other sample preservation issues were noted by the laboratory.

The following issues were noted for the chain of custodies (COCs); however, these did not result in qualifications:

- DPWG79106 - The sample IDs were changed per the client's request. The last dash in the sample IDs were replaced with "to" and the " at the end of the sample ID was removed; for example, HA-01-0-12" was changed to HA-01-0to12.
- DPWG79106 - Per the client's request the samples ending in 12-24" were placed on hold and were not reported.
- DPWG79150 - Sample BH-GW-21-210917 was listed on the COC twice with the collection times of 09/17/21 1050 and 09/17/21 0900. Per the client's request the ID for the sample collected at 09/17/21 0900 was changed to BH-GW-19-210917.
- DPWG79150 – Samples were listed on hold on the COC and were not reported.
- DPWG79307 – Samples SG-23-0to10 and SG-27-0to10 were not listed on the COC. These samples were added to the COC and analyzed per the client's request.
- DPWG79323 – Sample BH-SC-24-5.9to7.7 was mistakenly not analyzed by the laboratory.
- DPWG79150 and DPWG79323 - Incorrect error corrections were observed on the COC, instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Equipment Blank
⊗ Field Duplicate
✓ Isotope Dilution Standards
✓ Target Compound Identifications
⊗ Target Compound Quantitations
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

Sample BH-SC-24-5.9to7.7 was mistakenly not analyzed by the laboratory. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for the sample set is 98.9%.

DPW793611_2 – The following samples were received at 7.6°C. Therefore, the non-detect results of the dioxins and furans were UJ qualified as estimated less than the sample detection limits (SDLs), or minimum reporting levels (MRLs) and the concentrations of the dioxins and furans were J qualified as estimated.

BH-SC-27-0to1.7
BH-SC-27-1.7To3.7
BH-SC-27-3.7To5.2
BH-SC-32-0to2
BH-SC-32-2to4
BH-SC-32-2to4-D
BH-SC-32-4to5.5

BH-SC-12-0to1.4
BH-SB-23-0to2
BH-SB-23-2to4
BH-SB-23-4to6
BH-SB-22-0to2
BH-SB-22-2to4
BH-SB-22-4to6

BH-SB-17-0to2
BH-SB-17-0to2-D
BH-SB-17-2to4
BH-SB-17-4to6
BH-SC-27-5.2to6.7

DPW79423 – The following samples were received at 18°C. Therefore, the non-detect results of the dioxins and furans were UJ qualified as estimated less than the SDLs or MRLs and the concentrations of the dioxins and furans were J qualified as estimated.

BH-SC-05-0to1.6
BH-SC-05-1.6to3.2
BH-SC-05-1.6to3.2-D
BH-SC-05-3.2to5.2
BH-SC-07-0to2.5
BH-SC-07-2.5to4.2
BH-SC-07-4.2to6.2

See qualifications in Attachment 3 at the end of this report.

The samples were analyzed using GC column DB-5. Per the laboratory SOP detections of 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD on GC column DB-5 are confirmed and quantitated by analysis using GC column DB-225. Therefore, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results were considered from the confirmation analysis when analyzed. However, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results that were not detected in the original analysis did not require confirmation and were considered from the original analysis. The results not considered for validation were R qualified as rejected in the EDD.

1.2 Holding Times

The holding times for the dioxin and furans analysis of water and solid samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Six method blanks were reported (batches WG78482, WG78518, WG78537, WG78538, WG78539 and WG79171). Dioxins and furans were not detected in the method blanks above the reporting limits (RLs), with the following exceptions.

DPWG79106: 1,2,3,7,8-PECDD, 1,2,3,4,7,8-HXCDD, 1,2,3,6,7,8-HXCDD, 1,2,3,7,8,9-HXCDD, 1,2,3,4,6,7,8-HPCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were detected in the method blank in batch WG78482 at concentrations greater than the SDLs and less than the limit of quantitations (LOQs). Since 1,2,3,4,6,7,8-HPCDD was detected in the associated samples at concentrations greater than the LOQ and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD data. However, the estimated concentrations of 1,2,3,7,8-PECDD, 1,2,3,4,7,8-HXCDD, 1,2,3,6,7,8-HXCDD, 1,2,3,7,8,9-HXCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG79106: OCDD (28.3 pg/g) was detected in the method blank in batch WG78482 at a concentration greater than the LOQ. Based on the OCDD concentration in the associated samples and professional and technical judgment, no qualifications were applied to the associated OCDD data.

DPWG79106: Total TCDD (1.71 pg/g), total PeCDD (0.515 pg/g), total HxCDD (1.53 pg/g), total HpCDD (3.38 pg/g), total TCDF (1.52 pg/g), total PeCDF (0.218 pg/g), total HxCDF (0.527 pg/g) and total HpCDD (0.521 pg/g) were detected in the method blank in batch WG78482 at concentrations greater than the SDLs and less than the LOQs. Based on the concentrations of total TCDD, total PeCDD, total HxCDD, total HpCDD, total PeCDF, total HxCDF and total HpCDD in the associated samples and professional and technical judgment, no qualifications were applied to the data. However, based on professional and technical judgment, the total TCDF concentration in sample HA-03-0to12 was J+ qualified as estimated with a high bias.

DPWG79150: OCDD and 1,2,3,7,8,9-HPCDF were detected in the method blank in batch WG78518 at concentrations greater than the SDLs and less than the LOQs. Therefore, the estimated concentrations of OCDD and 1,2,3,7,8,9-HPCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG79307: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF and 1,2,3,4,6,7,8-HPCDF were detected in the method blank in batch WG78537 at concentrations greater than the SDLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD, OCDD and 1,2,3,4,6,7,8-HPCDF were detected in the associated samples at concentrations greater than the LOQs and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD, OCDD and 1,2,3,4,6,7,8-HPCDF data. However, the estimated concentrations of 1,2,3,7,8-PECDF in the associated samples were U qualified as not detected at the LOQ.

DPWG79323: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8,9-HPCDF and 1,2,3,4,6,7,8-HPCDF were detected in the method blank in batch WG78538 at concentrations greater than the SDLs and less than the LOQs. Since OCDD was detected in the associated samples at concentrations greater than the LOQ and based on professional and technical judgment, no qualifications were applied to the OCDD data. However, the estimated concentrations of 1,2,3,4,6,7,8-HPCDD, 1,2,3,7,8,9-HPCDF and 1,2,3,4,6,7,8-HPCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG79323: Total HxCDF (0.0630 pg/g) and total HpCDF (0.0555 pg/g) were detected in the method blank in batch WG78538 at concentrations greater than the SDLs and less than the LOQs. Therefore, based on professional and technical judgment, the total HxCDF concentration in sample BH-SB-18-4to6 and the total HpCDF concentration in sample BH-SC-38-1.8to3.8 were J+ qualified as estimated with high biases.

DPWG79361: 1,2,3,6,7,8-HXCDD, 1,2,3,7,8,9-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were detected in the method blank in batch WG78539 at concentrations greater than the SDLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected in the associated samples at concentrations greater than the LOQs and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,6,7,8-HXCDD, 1,2,3,7,8,9-HXCDD, 1,2,3,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG79361: Total HxCDD (0.0615 pg/g), total PeCDF (0.0625 pg/g), total HxCDF (0.174 pg/g) and total HpCDF (0.0690 pg/g) were detected in the method blank in batch WG78539 at concentrations greater than the SDLs and less than the LOQs. Based on the concentration of total

HxCDD, total PeCDF and total HpCDF in the associated samples and based on professional and technical judgment, no qualifications were applied to the total HxCDD, total PeCDF and total HpCDF data. However, the total HxCDF concentration in sample BH-SC-32-2to4-D was J+ qualified as estimated with a high bias.

DPWG79361: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 1,2,3,6,7,8-HXCDF and OCDF were detected in the method blank in batch WG79171 at concentrations greater than the SDLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected at concentrations greater than the LOQs, 1,2,3,6,7,8-HXCDF was not detected in the associated sample and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD, OCDD and 1,2,3,6,7,8-HXCDF data. However, the estimated concentrations of 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF and OCDF in the associated sample were U qualified as not detected at the LOQs.

DPWG79361: Total HxCDF (0.0673 pg/g) and total HxCDF (0.0862 pg/g) were detected in the method blank in batch WG79171 at concentrations greater than the SDLs and less than the LOQs. Since total HxCDF and total HxCDF were not detected in the associated sample, no qualifications were applied to the data.

DPWG79423: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF and 1,2,3,7,8,9-HXCDF were detected in the method blank in batch WG78540 at concentrations greater than the SDLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected in the associated samples at concentrations greater than the LOQs and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,7,8-PECDF and 1,2,3,7,8,9-HXCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG79423: Total HpCDD (0.0637 pg/g) and total PeCDF (0.0558 pg/g) were detected in the method blank in batch WG78540 at concentrations greater than the SDLs and less than the LOQs. Based on the concentrations of total HpCDD and total PeCDF in the associated samples and professional and technical judgment, no qualifications were applied to the data.

DPWG79423: 1,2,3,6,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF were detected in the method blank in batch WG79023 at concentrations greater than the SDLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected at concentrations greater than the LOQs in the associated sample and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,6,7,8-HXCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF in the associated sample were U qualified as not detected at the LOQs.

DPWG79423: Total HpCDD (0.106 pg/g) and total HpCDF (0.136 pg/g) were detected in the method blank in batch WG79023 at concentrations greater than the SDLs and less than the LOQs. Based on the concentrations of total HpCDD and total HpCDF in the associated sample and based on professional and technical judgment, no qualifications were applied to the data.

See qualifications in Attachment 4 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Eight LCS/LCS duplicate (LCSD) pairs were reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Four equipment blanks were submitted with the sample set, BH-SC-EB-CP, BH-SC-EB-CC, BH-EB-GW-210916-1500 and BH-EB-SB-210916. Dioxin and furans were not detected in the equipment blank above the SDLs or MRLs, with the following exceptions.

DPWG79150: OCDD and 1,2,3,7,8,9-HXCDF were detected in BH-SC-EB-CP at estimated concentrations greater than the SDLs and less than the LOQs. Since the OCDD and 1,2,3,7,8,9-HXCDF concentrations in BH-SC-EB-CP were U qualified due to method blank contamination and based on professional and technical judgement, no additional qualifications were applied to the data.

DPWG79150: OCDD was detected in BH-SC-EB-CC at a concentration greater than the LOQ. Since the OCDD concentration in BH-SC-EB-CC was U qualified due to method blank contamination and based on professional and technical judgement, no additional qualifications were applied to the data.

DPWG79150: OCDD was detected in BH-EB-GW-210916-1500 and BH-EB-SB-210916 at estimated concentrations greater than the SDL and less than the LOQ. Since the OCDD concentrations in BH-EB-GW-210916-1500 and BH-EB-SB-210916 were U qualified due to method blank contamination and based on professional and technical judgement, no additional qualifications were applied to the data.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Ten field duplicate samples were submitted and analyzed with the sample set, HA-06-0to12-D, HA-07-0to12-D, BH-GW-21-210917-D, SG-15-0to10-D, SG-22-0to10-D, BH-SB-19-2to6-DUP, BH-SC-24-3.8to5.9-D, BH-SB-17-0to2-D, BH-SC-32-2to4-D and BH-SC-05-1.6to3.2-D. Acceptable precision (waters RPD ≤30%, solids RPD ≤50%) was demonstrated between the field duplicates and original samples, HA-06-0to12, HA-07-0to12, BH-GW-21-210917, SG-15-0to10, SG-22-0to10, BH-SB-19-2to6, BH-SC-24-3.8to5.9, BH-SB-17-0to2, BH-SC-32-2to4 and BH-SC-05-1.6to3.2, respectively.

For RPDs greater than 30% for waters and 50% for solids, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the SDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the SDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

For analytes with both a concentration greater than the LOQ and an estimated concentration greater than the SDL and less than the LOQ, the RPDs were not calculable. Therefore, these concentrations in the field duplicate pair were J qualified as estimated.

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	RPD	Validation Result (pg/L)	Validation Qualifier*	Reason Code**
BH-GW-21-210917	1,2,3,6,7,8-HXCDF	0.735	NJ J	NC	0.735	J	7
BH-GW-21-210917-D	1,2,3,6,7,8-HXCDF	0.526	UJ		0.526	UJ	7
BH-GW-21-210917	2,3,4,6,7,8-HXCDF	0.754	NJ J	NC	0.754	J	7
BH-GW-21-210917-D	2,3,4,6,7,8-HXCDF	0.526	UJ		0.526	UJ	7
BH-GW-21-210917	OCDF	0.614	NJ J	NC	0.614	J	7
BH-GW-21-210917-D	OCDF	0.526	UJ		0.526	UJ	7
BH-GW-21-210917	Total Hepta-Dioxins	1.25	NA	71	1.25	J	7
BH-GW-21-210917-D	Total Hepta-Dioxins	0.596	NA		0.596	J	7

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	RPD	Validation Result (pg/L)	Validation Qualifier*	Reason Code**
BH-GW-21-210917	Total Hepta-Furans	4.39	NA	75	4.39	J	7
BH-GW-21-210917-D	Total Hepta-Furans	2.00	NA		2.00	J	7
BH-GW-21-210917	Total Hexa-Furans	6.77	NA	60	6.77	J	7
BH-GW-21-210917-D	Total Hexa-Furans	3.64	NA		3.64	J	7
BH-GW-21-210917	Total Penta-Dioxins	1.21	NA	NC	1.21	J	7
BH-GW-21-210917-D	Total Penta-Dioxins	0.526	UJ		0.526	UJ	7
BH-GW-21-210917	Total Penta-Furans	5.86	NA	77	5.86	J	7
BH-GW-21-210917-D	Total Penta-Furans	2.6	NA		2.6	J	7
BH-GW-21-210917	Total Tetra-Furans	4.82	NA	85	4.82	J	7
BH-GW-21-210917-D	Total Tetra-Furans	1.94	NA		1.94	J	7

pg/L-picograms per liter
J-estimated concentration greater than the SDL or MRL but less than the LOQ
UJ-not detected at or above the SDL or MRL
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable
NC-not calculable
RPD-relative percent difference
* Validation qualifiers are defined in Attachment 1 at the end of this report
**Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-19-2to6	1,2,3,4,6,7,8-HPCDD	5.60	NA	NC*	NA	NA	NA
BH-SB-19-2to6-DUP	1,2,3,4,6,7,8-HPCDD	5.51	J		NA	NA	NA
BH-SB-19-2to6	1,2,3,7,8,9-HXCDF	0.197	NJ B J	NC*	NA	NA	NA
BH-SB-19-2to6-DUP	1,2,3,7,8,9-HXCDF	0.271	UJ		NA	NA	NA
BH-SB-19-2to6	Total Penta-Furans	2.68	NA	147	2.68	J	7
BH-SB-19-2to6-DUP	Total Penta-Furans	17.5	NA		17.5	J	7
BH-SC-05-1.6to3.2	1,2,3,7,8,9-HXCDD	2.20	J	NC	2.20	J	7

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-05-1.6to3.2-D	1,2,3,7,8,9-HXCDD	2.36	NA		2.36	J	7
BH-SC-24-3.8to5.9	OCDD	227	NA	54	227	J	7
BH-SC-24-3.8to5.9-D	OCDD	130	NA		130	J	7
BH-SC-32-2to4	Total Hexa-Furans	0.0484	UJ	NC	0.0484	UJ	7
BH-SC-32-2to4-D	Total Hexa-Furans	0.0628	B		0.0628	J	7
HA-07-0to12	Total Tetra-Dioxins	154	NA	59	154	J	7
HA-07-0to12-D	Total Tetra-Dioxins	283	NA		283	J	7
SG-22-0to10	2,3,7,8-TCDD	0.740	J	NC	0.74	J	7
SG-22-0to10-D	2,3,7,8-TCDD	0.887	NA		0.887	J	7
SG-22-0to10	Total Tetra-Dioxins	47.6	NA	132	47.6	J	7
SG-22-0to10-D	Total Tetra-Dioxins	231	NA		231	J	7
SG-22-0to10	Total Tetra-Furans	29.6	NA	94	29.6	J	7
SG-22-0to10-D	Total Tetra-Furans	82.4	NA		82.4	J	7

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
UJ-not detected at or above the SDL or MRL
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable
NC-not calculable
RPD-relative percent difference
*no qualification, see explanation above

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged NJ by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions. For these concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Eight concentrations of 1,2,3,7,8-PECDD were flagged G by the laboratory to indicate interference was present. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment.

See qualifications in Attachment 5 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the SDLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for solids and QAPP Table 9b for waters for 2,3,7,8-TCDD and 1,2,3,4,7,8-PeCDD. The screening levels were met with the following exception.

The SDL for solids for 2,3,7,8-TCDD of 0.065 pg/g did not meet the screening level of 0.0013 pg/g listed in Table 9a of the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV report at a minimum of 20%. The laboratory used flag D for results reported from a dilution in the EDD but was not reported in the level IV report. No other discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

X The sample results were affected by serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified. Acceptance or rejection of the data should be decided by the project team (which should include a Project Chemist), but exclusion of the data is recommended.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR RECEIPT TEMPERATURE EXCEEDANCES

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-0to2	1,2,3,4,6,7,8-HPCDD	49.8	NA	49.8	J	1
BH-SB-17-0to2	1,2,3,4,6,7,8-HPCDF	51.7	NA	51.7	J	1
BH-SB-17-0to2	1,2,3,4,7,8,9-HPCDF	6.30	NA	6.30	J	1
BH-SB-17-0to2	1,2,3,4,7,8-HXCDD	6.70	NA	6.70	J	1
BH-SB-17-0to2	1,2,3,4,7,8-HXCDF	33.5	NA	33.5	J	1
BH-SB-17-0to2	1,2,3,6,7,8-HXCDD	9.64	NA	9.64	J	1
BH-SB-17-0to2	1,2,3,6,7,8-HXCDF	22.5	NA	22.5	J	1
BH-SB-17-0to2	1,2,3,7,8,9-HXCDD	7.24	NA	7.24	J	1
BH-SB-17-0to2	1,2,3,7,8,9-HXCDF	2.02	J	2.02	J	1
BH-SB-17-0to2	1,2,3,7,8-PECDD	11.6	G	11.6	J	1
BH-SB-17-0to2	1,2,3,7,8-PECDF	27.6	NA	27.6	J	1
BH-SB-17-0to2	2,3,4,6,7,8-HXCDF	16.1	NA	16.1	J	1
BH-SB-17-0to2	2,3,4,7,8-PECDF	28.9	NA	28.9	J	1
BH-SB-17-0to2	2,3,7,8-TCDD	5.10	NA	5.10	J	1
BH-SB-17-0to2	2,3,7,8-TCDF	37.2	NA	37.2	J	1
BH-SB-17-0to2	OCDD	100	NA	100	J	1
BH-SB-17-0to2	OCDF	18.2	NA	18.2	J	1
BH-SB-17-0to2	TOTAL HpCDD	99.5	NA	99.5	J	1
BH-SB-17-0to2	TOTAL HpCDF	75.4	NA	75.4	J	1
BH-SB-17-0to2	TOTAL HxCDD	241	NA	241	J	1
BH-SB-17-0to2	TOTAL HxCDF	177	NA	177	J	1
BH-SB-17-0to2	TOTAL PeCDD	282	NA	282	J	1
BH-SB-17-0to2	TOTAL PeCDF	294	NA	294	J	1
BH-SB-17-0to2	TOTAL TCDD	335	NA	335	J	1
BH-SB-17-0to2	TOTAL TCDF	477	NA	477	J	1
BH-SB-17-0to2-D	1,2,3,4,6,7,8-HPCDD	61.7	NA	61.7	J	1
BH-SB-17-0to2-D	1,2,3,4,6,7,8-HPCDF	43.9	NA	43.9	J	1
BH-SB-17-0to2-D	1,2,3,4,7,8,9-HPCDF	4.97	NA	4.97	J	1
BH-SB-17-0to2-D	1,2,3,4,7,8-HXCDD	6.73	NA	6.73	J	1
BH-SB-17-0to2-D	1,2,3,4,7,8-HXCDF	27.6	NA	27.6	J	1
BH-SB-17-0to2-D	1,2,3,6,7,8-HXCDD	10.4	NA	10.4	J	1
BH-SB-17-0to2-D	1,2,3,6,7,8-HXCDF	19.5	NA	19.5	J	1
BH-SB-17-0to2-D	1,2,3,7,8,9-HXCDD	6.89	NA	6.89	J	1
BH-SB-17-0to2-D	1,2,3,7,8,9-HXCDF	1.51	J	1.51	J	1
BH-SB-17-0to2-D	1,2,3,7,8-PECDD	10.8	G	10.8	J	1
BH-SB-17-0to2-D	1,2,3,7,8-PECDF	24.8	NA	24.8	J	1
BH-SB-17-0to2-D	2,3,4,6,7,8-HXCDF	14.1	NA	14.1	J	1
BH-SB-17-0to2-D	2,3,4,7,8-PECDF	25.7	NA	25.7	J	1
BH-SB-17-0to2-D	2,3,7,8-TCDD	5.03	NA	5.03	J	1
BH-SB-17-0to2-D	2,3,7,8-TCDF	34.2	NA	34.2	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-0to2-D	OCDD	148	NA	148	J	1
BH-SB-17-0to2-D	OCDF	11.9	NA	11.9	J	1
BH-SB-17-0to2-D	TOTAL HpCDD	124	NA	124	J	1
BH-SB-17-0to2-D	TOTAL HpCDF	63.0	NA	63.0	J	1
BH-SB-17-0to2-D	TOTAL HxCDD	266	NA	266	J	1
BH-SB-17-0to2-D	TOTAL HxCDF	154	NA	154	J	1
BH-SB-17-0to2-D	TOTAL PeCDD	246	NA	246	J	1
BH-SB-17-0to2-D	TOTAL PeCDF	270	NA	270	J	1
BH-SB-17-0to2-D	TOTAL TCDD	309	NA	309	J	1
BH-SB-17-0to2-D	TOTAL TCDF	439	NA	439	J	1
BH-SB-17-2to4	1,2,3,4,6,7,8-HPCDD	18.3	NA	18.3	J	1
BH-SB-17-2to4	1,2,3,4,6,7,8-HPCDF	3.41	J	3.41	J	1
BH-SB-17-2to4	1,2,3,4,7,8,9-HPCDF	0.414	B J	0.414	J	1
BH-SB-17-2to4	1,2,3,4,7,8-HXCDD	3.06	J	3.06	J	1
BH-SB-17-2to4	1,2,3,4,7,8-HXCDF	2.09	J	2.09	J	1
BH-SB-17-2to4	1,2,3,6,7,8-HXCDD	3.81	J	3.81	J	1
BH-SB-17-2to4	1,2,3,6,7,8-HXCDF	1.62	J	1.62	J	1
BH-SB-17-2to4	1,2,3,7,8,9-HXCDD	3.92	J	3.92	J	1
BH-SB-17-2to4	1,2,3,7,8,9-HXCDF	0.187	NJ J	0.187	J	1
BH-SB-17-2to4	1,2,3,7,8-PECDD	4.70	G	4.70	J	1
BH-SB-17-2to4	1,2,3,7,8-PECDF	3.53	J	3.53	J	1
BH-SB-17-2to4	2,3,4,6,7,8-HXCDF	1.30	J	1.30	J	1
BH-SB-17-2to4	2,3,4,7,8-PECDF	3.38	J	3.38	J	1
BH-SB-17-2to4	2,3,7,8-TCDD	2.49	NA	2.49	J	1
BH-SB-17-2to4	2,3,7,8-TCDF	7.26	NA	7.26	J	1
BH-SB-17-2to4	OCDD	48.0	NA	48.0	J	1
BH-SB-17-2to4	OCDF	1.46	J	1.46	J	1
BH-SB-17-2to4	TOTAL HpCDD	33.1	NA	33.1	J	1
BH-SB-17-2to4	TOTAL HpCDF	4.32	NA	4.32	J	1
BH-SB-17-2to4	TOTAL HxCDD	101	NA	101	J	1
BH-SB-17-2to4	TOTAL HxCDF	10.6	NA	10.6	J	1
BH-SB-17-2to4	TOTAL PeCDD	177	NA	177	J	1
BH-SB-17-2to4	TOTAL PeCDF	38.6	NA	38.6	J	1
BH-SB-17-2to4	TOTAL TCDD	314	NA	314	J	1
BH-SB-17-2to4	TOTAL TCDF	115	NA	115	J	1
BH-SB-17-4to6	1,2,3,4,6,7,8-HPCDD	29.3	NA	29.3	J	1
BH-SB-17-4to6	1,2,3,4,6,7,8-HPCDF	8.52	NA	8.52	J	1
BH-SB-17-4to6	1,2,3,4,7,8,9-HPCDF	0.675	J	0.675	J	1
BH-SB-17-4to6	1,2,3,4,7,8-HXCDD	1.65	J	1.65	J	1
BH-SB-17-4to6	1,2,3,4,7,8-HXCDF	3.20	J	3.20	J	1
BH-SB-17-4to6	1,2,3,6,7,8-HXCDD	2.76	J	2.76	J	1
BH-SB-17-4to6	1,2,3,6,7,8-HXCDF	1.45	J	1.45	J	1
BH-SB-17-4to6	1,2,3,7,8,9-HXCDD	2.58	J	2.58	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-4to6	1,2,3,7,8,9-HXCDF	0.560	J	0.560	J	1
BH-SB-17-4to6	1,2,3,7,8-PECDD	1.83	NJ J G	1.83	J	1
BH-SB-17-4to6	1,2,3,7,8-PECDF	2.48	J	2.48	J	1
BH-SB-17-4to6	2,3,4,6,7,8-HXCDF	1.09	J	1.09	J	1
BH-SB-17-4to6	2,3,4,7,8-PECDF	2.09	J	2.09	J	1
BH-SB-17-4to6	2,3,7,8-TCDD	0.873	J	0.873	J	1
BH-SB-17-4to6	2,3,7,8-TCDF	4.30	NA	4.30	J	1
BH-SB-17-4to6	OCDD	358	NA	358	J	1
BH-SB-17-4to6	OCDF	5.80	J	5.80	J	1
BH-SB-17-4to6	TOTAL HpCDD	64.6	NA	64.6	J	1
BH-SB-17-4to6	TOTAL HpCDF	13.5	NA	13.5	J	1
BH-SB-17-4to6	TOTAL HxCDD	42.4	NA	42.4	J	1
BH-SB-17-4to6	TOTAL HxCDF	15.2	NA	15.2	J	1
BH-SB-17-4to6	TOTAL PeCDD	40.1	NA	40.1	J	1
BH-SB-17-4to6	TOTAL PeCDF	21.5	NA	21.5	J	1
BH-SB-17-4to6	TOTAL TCDD	66.4	NA	66.4	J	1
BH-SB-17-4to6	TOTAL TCDF	63.6	NA	63.6	J	1
BH-SB-22-0to2	1,2,3,4,6,7,8-HPCDD	154	NA	154	J	1
BH-SB-22-0to2	1,2,3,4,6,7,8-HPCDF	86.0	NA	86.0	J	1
BH-SB-22-0to2	1,2,3,4,7,8,9-HPCDF	4.69	NA	4.69	J	1
BH-SB-22-0to2	1,2,3,4,7,8-HXCDD	24.1	NA	24.1	J	1
BH-SB-22-0to2	1,2,3,4,7,8-HXCDF	72.0	NA	72.0	J	1
BH-SB-22-0to2	1,2,3,6,7,8-HXCDD	43.7	NA	43.7	J	1
BH-SB-22-0to2	1,2,3,6,7,8-HXCDF	21.4	NA	21.4	J	1
BH-SB-22-0to2	1,2,3,7,8,9-HXCDD	34.4	NA	34.4	J	1
BH-SB-22-0to2	1,2,3,7,8,9-HXCDF	1.74	J	1.74	J	1
BH-SB-22-0to2	1,2,3,7,8-PECDD	43.6	G	43.6	J	1
BH-SB-22-0to2	1,2,3,7,8-PECDF	53.8	NA	53.8	J	1
BH-SB-22-0to2	2,3,4,6,7,8-HXCDF	10.1	NA	10.1	J	1
BH-SB-22-0to2	2,3,4,7,8-PECDF	27.2	NA	27.2	J	1
BH-SB-22-0to2	2,3,7,8-TCDD	16.2	NA	16.2	J	1
BH-SB-22-0to2	2,3,7,8-TCDF	63.0	NA	63.0	J	1
BH-SB-22-0to2	OCDD	251	NA	251	J	1
BH-SB-22-0to2	OCDF	29.3	NA	29.3	J	1
BH-SB-22-0to2	TOTAL HpCDD	254	NA	254	J	1
BH-SB-22-0to2	TOTAL HpCDF	106	NA	106	J	1
BH-SB-22-0to2	TOTAL HxCDD	713	NA	713	J	1
BH-SB-22-0to2	TOTAL HxCDF	181	NA	181	J	1
BH-SB-22-0to2	TOTAL PeCDD	1300	NA	1300	J	1
BH-SB-22-0to2	TOTAL PeCDF	336	NA	336	J	1
BH-SB-22-0to2	TOTAL TCDD	2030	NA	2030	J	1
BH-SB-22-0to2	TOTAL TCDF	811	NA	811	J	1
BH-SB-22-2to4	1,2,3,4,6,7,8-HPCDD	73.4	D	73.4	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-22-2to4	1,2,3,4,6,7,8-HPCDF	19.1	D	19.1	J	1
BH-SB-22-2to4	1,2,3,4,7,8,9-HPCDF	1.48	NJ D J	1.48	J	1
BH-SB-22-2to4	1,2,3,4,7,8-HXCDD	18.7	D	18.7	J	1
BH-SB-22-2to4	1,2,3,4,7,8-HXCDF	15.4	D	15.4	J	1
BH-SB-22-2to4	1,2,3,6,7,8-HXCDD	21.4	D	21.4	J	1
BH-SB-22-2to4	1,2,3,6,7,8-HXCDF	7.88	D J	7.88	J	1
BH-SB-22-2to4	1,2,3,7,8,9-HXCDD	16.9	D	16.9	J	1
BH-SB-22-2to4	1,2,3,7,8,9-HXCDF	0.663	D J	0.663	J	1
BH-SB-22-2to4	1,2,3,7,8-PECDD	38.4	D	38.4	J	1
BH-SB-22-2to4	1,2,3,7,8-PECDF	23.4	D	23.4	J	1
BH-SB-22-2to4	2,3,4,6,7,8-HXCDF	4.17	D J	4.17	J	1
BH-SB-22-2to4	2,3,4,7,8-PECDF	18.3	D	18.3	J	1
BH-SB-22-2to4	2,3,7,8-TCDD	33.3	D	33.3	J	1
BH-SB-22-2to4	2,3,7,8-TCDF	61.1	D	61.1	J	1
BH-SB-22-2to4	OCDD	106	D	106	J	1
BH-SB-22-2to4	OCDF	7.11	D J	7.11	J	1
BH-SB-22-2to4	TOTAL HpCDD	132	D	132	J	1
BH-SB-22-2to4	TOTAL HpCDF	22.9	D	22.9	J	1
BH-SB-22-2to4	TOTAL HxCDD	510	D	510	J	1
BH-SB-22-2to4	TOTAL HxCDF	61.6	D	61.6	J	1
BH-SB-22-2to4	TOTAL PeCDD	1110	D	1110	J	1
BH-SB-22-2to4	TOTAL PeCDF	201	D	201	J	1
BH-SB-22-2to4	TOTAL TCDD	2330	D	2330	J	1
BH-SB-22-2to4	TOTAL TCDF	834	D	834	J	1
BH-SB-22-4to6	1,2,3,4,6,7,8-HPCDD	61100	D	61100	J	1
BH-SB-22-4to6	1,2,3,4,6,7,8-HPCDF	37800	D	37800	J	1
BH-SB-22-4to6	1,2,3,4,7,8,9-HPCDF	1360	D	1360	J	1
BH-SB-22-4to6	1,2,3,4,7,8-HXCDD	4140	D	4140	J	1
BH-SB-22-4to6	1,2,3,4,7,8-HXCDF	26200	D	26200	J	1
BH-SB-22-4to6	1,2,3,6,7,8-HXCDD	14100	D	14100	J	1
BH-SB-22-4to6	1,2,3,6,7,8-HXCDF	4470	D	4470	J	1
BH-SB-22-4to6	1,2,3,7,8,9-HXCDD	6830	D	6830	J	1
BH-SB-22-4to6	1,2,3,7,8,9-HXCDF	271	D	271	J	1
BH-SB-22-4to6	1,2,3,7,8-PECDD	2770	D	2770	J	1
BH-SB-22-4to6	1,2,3,7,8-PECDF	9490	D	9490	J	1
BH-SB-22-4to6	2,3,4,6,7,8-HXCDF	1050	D	1050	J	1
BH-SB-22-4to6	2,3,4,7,8-PECDF	2330	D	2330	J	1
BH-SB-22-4to6	2,3,7,8-TCDD	515	D	515	J	1
BH-SB-22-4to6	2,3,7,8-TCDF	3920	D	3920	J	1
BH-SB-22-4to6	OCDD	38500	D	38500	J	1
BH-SB-22-4to6	OCDF	21500	D	21500	J	1
BH-SB-22-4to6	TOTAL HpCDD	71400	D	71400	J	1
BH-SB-22-4to6	TOTAL HpCDF	43300	D	43300	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-22-4to6	TOTAL HxCDD	64000	D	64000	J	1
BH-SB-22-4to6	TOTAL HxCDF	43300	D	43300	J	1
BH-SB-22-4to6	TOTAL PeCDD	23500	D	23500	J	1
BH-SB-22-4to6	TOTAL PeCDF	28000	D	28000	J	1
BH-SB-22-4to6	TOTAL TCDD	18200	D	18200	J	1
BH-SB-22-4to6	TOTAL TCDF	16200	D	16200	J	1
BH-SB-23-0to2	1,2,3,4,6,7,8-HPCDD	174	NA	174	J	1
BH-SB-23-0to2	1,2,3,4,6,7,8-HPCDF	115	NA	115	J	1
BH-SB-23-0to2	1,2,3,4,7,8,9-HPCDF	7.67	NA	7.67	J	1
BH-SB-23-0to2	1,2,3,4,7,8-HXCDD	13.1	NA	13.1	J	1
BH-SB-23-0to2	1,2,3,4,7,8-HXCDF	64.7	NA	64.7	J	1
BH-SB-23-0to2	1,2,3,6,7,8-HXCDD	37.5	NA	37.5	J	1
BH-SB-23-0to2	1,2,3,6,7,8-HXCDF	25.7	NA	25.7	J	1
BH-SB-23-0to2	1,2,3,7,8,9-HXCDD	24.6	NA	24.6	J	1
BH-SB-23-0to2	1,2,3,7,8,9-HXCDF	1.54	J	1.54	J	1
BH-SB-23-0to2	1,2,3,7,8-PECDD	17.6	G	17.6	J	1
BH-SB-23-0to2	1,2,3,7,8-PECDF	24.8	NA	24.8	J	1
BH-SB-23-0to2	2,3,4,6,7,8-HXCDF	11.7	NA	11.7	J	1
BH-SB-23-0to2	2,3,4,7,8-PECDF	15.7	NA	15.7	J	1
BH-SB-23-0to2	2,3,7,8-TCDD	2.27	NA	2.27	J	1
BH-SB-23-0to2	2,3,7,8-TCDF	15.8	NA	15.8	J	1
BH-SB-23-0to2	OCDD	690	NA	690	J	1
BH-SB-23-0to2	OCDF	27.6	NA	27.6	J	1
BH-SB-23-0to2	TOTAL HpCDD	322	NA	322	J	1
BH-SB-23-0to2	TOTAL HpCDF	142	NA	142	J	1
BH-SB-23-0to2	TOTAL HxCDD	679	NA	679	J	1
BH-SB-23-0to2	TOTAL HxCDF	215	NA	215	J	1
BH-SB-23-0to2	TOTAL PeCDD	756	NA	756	J	1
BH-SB-23-0to2	TOTAL PeCDF	185	NA	185	J	1
BH-SB-23-0to2	TOTAL TCDD	757	NA	757	J	1
BH-SB-23-0to2	TOTAL TCDF	186	NA	186	J	1
BH-SB-23-2to4	1,2,3,4,6,7,8-HPCDD	25.4	NA	25.4	J	1
BH-SB-23-2to4	1,2,3,4,6,7,8-HPCDF	5.36	NA	5.36	J	1
BH-SB-23-2to4	1,2,3,4,7,8,9-HPCDF	0.444	J	0.444	J	1
BH-SB-23-2to4	1,2,3,4,7,8-HXCDD	6.77	NA	6.77	J	1
BH-SB-23-2to4	1,2,3,4,7,8-HXCDF	2.82	NA	2.82	J	1
BH-SB-23-2to4	1,2,3,6,7,8-HXCDD	6.45	NA	6.45	J	1
BH-SB-23-2to4	1,2,3,6,7,8-HXCDF	1.93	J	1.93	J	1
BH-SB-23-2to4	1,2,3,7,8,9-HXCDD	5.47	NA	5.47	J	1
BH-SB-23-2to4	1,2,3,7,8,9-HXCDF	0.217	NJ J	0.217	J	1
BH-SB-23-2to4	1,2,3,7,8-PECDD	10.7	G	10.7	J	1
BH-SB-23-2to4	1,2,3,7,8-PECDF	3.91	NA	3.91	J	1
BH-SB-23-2to4	2,3,4,6,7,8-HXCDF	1.43	J	1.43	J	1

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BH-SB-23-2to4	2,3,4,7,8-PECDF	3.51	NA	3.51	J	1
BH-SB-23-2to4	2,3,7,8-TCDD	6.88	NA	6.88	J	1
BH-SB-23-2to4	2,3,7,8-TCDF	9.91	NA	9.91	J	1
BH-SB-23-2to4	OCDD	23.6	NA	23.6	J	1
BH-SB-23-2to4	OCDF	1.72	J	1.72	J	1
BH-SB-23-2to4	TOTAL HpCDD	43.2	NA	43.2	J	1
BH-SB-23-2to4	TOTAL HpCDF	7.03	NA	7.03	J	1
BH-SB-23-2to4	TOTAL HxCDD	167	NA	167	J	1
BH-SB-23-2to4	TOTAL HxCDF	14.9	NA	14.9	J	1
BH-SB-23-2to4	TOTAL PeCDD	404	NA	404	J	1
BH-SB-23-2to4	TOTAL PeCDF	44.2	NA	44.2	J	1
BH-SB-23-2to4	TOTAL TCDD	841	NA	841	J	1
BH-SB-23-2to4	TOTAL TCDF	159	NA	159	J	1
BH-SB-23-4to6	1,2,3,4,6,7,8-HPCDD	104	D	104	J	1
BH-SB-23-4to6	1,2,3,4,6,7,8-HPCDF	60.6	D	60.6	J	1
BH-SB-23-4to6	1,2,3,4,7,8,9-HPCDF	3.55	D J	3.55	J	1
BH-SB-23-4to6	1,2,3,4,7,8-HXCDD	9.79	D J	9.79	J	1
BH-SB-23-4to6	1,2,3,4,7,8-HXCDF	37.6	D	37.6	J	1
BH-SB-23-4to6	1,2,3,6,7,8-HXCDD	24.7	D	24.7	J	1
BH-SB-23-4to6	1,2,3,6,7,8-HXCDF	15.2	D	15.2	J	1
BH-SB-23-4to6	1,2,3,7,8,9-HXCDD	15.6	D	15.6	J	1
BH-SB-23-4to6	1,2,3,7,8,9-HXCDF	0.914	D J	0.914	J	1
BH-SB-23-4to6	1,2,3,7,8-PECDD	11.4	D J	11.4	J	1
BH-SB-23-4to6	1,2,3,7,8-PECDF	17.8	D	17.8	J	1
BH-SB-23-4to6	2,3,4,6,7,8-HXCDF	6.93	D J	6.93	J	1
BH-SB-23-4to6	2,3,4,7,8-PECDF	11.2	D J	11.2	J	1
BH-SB-23-4to6	2,3,7,8-TCDD	1.97	D J	1.97	J	1
BH-SB-23-4to6	2,3,7,8-TCDF	14.2	D	14.2	J	1
BH-SB-23-4to6	OCDD	462	D	462	J	1
BH-SB-23-4to6	OCDF	15.9	D J	15.9	J	1
BH-SB-23-4to6	TOTAL HpCDD	194	D	194	J	1
BH-SB-23-4to6	TOTAL HpCDF	69.8	D	69.8	J	1
BH-SB-23-4to6	TOTAL HxCDD	408	D	408	J	1
BH-SB-23-4to6	TOTAL HxCDF	122	D	122	J	1
BH-SB-23-4to6	TOTAL PeCDD	431	D	431	J	1
BH-SB-23-4to6	TOTAL PeCDF	129	D	129	J	1
BH-SB-23-4to6	TOTAL TCDD	559	D	559	J	1
BH-SB-23-4to6	TOTAL TCDF	138	D	138	J	1
BH-SC-05-0to1.6	1,2,3,4,6,7,8-HPCDD	60.3	NA	60.3	J	1
BH-SC-05-0to1.6	1,2,3,4,6,7,8-HPCDF	10.5	NA	10.5	J	1
BH-SC-05-0to1.6	1,2,3,4,7,8,9-HPCDF	0.481	J	0.481	J	1
BH-SC-05-0to1.6	1,2,3,4,7,8-HXCDD	2.20	J	2.20	J	1
BH-SC-05-0to1.6	1,2,3,4,7,8-HXCDF	4.28	NA	4.28	J	1

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BH-SC-05-0to1.6	1,2,3,6,7,8-HXCDD	4.64	NA	4.64	J	1
BH-SC-05-0to1.6	1,2,3,6,7,8-HXCDF	1.73	J	1.73	J	1
BH-SC-05-0to1.6	1,2,3,7,8,9-HXCDD	4.47	NA	4.47	J	1
BH-SC-05-0to1.6	1,2,3,7,8,9-HXCDF	0.205	NJ J	0.205	J	1
BH-SC-05-0to1.6	1,2,3,7,8-PECDD	2.42	J	2.42	J	1
BH-SC-05-0to1.6	1,2,3,7,8-PECDF	2.83	NA	2.83	J	1
BH-SC-05-0to1.6	2,3,4,6,7,8-HXCDF	1.23	J	1.23	J	1
BH-SC-05-0to1.6	2,3,4,7,8-PECDF	2.42	J	2.42	J	1
BH-SC-05-0to1.6	2,3,7,8-TCDD	1.10	NA	1.10	J	1
BH-SC-05-0to1.6	2,3,7,8-TCDF	5.00	NA	5.00	J	1
BH-SC-05-0to1.6	OCDD	569	NA	569	J	1
BH-SC-05-0to1.6	OCDF	8.48	NA	8.48	J	1
BH-SC-05-0to1.6	TOTAL HpCDD	164	NA	164	J	1
BH-SC-05-0to1.6	TOTAL HpCDF	16.5	NA	16.5	J	1
BH-SC-05-0to1.6	TOTAL HxCDD	88.2	NA	88.2	J	1
BH-SC-05-0to1.6	TOTAL HxCDF	21.2	NA	21.2	J	1
BH-SC-05-0to1.6	TOTAL PeCDD	58.7	NA	58.7	J	1
BH-SC-05-0to1.6	TOTAL PeCDF	37.3	NA	37.3	J	1
BH-SC-05-0to1.6	TOTAL TCDD	177	NA	177	J	1
BH-SC-05-0to1.6	TOTAL TCDF	99.4	NA	99.4	J	1
BH-SC-05-1.6to3.2	1,2,3,4,6,7,8-HPCDD	26.3	NA	26.3	J	1
BH-SC-05-1.6to3.2	1,2,3,4,6,7,8-HPCDF	4.91	NA	4.91	J	1
BH-SC-05-1.6to3.2	1,2,3,4,7,8,9-HPCDF	0.189	J	0.189	J	1
BH-SC-05-1.6to3.2	1,2,3,4,7,8-HXCDD	1.07	J	1.07	J	1
BH-SC-05-1.6to3.2	1,2,3,4,7,8-HXCDF	1.99	J	1.99	J	1
BH-SC-05-1.6to3.2	1,2,3,6,7,8-HXCDD	1.94	J	1.94	J	1
BH-SC-05-1.6to3.2	1,2,3,6,7,8-HXCDF	0.859	J	0.859	J	1
BH-SC-05-1.6to3.2	1,2,3,7,8,9-HXCDD	2.20	J	2.20	J	1
BH-SC-05-1.6to3.2	1,2,3,7,8,9-HXCDF	0.151	NJ J	0.151	J	1
BH-SC-05-1.6to3.2	1,2,3,7,8-PECDD	1.26	NJ J	1.26	J	1
BH-SC-05-1.6to3.2	1,2,3,7,8-PECDF	1.33	J	1.33	J	1
BH-SC-05-1.6to3.2	2,3,4,6,7,8-HXCDF	0.494	NJ J	0.494	J	1
BH-SC-05-1.6to3.2	2,3,4,7,8-PECDF	0.903	J	0.903	J	1
BH-SC-05-1.6to3.2	2,3,7,8-TCDD	0.657	NJ J	0.657	J	1
BH-SC-05-1.6to3.2	2,3,7,8-TCDF	2.62	NA	2.62	J	1
BH-SC-05-1.6to3.2	OCDD	332	NA	332	J	1
BH-SC-05-1.6to3.2	OCDF	2.60	J	2.60	J	1
BH-SC-05-1.6to3.2	TOTAL HpCDD	71.3	NA	71.3	J	1
BH-SC-05-1.6to3.2	TOTAL HpCDF	5.10	NA	5.10	J	1
BH-SC-05-1.6to3.2	TOTAL HxCDD	43.7	NA	43.7	J	1
BH-SC-05-1.6to3.2	TOTAL HxCDF	6.42	NA	6.42	J	1
BH-SC-05-1.6to3.2	TOTAL PeCDD	27.6	NA	27.6	J	1
BH-SC-05-1.6to3.2	TOTAL PeCDF	13.4	NA	13.4	J	1

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BH-SC-05-1.6to3.2	TOTAL TCDD	86.7	NA	86.7	J	1
BH-SC-05-1.6to3.2	TOTAL TCDF	49.4	NA	49.4	J	1
BH-SC-05-1.6to3.2-D	1,2,3,4,6,7,8-HPCDD	30.7	NA	30.7	J	1
BH-SC-05-1.6to3.2-D	1,2,3,4,6,7,8-HPCDF	3.96	NA	3.96	J	1
BH-SC-05-1.6to3.2-D	1,2,3,4,7,8,9-HPCDF	0.191	NJ J	0.191	J	1
BH-SC-05-1.6to3.2-D	1,2,3,4,7,8-HXCDD	1.11	J	1.11	J	1
BH-SC-05-1.6to3.2-D	1,2,3,4,7,8-HXCDF	1.61	J	1.61	J	1
BH-SC-05-1.6to3.2-D	1,2,3,6,7,8-HXCDD	2.14	J	2.14	J	1
BH-SC-05-1.6to3.2-D	1,2,3,6,7,8-HXCDF	0.615	J	0.615	J	1
BH-SC-05-1.6to3.2-D	1,2,3,7,8,9-HXCDD	2.36	NA	2.36	J	1
BH-SC-05-1.6to3.2-D	1,2,3,7,8,9-HXCDF	0.0878	NJ J	0.0878	J	1
BH-SC-05-1.6to3.2-D	1,2,3,7,8-PECDD	1.15	J	1.15	J	1
BH-SC-05-1.6to3.2-D	1,2,3,7,8-PECDF	1.12	J	1.12	J	1
BH-SC-05-1.6to3.2-D	2,3,4,6,7,8-HXCDF	0.436	J	0.436	J	1
BH-SC-05-1.6to3.2-D	2,3,4,7,8-PECDF	0.817	J	0.817	J	1
BH-SC-05-1.6to3.2-D	2,3,7,8-TCDD	0.727	J	0.727	J	1
BH-SC-05-1.6to3.2-D	2,3,7,8-TCDF	2.26	NA	2.26	J	1
BH-SC-05-1.6to3.2-D	OCDD	313	NA	313	J	1
BH-SC-05-1.6to3.2-D	OCDF	2.53	J	2.53	J	1
BH-SC-05-1.6to3.2-D	TOTAL HpCDD	81.5	NA	81.5	J	1
BH-SC-05-1.6to3.2-D	TOTAL HpCDF	4.89	NA	4.89	J	1
BH-SC-05-1.6to3.2-D	TOTAL HxCDD	44.6	NA	44.6	J	1
BH-SC-05-1.6to3.2-D	TOTAL HxCDF	5.96	NA	5.96	J	1
BH-SC-05-1.6to3.2-D	TOTAL PeCDD	27.1	NA	27.1	J	1
BH-SC-05-1.6to3.2-D	TOTAL PeCDF	11.2	NA	11.2	J	1
BH-SC-05-1.6to3.2-D	TOTAL TCDD	80.5	NA	80.5	J	1
BH-SC-05-1.6to3.2-D	TOTAL TCDF	39.8	NA	39.8	J	1
BH-SC-05-3.2to5.2	1,2,3,4,6,7,8-HPCDD	23.4	NA	23.4	J	1
BH-SC-05-3.2to5.2	1,2,3,4,6,7,8-HPCDF	1.04	J	1.04	J	1
BH-SC-05-3.2to5.2	1,2,3,4,7,8,9-HPCDF	0.0845	J	0.0845	J	1
BH-SC-05-3.2to5.2	1,2,3,4,7,8-HXCDD	0.506	J	0.506	J	1
BH-SC-05-3.2to5.2	1,2,3,4,7,8-HXCDF	0.487	J	0.487	J	1
BH-SC-05-3.2to5.2	1,2,3,6,7,8-HXCDD	1.08	J	1.08	J	1
BH-SC-05-3.2to5.2	1,2,3,6,7,8-HXCDF	0.24	J	0.24	J	1
BH-SC-05-3.2to5.2	1,2,3,7,8,9-HXCDD	1.88	J	1.88	J	1
BH-SC-05-3.2to5.2	1,2,3,7,8,9-HXCDF	0.0840	J	0.0840	J	1
BH-SC-05-3.2to5.2	1,2,3,7,8-PECDD	0.612	J	0.612	J	1
BH-SC-05-3.2to5.2	1,2,3,7,8-PECDF	0.332	J	0.332	J	1
BH-SC-05-3.2to5.2	2,3,4,6,7,8-HXCDF	0.129	J	0.129	J	1
BH-SC-05-3.2to5.2	2,3,4,7,8-PECDF	0.269	J	0.269	J	1
BH-SC-05-3.2to5.2	2,3,7,8-TCDD	0.344	J	0.344	J	1
BH-SC-05-3.2to5.2	2,3,7,8-TCDF	0.495	NA	0.495	J	1
BH-SC-05-3.2to5.2	OCDD	269	NA	269	J	1

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BH-SC-05-3.2to5.2	OCDF	0.856	J	0.856	J	1
BH-SC-05-3.2to5.2	TOTAL HpCDD	72.4	NA	72.4	J	1
BH-SC-05-3.2to5.2	TOTAL HpCDF	1.35	NA	1.35	J	1
BH-SC-05-3.2to5.2	TOTAL HxCDD	34	NA	34	J	1
BH-SC-05-3.2to5.2	TOTAL HxCDF	1.54	NA	1.54	J	1
BH-SC-05-3.2to5.2	TOTAL PeCDD	12.5	NA	12.5	J	1
BH-SC-05-3.2to5.2	TOTAL PeCDF	2.50	NA	2.50	J	1
BH-SC-05-3.2to5.2	TOTAL TCDD	51.8	NA	51.8	J	1
BH-SC-05-3.2to5.2	TOTAL TCDF	8.91	NA	8.91	J	1
BH-SC-07-0to2.5	1,2,3,4,6,7,8-HPCDD	25.6	NA	25.6	J	1
BH-SC-07-0to2.5	1,2,3,4,6,7,8-HPCDF	3.61	NA	3.61	J	1
BH-SC-07-0to2.5	1,2,3,4,7,8,9-HPCDF	0.221	NJ J	0.221	J	1
BH-SC-07-0to2.5	1,2,3,4,7,8-HXCDD	1.45	NJ J	1.45	J	1
BH-SC-07-0to2.5	1,2,3,4,7,8-HXCDF	1.91	J	1.91	J	1
BH-SC-07-0to2.5	1,2,3,6,7,8-HXCDD	2.73	J	2.73	J	1
BH-SC-07-0to2.5	1,2,3,6,7,8-HXCDF	0.995	J	0.995	J	1
BH-SC-07-0to2.5	1,2,3,7,8,9-HXCDD	2.59	J	2.59	J	1
BH-SC-07-0to2.5	1,2,3,7,8,9-HXCDF	0.157	NJ J	0.157	J	1
BH-SC-07-0to2.5	1,2,3,7,8-PECDD	2.40	J	2.40	J	1
BH-SC-07-0to2.5	1,2,3,7,8-PECDF	2.13	J	2.13	J	1
BH-SC-07-0to2.5	2,3,4,6,7,8-HXCDF	0.701	NJ J	0.701	J	1
BH-SC-07-0to2.5	2,3,4,7,8-PECDF	1.52	J	1.52	J	1
BH-SC-07-0to2.5	2,3,7,8-TCDD	1.45	NJ	1.45	J	1
BH-SC-07-0to2.5	2,3,7,8-TCDF	5.22	NA	5.22	J	1
BH-SC-07-0to2.5	OCDD	292	NA	292	J	1
BH-SC-07-0to2.5	OCDF	2.05	J	2.05	J	1
BH-SC-07-0to2.5	TOTAL HpCDD	62.3	NA	62.3	J	1
BH-SC-07-0to2.5	TOTAL HpCDF	4.50	NA	4.50	J	1
BH-SC-07-0to2.5	TOTAL HxCDD	52.6	NA	52.6	J	1
BH-SC-07-0to2.5	TOTAL HxCDF	7.05	NA	7.05	J	1
BH-SC-07-0to2.5	TOTAL PeCDD	64.4	NA	64.4	J	1
BH-SC-07-0to2.5	TOTAL PeCDF	21.1	NA	21.1	J	1
BH-SC-07-0to2.5	TOTAL TCDD	138	NA	138	J	1
BH-SC-07-0to2.5	TOTAL TCDF	87.5	NA	87.5	J	1
BH-SC-07-2.5to4.2	1,2,3,4,6,7,8-HPCDD	25.8	NA	25.8	J	1
BH-SC-07-2.5to4.2	1,2,3,4,6,7,8-HPCDF	1.82	J	1.82	J	1
BH-SC-07-2.5to4.2	1,2,3,4,7,8,9-HPCDF	0.137	J	0.137	J	1
BH-SC-07-2.5to4.2	1,2,3,4,7,8-HXCDD	0.82	J	0.82	J	1
BH-SC-07-2.5to4.2	1,2,3,4,7,8-HXCDF	0.851	J	0.851	J	1
BH-SC-07-2.5to4.2	1,2,3,6,7,8-HXCDD	1.31	J	1.31	J	1
BH-SC-07-2.5to4.2	1,2,3,6,7,8-HXCDF	0.408	J	0.408	J	1
BH-SC-07-2.5to4.2	1,2,3,7,8,9-HXCDD	1.99	NJ J	1.99	J	1
BH-SC-07-2.5to4.2	1,2,3,7,8,9-HXCDF	0.105	NJ J	0.105	J	1

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BH-SC-07-2.5to4.2	1,2,3,7,8-PECDD	0.958	J	0.958	J	1
BH-SC-07-2.5to4.2	1,2,3,7,8-PECDF	0.740	J	0.740	J	1
BH-SC-07-2.5to4.2	2,3,4,6,7,8-HXCDF	0.286	J	0.286	J	1
BH-SC-07-2.5to4.2	2,3,4,7,8-PECDF	0.515	NJ J	0.515	J	1
BH-SC-07-2.5to4.2	2,3,7,8-TCDD	0.491	J	0.491	J	1
BH-SC-07-2.5to4.2	2,3,7,8-TCDF	1.17	NA	1.17	J	1
BH-SC-07-2.5to4.2	OCDD	377	NA	377	J	1
BH-SC-07-2.5to4.2	OCDF	0.923	J	0.923	J	1
BH-SC-07-2.5to4.2	TOTAL HpCDD	75.9	NA	75.9	J	1
BH-SC-07-2.5to4.2	TOTAL HpCDF	2.14	NA	2.14	J	1
BH-SC-07-2.5to4.2	TOTAL HxCDD	35.0	NA	35.0	J	1
BH-SC-07-2.5to4.2	TOTAL HxCDF	2.81	NA	2.81	J	1
BH-SC-07-2.5to4.2	TOTAL PeCDD	15.7	NA	15.7	J	1
BH-SC-07-2.5to4.2	TOTAL PeCDF	5.60	NA	5.60	J	1
BH-SC-07-2.5to4.2	TOTAL TCDD	45.8	NA	45.8	J	1
BH-SC-07-2.5to4.2	TOTAL TCDF	21.4	NA	21.4	J	1
BH-SC-07-4.2to6.2	1,2,3,4,6,7,8-HPCDD	21.5	NA	21.5	J	1
BH-SC-07-4.2to6.2	1,2,3,4,6,7,8-HPCDF	0.219	J	0.219	J	1
BH-SC-07-4.2to6.2	1,2,3,4,7,8,9-HPCDF	0.046	UJ	0.046	UJ	1
BH-SC-07-4.2to6.2	1,2,3,4,7,8-HXCDD	0.592	J	0.592	J	1
BH-SC-07-4.2to6.2	1,2,3,4,7,8-HXCDF	0.0752	J	0.0752	J	1
BH-SC-07-4.2to6.2	1,2,3,6,7,8-HXCDD	1.33	J	1.33	J	1
BH-SC-07-4.2to6.2	1,2,3,6,7,8-HXCDF	0.0561	NJ J	0.0561	J	1
BH-SC-07-4.2to6.2	1,2,3,7,8,9-HXCDD	2.13	J	2.13	J	1
BH-SC-07-4.2to6.2	1,2,3,7,8,9-HXCDF	0.0604	NJ J	0.0604	J	1
BH-SC-07-4.2to6.2	1,2,3,7,8-PECDD	0.615	J	0.615	J	1
BH-SC-07-4.2to6.2	1,2,3,7,8-PECDF	0.0862	B J	0.0862	J	1
BH-SC-07-4.2to6.2	2,3,4,6,7,8-HXCDF	0.0460	UJ	0.0460	UJ	1
BH-SC-07-4.2to6.2	2,3,4,7,8-PECDF	0.0511	NJ J	0.0511	J	1
BH-SC-07-4.2to6.2	2,3,7,8-TCDD	0.355	J	0.355	J	1
BH-SC-07-4.2to6.2	2,3,7,8-TCDF	0.185	J	0.185	J	1
BH-SC-07-4.2to6.2	OCDD	243	NA	243	J	1
BH-SC-07-4.2to6.2	OCDF	0.144	NJ J	0.144	J	1
BH-SC-07-4.2to6.2	TOTAL HpCDD	74.0	NA	74.0	J	1
BH-SC-07-4.2to6.2	TOTAL HpCDF	0.219	NA	0.219	J	1
BH-SC-07-4.2to6.2	TOTAL HxCDD	37.6	NA	37.6	J	1
BH-SC-07-4.2to6.2	TOTAL HxCDF	0.0752	NA	0.0752	J	1
BH-SC-07-4.2to6.2	TOTAL PeCDD	14.0	NA	14.0	J	1
BH-SC-07-4.2to6.2	TOTAL PeCDF	0.441	NA	0.441	J	1
BH-SC-07-4.2to6.2	TOTAL TCDD	69.3	NA	69.3	J	1
BH-SC-07-4.2to6.2	TOTAL TCDF	2.34	NA	2.34	J	1
BH-SC-12-0to1.4	1,2,3,4,6,7,8-HPCDD	136	NA	136	J	1
BH-SC-12-0to1.4	1,2,3,4,6,7,8-HPCDF	28.6	NA	28.6	J	1

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BH-SC-12-0to1.4	1,2,3,4,7,8,9-HPCDF	1.07	J	1.07	J	1
BH-SC-12-0to1.4	1,2,3,4,7,8-HXCDD	4.63	NA	4.63	J	1
BH-SC-12-0to1.4	1,2,3,4,7,8-HXCDF	10.3	NA	10.3	J	1
BH-SC-12-0to1.4	1,2,3,6,7,8-HXCDD	11.5	NA	11.5	J	1
BH-SC-12-0to1.4	1,2,3,6,7,8-HXCDF	3.98	NA	3.98	J	1
BH-SC-12-0to1.4	1,2,3,7,8,9-HXCDD	26.7	NA	26.7	J	1
BH-SC-12-0to1.4	1,2,3,7,8,9-HXCDF	0.236	J	0.236	J	1
BH-SC-12-0to1.4	1,2,3,7,8-PECDD	5.48	NA	5.48	J	1
BH-SC-12-0to1.4	1,2,3,7,8-PECDF	4.99	NA	4.99	J	1
BH-SC-12-0to1.4	2,3,4,6,7,8-HXCDF	3.04	J	3.04	J	1
BH-SC-12-0to1.4	2,3,4,7,8-PECDF	3.92	NA	3.92	J	1
BH-SC-12-0to1.4	2,3,7,8-TCDD	1.54	NJ	1.54	J	1
BH-SC-12-0to1.4	2,3,7,8-TCDF	5.12	NA	5.12	J	1
BH-SC-12-0to1.4	OCDD	804	NA	804	J	1
BH-SC-12-0to1.4	OCDF	23.0	NA	23.0	J	1
BH-SC-12-0to1.4	TOTAL HpCDD	405	NA	405	J	1
BH-SC-12-0to1.4	TOTAL HpCDF	42.3	NA	42.3	J	1
BH-SC-12-0to1.4	TOTAL HxCDD	250	NA	250	J	1
BH-SC-12-0to1.4	TOTAL HxCDF	44.8	NA	44.8	J	1
BH-SC-12-0to1.4	TOTAL PeCDD	106	NA	106	J	1
BH-SC-12-0to1.4	TOTAL PeCDF	56.1	NA	56.1	J	1
BH-SC-12-0to1.4	TOTAL TCDD	237	NA	237	J	1
BH-SC-12-0to1.4	TOTAL TCDF	96.4	NA	96.4	J	1
BH-SC-27-0to1.7	1,2,3,4,6,7,8-HPCDD	18.2	NA	18.2	J	1
BH-SC-27-0to1.7	1,2,3,4,6,7,8-HPCDF	2.83	NA	2.83	J	1
BH-SC-27-0to1.7	1,2,3,4,7,8,9-HPCDF	0.163	B J	0.163	J	1
BH-SC-27-0to1.7	1,2,3,4,7,8-HXCDD	0.454	NJ J	0.454	J	1
BH-SC-27-0to1.7	1,2,3,4,7,8-HXCDF	1.08	J	1.08	J	1
BH-SC-27-0to1.7	1,2,3,6,7,8-HXCDD	1.12	NJ J	1.12	J	1
BH-SC-27-0to1.7	1,2,3,6,7,8-HXCDF	0.432	J	0.432	J	1
BH-SC-27-0to1.7	1,2,3,7,8,9-HXCDD	1.18	J	1.18	J	1
BH-SC-27-0to1.7	1,2,3,7,8,9-HXCDF	0.0898	J	0.0898	J	1
BH-SC-27-0to1.7	1,2,3,7,8-PECDD	0.413	J	0.413	J	1
BH-SC-27-0to1.7	1,2,3,7,8-PECDF	0.552	J	0.552	J	1
BH-SC-27-0to1.7	2,3,4,6,7,8-HXCDF	0.406	NJ J	0.406	J	1
BH-SC-27-0to1.7	2,3,4,7,8-PECDF	0.418	J	0.418	J	1
BH-SC-27-0to1.7	2,3,7,8-TCDD	0.238	J	0.238	J	1
BH-SC-27-0to1.7	2,3,7,8-TCDF	0.680	NA	0.680	J	1
BH-SC-27-0to1.7	OCDD	177	NA	177	J	1
BH-SC-27-0to1.7	OCDF	2.50	J	2.50	J	1
BH-SC-27-0to1.7	TOTAL HpCDD	54.6	NA	54.6	J	1
BH-SC-27-0to1.7	TOTAL HpCDF	4.73	NA	4.73	J	1
BH-SC-27-0to1.7	TOTAL HxCDD	21.4	NA	21.4	J	1

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BH-SC-27-0to1.7	TOTAL HxCDF	4.79	NA	4.79	J	1
BH-SC-27-0to1.7	TOTAL PeCDD	8.04	NA	8.04	J	1
BH-SC-27-0to1.7	TOTAL PeCDF	4.33	NA	4.33	J	1
BH-SC-27-0to1.7	TOTAL TCDD	28.5	NA	28.5	J	1
BH-SC-27-0to1.7	TOTAL TCDF	10.1	NA	10.1	J	1
BH-SC-27-1.7To3.7	1,2,3,4,6,7,8-HPCDD	15.7	NA	15.7	J	1
BH-SC-27-1.7To3.7	1,2,3,4,6,7,8-HPCDF	0.0811	NJ J	0.0811	J	1
BH-SC-27-1.7To3.7	1,2,3,4,7,8,9-HPCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	1,2,3,4,7,8-HXCDD	0.381	J	0.381	J	1
BH-SC-27-1.7To3.7	1,2,3,4,7,8-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	1,2,3,6,7,8-HXCDD	0.576	J	0.576	J	1
BH-SC-27-1.7To3.7	1,2,3,6,7,8-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	1,2,3,7,8,9-HXCDD	1.15	J	1.15	J	1
BH-SC-27-1.7To3.7	1,2,3,7,8,9-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	1,2,3,7,8-PECDD	0.233	J	0.233	J	1
BH-SC-27-1.7To3.7	1,2,3,7,8-PECDF	0.0502	NJ B J	0.0502	J	1
BH-SC-27-1.7To3.7	2,3,4,6,7,8-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	2,3,4,7,8-PECDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	2,3,7,8-TCDD	0.209	J	0.209	J	1
BH-SC-27-1.7To3.7	2,3,7,8-TCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	OCDD	200	NA	200	J	1
BH-SC-27-1.7To3.7	OCDF	0.0710	NJ B J	0.0710	J	1
BH-SC-27-1.7To3.7	TOTAL HpCDD	54.2	NA	54.2	J	1
BH-SC-27-1.7To3.7	TOTAL HpCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	TOTAL HxCDD	23.9	NA	23.9	J	1
BH-SC-27-1.7To3.7	TOTAL HxCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	TOTAL PeCDD	6.23	NA	6.23	J	1
BH-SC-27-1.7To3.7	TOTAL PeCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-1.7To3.7	TOTAL TCDD	33.4	NA	33.4	J	1
BH-SC-27-1.7To3.7	TOTAL TCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	1,2,3,4,6,7,8-HPCDD	22.8	NA	22.8	J	1
BH-SC-27-3.7To5.2	1,2,3,4,6,7,8-HPCDF	0.0677	NJ J	0.0677	J	1
BH-SC-27-3.7To5.2	1,2,3,4,7,8,9-HPCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	1,2,3,4,7,8-HXCDD	0.442	J	0.442	J	1
BH-SC-27-3.7To5.2	1,2,3,4,7,8-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	1,2,3,6,7,8-HXCDD	0.966	J	0.966	J	1
BH-SC-27-3.7To5.2	1,2,3,6,7,8-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	1,2,3,7,8,9-HXCDD	2.12	J	2.12	J	1
BH-SC-27-3.7To5.2	1,2,3,7,8,9-HXCDF	0.0559	NJ J	0.0559	J	1
BH-SC-27-3.7To5.2	1,2,3,7,8-PECDD	0.273	J	0.273	J	1
BH-SC-27-3.7To5.2	1,2,3,7,8-PECDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	2,3,4,6,7,8-HXCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	2,3,4,7,8-PECDF	0.0477	UJ	0.0477	UJ	1

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BH-SC-27-3.7To5.2	2,3,7,8-TCDD	0.170	NJ J	0.170	J	1
BH-SC-27-3.7To5.2	2,3,7,8-TCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	OCDD	269	NA	269	J	1
BH-SC-27-3.7To5.2	OCDF	0.0758	NJ B J	0.0758	J	1
BH-SC-27-3.7To5.2	TOTAL HpCDD	75.4	NA	75.4	J	1
BH-SC-27-3.7To5.2	TOTAL HpCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	TOTAL HxCDD	36.1	NA	36.1	J	1
BH-SC-27-3.7To5.2	TOTAL HxCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	TOTAL PeCDD	6.85	NA	6.85	J	1
BH-SC-27-3.7To5.2	TOTAL PeCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-3.7To5.2	TOTAL TCDD	23.3	NA	23.3	J	1
BH-SC-27-3.7To5.2	TOTAL TCDF	0.0477	UJ	0.0477	UJ	1
BH-SC-27-5.2to6.7	1,2,3,4,6,7,8-HPCDD	38.1	NA	38.1	J	1
BH-SC-27-5.2to6.7	1,2,3,4,6,7,8-HPCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	1,2,3,4,7,8,9-HPCDF	0.0662	J	0.0662	J	1
BH-SC-27-5.2to6.7	1,2,3,4,7,8-HXCDD	0.530	NJ J	0.530	J	1
BH-SC-27-5.2to6.7	1,2,3,4,7,8-HXCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	1,2,3,6,7,8-HXCDD	0.967	J	0.967	J	1
BH-SC-27-5.2to6.7	1,2,3,6,7,8-HXCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	1,2,3,7,8,9-HXCDD	1.44	J	1.44	J	1
BH-SC-27-5.2to6.7	1,2,3,7,8,9-HXCDF	0.0814	NJ B J	0.0814	J	1
BH-SC-27-5.2to6.7	1,2,3,7,8-PECDD	0.292	J	0.292	J	1
BH-SC-27-5.2to6.7	1,2,3,7,8-PECDF	0.0521	NJ J	0.0521	J	1
BH-SC-27-5.2to6.7	2,3,4,6,7,8-HXCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	2,3,4,7,8-PECDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	2,3,7,8-TCDD	0.182	J	0.182	J	1
BH-SC-27-5.2to6.7	2,3,7,8-TCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	OCDD	1060	NA	1060	J	1
BH-SC-27-5.2to6.7	OCDF	0.0591	J	0.0591	J	1
BH-SC-27-5.2to6.7	TOTAL HpCDD	139	NA	139	J	1
BH-SC-27-5.2to6.7	TOTAL HpCDF	0.0662	NA	0.0662	J	1
BH-SC-27-5.2to6.7	TOTAL HxCDD	54.4	NA	54.4	J	1
BH-SC-27-5.2to6.7	TOTAL HxCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	TOTAL PeCDD	9.58	NA	9.58	J	1
BH-SC-27-5.2to6.7	TOTAL PeCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-27-5.2to6.7	TOTAL TCDD	35.0	NA	35.0	J	1
BH-SC-27-5.2to6.7	TOTAL TCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-0to2	1,2,3,4,6,7,8-HPCDD	19.6	NA	19.6	J	1
BH-SC-32-0to2	1,2,3,4,6,7,8-HPCDF	1.82	J	1.82	J	1
BH-SC-32-0to2	1,2,3,4,7,8,9-HPCDF	0.145	B J	0.145	J	1
BH-SC-32-0to2	1,2,3,4,7,8-HXCDD	0.414	J	0.414	J	1
BH-SC-32-0to2	1,2,3,4,7,8-HXCDF	0.400	NJ J	0.400	J	1
BH-SC-32-0to2	1,2,3,6,7,8-HXCDD	1.15	NJ J	1.15	J	1

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BH-SC-32-0to2	1,2,3,6,7,8-HXCDF	0.166	B J	0.166	J	1
BH-SC-32-0to2	1,2,3,7,8,9-HXCDD	1.52	J	1.52	J	1
BH-SC-32-0to2	1,2,3,7,8,9-HXCDF	0.0553	NJ J	0.0553	J	1
BH-SC-32-0to2	1,2,3,7,8-PECDD	0.473	J	0.473	J	1
BH-SC-32-0to2	1,2,3,7,8-PECDF	0.250	NJ B J	0.250	J	1
BH-SC-32-0to2	2,3,4,6,7,8-HXCDF	0.198	NJ B J	0.198	J	1
BH-SC-32-0to2	2,3,4,7,8-PECDF	0.199	J	0.199	J	1
BH-SC-32-0to2	2,3,7,8-TCDD	0.297	J	0.297	J	1
BH-SC-32-0to2	2,3,7,8-TCDF	0.383	J	0.383	J	1
BH-SC-32-0to2	OCDD	213	NA	213	J	1
BH-SC-32-0to2	OCDF	2.80	J	2.80	J	1
BH-SC-32-0to2	TOTAL HpCDD	61.1	NA	61.1	J	1
BH-SC-32-0to2	TOTAL HpCDF	4.21	NA	4.21	J	1
BH-SC-32-0to2	TOTAL HxCDD	25.5	NA	25.5	J	1
BH-SC-32-0to2	TOTAL HxCDF	2.15	NA	2.15	J	1
BH-SC-32-0to2	TOTAL PeCDD	9.60	NA	9.60	J	1
BH-SC-32-0to2	TOTAL PeCDF	1.90	NA	1.90	J	1
BH-SC-32-0to2	TOTAL TCDD	24.8	NA	24.8	J	1
BH-SC-32-0to2	TOTAL TCDF	4.98	NA	4.98	J	1
BH-SC-32-2to4	1,2,3,4,6,7,8-HPCDD	32.6	NA	32.6	J	1
BH-SC-32-2to4	1,2,3,4,6,7,8-HPCDF	0.0549	NJ J	0.0549	J	1
BH-SC-32-2to4	1,2,3,4,7,8,9-HPCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	1,2,3,4,7,8-HXCDD	0.474	J	0.474	J	1
BH-SC-32-2to4	1,2,3,4,7,8-HXCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	1,2,3,6,7,8-HXCDD	1.06	J	1.06	J	1
BH-SC-32-2to4	1,2,3,6,7,8-HXCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	1,2,3,7,8,9-HXCDD	2.14	J	2.14	J	1
BH-SC-32-2to4	1,2,3,7,8,9-HXCDF	0.0568	NJ J	0.0568	J	1
BH-SC-32-2to4	1,2,3,7,8-PECDD	0.418	J G	0.418	J	1
BH-SC-32-2to4	1,2,3,7,8-PECDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	2,3,4,6,7,8-HXCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	2,3,4,7,8-PECDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	2,3,7,8-TCDD	0.157	J	0.157	J	1
BH-SC-32-2to4	2,3,7,8-TCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	OCDD	457	NA	457	J	1
BH-SC-32-2to4	OCDF	0.0629	NJ B J	0.0629	J	1
BH-SC-32-2to4	TOTAL HpCDD	118	NA	118	J	1
BH-SC-32-2to4	TOTAL HpCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	TOTAL HxCDD	48.1	NA	48.1	J	1
BH-SC-32-2to4	TOTAL HxCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	TOTAL PeCDD	13.4	NA	13.4	J	1
BH-SC-32-2to4	TOTAL PeCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4	TOTAL TCDD	33.5	NA	33.5	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-32-2to4	TOTAL TCDF	0.0484	UJ	0.0484	UJ	1
BH-SC-32-2to4-D	1,2,3,4,6,7,8-HPCDD	28.9	NA	28.9	J	1
BH-SC-32-2to4-D	1,2,3,4,6,7,8-HPCDF	0.0719	NJ J	0.0719	J	1
BH-SC-32-2to4-D	1,2,3,4,7,8,9-HPCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	1,2,3,4,7,8-HXCDD	0.592	J	0.592	J	1
BH-SC-32-2to4-D	1,2,3,4,7,8-HXCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	1,2,3,6,7,8-HXCDD	1.13	J	1.13	J	1
BH-SC-32-2to4-D	1,2,3,6,7,8-HXCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	1,2,3,7,8,9-HXCDD	2.11	J	2.11	J	1
BH-SC-32-2to4-D	1,2,3,7,8,9-HXCDF	0.0628	J	0.0628	J	1
BH-SC-32-2to4-D	1,2,3,7,8-PECDD	0.491	J	0.491	J	1
BH-SC-32-2to4-D	1,2,3,7,8-PECDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	2,3,4,6,7,8-HXCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	2,3,4,7,8-PECDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	2,3,7,8-TCDD	0.236	J	0.236	J	1
BH-SC-32-2to4-D	2,3,7,8-TCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	OCDD	434	NA	434	J	1
BH-SC-32-2to4-D	OCDF	0.0799	NJ B J	0.0799	J	1
BH-SC-32-2to4-D	TOTAL HpCDD	105	NA	105	J	1
BH-SC-32-2to4-D	TOTAL HpCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	TOTAL HxCDD	43.3	NA	43.3	J	1
BH-SC-32-2to4-D	TOTAL HxCDF	0.0628	B	0.0628	J	1
BH-SC-32-2to4-D	TOTAL PeCDD	10.6	NA	10.6	J	1
BH-SC-32-2to4-D	TOTAL PeCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-2to4-D	TOTAL TCDD	29.6	NA	29.6	J	1
BH-SC-32-2to4-D	TOTAL TCDF	0.0479	UJ	0.0479	UJ	1
BH-SC-32-4to5.5	1,2,3,4,6,7,8-HPCDD	43.8	NA	43.8	J	1
BH-SC-32-4to5.5	1,2,3,4,6,7,8-HPCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	1,2,3,4,7,8,9-HPCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	1,2,3,4,7,8-HXCDD	0.630	J	0.630	J	1
BH-SC-32-4to5.5	1,2,3,4,7,8-HXCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	1,2,3,6,7,8-HXCDD	1.28	J	1.28	J	1
BH-SC-32-4to5.5	1,2,3,6,7,8-HXCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	1,2,3,7,8,9-HXCDD	2.61	NA	2.61	J	1
BH-SC-32-4to5.5	1,2,3,7,8,9-HXCDF	0.0545	NJ J	0.0545	J	1
BH-SC-32-4to5.5	1,2,3,7,8-PECDD	0.411	J	0.411	J	1
BH-SC-32-4to5.5	1,2,3,7,8-PECDF	0.0576	NJ B J	0.0576	J	1
BH-SC-32-4to5.5	2,3,4,6,7,8-HXCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	2,3,4,7,8-PECDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	2,3,7,8-TCDD	0.168	NJ J	0.168	J	1
BH-SC-32-4to5.5	2,3,7,8-TCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	OCDD	938	NA	938	J	1
BH-SC-32-4to5.5	OCDF	0.0747	NJ B J	0.0747	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-32-4to5.5	TOTAL HpCDD	181	NA	181	J	1
BH-SC-32-4to5.5	TOTAL HpCDF	0.048	UJ	0.048	UJ	1
BH-SC-32-4to5.5	TOTAL HxCDD	76.6	NA	76.6	J	1
BH-SC-32-4to5.5	TOTAL HxCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	TOTAL PeCDD	21.1	NA	21.1	J	1
BH-SC-32-4to5.5	TOTAL PeCDF	0.0480	UJ	0.0480	UJ	1
BH-SC-32-4to5.5	TOTAL TCDD	45.5	NA	45.5	J	1
BH-SC-32-4to5.5	TOTAL TCDF	0.0480	UJ	0.0480	UJ	1

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
UJ-not detected at or above the SDL or MRL
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
D-laboratory flag indicating the analyte was reported from a dilution
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

ATTACHMENT 4
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-2to4	1,2,3,4,6,7,8-HPCDF	3.41	J	3.99	U	3
BH-SB-17-2to4	1,2,3,4,7,8,9-HPCDF	0.414	B J	3.99	U	3
BH-SB-17-2to4	1,2,3,4,7,8-HXCDF	2.09	J	3.99	U	3
BH-SB-17-2to4	1,2,3,6,7,8-HXCDD	3.81	J	3.99	U	3
BH-SB-17-2to4	1,2,3,6,7,8-HXCDF	1.62	J	3.99	U	3
BH-SB-17-2to4	1,2,3,7,8-PECDF	3.53	J	3.99	U	3
BH-SB-17-2to4	2,3,4,6,7,8-HXCDF	1.3	J	3.99	U	3
BH-SB-17-2to4	OCDF	1.46	J	7.97	U	3
BH-SB-17-4to6	1,2,3,4,7,8,9-HPCDF	0.675	J	3.96	U	3
BH-SB-17-4to6	1,2,3,4,7,8-HXCDF	3.2	J	3.96	U	3
BH-SB-17-4to6	1,2,3,6,7,8-HXCDD	2.76	J	3.96	U	3
BH-SB-17-4to6	1,2,3,6,7,8-HXCDF	1.45	J	3.96	U	3
BH-SB-17-4to6	1,2,3,7,8,9-HXCDD	2.58	J	3.96	U	3
BH-SB-17-4to6	1,2,3,7,8-PECDF	2.48	J	3.96	U	3
BH-SB-17-4to6	2,3,4,6,7,8-HXCDF	1.09	J	3.96	U	3
BH-SB-17-4to6	OCDF	5.8	J	7.92	U	3
BH-SB-18-0to2	1,2,3,7,8,9-HXCDF	0.201	B J	2.41	U	3
BH-SB-18-2to4	1,2,3,7,8,9-HXCDF	1.53	J	2.26	U	3
BH-SB-18-4to6	1,2,3,4,6,7,8-HPCDF	0.367	NJ J	2.41	U	3
BH-SB-18-4to6	1,2,3,7,8,9-HXCDF	0.0603	NJ B J	2.41	U	3
BH-SB-18-4to6	TOTAL HxCDF	0.262	B	0.262	J+	3
BH-SB-19-0to2	1,2,3,7,8,9-HXCDF	1.81	J	2.64	U	3
BH-SB-19-2to6	1,2,3,4,6,7,8-HPCDF	1.72	J	5.46	U	3
BH-SB-19-2to6	1,2,3,7,8,9-HXCDF	0.197	NJ B J	5.46	U	3
BH-SB-19-2to6-DUP	1,2,3,4,6,7,8-HPCDD	5.51	J	5.84	U	3
BH-SB-19-2to6-DUP	1,2,3,4,6,7,8-HPCDF	2.04	J	5.84	U	3
BH-SB-20-0to3	1,2,3,7,8,9-HXCDF	0.194	B J	2.39	U	3
BH-SB-20-3to5	1,2,3,4,6,7,8-HPCDF	2.25	J	4.7	U	3
BH-SB-21-0to2	1,2,3,7,8,9-HXCDF	1.44	NJ J	2.35	U	3
BH-SB-21-4to6	1,2,3,7,8,9-HXCDF	0.908	NJ J	3.84	U	3
BH-SB-22-2to4	1,2,3,4,7,8,9-HPCDF	1.48	NJ D J	12.8	U	3
BH-SB-22-2to4	1,2,3,6,7,8-HXCDF	7.88	D J	12.8	U	3
BH-SB-22-2to4	2,3,4,6,7,8-HXCDF	4.17	D J	12.8	U	3
BH-SB-22-2to4	OCDF	7.11	D J	25.6	U	3
BH-SB-23-2to4	1,2,3,4,7,8,9-HPCDF	0.444	J	2.38	U	3
BH-SB-23-2to4	1,2,3,6,7,8-HXCDF	1.93	J	2.38	U	3
BH-SB-23-2to4	2,3,4,6,7,8-HXCDF	1.43	J	2.38	U	3
BH-SB-23-2to4	OCDF	1.72	J	4.76	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-23-4to6	1,2,3,4,7,8,9-HPCDF	3.55	D J	12.2	U	3
BH-SB-23-4to6	2,3,4,6,7,8-HXCDF	6.93	D J	12.2	U	3
BH-SB-23-4to6	OCDF	15.9	D J	24.4	U	3
BH-SC-05-0to1.6	1,2,3,7,8,9-HXCDF	0.205	NJ J	2.64	U	3
BH-SC-05-1.6to3.2	1,2,3,7,8,9-HXCDF	0.151	NJ J	2.5	U	3
BH-SC-05-1.6to3.2	1,2,3,7,8-PECDF	1.33	J	2.5	U	3
BH-SC-05-1.6to3.2-D	1,2,3,7,8,9-HXCDF	0.0878	NJ J	2.29	U	3
BH-SC-05-1.6to3.2-D	1,2,3,7,8-PECDF	1.12	J	2.29	U	3
BH-SC-05-3.2to5.2	1,2,3,7,8,9-HXCDF	0.0840	J	2.4400	U	3
BH-SC-05-3.2to5.2	1,2,3,7,8-PECDF	0.332	J	2.44	U	3
BH-SC-07-0to2.5	1,2,3,7,8,9-HXCDF	0.157	NJ J	3.3	U	3
BH-SC-07-0to2.5	1,2,3,7,8-PECDF	2.13	J	3.3	U	3
BH-SC-07-2.5to4.2	1,2,3,7,8,9-HXCDF	0.105	J	2.43	U	3
BH-SC-07-2.5to4.2	1,2,3,4,6,7,8-HPCDF	1.82	J	2.43	U	3
BH-SC-07-2.5to4.2	1,2,3,4,7,8,9-HPCDF	0.137	J	2.43	U	3
BH-SC-07-2.5to4.2	1,2,3,4,7,8-HXCDF	0.851	J	2.43	U	3
BH-SC-07-2.5to4.2	1,2,3,6,7,8-HXCDD	1.31	J	2.43	U	3
BH-SC-07-2.5to4.2	1,2,3,7,8-PECDF	0.74	J	2.43	U	3
BH-SC-07-2.5to4.2	2,3,4,7,8-PECDF	0.515	NJ J	2.43	U	3
BH-SC-07-2.5to4.2	OCDF	0.923	J	4.86	U	3
BH-SC-07-4.2to6.2	1,2,3,7,8,9-HXCDF	0.0604	NJ J	2.3	U	3
BH-SC-07-4.2to6.2	1,2,3,7,8-PECDF	0.0862	B J	2.3	U	3
BH-SC-12-0to1.4	1,2,3,4,7,8,9-HPCDF	1.07	J	3.45	U	3
BH-SC-12-0to1.4	2,3,4,6,7,8-HXCDF	3.04	J	3.45	U	3
BH-SC-24-0to2	1,2,3,7,8,9-HXCDF	0.227	B J	2.46	U	3
BH-SC-24-2to3.8	1,2,3,7,8,9-HXCDF	0.126	B J	2.33	U	3
BH-SC-24-3.8to5.9	1,2,3,7,8,9-HXCDF	0.722	J	2.26	U	3
BH-SC-24-3.8to5.9-D	1,2,3,7,8,9-HXCDF	0.712	J	2.29	U	3
BH-SC-27-0to1.7	1,2,3,4,7,8,9-HPCDF	0.163	B J	2.47	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-27-0to1.7	1,2,3,4,7,8-HXCDF	1.08	J	2.47	U	3
BH-SC-27-0to1.7	1,2,3,6,7,8-HXCDD	1.12	NJ J	2.47	U	3
BH-SC-27-0to1.7	1,2,3,6,7,8-HXCDF	0.432	J	2.47	U	3
BH-SC-27-0to1.7	1,2,3,7,8,9-HXCDD	1.18	J	2.47	U	3
BH-SC-27-0to1.7	1,2,3,7,8-PECDF	0.552	J	2.47	U	3
BH-SC-27-0to1.7	2,3,4,6,7,8-HXCDF	0.406	NJ J	2.47	U	3
BH-SC-27-0to1.7	OCDF	2.5	J	4.94	U	3
BH-SC-27-1.7To3.7	1,2,3,4,6,7,8-HPCDF	0.0811	NJ J	2.38	U	3
BH-SC-27-1.7To3.7	1,2,3,6,7,8-HXCDD	0.576	J	2.38	U	3
BH-SC-27-1.7To3.7	1,2,3,7,8,9-HXCDD	1.15	J	2.38	U	3
BH-SC-27-1.7To3.7	1,2,3,7,8-PECDF	0.0502	NJ B J	2.38	U	3
BH-SC-27-1.7To3.7	OCDF	0.0710	NJ B J	4.7700	U	3
BH-SC-27-3.7To5.2	1,2,3,4,6,7,8-HPCDF	0.0677	NJ J	2.39	U	3
BH-SC-27-3.7To5.2	1,2,3,6,7,8-HXCDD	0.966	J	2.39	U	3
BH-SC-27-3.7To5.2	OCDF	0.0758	NJ B J	4.77	U	3
BH-SC-27-5.2to6.7	1,2,3,7,8,9-HXCDF	0.0814	NJ B J	2.42	U	3
BH-SC-27-5.2to6.7	1,2,3,7,8-PECDF	0.0521	NJ J	2.42	U	3
BH-SC-27-5.2to6.7	OCDF	0.0591	J	4.84	U	3
BH-SC-32-0to2	1,2,3,4,6,7,8-HPCDF	1.82	J	2.19	U	3
BH-SC-32-0to2	1,2,3,4,7,8,9-HPCDF	0.145	B J	2.19	U	3
BH-SC-32-0to2	1,2,3,4,7,8-HXCDF	0.4	NJ J	2.19	U	3
BH-SC-32-0to2	1,2,3,6,7,8-HXCDD	1.15	NJ J	2.19	U	3
BH-SC-32-0to2	1,2,3,6,7,8-HXCDF	0.166	B J	2.19	U	3
BH-SC-32-0to2	1,2,3,7,8-PECDF	0.25	NJ B J	2.19	U	3
BH-SC-32-0to2	2,3,4,6,7,8-HXCDF	0.198	NJ B J	2.19	U	3
BH-SC-32-0to2	OCDF	2.8	J	4.37	U	3
BH-SC-32-2to4	1,2,3,4,6,7,8-HPCDF	0.0549	NJ J	2.42	U	3
BH-SC-32-2to4	1,2,3,6,7,8-HXCDD	1.06	J	2.42	U	3
BH-SC-32-2to4	OCDF	0.0629	NJ B J	4.84	U	3
BH-SC-32-2to4-D	1,2,3,4,6,7,8-HPCDF	0.0719	NJ J	2.39	U	3
BH-SC-32-2to4-D	1,2,3,6,7,8-HXCDD	1.13	J	2.39	U	3
BH-SC-32-2to4-D	OCDF	0.0799	NJ B J	4.79	U	3
BH-SC-32-2to4-D	TOTAL HxCDF	0.0628	B	0.0628	J+	3
BH-SC-32-4to5.5	1,2,3,6,7,8-HXCDD	1.28	J	2.4	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-32-4to5.5	1,2,3,7,8-PECDF	0.0576	NJ B J	2.4	U	3
BH-SC-32-4to5.5	OCDF	0.0747	NJ B J	4.8	U	3
BH-SC-38-0to1.8	1,2,3,7,8,9-HXCDF	0.101	B J	1.84	U	3
BH-SC-38-1.8to3.8	1,2,3,4,6,7,8-HPCDF	0.348	J	2.48	U	3
BH-SC-38-1.8to3.8	1,2,3,7,8,9-HXCDF	0.0502	NJ B J	2.48	U	3
BH-SC-38-1.8to3.8	TOTAL HpCDF	0.348	NA	0.348	J+	3
BH-SC-38-3.8to5.8	1,2,3,4,6,7,8-HPCDF	0.0623	NJ B J	2.4	U	3
BH-SC-38-3.8to5.8	1,2,3,7,8,9-HXCDF	0.0485	NJ B J	2.4	U	3
BH-SC-38-5.8to7.9	1,2,3,4,6,7,8-HPCDF	0.0711	NJ B J	2.39	U	3
HA-01-0to12	1,2,3,4,7,8,9-HPCDF	0.35	J	2.43	U	3
HA-01-0to12	1,2,3,4,7,8-HXCDD	1.23	J	2.43	U	3
HA-01-0to12	1,2,3,4,7,8-HXCDF	1.86	J	2.43	U	3
HA-01-0to12	1,2,3,6,7,8-HXCDF	1.4	J	2.43	U	3
HA-01-0to12	1,2,3,7,8,9-HXCDF	0.132	J	2.43	U	3
HA-01-0to12	1,2,3,7,8-PECDD	1.72	J	2.43	U	3
HA-01-0to12	1,2,3,7,8-PECDF	1.99	J	2.43	U	3
HA-01-0to12	2,3,4,6,7,8-HXCDF	1.09	J	2.43	U	3
HA-01-0to12	2,3,4,7,8-PECDF	1.87	J	2.43	U	3
HA-01-0to12	OCDF	4.54	B J	4.86	U	3
HA-02-0to12	1,2,3,4,7,8,9-HPCDF	0.5	J	2.43	U	3
HA-02-0to12	1,2,3,4,7,8-HXCDF	2.01	J	2.43	U	3
HA-02-0to12	1,2,3,6,7,8-HXCDF	1.61	J	2.43	U	3
HA-02-0to12	1,2,3,7,8,9-HXCDF	0.182	NJ J	2.43	U	3
HA-02-0to12	2,3,4,6,7,8-HXCDF	1.33	J	2.43	U	3
HA-02-0to12	OCDF	3.64	B J	4.85	U	3
HA-03-0to12	1,2,3,4,7,8,9-HPCDF	0.184	B J	2.41	U	3
HA-03-0to12	1,2,3,4,7,8-HXCDD	0.839	J	2.41	U	3
HA-03-0to12	1,2,3,4,7,8-HXCDF	1.31	J	2.41	U	3
HA-03-0to12	1,2,3,6,7,8-HXCDD	1.57	J	2.41	U	3
HA-03-0to12	1,2,3,6,7,8-HXCDF	0.563	J	2.41	U	3
HA-03-0to12	1,2,3,7,8,9-HXCDD	1.70	J	2.41	U	3
HA-03-0to12	1,2,3,7,8,9-HXCDF	0.0712	NJ J	2.41	U	3
HA-03-0to12	1,2,3,7,8-PECDD	0.617	J	2.41	U	3
HA-03-0to12	1,2,3,7,8-PECDF	0.51	J	2.41	U	3
HA-03-0to12	2,3,4,6,7,8-HXCDF	0.418	B J	2.41	U	3
HA-03-0to12	2,3,4,7,8-PECDF	0.469	J	2.41	U	3
HA-03-0to12	2,3,7,8-TCDF	0.428	J	0.482	U	3
HA-03-0to12	OCDF	2.85	B J	4.82	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
HA-03-0to12	TOTAL TCDF	5.13	B	5.13	J+	3
HA-04-0to12	1,2,3,4,7,8,9-HPCDF	1.92	J	2.5	U	3
HA-04-0to12	1,2,3,7,8,9-HXCDF	0.737	J	2.50	U	3
HA-05-0to12	1,2,3,7,8,9-HXCDF	1.58	J	2.37	U	3
HA-06-0to12	1,2,3,7,8,9-HXCDF	1.15	J	2.50	U	3
HA-06-0to12-D	1,2,3,7,8,9-HXCDF	0.912	J	2.36	U	3
HA-07-0to12	1,2,3,7,8,9-HXCDF	0.362	J	2.40	U	3
HA-07-0to12-D	1,2,3,7,8,9-HXCDF	0.364	J	2.36	U	3
HA-08-0to12	1,2,3,7,8,9-HXCDF	0.686	J	2.44	U	3
HA-09-0to12	1,2,3,4,7,8,9-HPCDF	0.855	J	2.37	U	3
HA-09-0to12	1,2,3,7,8,9-HXCDF	0.215	J	2.37	U	3
HA-09-0to12	2,3,4,6,7,8-HXCDF	1.98	J	2.37	U	3
HA-10-0to12	1,2,3,4,7,8-HXCDD	2.21	J	2.50	U	3
HA-10-0to12	1,2,3,7,8,9-HXCDF	0.543	J	2.50	U	3
HA-10-0to12	1,2,3,7,8-PECDD	1.77	J	2.50	U	3
HA-11-0to12	1,2,3,4,7,8,9-HPCDF	0.938	J	2.42	U	3
HA-11-0to12	1,2,3,4,7,8-HXCDD	2.05	J	2.42	U	3
HA-11-0to12	1,2,3,7,8,9-HXCDF	0.26	J	2.42	U	3
HA-11-0to12	2,3,4,6,7,8-HXCDF	2.27	J	2.42	U	3
HA-12-0to12	1,2,3,4,7,8,9-HPCDF	1.91	J	2.37	U	3
HA-12-0to12	1,2,3,4,7,8-HXCDD	2.27	J	2.37	U	3
HA-12-0to12	1,2,3,6,7,8-HXCDF	2.22	J	2.37	U	3
HA-12-0to12	1,2,3,7,8,9-HXCDF	0.171	J	2.37	U	3
HA-12-0to12	1,2,3,7,8-PECDD	1.17	J	2.37	U	3
HA-12-0to12	1,2,3,7,8-PECDF	0.819	J	2.37	U	3
HA-12-0to12	2,3,4,6,7,8-HXCDF	1.7	J	2.37	U	3
HA-12-0to12	2,3,4,7,8-PECDF	1.24	J	2.37	U	3
HA-13-0to12	1,2,3,4,7,8,9-HPCDF	0.36	J	2.40	U	3
HA-13-0to12	1,2,3,4,7,8-HXCDD	0.915	J	2.40	U	3
HA-13-0to12	1,2,3,4,7,8-HXCDF	1.32	J	2.40	U	3
HA-13-0to12	1,2,3,6,7,8-HXCDD	1.74	J	2.40	U	3
HA-13-0to12	1,2,3,6,7,8-HXCDF	1.17	J	2.40	U	3
HA-13-0to12	1,2,3,7,8,9-HXCDF	0.115	J	2.40	U	3
HA-13-0to12	1,2,3,7,8-PECDD	1	J	2.40	U	3
HA-13-0to12	1,2,3,7,8-PECDF	1.03	J	2.40	U	3
HA-13-0to12	2,3,4,6,7,8-HXCDF	1.09	J	2.40	U	3
HA-13-0to12	2,3,4,7,8-PECDF	1.19	J	2.40	U	3
HA-13-0to12	OCDF	4.28	B J	4.81	U	3
HA-14-0to12	1,2,3,4,7,8,9-HPCDF	1.17	J	2.27	U	3
HA-14-0to12	1,2,3,7,8,9-HXCDF	0.19	J	2.27	U	3
HA-14-0to12	1,2,3,7,8-PECDF	1.94	J	2.27	U	3
HA-15-0to12	1,2,3,4,7,8,9-HPCDF	0.898	J	2.43	U	3
HA-15-0to12	1,2,3,4,7,8-HXCDD	0.99	J	2.43	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
HA-15-0to12	1,2,3,4,7,8-HXCDF	2.15	J	2.43	U	3
HA-15-0to12	1,2,3,6,7,8-HXCDF	1.64	J	2.43	U	3
HA-15-0to12	1,2,3,7,8,9-HXCDF	0.165	J	2.43	U	3
HA-15-0to12	1,2,3,7,8-PECDD	0.877	J	2.43	U	3
HA-15-0to12	1,2,3,7,8-PECDF	1.28	J	2.43	U	3
HA-15-0to12	2,3,4,6,7,8-HXCDF	1.36	J	2.43	U	3
HA-15-0to12	2,3,4,7,8-PECDF	1.47	J	2.43	U	3
HA-16-0to12	1,2,3,7,8,9-HXCDF	1.01	J	2.41	U	3
SG-02-0to10	1,2,3,7,8-PECDF	1.53	J	2.32	U	3
SG-06-0to10	1,2,3,7,8-PECDF	2.35	J	2.51	U	3
SG-15-0to10	1,2,3,7,8-PECDF	2.05	J	2.60	U	3
SG-15-0to10-D	1,2,3,7,8-PECDF	1.64	J	2.52	U	3
SG-22-0to10	1,2,3,7,8-PECDF	2.32	J	2.41	U	3
SG-22-0to10-D	1,2,3,7,8-PECDF	2.47	J	2.50	U	3
SG-25-0to10	1,2,3,7,8-PECDF	0.398	J	2.36	U	3
SG-27-0to10	1,2,3,7,8-PECDF	0.904	J	2.45	U	3
SG-33-0to10	1,2,3,7,8-PECDF	1.24	J	2.50	U	3
SG-35-0to10	1,2,3,7,8-PECDF	1.19	J	2.42	U	3
SG-36-0to10	1,2,3,7,8-PECDF	1.41	J	2.70	U	3
SG-39-0to10	1,2,3,7,8-PECDF	0.673	J	2.57	U	3

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
D-laboratory flag indicating the analyte was reported from a dilution
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-EB-GW-210916-1500	OCDD	1.02	B J	53.7	U	3
BH-EB-SB-210916	OCDD	2.51	NJ B J	59.1	U	3
BH-GW-17-210916	1,2,3,7,8,9-HXCDF	0.587	NJ J	25.2	U	3
BH-GW-17-210916	OCDD	5.09	B J	50.3	U	3
BH-GW-18-210916	1,2,3,7,8,9-HXCDF	1.32	NJ J	32.9	U	3
BH-GW-19-210917	OCDD	45.7	J	54.7	U	3
BH-GW-20-210917	1,2,3,7,8,9-HXCDF	0.526	NJ J	25	U	3
BH-GW-20-210917	OCDD	26.7	J	50.1	U	3
BH-GW-21-210917	1,2,3,7,8,9-HXCDF	0.541	NJ J	26.4	U	3
BH-GW-21-210917	OCDD	3.48	B J	52.9	U	3
BH-GW-21-210917-D	1,2,3,7,8,9-HXCDF	0.574	NJ J	26.3	U	3

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-GW-21-210917-D	OCDD	3.16	B J	52.6	U	3
BH-SC-EB-CC	OCDD	1.29	NJ B J	52.2	U	3
BH-SC-EB-CP	1,2,3,7,8,9-HXCDF	0.551	NJ J	25.8	U	3
BH-SC-EB-CP	OCDD	2.78	B J	51.6	U	3

pg/L-picograms per liter
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

ATTACHMENT 5
QUALIFICATION FOR INDENTIFICATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-0to2	1,2,3,7,8-PECDD	11.6	G	11.6	J	13
BH-SB-17-0to2-D	1,2,3,7,8-PECDD	10.8	G	10.8	J	13
BH-SB-17-2to4	1,2,3,7,8,9-HXCDF	0.187	NJ J	0.187	J	13
BH-SB-17-2to4	1,2,3,7,8-PECDD	4.7	G	4.7	J	13
BH-SB-17-4to6	1,2,3,7,8-PECDD	1.83	NJ J G	1.83	J	13
BH-SB-18-4to6	1,2,3,4,7,8-HXCDF	0.163	NJ J	0.163	J	13
BH-SB-18-4to6	1,2,3,6,7,8-HXCDF	0.0806	NJ J	0.0806	J	13
BH-SB-18-4to6	2,3,4,6,7,8-HXCDF	0.0765	NJ J	0.0765	J	13
BH-SB-18-4to6	2,3,4,7,8-PECDF	0.135	NJ J	0.135	J	13
BH-SB-18-4to6	2,3,7,8-TCDD	0.26	NJ J	0.26	J	13
BH-SB-19-2to6	1,2,3,4,7,8,9-HPCDF	0.16	NJ J	0.16	J	13
BH-SB-19-2to6	1,2,3,6,7,8-HXCDF	0.825	NJ J	0.825	J	13
BH-SB-19-2to6	2,3,4,6,7,8-HXCDF	0.71	NJ J	0.71	J	13
BH-SB-19-2to6	2,3,4,7,8-PECDF	1.41	NJ J	1.41	J	13
BH-SB-19-2to6	2,3,7,8-TCDD	0.459	NJ J	0.459	J	13
BH-SB-19-2to6	OCDF	0.728	NJ J	0.728	J	13
BH-SB-19-2to6-DUP	1,2,3,4,7,8,9-HPCDF	0.207	NJ J	0.207	J	13
BH-SB-19-2to6-DUP	1,2,3,7,8-PECDD	0.982	NJ J	0.982	J	13
BH-SB-19-2to6-DUP	1,2,3,7,8-PECDF	1.78	NJ J	1.78	J	13
BH-SB-19-2to6-DUP	2,3,4,6,7,8-HXCDF	0.795	NJ J	0.795	J	13
BH-SB-19-2to6-DUP	OCDF	0.589	NJ J	0.589	J	13
BH-SB-20-3to5	1,2,3,7,8-PECDD	0.994	NJ J	0.994	J	13
BH-SB-20-3to5	1,2,3,7,8-PECDF	1.05	NJ J	1.05	J	13
BH-SB-20-3to5	2,3,7,8-TCDD	0.754	NJ J	0.754	J	13
BH-SB-21-0to2	1,2,3,4,7,8-HXCDF	18.7	NJ	18.7	J	13
BH-SB-22-0to2	1,2,3,7,8-PECDD	43.6	G	43.6	J	13
BH-SB-23-0to2	1,2,3,7,8-PECDD	17.6	G	17.6	J	13
BH-SB-23-2to4	1,2,3,7,8,9-HXCDF	0.217	NJ J	0.217	J	13
BH-SB-23-2to4	1,2,3,7,8-PECDD	10.7	G	10.7	J	13
BH-SC-05-1.6to3.2	1,2,3,7,8-PECDD	1.26	NJ J	1.26	J	13
BH-SC-05-1.6to3.2	2,3,4,6,7,8-HXCDF	0.494	NJ J	0.494	J	13
BH-SC-05-1.6to3.2	2,3,7,8-TCDD	0.657	NJ J	0.657	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-05-1.6to3.2-D	1,2,3,4,7,8,9-HPCDF	0.191	NJ J	0.191	J	13
BH-SC-07-0to2.5	1,2,3,4,7,8,9-HPCDF	0.221	NJ J	0.221	J	13
BH-SC-07-0to2.5	1,2,3,4,7,8-HXCDD	1.45	NJ J	1.45	J	13
BH-SC-07-0to2.5	2,3,4,6,7,8-HXCDF	0.701	NJ J	0.701	J	13
BH-SC-07-0to2.5	2,3,7,8-TCDD	1.45	NJ	1.45	J	13
BH-SC-07-2.5to4.2	1,2,3,7,8,9-HXCDD	1.99	NJ J	1.99	J	13
BH-SC-07-4.2to6.2	1,2,3,6,7,8-HXCDF	0.0561	NJ J	0.0561	J	13
BH-SC-07-4.2to6.2	2,3,4,7,8-PECDF	0.0511	NJ J	0.0511	J	13
BH-SC-07-4.2to6.2	OCDF	0.144	NJ J	0.144	J	13
BH-SC-12-0to1.4	2,3,7,8-TCDD	1.54	NJ	1.54	J	13
BH-SC-24-0to2	2,3,7,8-TCDD	1.01	NJ	1.01	J	13
BH-SC-24-2to3.8	2,3,7,8-TCDD	0.345	NJ J	0.345	J	13
BH-SC-27-0to1.7	1,2,3,4,7,8-HXCDD	0.454	NJ J	0.454	J	13
BH-SC-27-3.7To5.2	1,2,3,7,8,9-HXCDF	0.0559	NJ J	0.0559	J	13
BH-SC-27-3.7To5.2	2,3,7,8-TCDD	0.17	NJ J	0.17	J	13
BH-SC-27-5.2to6.7	1,2,3,4,7,8-HXCDD	0.53	NJ J	0.53	J	13
BH-SC-32-0to2	1,2,3,7,8,9-HXCDF	0.0553	NJ J	0.0553	J	13
BH-SC-32-2to4	1,2,3,7,8,9-HXCDF	0.0568	NJ J	0.0568	J	13
BH-SC-32-2to4	1,2,3,7,8-PECDD	0.418	J G	0.418	J	13
BH-SC-32-4to5.5	1,2,3,7,8,9-HXCDF	0.0545	NJ J	0.0545	J	13
BH-SC-32-4to5.5	2,3,7,8-TCDD	0.168	NJ J	0.168	J	13
BH-SC-38-1.8to3.8	2,3,7,8-TCDD	0.13	NJ J	0.13	J	13
BH-SC-38-3.8to5.8	2,3,7,8-TCDD	0.102	NJ J	0.102	J	13
BH-SC-38-5.8to7.9	1,2,3,6,7,8-HXCDD	0.51	NJ J	0.51	J	13
BH-SC-38-5.8to7.9	1,2,3,7,8-PECDD	0.118	NJ J	0.118	J	13
BH-SC-38-5.8to7.9	2,3,7,8-TCDD	0.107	NJ J	0.107	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
HA-03-0to12	2,3,7,8-TCDD	0.0688	NJ J	0.0688	J	13
SG-02-0to10	1,2,3,4,7,8,9-HPCDF	0.341	NJ J	0.341	J	13
SG-02-0to10	1,2,3,7,8,9-HXCD	2.85	NJ	2.85	J	13
SG-05-0to10	1,2,3,4,7,8,9-HPCDF	0.713	NJ J	0.713	J	13
SG-05-0to10	2,3,4,6,7,8-HXCDF	1.55	NJ J	1.55	J	13
SG-05-0to10	2,3,7,8-TCDD	1.23	NJ	1.23	J	13
SG-06-0to10	1,2,3,7,8,9-HXCDF	0.165	NJ J	0.165	J	13
SG-15-0to10-D	1,2,3,7,8,9-HXCDF	0.108	NJ J	0.108	J	13
SG-22-0to10	1,2,3,7,8,9-HXCDF	0.133	NJ J	0.133	J	13
SG-22-0to10-D	1,2,3,4,7,8,9-HPCDF	0.511	NJ J	0.511	J	13
SG-22-0to10-D	1,2,3,7,8,9-HXCDF	0.14	NJ J	0.14	J	13
SG-25-0to10	2,3,7,8-TCDD	0.266	NJ J	0.266	J	13
SG-27-0to10	1,2,3,7,8,9-HXCDF	0.115	NJ J	0.115	J	13
SG-39-0to10	1,2,3,4,7,8-HXCDD	0.786	NJ J	0.786	J	13
SG-39-0to10	1,2,3,7,8,9-HXCDF	0.137	NJ J	0.137	J	13
SG-39-0to10	1,2,3,7,8-PECDD	0.639	NJ J	0.639	J	13
SG-39-0to10	2,3,7,8-TCDD	0.206	NJ J	0.206	J	13

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-GW-17-210916	1,2,3,4,6,7,8-HPCDD	0.841	NJ J	0.841	J	13
BH-GW-18-210916	1,2,3,4,7,8-HXCDD	1.05	NJ J	1.05	J	13
BH-GW-18-210916	1,2,3,7,8,9-HXCDD	1.43	NJ J	1.43	J	13
BH-GW-18-210916	1,2,3,7,8-PECDD	1.18	NJ J	1.18	J	13
BH-GW-18-210916	1,2,3,7,8-PECDF	1.67	NJ J	1.67	J	13
BH-GW-18-210916	2,3,4,6,7,8-HXCDF	1.46	NJ J	1.46	J	13
BH-GW-19-210917	1,2,3,4,6,7,8-HPCDD	2.87	NJ J	2.87	J	13
BH-GW-20-210917	1,2,3,4,6,7,8-HPCDD	2.4	NJ J	2.4	J	13
BH-GW-21-210917	1,2,3,6,7,8-HXCDF	0.735	NJ J	0.735	J	13
BH-GW-21-210917	2,3,4,6,7,8-HXCDF	0.754	NJ J	0.754	J	13

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-GW-21-210917	2,3,7,8-TCDF	1.17	NJ J	1.17	J	13
BH-GW-21-210917	OCDF	0.614	NJ J	0.614	J	13
BH-GW-21-210917-D	1,2,3,4,6,7,8-HPCDD	0.878	NJ J	0.878	J	13
BH-GW-21-210917-D	1,2,3,7,8-PECDF	0.602	NJ J	0.602	J	13
BH-GW-21-210917-D	2,3,7,8-TCDF	0.765	NJ J	0.765	J	13

pg/L-picograms per liter
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date: 17 March 2022

To: Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900

From: Kathy Petersen, Geosyntec

CC: Julia Klens Caprio, Geosyntec

Subject: **Blakely Harbor Park Site Stage 2A Data Validation - Level II Data Deliverables –**

Analytical Resources, Incorporated Work Orders 21H0321, 21H0340, 21H0343, 21H0357, 21H0371, 21I0190, 21I0192, 21I0214, 21I0225, 21I0246, 21I0278, 21I0301, 21I0325, 21J0204, and 21L0075

Alpha Analytical, Work Order L2148255

Matrices: **Soil, Groundwater, Sediment and Wood Pilings**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2A data validation of one hundred sediment samples, fifty-eight soil samples, six groundwater samples, and six composite wood piling samples, as well as 17 field duplicate samples and six equipment blanks, collected on August 19 through September 21, 2021, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Portland and Knoxville offices.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- United States Environmental Protection Agency (USEPA) Methods 3546/8270E and 3510C/8270E – Semi-volatile Organic Compounds (SVOCs) by Gas Chromatography/Mass Spectrometry (GC/MS)
- USEPA Methods 3546/8270E and 3520C/8270E Selected Ion Monitoring (SIM) – SVOCs by GC/MS
- Methods 3510C/Northwest Petroleum Hydrocarbon (NWTPH)-Dx, 3546/NWTPH-Dx, and 3580A/NWTPH-Hydrocarbon Identification (HCID) – Gasoline Range Organics (GRO), Diesel Range Organics (DRO), and Motor Oil Range Organics (MRO) by GC/Flame Ionization Detector (FID)

- USEPA Methods 3050B/6020B, 3050B/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED), 3010A/6020B, and 3010A/6020B UCT-KED – Simultaneously Extracted Metals (SEM), Total, and Dissolved Metals by Inductively Coupled Plasma/Mass Spectrometry (ICP/MS)
- USEPA Methods 7470A and 7471B – Total and Dissolved Mercury by Atomic Absorption (AA)
- USEPA Methods 3060A/7196A – Hexavalent Chromium by Colorimetric Analyses
- USEPA Methods 1311/6010D – Lead by Toxicity Characteristic Leaching Procedure (TCLP)
- Puget Sound Estuary Protocol (PSEP) Method 1986 (modified) and USEPA Method 9060A – Total Organic Carbon (TOC)
- Standard Method (SM) 4500-NH3 H – Ammonia
- SM 4500-S2 D –Acid Volatile Sulfide (AVS) and Total Sulfide
- SM 2540 G/E– Total Volatile Solids (TVS)
- SM 2540G - Total Solids (TS)

The following analysis was performed on sediment samples at AmTest Laboratories, Inc. Kirkland, WA:

- American Society of Testing Materials (ASTM) D422/PSEP (modified)– Grain Size Analysis by Hydrometer and Wet Sieving (Particle Size Distribution)

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- ASTM D6913- Particle Size Distribution by Sieve Analysis

The following analysis was performed on wood waste samples at Alpha Analytical, Mansfield, MA:

- USEPA Method 8270D SIM –SVOCs by GC/MS

EXECUTIVE SUMMARY

Based on this Stage 2A data validation covering the quality control (QC) parameters listed below and the information provided, the qualified data are considered usable for supporting project objectives, with the following exceptions.

Exceptions

The non-detect USEPA 8270E benzoic acid results in samples BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, SG-18-0to10, and SG-35-0to10 and the non-detect USEPA 8270E SIM benzoic

acid results in samples BH-SC-20-3to5 and BH-SC-26-0to2 were R qualified as rejected due to low recoveries (<20%) in the matrix spike (MS)/MS duplicate (MSD) pairs.

The non-detect hexavalent chromium results in samples BH-SB-18-2to4, BH-SB-18-4to6, BH-SB-20-0to3, BH-SB-21-0to2, BH-SB-21-2to4, HA-04-0-12", HA-05-0-12", HA-05-12-24", HA-09-0-12", HA-09-12-24", HA-11-0-12", and HA-16-0-12" were R qualified as rejected due to holding time exceedances.

The non-detect total sulfide results in samples SG-09-0to10, SG-10-0to10, SG-11-0to10, and SG-15-0to10-D, and SG-25-0to10 were R qualified as rejected due to holding time exceedances.

The non-detect AVS results in samples SG-01-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, and SG-15-0to10-D, and SG-25-0to10 were R qualified as rejected due to holding time exceedances.

Qualified data that are not rejected should be used within the limitations of the qualifications. The completeness goal of > 90% was still met and data quality for completeness was not significantly impacted.

Data Quality Review

The solids data used to report the samples on a dry weight basis were not validated.

The data were reviewed based on the pertinent methods referenced by the data package, professional and technical judgment and the following:

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021

- National Functional Guidelines for Inorganic Superfund Methods Data Review, January 2017 (EPA 540-R-2017-001); and

- National Functional Guidelines for Organic Superfund Methods Data Review, January 2017 (EPA 540-R-2017-002).

Validation qualifiers, validation reason codes, and samples analyzed and validated at a Stage 2A level are listed in Attachments 1, 2, and 3, respectively.

The samples were received at the laboratory between 0.8 - 20.4 degrees Celsius (ºC). The samples received at 20.4 ºC, were outside of the QAPP criteria listed in Table 5. Since the samples received at 20.4 ºC were grain size samples, no qualifications were applied to the data. No additional preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- AmTest Laboratories analyzed the sediment samples for particle size distribution by ASTM D422, however the QAPP stated particle size distribution to be analyzed by PSEP-particle size (PS).

- ARI Laboratories analyzed petroleum hydrocarbons by NWTPH-HCID, however the QAPP stated petroleum hydrocarbons to be analyzed by NWTPH-Dx.

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

The following issues were noted from the chain of custody (COC) forms:

- Due to laboratory software limitations, the client sample identifications (IDs) listed on the COCs were reported twice using separate laboratory sample IDs for reports 21H0321, 21H0340, and 21H0371. The second laboratory sample ID corresponding with the AVS/SEM results.

- Due to laboratory software limitations, the client sample IDs listed on the COCs were reported twice using separate laboratory sample IDs for reports 21I0214 and 21I0225. The second laboratory sample ID corresponding with the dissolved metals results.

- Incorrect error corrections were observed on the COCs for Workorders (WOs) 21H0321, 21H0340, 21H0343, 21H0357, 21I0190, 21I0192, 21I0301, and 21I0325 instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

- The third sample transfer was recorded at the bottom of the COCs, outside the COC form fields for WGs 21H0321, 21H0340, 21H0343, 21I0190, and 21I0192.

- 21H0321: On page 2 of the COC the third sample *relinquished by* year was documented as 2. The correct *relinquished by* year was 2021. The laboratory report and electronic data deliverable (EDD) were revised on 01/13/2022 to update reporting units for the AVS/SEM results.

- 21H0340: According to the cooler receipt form, two additional samples were received with the COC, samples SG-03-0 to 10 and SG-04-0 to 10. Per client request, the sample analyses were cancelled. The samples were resubmitted to the lab and reported in WO 21H0371. The laboratory report and EDD were revised on 12/06/2021 to include grain size results.

The laboratory report and EDD were revised on 01/13/2022 to update reporting units for the AVS/SEM results.

- 21H0343: Per client request, the NWTPH-Dx, NWTPH-Gx, and NWTPH-HCID analyses listed on the COC were cancelled. Additionally, according to the cooler receipt form, nine unpreserved vials were received. These vials were confirmed to be temperature blanks therefore no further action was needed.

- 21H0357: The second sample transfer receipt time is missing from page 4 of the COC. For field duplicate samples HA-12-12-24"-D, HA-10-12-24"-D, and HA-07-0-12"-D grain size analyses was inadvertently requested and for equipment blank sample EB20210824 NWTPH-HCID was inadvertently requested for analyses on the COC. Per client request, these analyses were cancelled. The EDD were revised on 11/30/2021 to include grain size results.

- 21H0371: Per client request, sample IDs were revised from SG-03-0to10-R and SG-04-0to10-R to SG-03-0to10 and SG-04-0to10, respectively. The laboratory report and EDD were revised on 01/13/2022 to update reporting units for the AVS/SEM results.

- 21I0190: It was noted that dissolved organic carbon was inadvertently requested on the COC for samples BH-SC-EB-CP and BH-SC-EB-CC. Per client request, the dissolved organic carbon analyses were cancelled. The laboratory report and EDD were revised on 12/16/2021 to revise the grain size preparation method from Plumb 1981 to PSEP 1986.

- 21I0192: The contact information sections for pages 2 – 3 of the COC were not completed. According to the cooler receipt form, sample BH-SB-19-2to6-DUP was marked for grain size analysis on the COC, but no container was provided. Per client request, the grain size analysis was cancelled. The laboratory report and EDD were revised on 11/30/2021 to include grain size results. Additionally, the laboratory report and EDD were revised on 12/23/2021 to update the total cadmium and lead results for sample BH-SB-19-0to2 to be reported on a dry weight basis.

- 21I0214: There were time lapses for the sample transfer times. The first sample relinquishing was documented as 09/16/21, 1755 and the first sample receiving was documented as 09/16/21, 1756. Additionally, the second sample relinquishing was documented as 09/17/21, 1137 and the second sample receiving was documented as 09/17/21, 1150.

- 21I0225: It was noted on the Cooler Receipt Form that an additional 250-mL amber container was received for sample BH-GW-20-210917.

- 21I0246: It was noted on the Cooler Receipt Form that sample BH-SC-29-0to2 was marked on the COC with four sample containers whereas the laboratory only received two sample containers. It was noted that grain size analysis was inadvertently requested on the COC for sample BH-SC-26-4to6-D. Per client request, the grain size analysis was cancelled. There was a time lapse for the sample transfer times. The sample relinquishing was documented as 09/17/21, 1135 and the sample receiving was documented as 09/17/21, 1150. The laboratory report and EDD were revised on 12/16/2021 to update the collection date for sample BH-SC-29-0to2 from 09/15/2021 to 09/16/2021.

  21I0278: There were time lapses for the sample transfer times. The first sample relinquishing was documented as 09/16/21, 1755 and the first sample receiving was documented as 09/16/21, 1756. Additionally, the second sample relinquishing was documented as 09/17/21, 1137 and the second sample receiving was documented as 09/17/21, 1150. It was noted that the field sampler entered the incorrect collection year on the COC for samples BH-SB-23-0to2, BH-SB-23-2to4, BH-SB-23-4to6, BH-SB-23-6to7, BH-SB-23-7to10, BH-SB-23-10to12, BH-SB-22-0to2, BH-SB-22-2to4, BH-SB-22-4to6, and BH-SB-22-6to10. The samples were collected in 2021. Additionally, no analyses were listed on the COC for sample BH-SB-22-0to2. Per client request, sample BH-SB-22-0to2 was analyzed for SVOCs, petroleum hydrocarbons, metals, grain size, and total solids. The EDD was revised on 11/30/2021 to include grain size results.

- 21I0301: It was noted that sample BH-SC-34-1.5to3.3-D was marked on the COC with four sample containers whereas the laboratory received only two sample containers.

- 21I0325: It was noted that two sample containers were inadvertently broken for sample BH-SC-03-3to5. The laboratory proceeded with transferring the sample aliquots to new sample containers.

- 21J0204: According to the email communication included in the laboratory report, the client requested hexavalent chromium analyses for samples BH-SB-18-2to4, BH-SB-18-4to6, BH-SB-20-0to3, BH-SB-21-0to2, BH-SB-21-2to4, HA-04-0-12", HA-05-0-12", HA-05-12-24", HA-09-0-12", HA-09-12-24", HA-11-0-12", and HA-16-0-12" on 10/14/2021. Per client request, the laboratory proceeded with extracting the samples past the 30-day holding time. The samples listed on the COCs were previously reported in WOs 21H0357 and 21I0192.

- 21L0025: According to the email communication included in the laboratory report, the client requested lead by TCLP analysis for sample BH-SB-20-0to3 on 12/06/2021 which is reported in this WO. The samples listed on the COCs were previously reported in WO 21I0192.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
⊗ Field Duplicate
⊗ Rinsate Blank
✓ Standard Reference Material
⊗ Surrogates
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect USEPA 8270E benzoic acid results in samples BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, SG-18-0to10, and SG-35-0to10 and the non-detect USEPA 8270E SIM benzoic acid results in samples BH-SC-20-3to5 and BH-SC-26-0to2 were R qualified as rejected due to low recoveries (<20%) in the MS/MSD pairs. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 99%.

1.1.2 Analysis Anomaly

In this section for cases where laboratory flagging, e.g., E or Q, did not result in qualification of the associated data based on professional and technical judgement, the details of the flagging are not discussed.

21H0321, 21H0340, 21H0357, 21I0190, 21I0192, 21I0246, 21I0278, 21I0301, and 21I0325: Multiple USEPA 8270E and 8270E SIM target analyte results were flagged with E, to indicate the

analyte concentrations exceeded the upper limit of the calibration range in the non-diluted sample. Therefore, since both sets of SVOC data were reported and based on professional and technical judgement, the non-diluted E-flagged target analytes results were R qualified as not considered for validation. For undiluted SVOC results that did not exceed the upper limit of the calibration range, the diluted SVOC results were R qualified as not considered for validation.

For method USEPA 8270E SIM, the case narrative indicated the internal standard (IS) chrysene-d12 responses in samples SG-02-0to10, SG-08-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-15-0to10, SG-15-0to10-D, SG-35-0to10, SG-36-0to10, and SG-39-0to10 were low and outside laboratory specified acceptance criteria. Since the re-analyses confirmed the IS failures in the samples and both sets of data were reported, based on professional and technical judgement, the re-analyses SVOC results were R qualified as not considered for validation. Therefore, from the original analysis, the non-detect results were UJ qualified as estimated less than the method detection limits (MDLs) and the detected results were J+ qualified as estimated with high biases in the affected samples.

For method USEPA 8270E SIM, the diethyl phthalate results in samples SG-01-0to10, SG-06-0to10, SG-13-0to10, SG-41-0to10, and SG-42-0to10 were flagged with Q, to indicate the associated CCV recoveries were high and outside of laboratory specified acceptance criteria. Therefore, based on professional and technical judgement, the diethyl phthalate results in samples SG-01-0to10, SG-06-0to10, SG-13-0to10, SG-41-0to10, and SG-42-0to10 were J qualified as estimated.

For method USEPA 8270E SIM, the case narrative indicated the IS responses in samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, and SG-33-0to10 were low and outside laboratory specified acceptance criteria. Since the re-analyses confirmed the IS failures in the samples and both sets of data were reported, based on professional and technical judgement, the reanalyses SVOC results were R qualified as not considered for validation. Therefore, from the original analysis, the non-detect results were UJ qualified as estimated less than the MDLs and the detected results were J+ qualified as estimated with high biases in the affected samples.

For method USEPA 8270E SIM, the pentachlorophenol results in sample SG-22-0to10-D, the MS/MSD pair using sample SG-18-0to10 and the LCS/LCSD pair in batch BJI0077 were flagged with Q, to indicate the associated ICV recoveries were outside of laboratory specified acceptance criteria. Based on professional and technical judgement, the pentachlorophenol result in sample SG-22-0to10-D was J qualified as estimated.

For method USEPA 8270E SIM, the phenol results in samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D; SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were flagged with Q, to indicate the associated ICV recoveries were outside of laboratory specified acceptance criteria. Based on professional and technical judgement, the phenol results in samples SG-05-0to10, SG-31-0to10, SG-37-0to10, and SG-37-0to10-D were J qualified as estimated.

For method USEPA 8270E, the benzyl alcohol results in sample SG-04-0to10, MS/MSD pair using sample SG-03-0to10 and the LCS pair in batch BJI0281 were flagged with Q, to indicate the associated ICV recovery was high and outside laboratory specified acceptance criteria. Based on professional and technical judgement, the benzyl alcohol result in sample SG-04-0to10 was J qualified as estimated.

For method USEPA 8270E SIM, the phenol result in sample SG-04-0to10 was flagged with E, to indicate the analyte concentration exceeded the upper limit of the calibration range. Therefore, based on professional and technical judgment, the phenol result in sample SG-04-0to10 was J qualified as estimated.

For method USEPA 8270E SIM, the benzoic acid and phenol results in sample SG-03-0to10 and the benzoic acid, benzyl alcohol, and phenol results in sample SG-04-0to10 were flagged with Q, to indicate the associated ICV recoveries were outside of laboratory specified acceptance criteria. Based on professional and technical judgement, the benzoic acid and phenol results in sample SG-03-0to10 and the benzoic acid, benzyl alcohol, and phenol results in sample SG-04-0to10 were J qualified as estimated.
21I0190: For method USEPA 8270E, the 4-methylphenol (p-cresol) result in sample BH-SC-38-0to1.8 was flagged with M, to indicate the value is estimated for a GC/MS analyte detected and confirmed by an analyst but with low spectral match parameters. Therefore, based on professional and technical judgement, the 4-methylphenol (p-cresol) result in sample BH-SC-38-0to1.8 was J qualified as estimated.

21I0192: For method USEPA 8270E SIM, the benzo(g,h,i)perylene result in sample BH-SB-18-2to4 was flagged with E, to indicate the analyte concentration exceeded the upper limit of the calibration range. Therefore, based on professional and technical judgment, the benzo(g,h,i)perylene result in sample BH-SB-18-2to4 was J qualified as estimated.

For method USEPA 8270E SIM, the fluoranthene results in samples BH-SC-21-0to1.5, BH-SC-21-1.5to3.7, BH-SC-34-0to1.5, BH-SC-34-1.5to3.3, BH-SC-34-1.5to3.3-D, LCS, and LCSD in batch BJI0792 were flagged with Q, to indicate the associated ICV recoveries were low and outside of laboratory specified acceptance criteria. Since the fluoranthene results were reported from a different analytical batch for samples BH-SC-21-0to1.5 and BH-SC-21-1.5to3.7, no qualifications were applied to the fluoranthene results. However, based on professional and technical judgement, the fluoranthene results in samples BH-SC-34-0to1.5, BH-SC-34-1.5to3.3, and BH-SC-34-1.5to3.3-D were J qualified as estimated.

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-18-2to4	8270E SIM	Benzo(g,h,i)perylene	662	E	662	J	10
BH-SC-34-0to1.5	8270E SIM	Fluoranthene	2510	Q, D	2510	J	9
BH-SC-34-1.5to3.3	8270E SIM	Fluoranthene	592	Q, D	592	J	9

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-34-1.5to3.3-D	8270E SIM	Fluoranthene	654	Q, D	654	J	9
BH-SC-38-0to1.8	8270E	p-Cresol	40.8	M	40.8	J	13
SG-01-0to10	8270E SIM	Diethyl phthalate	22.4	Q	22.4	J	9
SG-03-0to10	8270E SIM	Benzoic acid	153	Q	153	J	9
SG-03-0to10	8270E SIM	Phenol	398	Q	398	J	9
SG-04-0to10	8270E	Benzyl alcohol	22.1	Q	22.1	J	9
SG-04-0to10	8270E SIM	Benzyl alcohol	33.9	Q	33.9	J	9
SG-04-0to10	8270E SIM	Benzoic acid	231	Q	231	J	9
SG-04-0to10	8270E SIM	Phenol	1250	Q, E	1250	J	9
SG-05-0to10	8270E SIM	Phenol	98.6	Q	98.6	J	9
SG-06-0to10	8270E SIM	Diethyl phthalate	30.7	Q	30.7	J	9
SG-13-0to10	8270E SIM	Diethyl phthalate	18.1	Q, J	18.1	J	9
SG-18-0to10	8270E SIM	Benzoic acid	110	Q	110	J	9
SG-22-0to10-D	8270E SIM	Pentachlorophenol	83.4	Q	83.4	J	9
SG-31-0to10	8270E SIM	Phenol	11.2	Q	11.2	J	9
SG-37-0to10	8270E SIM	Phenol	8.10	Q	8.10	J	9
SG-37-0to10-D	8270E SIM	Phenol	12.0	Q	12.0	J	9
SG-41-0to10	8270E SIM	Diethyl phthalate	19.7	Q, J	19.7	J	9
SG-42-0to10	8270E SIM	Diethyl phthalate	27.7	Q	27.7	J	9

D-laboratory flag indicating the reported value is from a dilution
E-laboratory flag indicating the analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration
M-laboratory flag indicating the value is estimated for a GC/MS analyte detected and confirmed by an analyst but with low spectral match parameters
J-laboratory flag indicating an estimated concentration value detected below the reporting limit
Q-laboratory flag indicating a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria
µg/kg-microgram per kilogram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.2 Holding Times

The holding time for the SVOC analysis of a soil or sediment sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the SVOC analysis of a water sample is seven days from collection to extraction and 40 days from extraction to analysis. Additionally, the QAPP specified holding time for the SVOC analysis of a sediment sample is one year from sample collection to extraction, if samples are frozen to -18°C. The holding times were met for the sample analyses.

1.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Fifteen method blanks were reported for USEPA 8270E (batches BJH0778, BJI0024, BJI0046, BJI0077, BJI0101, BJI0281, BJI0471, BJI0524, BJI0561, BJI0563, BJI0565, BJI0673, BJI0784, BJI0790, and BJJ0040) and twenty-three method blanks were reported from USEPA 8270E SIM (batches BJH0778, BJH0780, BJI0023, BJI0024, BJI0047, BJI0077, BJI0080, BJI0102, BJI0112, BJI0281, BJI0523, BJI0560, BJI0561, BJI0562, BJI0563, BJI0564, BJI0673, BJI0675, BJI0785, BJI0790, BJI0792, BJJ0041, and WG1556147). SVOCs were not detected in the method blank WG1556147 above the reporting limits (RLs). SVOCs were not detected in the remaining method blanks above the MDLs, with the following exceptions.

21H0321: Bis(2-ethylhexyl) phthalate was detected in the USEPA 8270E method blank in batch BJI0024 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated bis(2-ethylhexyl) phthalate results in samples SG-01-0to10, SG-06-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-35-0to10, and SG-39-0to10 were U qualified as not detected at the RLs.

Acenaphthene was detected in the USEPA 8270E SIM method blank in batch BJI0023 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated acenaphthene results in samples SG-01-0to10, SG-09-0to10, and SG-42-0to10 were U qualified as not detected at the RLs.

Diethyl phthalate was detected in the USEPA 8270E SIM method blank in batch BJI0024 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated diethyl phthalate results in samples SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-13-0to10, SG-35-0to10, SG-36-0to10, SG-39-0to10, and SG-41-0to10 were U qualified as not detected at the RLs.

21H0340: Diethyl phthalate and phenol were detected in the USEPA 8270E SIM method blank in batch BJI0077 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated USEPA 8270E diethyl phthalate results in samples SG-18-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D and the estimated phenol result in sample SG-25-0to10 were U qualified as not detected at the RLs.

Acenaphthene, fluoranthene, fluorene, and phenanthrene were detected in the USEPA 8270E SIM method blank in batch BJI0080 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated acenaphthene results in samples SG-19-0to10, SG-25-0to10, SG-26-0to10, SG-37-0to10, and SG-37-0to10-D and the estimated fluorene result in sample SG-25-0to10 were U qualified as not detected at the RLs.

21H0357: Diethyl phthalate was detected in the USEPA 8270E method blank in batch BJI0101 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated diethyl phthalate results in samples HA-08-0-12", HA-08-12-24", HA-09-0-12", HA-10-12-24", HA-11-0-12", HA-11-12-24", HA-12-12-24"-D, HA-13-0-12", HA-13-12-24", HA-14-0-12", HA-15-0-12", and HA-15-12-24" were U qualified as not detected at the RLs.

1-Methylnaphthalene and acenaphthene were detected in the USEPA 8270E SIM method blank in batch BJI0047 and 1-methylnaphthalene was detected in the USEPA 8270E SIM method blank in batch BJI0102 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated 1-methylnaphthalene results in samples HA-03-0-12", HA-03-12-24", HA-04-12-24", HA-05-0-12", HA-06-12-24", HA-07-0-12", HA-07-0-12"-D, HA-08-0-12", HA-08-12-24", HA-09-0-12", HA-09-12-24", HA-12-0-12", HA-12-12-24", HA-12-12-24"-D, HA-14-0-12", and HA-16-0-12" were U qualified as not detected at the RLs. Additionally, the estimated acenaphthene results in samples HA-03-0-12", HA-03-12-24", HA-04-0-12", HA-04-12-24", HA-05-0-12", HA-05-12-24", HA-06-12-24", HA-12-0-12", HA-12-12-24", and HA-16-0-12" were U qualified as not detected at the RLs.

21H0371: Benzo(a)pyrene and pyrene were detected in the USEPA 8270E SIM method blank in batch BJI0112 at estimated concentrations greater than the MDLs and less than the RLs. Since the benzo(a)pyrene and pyrene results were greater than the RLs in the associated samples, no qualifications were applied to the data.

Diethyl phthalate and phenol were detected in the USEPA 8270E SIM method blank in batch BJI0281 at estimated concentrations greater than the MDLs and less than the RLs. Since the diethyl phthalate result in sample SG-03-0to10 and the phenol results in samples SG-03-0to10 and SG-04-0to10 were greater than the RLs, no qualifications were applied to the data. However, the estimated diethyl phthalate result in sample SG-04-0to10 was U qualified as not detected at the RL.

21I0190: Bis(2-ethylhexyl) phthalate was detected in the USEPA 8270E method blank in batch BJI0561 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated bis(2-ethylhexyl) phthalate results in samples BH-SC-37-2to4, BH-SC-38-0to1.8, BH-SC-38-3.8to5.8, BH-SC-40-0to2, BH-SC-40-2to4, BH-SC-40-6to8, and BH-SC-40-8to9 were U qualified as not detected at the RLs.

Diethyl phthalate was detected at an estimated concentration greater than the MDL and less than the RL and phenol was detected at a concentration (5.8 µg/kg) greater than the RL in the USEPA 8270E SIM method blank in batch BJI0561. Therefore, the estimated diethyl phthalate results in samples BH-SC-37-0to2, BH-SC-37-2to4, BH-SC-37-4to6, BH-SC-37-6to8, BH-SC-40-0to2, BH-SC-40-4to6, BH-SC-40-6to8, and BH-SC-40-8to9 were U qualified as not detected at the RLs. Based on professional and technical judgment, the phenol results in samples BH-SC-40-4to6, BH-

SC-37-6to8, BH-SC-37-4to6, BH-SC-40-8to9, BH-SC-38-3.8to5.8, BH-SC-40-6to8, and BH-SC-37-2to4 were U qualified as not detected at the reported results. Additionally, the phenol results in samples BH-SC-37-0to2, BH-SC-38-1.8to3.8, and BH-SC-40-2to4 were J+ qualified as estimated with high biases.

Benzyl alcohol and diethyl phthalate were detected in the USEPA 8270E SIM method blank in batch BJI0563 at estimated concentrations greater than the MDLs and less than the RLs. Since benzyl alcohol was not detected in the associated samples, no qualifications were applied to the benzyl alcohol data. However, the estimated diethyl phthalate results in samples BH-SC-20-0to1.5, BH-SC-20-1.5to3, BH-SC-20-3to5, BH-SC-20-5to7, BH-SC-20-7to9, BH-SC-24-0to2, BH-SC-24-2to3.8, BH-SC-24-3.8to5.9, BH-SC-24-3.8to5.9-D, and BH-SC-38-5.8to7.9 were U qualified as not detected at the RLs.

21I0192: Diethyl phthalate was detected in the USEPA 8270E method blank in batch BJI0565 at a concentration (68.4 µg/kg) greater than the RL. Therefore, the estimated diethyl phthalate results in samples BH-SB-18-0to2, BH-SB-18-2to4, BH-SB-18-4to6, BH-SB-19-0to2, BH-SB-19-2to6, BH-SB-20-0to3, and BH-SB-21-2to4 were U qualified as not detected at the RLs.

1-Methylnaphthalene, acenaphthene, benzo(a)anthracene, benzo(a)pyrene, dibenzo(a,h)anthracene, fluoranthene, fluorene, naphthalene, and pyrene were detected in the USEPA 8270E SIM method blank in batch BJI0564 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, based on professional and technical judgement, the estimated 1-methylnaphthalene, acenaphthene, benzo(a)anthracene, benzo(a)pyrene, dibenzo(a,h)anthracene, fluoranthene, fluorene, naphthalene, and pyrene results in the associated samples were U qualified as not detected at the RLs.

21I0246: Bis(2-ethylhexyl) phthalate was detected in the USEPA 8270E method blank in batch BJI0673 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated bis(2-ethylhexyl) phthalate results in samples BH-SC-26-0to2, BH-SC-26-4to6-D, BH-SC-27-0to1.7, BH-SC-27-5.2to6.7, BH-SC-14-0to1.3, and BH-SC-14-1.3to2.6 were U qualified as not detected at the RLs.

Diethyl phthalate and phenol were detected in the USEPA 8270E SIM method blank in batch BJI0673 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated diethyl phthalate results in samples BH-SC-26-0to2, BH-SC-26-2to4, BH-SC-26-4to6, BH-SC-26-4to6-D, BH-SC-26-6to7.9, BH-SC-27-0to1.7, BH-SC-27-1.7to3.7, BH-SC-27-3.7to5.2, BH-SC-29-0to2, BH-SC-29-2to4, BH-SC-29-4to6, BH-SC-29-6to7.9, BH-SC-32-0to2, BH-SC-32-2to4, BH-SC-32-2to4-D, BH-SC-32-4to5.5, BH-SC-14-0to1.3, and BH-SC-14-1.3to2.6 and the estimated phenol results in samples BH-SC-26-2to4, BH-SC-26-4to6, BH-SC-26-4to6-D, BH-SC-26-6to7.9, BH-SC-27-1.7to3.7, BH-SC-27-3.7to5.2, BH-SC-27-5.2to6.7, BH-

SC-29-2to4, BH-SC-29-4to6, BH-SC-29-6to7.9, BH-SC-32-2to4, and BH-SC-32-4to5.5 were U qualified as not detected at the RLs.

Acenaphthene, fluorene, and pyrene were detected in the USEPA 8270E SIM method blank in batch BJI0675 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated acenaphthene results in samples BH-SC-14-1.3to2.6, BH-SC-26-0to2, and BH-SC-29-0to2; the estimated fluorene results in samples BH-SC-14-1.3to2.6 and BH-SC-26-0to2; and the estimated pyrene results in samples BH-SC-26-2to4, BH-SC-26-4to6-D, BH-SC-27-1.7to3.7, BH-SC-27-3.7to5.2, and BH-SC-29-2to4 were U qualified as not detected at the RLs.

21I0278: 1-Methylnaphthalene, acenaphthene, fluorene, and naphthalene were detected in the USEPA 8270E SIM method blank in batch BJI0785 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated 1-methylnaphthalene results in samples BH-SB-17-0to2, BH-SB-17-0to2-D, BH-SB-17-2to4, BH-SB-17-4to6, BH-SB-22-0to2, BH-SB-22-2to4, BH-SB-22-4to6, BH-SB-23-0to2, and BH-SB-23-2to4; the estimated acenaphthene results in samples BH-SB-17-0to2, BH-SB-17-4to6, BH-SB-22-0to2, and BH-SB-22-4to6; and the estimated fluorene results in samples BH-SB-17-0to2, BH-SB-17-0to2-D, BH-SB-17-2to4, BH-SB-17-4to6, BH-SB-22-0to2, BH-SB-22-2to4, BH-SB-22-4to6, and BH-SB-23-2to4 were U qualified as not detected at the RLs.

21I0301: Diethyl phthalate was detected in the USEPA 8270E SIM method blank in batch BJI0790 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated diethyl phthalate results in samples BH-SC-21-0to1.5, BH-SC-21-1.5to3.7, BH-SC-21-3.7to5.8, BH-SC-21-5.8to8, BH-SC-21-8to10, BH-SC-34-0to1.5, BH-SC-34-1.5to3.3, BH-SC-34-1.5to3.3-D, BH-SC-34-3.3to4.8, and BH-SC-34-4.8to5.6 were U qualified as not detected at the RLs.

2-Methylnaphthalene, acenaphthene, fluorene, and naphthalene were detected in the USEPA 8270E SIM method blank in batch BJI0792 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated 2-methylnaphthalene, acenaphthene, fluorene, and naphthalene results in samples BH-SC-21-3.7to5.8, BH-SC-21-8to10, and BH-SC-34-4.8to5.6 were U qualified as not detected at the RLs.

21I0325: Acenaphthene and fluorene were detected in the USEPA 8270E SIM method blank in batch BJJ0041 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated acenaphthene and fluorene results in samples BH-SC-04-1.3to3 and BH-SC-07-4.2to6.2 were U qualified as not detected at the RLs.

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-17-0to2	8270E SIM	1-Methylnaphthalene	1.23	J	5.00	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-17-0to2	8270E SIM	Acenaphthene	0.63	J	5.00	U	3
BH-SB-17-0to2	8270E SIM	Fluorene	0.98	J	5.00	U	3
BH-SB-17-0to2-D	8270E SIM	1-Methylnaphthalene	1.01	J	5.00	U	3
BH-SB-17-0to2-D	8270E SIM	Fluorene	0.91	J	5.00	U	3
BH-SB-17-2to4	8270E SIM	1-Methylnaphthalene	6.28	J	18.5	U	3
BH-SB-17-2to4	8270E SIM	Fluorene	7.03	J	18.5	U	3
BH-SB-17-4to6	8270E SIM	1-Methylnaphthalene	4.85	J	20.1	U	3
BH-SB-17-4to6	8270E SIM	Acenaphthene	2.47	J	20.1	U	3
BH-SB-17-4to6	8270E SIM	Fluorene	5.81	J	20.1	U	3
BH-SB-18-0to2	8270E	Diethyl phthalate	33.7	J, B	33.7	U	3
BH-SB-18-0to2	8270E SIM	1-Methylnaphthalene	1.39	J	5.00	U	3
BH-SB-18-0to2	8270E SIM	Acenaphthene	1.01	J	5.00	U	3
BH-SB-18-0to2	8270E SIM	Dibenzo(a,h)anthracene	3.28	J	5.00	U	3
BH-SB-18-0to2	8270E SIM	Fluorene	1.05	J	5.00	U	3
BH-SB-18-0to2	8270E SIM	Naphthalene	3.27	J	5.00	U	3
BH-SB-18-2to4	8270E	Diethyl phthalate	21.4	J, B	21.4	U	3
BH-SB-18-2to4	8270E SIM	1-Methylnaphthalene	4.45	J	5.00	U	3
BH-SB-18-2to4	8270E SIM	Acenaphthene	2.02	J	5.00	U	3
BH-SB-18-4to6	8270E	Diethyl phthalate	22.8	J, B	22.8	U	3
BH-SB-18-4to6	8270E SIM	1-Methylnaphthalene	0.48	J	5.00	U	3
BH-SB-18-4to6	8270E SIM	Benzo(a)pyrene	1.10	J	5.00	U	3
BH-SB-18-4to6	8270E SIM	Fluoranthene	2.05	J	5.00	U	3
BH-SB-18-4to6	8270E SIM	Naphthalene	1.70	J	5.00	U	3
BH-SB-18-4to6	8270E SIM	Pyrene	1.08	J	5.00	U	3
BH-SB-19-0to2	8270E	Diethyl phthalate	20.8	J, B	20.8	U	3
BH-SB-19-2to6	8270E	Diethyl phthalate	140	J, B	140	U	3
BH-SB-19-2to6	8270E SIM	1-Methylnaphthalene	17.3	J	29.4	U	3
BH-SB-19-2to6	8270E SIM	Acenaphthene	9.20	J	29.4	U	3
BH-SB-19-2to6	8270E SIM	Fluorene	19.8	J	29.4	U	3
BH-SB-19-2to6-Dup	8270E SIM	1-Methylnaphthalene	14.0	J	26.0	U	3
BH-SB-19-2to6-Dup	8270E SIM	Acenaphthene	6.87	J	26.0	U	3
BH-SB-19-2to6-Dup	8270E SIM	Fluorene	15.9	J	26.0	U	3
BH-SB-20-0to3	8270E	Diethyl phthalate	32.5	J, B	32.5	U	3
BH-SB-20-3to5	8270E SIM	1-Methylnaphthalene	3.63	J	22.9	U	3
BH-SB-20-3to5	8270E SIM	Acenaphthene	3.35	J	22.9	U	3
BH-SB-20-3to5	8270E SIM	Benz(a)anthracene	15.0	J	22.9	U	3
BH-SB-20-3to5	8270E SIM	Dibenzo(a,h)anthracene	10.2	J	22.9	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-21-2to4	8270E	Diethyl phthalate	41.5	J, B	41.5	U	3
BH-SB-21-2to4	8270E SIM	1-Methylnaphthalene	5.20	J, D	14.9	U	3
BH-SB-21-2to4	8270E SIM	Acenaphthene	4.29	J, D	14.9	U	3
BH-SB-21-2to4	8270E SIM	Fluorene	5.69	J, D	14.9	U	3
BH-SB-21-4to6	8270E SIM	1-Methylnaphthalene	6.20	J	12.8	U	3
BH-SB-21-4to6	8270E SIM	Acenaphthene	2.92	J	12.8	U	3
BH-SB-21-4to6	8270E SIM	Fluorene	6.08	J	12.8	U	3
BH-SB-22-0to2	8270E SIM	1-Methylnaphthalene	4.66	J	4.99	U	3
BH-SB-22-0to2	8270E SIM	Acenaphthene	1.32	J	4.99	U	3
BH-SB-22-0to2	8270E SIM	Fluorene	3.52	J	4.99	U	3
BH-SB-22-2to4	8270E SIM	1-Methylnaphthalene	2.88	J	4.99	U	3
BH-SB-22-2to4	8270E SIM	Fluorene	1.10	J	4.99	U	3
BH-SB-22-4to6	8270E SIM	1-Methylnaphthalene	3.91	J	4.99	U	3
BH-SB-22-4to6	8270E SIM	Acenaphthene	2.10	J	4.99	U	3
BH-SB-22-4to6	8270E SIM	Fluorene	3.02	J	4.99	U	3
BH-SB-23-0to2	8270E SIM	1-Methylnaphthalene	4.69	J	5.00	U	3
BH-SB-23-2to4	8270E SIM	1-Methylnaphthalene	3.02	J	5.00	U	3
BH-SB-23-2to4	8270E SIM	Fluorene	4.09	J	5.00	U	3
BH-SC-04-1.3to3	8270E SIM	Acenaphthene	2.38	J	4.98	U	3
BH-SC-04-1.3to3	8270E SIM	Fluorene	3.89	J	4.98	U	3
BH-SC-07-4.2to6.2	8270E SIM	Acenaphthene	3.03	J	4.99	U	3
BH-SC-07-4.2to6.2	8270E SIM	Fluorene	4.10	J	4.99	U	3
BH-SC-14-0to1.3	8270E	Bis(2-ethylhexyl) phthalate	8.80	J	49.9	U	3
BH-SC-14-0to1.3	8270E SIM	Diethyl phthalate	8.90	J	19.9	U	3
BH-SC-14-1.3to2.6	8270E	Bis(2-ethylhexyl) phthalate	6.00	J	49.8	U	3
BH-SC-14-1.3to2.6	8270E SIM	Diethyl phthalate	13.1	J	19.9	U	3
BH-SC-14-1.3to2.6	8270E SIM	Acenaphthene	2.12	J	5.00	U	3
BH-SC-14-1.3to2.6	8270E SIM	Fluorene	2.23	J	5.00	U	3
BH-SC-20-0to1.5	8270E SIM	Diethyl phthalate	15.6	J	19.9	U	3
BH-SC-20-1.5to3	8270E SIM	Diethyl phthalate	17.2	J	20.0	U	3
BH-SC-20-3to5	8270E SIM	Diethyl phthalate	10.4	J	19.9	U	3
BH-SC-20-5to7	8270E SIM	Diethyl phthalate	16.4	J	19.9	U	3
BH-SC-20-7to9	8270E SIM	Diethyl phthalate	16.6	J	19.9	U	3
BH-SC-21-0to1.5	8270E SIM	Diethyl phthalate	14.9	J	20.0	U	3
BH-SC-21-1.5to3.7	8270E SIM	Diethyl phthalate	10.4	J	19.9	U	3
BH-SC-21-3.7to5.8	8270E SIM	Diethyl phthalate	7.50	J	20.00	U	3
BH-SC-21-3.7to5.8	8270E SIM	2-Methylnaphthalene	1.40	J	4.99	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-21-3.7to5.8	8270E SIM	Fluorene	1.12	J	4.99	U	3
BH-SC-21-5.8to8	8270E SIM	Diethyl phthalate	10.9	J	19.9	U	3
BH-SC-21-8to10	8270E SIM	Diethyl phthalate	12.4	J	20.0	U	3
BH-SC-21-8to10	8270E SIM	2-Methylnaphthalene	1.34	J	4.99	U	3
BH-SC-21-8to10	8270E SIM	Naphthalene	2.84	J	4.99	U	3
BH-SC-24-0to2	8270E SIM	Diethyl phthalate	19.5	J	20.0	U	3
BH-SC-24-2to3.8	8270E SIM	Diethyl phthalate	12.1	J	19.9	U	3
BH-SC-24-3.8to5.9	8270E SIM	Diethyl phthalate	13.7	J	19.9	U	3
BH-SC-24-3.8to5.9-D	8270E SIM	Diethyl phthalate	13.3	J	19.9	U	3
BH-SC-26-0to2	8270E	Bis(2-ethylhexyl) phthalate	7.80	J	49.9	U	3
BH-SC-26-0to2	8270E SIM	Diethyl phthalate	11.9	J	20.0	U	3
BH-SC-26-0to2	8270E SIM	Acenaphthene	2.97	J	5.00	U	3
BH-SC-26-0to2	8270E SIM	Fluorene	4.43	J	5.00	U	3
BH-SC-26-2to4	8270E SIM	Diethyl phthalate	18.7	J	19.9	U	3
BH-SC-26-2to4	8270E SIM	Phenol	4.80	J	5.00	U	3
BH-SC-26-2to4	8270E SIM	Pyrene	1.04	J	4.99	U	3
BH-SC-26-4to6	8270E SIM	Diethyl phthalate	16.0	J	20.0	U	3
BH-SC-26-4to6	8270E SIM	Phenol	3.90	J	5.00	U	3
BH-SC-26-4to6-D	8270E	Bis(2-ethylhexyl) phthalate	5.70	J	50.0	U	3
BH-SC-26-4to6-D	8270E SIM	Diethyl phthalate	17.5	J	20.0	U	3
BH-SC-26-4to6-D	8270E SIM	Phenol	3.50	J	5.00	U	3
BH-SC-26-4to6-D	8270E SIM	Pyrene	1.17	J	4.99	U	3
BH-SC-26-6to7.9	8270E SIM	Diethyl phthalate	10.6	J	20.0	U	3
BH-SC-26-6to7.9	8270E SIM	Phenol	4.40	J	5.00	U	3
BH-SC-27-0to1.7	8270E	Bis(2-ethylhexyl) phthalate	5.50	J	50.0	U	3
BH-SC-27-0to1.7	8270E SIM	Diethyl phthalate	8.50	J	20.0	U	3
BH-SC-27-1.7to3.7	8270E SIM	Diethyl phthalate	0.06	J	0.20	U	3
BH-SC-27-1.7to3.7	8270E SIM	Phenol	0.03	J	0.05	U	3
BH-SC-27-1.7to3.7	8270E SIM	Pyrene	1.01	J	4.99	U	3
BH-SC-27-3.7to5.2	8270E SIM	Diethyl phthalate	6.30	J	19.9	U	3
BH-SC-27-3.7to5.2	8270E SIM	Phenol	4.30	J	5.00	U	3
BH-SC-27-3.7to5.2	8270E SIM	Pyrene	0.83	J	5.00	U	3
BH-SC-27-5.2to6.7	8270E	Bis(2-ethylhexyl) phthalate	6.00	J	49.9	U	3
BH-SC-27-5.2to6.7	8270E SIM	Phenol	3.40	J	5.00	U	3
BH-SC-29-0to2	8270E SIM	Diethyl phthalate	4.90	J	20.0	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-29-0to2	8270E SIM	Acenaphthene	3.15	J	4.99	U	3
BH-SC-29-2to4	8270E SIM	Diethyl phthalate	5.70	J	20.0	U	3
BH-SC-29-2to4	8270E SIM	Phenol	4.60	J	5.00	U	3
BH-SC-29-2to4	8270E SIM	Pyrene	0.97	J	5.00	U	3
BH-SC-29-4to6	8270E SIM	Diethyl phthalate	6.20	J	20.0	U	3
BH-SC-29-4to6	8270E SIM	Phenol	5.00	J	5.00	U	3
BH-SC-29-6to7.9	8270E SIM	Diethyl phthalate	8.30	J	20.0	U	3
BH-SC-29-6to7.9	8270E SIM	Phenol	4.00	J	5.00	U	3
BH-SC-32-0to2	8270E SIM	Diethyl phthalate	11.3	J	20.0	U	3
BH-SC-32-2to4	8270E SIM	Diethyl phthalate	6.20	J	20.0	U	3
BH-SC-32-2to4	8270E SIM	Phenol	3.90	J	5.00	U	3
BH-SC-32-2to4-D	8270E SIM	Diethyl phthalate	6.40	J	19.9	U	3
BH-SC-32-4to5.5	8270E SIM	Diethyl phthalate	5.90	J	20.0	U	3
BH-SC-32-4to5.5	8270E SIM	Phenol	4.50	J	5.00	U	3
BH-SC-34-0to1.5	8270E SIM	Diethyl phthalate	49.3	J	71.4	U	3
BH-SC-34-1.5to3.3	8270E SIM	Diethyl phthalate	14.3	J	20.0	U	3
BH-SC-34-1.5to3.3-D	8270E SIM	Diethyl phthalate	15.4	J	20.0	U	3
BH-SC-34-3.3to4.8	8270E SIM	Diethyl phthalate	18.8	J	19.9	U	3
BH-SC-34-4.8to5.6	8270E SIM	Diethyl phthalate	19.0	J	19.9	U	3
BH-SC-34-4.8to5.6	8270E SIM	Naphthalene	1.58	J	4.99	U	3
BH-SC-37-0to2	8270E SIM	Diethyl phthalate	18.7	J	20.0	U	3
BH-SC-37-0to2	8270E SIM	Phenol	17.1	B	17.1	J+	3
BH-SC-37-2to4	8270E	Bis(2-ethylhexyl) phthalate	8.40	J	50.0	U	3
BH-SC-37-2to4	8270E SIM	Diethyl phthalate	15.6	J	20.0	U	3
BH-SC-37-2to4	8270E SIM	Phenol	7.70	B	7.70	U	3
BH-SC-37-4to6	8270E SIM	Diethyl phthalate	16.1	J	20.0	U	3
BH-SC-37-4to6	8270E SIM	Phenol	6.20	B	6.20	U	3
BH-SC-37-6to8	8270E SIM	Diethyl phthalate	9.00	J	20.0	U	3
BH-SC-37-6to8	8270E SIM	Phenol	5.90	B	5.90	U	3
BH-SC-38-0to1.8	8270E	Bis(2-ethylhexyl) phthalate	7.30	J	49.9	U	3
BH-SC-38-1.8to3.8	8270E SIM	Phenol	9.20	B	9.20	J+	3
BH-SC-38-3.8to5.8	8270E	Bis(2-ethylhexyl) phthalate	6.50	J	50.0	U	3
BH-SC-38-3.8to5.8	8270E SIM	Phenol	7.20	B	7.20	U	3
BH-SC-38-5.8to7.9	8270E SIM	Diethyl phthalate	12.5	J	19.9	U	3
BH-SC-40-0to2	8270E	Bis(2-ethylhexyl) phthalate	9.50	J	50.0	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-40-0to2	8270E SIM	Diethyl phthalate	12.3	J	20.0	U	3
BH-SC-40-2to4	8270E	Bis(2-ethylhexyl) phthalate	5.70	J	50.0	U	3
BH-SC-40-2to4	8270E SIM	Phenol	10.4	B	10.4	J+	3
BH-SC-40-4to6	8270E SIM	Diethyl phthalate	15.6	J	20.0	U	3
BH-SC-40-4to6	8270E SIM	Phenol	5.70	B	5.70	U	3
BH-SC-40-6to8	8270E	Bis(2-ethylhexyl) phthalate	5.90	J	50.0	U	3
BH-SC-40-6to8	8270E SIM	Diethyl phthalate	16.7	J	20.0	U	3
BH-SC-40-6to8	8270E SIM	Phenol	7.20	B	7.20	U	3
BH-SC-40-8to9	8270E	Bis(2-ethylhexyl) phthalate	9.10	J	50.0	U	3
BH-SC-40-8to9	8270E SIM	Diethyl phthalate	13.3	J	20.0	U	3
BH-SC-40-8to9	8270E SIM	Phenol	6.90	B	6.90	U	3
HA-03-0-12"	8270E SIM	1-Methylnaphthalene	0.46	J	5.01	U	3
HA-03-0-12"	8270E SIM	Acenaphthene	0.98	J	5.01	U	3
HA-03-12-24"	8270E SIM	1-Methylnaphthalene	0.71	J	4.99	U	3
HA-03-12-24"	8270E SIM	Acenaphthene	0.99	J	4.99	U	3
HA-04-0-12"	8270E SIM	Acenaphthene	4.80	J	4.99	U	3
HA-04-12-24"	8270E SIM	1-Methylnaphthalene	1.31	J	5.01	U	3
HA-04-12-24"	8270E SIM	Acenaphthene	1.05	J	5.01	U	3
HA-05-0-12"	8270E SIM	1-Methylnaphthalene	4.60	J	5.01	U	3
HA-05-0-12"	8270E SIM	Acenaphthene	4.22	J	5.01	U	3
HA-05-12-24"	8270E SIM	Acenaphthene	2.65	J	5.00	U	3
HA-06-12-24"	8270E SIM	1-Methylnaphthalene	1.05	J	5.01	U	3
HA-06-12-24"	8270E SIM	Acenaphthene	1.01	J	5.01	U	3
HA-07-0-12"	8270E SIM	1-Methylnaphthalene	2.92	J	4.99	U	3
HA-07-0-12"-D	8270E SIM	1-Methylnaphthalene	4.34	J	4.99	U	3
HA-08-0-12"	8270E	Diethyl phthalate	31.7	J	49.8	U	3
HA-08-0-12"	8270E SIM	1-Methylnaphthalene	2.57	J	4.99	U	3
HA-08-12-24"	8270E	Diethyl phthalate	30.2	J	49.9	U	3
HA-08-12-24"	8270E SIM	1-Methylnaphthalene	1.16	J	5.00	U	3
HA-09-0-12"	8270E	Diethyl phthalate	28.8	J	49.9	U	3
HA-09-0-12"	8270E SIM	1-Methylnaphthalene	3.07	J	4.99	U	3
HA-09-12-24"	8270E SIM	1-Methylnaphthalene	0.46	J	5.00	U	3
HA-10-12-24"	8270E	Diethyl phthalate	22.0	J	49.7	U	3
HA-11-0-12"	8270E	Diethyl phthalate	19.6	J	49.8	U	3
HA-11-12-24"	8270E	Diethyl phthalate	22.3	J	49.8	U	3
HA-12-0-12"	8270E SIM	1-Methylnaphthalene	0.49	J	5.00	U	3
HA-12-0-12"	8270E SIM	Acenaphthene	0.80	J	5.00	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
HA-12-12-24"	8270E SIM	1-Methylnaphthalene	0.87	J	4.98	U	3
HA-12-12-24"	8270E SIM	Acenaphthene	1.44	J	4.98	U	3
HA-12-12-24"-D	8270E	Diethyl phthalate	21.5	J	49.8	U	3
HA-12-12-24"-D	8270E SIM	1-Methylnaphthalene	0.59	J	5.00	U	3
HA-13-0-12"	8270E	Diethyl phthalate	25.5	J	50.0	U	3
HA-13-12-24"	8270E	Diethyl phthalate	21.7	J	49.9	U	3
HA-14-0-12"	8270E	Diethyl phthalate	21.0	J	50.0	U	3
HA-14-0-12"	8270E SIM	1-Methylnaphthalene	1.87	J	5.00	U	3
HA-15-0-12"	8270E	Diethyl phthalate	45.7	J	49.8	U	3
HA-15-12-24"	8270E	Diethyl phthalate	28.3	J	49.9	U	3
HA-16-0-12"	8270E SIM	1-Methylnaphthalene	0.84	J	5.00	U	3
HA-16-0-12"	8270E SIM	Acenaphthene	0.81	J	5.00	U	3
SG-01-0to10	8270E	Bis(2-ethylhexyl) phthalate	14.3	J	49.6	U	3
SG-01-0to10	8270E SIM	Acenaphthene	0.58	J	5.00	U	3
SG-04-0to10	8270E SIM	Diethyl phthalate	11.5	J	20.0	U	3
SG-06-0to10	8270E	Bis(2-ethylhexyl) phthalate	18.7	J	49.8	U	3
SG-09-0to10	8270E	Bis(2-ethylhexyl) phthalate	6.90	J	50.0	U	3
SG-09-0to10	8270E SIM	Acenaphthene	1.38	J	4.99	U	3
SG-09-0to10	8270E SIM	Diethyl phthalate	16.7	J	20.0	U	3
SG-10-0to10	8270E	Bis(2-ethylhexyl) phthalate	6.90	J	49.4	U	3
SG-10-0to10	8270E SIM	Diethyl phthalate	15.6	J	19.7	U	3
SG-11-0to10	8270E	Bis(2-ethylhexyl) phthalate	6.20	J	49.6	U	3
SG-11-0to10	8270E SIM	Diethyl phthalate	15.8	J	19.8	U	3
SG-13-0to10	8270E SIM	Diethyl phthalate	18.1	J	19.9	U	3
SG-18-0to10	8270E SIM	Diethyl phthalate	15.5	J	20.0	U	3
SG-19-0to10	8270E SIM	Acenaphthene	2.92	J	4.98	U	3
SG-22-0to10	8270E SIM	Diethyl phthalate	12.4	J	20.0	U	3
SG-22-0to10-D	8270E SIM	Diethyl phthalate	18.9	J	20.0	U	3
SG-23-0to10	8270E SIM	Diethyl phthalate	13.9	J	20.0	U	3
SG-25-0to10	8270E SIM	Diethyl phthalate	11.2	J	19.9	U	3
SG-25-0to10	8270E SIM	Phenol	4.70	J	5.00	U	3
SG-25-0to10	8270E SIM	Acenaphthene	2.16	J	4.98	U	3
SG-25-0to10	8270E SIM	Fluorene	3.94	J	4.98	U	3
SG-26-0to10	8270E SIM	Acenaphthene	4.77	J	5.00	U	3
SG-27-0to10	8270E SIM	Diethyl phthalate	13.0	J	20.0	U	3

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
SG-28-0to10	8270E SIM	Diethyl phthalate	10.3	J	20.0	U	3
SG-30-0to10	8270E SIM	Diethyl phthalate	16.0	J	20.0	U	3
SG-31-0to10	8270E SIM	Diethyl phthalate	15.4	J	20.0	U	3
SG-33-0to10	8270E SIM	Diethyl phthalate	12.4	J	20.3	U	3
SG-35-0to10	8270E	Bis(2-ethylhexyl) phthalate	13.0	J	50.0	U	3
SG-35-0to10	8270E SIM	Diethyl phthalate	18.5	J	20.0	U	3
SG-36-0to10	8270E SIM	Diethyl phthalate	16.4	J	20.0	U	3
SG-37-0to10	8270E SIM	Diethyl phthalate	7.50	J	19.9	U	3
SG-37-0to10	8270E SIM	Acenaphthene	4.58	J	4.91	U	3
SG-37-0to10-D	8270E SIM	Diethyl phthalate	14.3	J	20.0	U	3
SG-37-0to10-D	8270E SIM	Acenaphthene	4.85	J	4.99	U	3
SG-39-0to10	8270E	Bis(2-ethylhexyl) phthalate	26.2	J	50.0	U	3
SG-39-0to10	8270E SIM	Diethyl phthalate	19.0	J	20.0	U	3
SG-41-0to10	8270E SIM	Diethyl phthalate	19.7	Q, J	20.0	U	3
SG-42-0to10	8270E SIM	Acenaphthene	4.83	J	4.99	U	3

B-laboratory flag indicating analyte was detected in the method blank
D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating an estimated concentration value detected below the reporting limit
Q-laboratory flag indicating a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria
SIM-selected ion monitoring
µg/kg-microgram per kilogram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.4 Matrix Spike/Matrix Spike Duplicate

Twelve sample set specific USEPA 8270E MS/MSD pairs were reported using samples BH-SB-17-2to4, BH-SB-18-0to2, BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, BH-SC-40-0to2, HA-01-0-12", HA-15-0-12", SG-03-0to10, SG-15-0to10-D, and SG-18-0to10. Twelve sample specific USEPA 8270E SIM MS/MSD pairs were reported using samples BH-SB-17-2to4, BH-SB-18-0to2, BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, BH-SC-40-0to2, HA-01-0-12", HA-15-0-12", SG-03-0to10, SG-15-0to10-D, and SG-18-0to10. One MS using sample SG-35-0to10 was reported for USEPA 8270E and USEPA 8270E SIM. Due to laboratory error, the MSD using sample SG-35-0to10 was not reported. The recovery and relative percent difference (RPD) results were within laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recoveries of benzoic acid were low (<20%) and outside of acceptance criteria for USEPA 8270E and USEPA 8270E SIM MSs using sample SG-35-0to10. Therefore, based on

professional and technical judgement, the non-detect USEPA 8270E benzoic acid result in sample SG-35-0to10 was R qualified as rejected. Additionally, the USEPA 8270E SIM benzoic acid result in sample SG-35-0to10 was J qualified as estimated.

The recoveries of multiple analytes were low and outside of the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample SG-35-0to10. Since the fluoranthene and pyrene results were flagged with E to indicate the analyte concentrations exceeded the upper limits of the calibration range, based on professional and technical judgement, the recovery limits were not applicable, and no qualifications were applied to the data. However, the remaining affected USEPA 8270E SIM target analytes in sample SG-35-0to10 were J qualified as estimated.

Additionally, the recoveries of multiple target analytes were low and outside of the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample SG-15-0to10-D. Therefore, the affected USEPA 8270E SIM target analyte results in sample SG-15-0to10-D were J qualified as estimated.

21H0340: The recoveries of benzoic acid were low (<20%) for USEPA 8270E and USEPA 8270E SIM MS/MSD pairs using sample SG-18-0to10. Therefore, based on professional and technical judgement, the non-detect USEPA 8270E benzoic acid result in sample SG-18-0to10 was R qualified as rejected. Additionally, the USEPA 8270E SIM benzoic acid result in sample SG-18-0to10 was J qualified as estimated.
The recoveries of multiple target analytes were low and outside of the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample SG-18-0to10. Therefore, the affected USEPA 8270E SIM target analytes in sample SG-18-0to10 were J qualified as estimated.

21H0357: The RPDs of 2,4-dinitrophenol were high and outside of the laboratory specified criteria for USEPA 8270E MS/MSD pairs using samples HA-01-0-12" and HA-15-0-12". Since 2,4-dinitrophenol was not detected in samples HA-01-0-12" and HA-15-0-12", no qualifications were applied to the data.

21H0371: The recoveries of multiple target analytes were high and outside of the laboratory specified criteria for USEPA 8270E MS/MSD pair using sample SG-03-0to10. Since diethyl phthalate was flagged with E indicating the analyte concentration exceeds the upper limit of the calibration range and based on professional and technical judgement, the MS/MSD recovery results were considered not applicable, and no qualifications were applied to the data. Additionally, since the remaining affected target analytes were not detected in sample SG-03-0to10, no qualifications were applied to the data.

The recoveries of fluoranthene and pyrene were low and outside of the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample SG-03-0to10. Therefore, the fluoranthene and pyrene results in sample SG-03-0to10 were J qualified as estimated.

The recoveries of 1,4-dichlorobenzene, benzyl alcohol, and n-nitrosodiphenylamine were high and outside of the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample

SG-03-0to10. Since n-nitrosodiphenylamine was not detected in sample SG-03-0to10, no qualifications were applied to the data. However, the 1,4-dichlorobenzene and benzyl alcohol results in sample SG-03-0to10 were J qualified as estimated.

21I0190: The recovery of benzoic acid was low (<20%) for USEPA 8270E MSD using sample BH-SC-20-3to5. Therefore, based on professional and technical judgement, the non-detect benzoic acid result in sample BH-SC-20-3to5 was R qualified as rejected.

The recovery of di-n-butyl phthalate was high and outside of the laboratory specified criteria for USEPA 8270E MS using sample BH-SC-20-3to5. Therefore, the di-n-butyl phthalate result in sample BH-SC-20-3to5 was J qualified as estimated.

The recovery of chrysene was high and outside of the laboratory specified criteria for USEPA 8270E SIM MSD using sample BH-SC-40-0to2. Therefore, the chrysene result in sample BH-SC-40-0to2 was J qualified as estimated.

The recovery of benzoic acid was low (<20%) and RPD high and outside of the laboratory specified criteria for USEPA 8270E SIM MSD using sample BH-SC-20-3to5. Therefore, based on professional and technical judgement, the non-detect benzoic acid result in sample BH-SC-20-3to5 was R qualified as rejected.

The recovery of dibenzo(a,h)anthracene was high and outside of the laboratory specified criteria for USEPA 8270E SIM MS using sample BH-SC-20-3to5. Since dibenzo(a,h)anthracene was not detected in sample BH-SC-20-3to5, no qualifications were applied to the data.

21I0192: The recoveries of 2,4-dinitrophenol and pentachlorophenol were high and outside of the laboratory specified criteria for USEPA 8270E MS/MSD pair using sample BH-SB-18-0to2. Since 2,4-dinitrophenol and pentachlorophenol were not detected in sample BH-SB-18-0to2, no qualifications were applied to the data.

21H0246: The recoveries of benzoic acid were low (<10%) for USEPA 8270E and USEPA 8270E SIM MS/MSD pairs using sample BH-SC-26-0to2. Therefore, based on professional and technical judgement, the non-detect USEPA 8270E and USEPA 8270E SIM benzoic acid results in sample BH-SC-26-0to2 were R qualified as rejected.

The recovery of n-nitrosodiphenylamine was low and outside of the laboratory specified criteria for USEPA 8270E SIM MS using sample BH-SC-26-0to2. Therefore, the non-detect n-nitrosodiphenylamine result in sample BH-SC-26-0to2 was UJ qualified as estimated less than the MDL.

21I0301: The recoveries of benzoic acid were low (<20%) for USEPA 8270E MS/MSD pair using sample BH-SC-34-0to1.5. Therefore, based on professional and technical judgement, the non-detect benzoic acid result in sample BH-SC-34-0to1.5 was R qualified as rejected.

The recoveries of benzoic acid were low (<20%) for USEPA 8270E SIM MS/MSD pair using sample BH-SC-34-0to1.5. Therefore, the estimated benzoic acid result in sample BH-SC-34-0to1.5 was J qualified as estimated.

The recoveries and RPDs of multiple target analytes were high and outside of the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample BH-SC-34-0to1.5. Since the affected target analytes were flagged with E indicating the analyte concentration exceeded the upper limit of the calibration range and based on professional and technical judgement, the MS/MSD recovery results were considered not applicable, and no qualifications were applied to the data. However, the acenaphthylene and dibenzo(a,h)anthracene results in sample BH-SC-34-0to1.5 were J qualified as estimated.

21I0325: The recoveries of pentachlorophenol were high and outside of the laboratory specified criteria for USEPA 8270E MS/MSD pair using sample BH-SC-07-0to2.5. Since pentachlorophenol was not detected in sample BH-SC-07-0to2.5, no qualifications were applied to the data.

The recoveries of fluoranthene, naphthalene, phenanthrene, and pyrene were outside the laboratory specified criteria for USEPA 8270E SIM MS/MSD pair using sample BH-SC-07-0to2.5. Based on the difference between the spiked and sample concentration and professional and technical judgment, the recovery limits were not applicable for naphthalene. Therefore, no qualifications were applied to the naphthalene data based on the MS/MSD recovery results. However, the fluoranthene, phenanthrene, and pyrene results in sample BH-SC-07-0to2.5 were J qualified as estimated.

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-07-0to2.5	8270E SIM	Fluoranthene	457	NA	457	J	4
BH-SC-07-0to2.5	8270E SIM	Phenanthrene	661	D	661	J	4
BH-SC-07-0to2.5	8270E SIM	Pyrene	542	D	542	J	4
BH-SC-20-3to5	8270E	Di-n-butyl phthalate	43.0	NA	43.0	J	4
BH-SC-20-3to5	8270E	Benzoic acid	38.9	U	38.9	R	4
BH-SC-20-3to5	8270E SIM	Benzoic acid	13.4	U	13.4	R	4
BH-SC-26-0to2	8270E	Benzoic acid	39.0	U	39.0	R	4
BH-SC-26-0to2	8270E SIM	Benzoic acid	13.4	U	13.4	R	4
BH-SC-26-0to2	8270E SIM	n-Nitrosodiphenylamine	1.30	U	1.30	UJ	4
BH-SC-34-0to1.5	8270E	Benzoic acid	714	U	714	R	4
BH-SC-34-0to1.5	8270E SIM	Benzoic acid	73.7	J	73.7	J	4
BH-SC-34-0to1.5	8270E SIM	Acenaphthylene	156	NA	156	J	4
BH-SC-34-0to1.5	8270E SIM	Dibenzo(a,h)anthracene	268	NA	268	J	4
BH-SC-40-0to2	8270E SIM	Chrysene	55.5	NA	55.5	J	4
SG-03-0to10	8270E SIM	1,4-Dichlorobenzene	5.60	NA	5.60	J	4

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
SG-03-0to10	8270E SIM	Benzyl alcohol	14.0	J	14.0	J	4
SG-03-0to10	8270E SIM	Fluoranthene	172	NA	172	J	4
SG-03-0to10	8270E SIM	Pyrene	203	NA	203	J	4
SG-15-0to10-D	8270E SIM	Acenaphthene	60.3	NA	60.3	J	4
SG-15-0to10-D	8270E SIM	Anthracene	83.4	NA	83.4	J	4
SG-15-0to10-D	8270E SIM	Benz(a)anthracene	113	NA	113	J	4
SG-15-0to10-D	8270E SIM	Benzo(a)pyrene	128	NA	128	J	4
SG-15-0to10-D	8270E SIM	Benzo(b)fluoranthene	82.1	NA	82.1	J	4
SG-15-0to10-D	8270E SIM	Benzo(g,h,i)perylene	87.7	NA	87.7	J	4
SG-15-0to10-D	8270E SIM	Benzo(j)fluoranthene	47.7	NA	47.7	J	4
SG-15-0to10-D	8270E SIM	Chrysene	145	NA	145	J	4
SG-15-0to10-D	8270E SIM	Dibenzo(a,h)anthracene	22.4	NA	22.4	J	4
SG-15-0to10-D	8270E SIM	Fluoranthene	305	NA	305	J	4
SG-15-0to10-D	8270E SIM	Fluorene	45.0	NA	45.0	J	4
SG-15-0to10-D	8270E SIM	Indeno(1,2,3-cd)pyrene	73.9	NA	73.9	J	4
SG-15-0to10-D	8270E SIM	Pyrene	349	NA	349	J	4
SG-15-0to10-D	8270E SIM	Phenanthrene	429	NA	429	J	4
SG-15-0to10-D	8270E SIM	Total (b+k+j) benzofluoranthenes	166	NA	166	J	4
SG-18-0to10	8270E	Benzoic acid	39.0	U	39.0	R	4
SG-18-0to10	8270E SIM	Benzoic acid	110	Q	110	J	4
SG-18-0to10	8270E SIM	Benzo(b)fluoranthene	78.2	NA	78.2	J	4
SG-18-0to10	8270E SIM	Chrysene	119	NA	119	J	4
SG-18-0to10	8270E SIM	Fluoranthene	224	NA	224	J	4
SG-18-0to10	8270E SIM	Indeno(1,2,3-cd)pyrene	66.1	NA	66.1	J	4
SG-18-0to10	8270E SIM	Phenanthrene	170	NA	170	J	4
SG-18-0to10	8270E SIM	Pyrene	260	NA	260	J	4
SG-35-0to10	8270E	Benzoic acid	39.0	U	39.0	R	4
SG-35-0to10	8270E SIM	Acenaphthene	42.1	NA	42.1	J	4
SG-35-0to10	8270E SIM	Anthracene	99.8	NA	99.8	J	4
SG-35-0to10	8270E SIM	Benz(a)anthracene	174	NA	174	J	4
SG-35-0to10	8270E SIM	Benzo(a)pyrene	191	NA	191	J	4
SG-35-0to10	8270E SIM	Benzo(b)fluoranthene	150	NA	150	J	4
SG-35-0to10	8270E SIM	Benzo(g,h,i)perylene	120	NA	120	J	4
SG-35-0to10	8270E SIM	Benzo(j)fluoranthene	70.4	NA	70.4	J	4
SG-35-0to10	8270E SIM	Benzoic acid	16.2	J	16.2	J	4
SG-35-0to10	8270E SIM	Chrysene	208	NA	208	J	4
SG-35-0to10	8270E SIM	Dibenzo(a,h)anthracene	39.6	NA	39.6	J	4
SG-35-0to10	8270E SIM	Fluorene	49.9	NA	49.9	J	4

Sample ID	Method	Compound	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
SG-35-0to10	8270E SIM	Indeno(1,2,3-cd)pyrene	121	NA	121	J	4
SG-35-0to10	8270E SIM	Naphthalene	97.8	NA	97.8	J	4
SG-35-0to10	8270E SIM	Phenanthrene	365	NA	365	J	4
SG-35-0to10	8270E SIM	Total (b+k+j) benzofluoranthenes	277	NA	277	J	4

D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating an estimated concentration value detected below the reporting limit
NA-not applicable
Q-laboratory flag indicating a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria
SIM-selected ion monitoring
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
µg/kg-microgram per kilogram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Thirteen LCS/LCSD pairs and two LCSs were reported for USEPA 8270E. Twenty-one LCS/LCSD pairs and one LCS were reported for USEPA 8270E SIM. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recoveries of benzoic acid, butyl benzyl phthalate, diethyl phthalate and the benzoic acid RPD in the USEPA 8270E LCS/LCSD pair were high and outside of the laboratory specified acceptance criteria in batch BJI0024. Therefore, based on professional and technical judgement, the benzoic acid and diethyl phthalate concentrations in the associated samples were J qualified as estimated.

21H0340: The recoveries of pentachlorophenol in the USEPA 8270E LCS/LCSD pair were high and outside of the laboratory specified acceptance criteria in batch BJI0077. Therefore, based on professional and technical judgement, the estimated pentachlorophenol result in sample SG-22-0to10-D was J qualified as estimated.

The recovery of n-nitrosodiphenylamine in the USEPA 8270E LCSD was low and outside of the laboratory specified acceptance criteria in batch BJI0077. Therefore, based on professional and technical judgement, the non-detect n-nitrosodiphenylamine results in the associated samples were UJ qualified as estimated less than the MDLs.

The 2,4-dimethylphenol RPD in the USEPA 8270E LCS/LCSD pair was high and outside of the laboratory specified acceptance criteria in batch BJI0077. Therefore, based on professional and

technical judgement, the estimated 2,4-dimethylphenol results in samples SG-18-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, and SG-33-0to10 were J qualified as estimated.

The 2,4-dimethylphenol RPD in the USEPA 8270E SIM LCS/LCSD pair was high and outside of the laboratory specified acceptance criteria in batch BJI0077. Therefore, based on professional and technical judgement, the estimated 2,4-dimethylphenol results in samples SG-18-0to10, SG-22-0to10, SG-22-0to10-D, and SG-33-0to10 were J qualified as estimated.

21H0343: The recovery of di-n-octylphthalate in the USEPA 8270E LCS was high and outside of the laboratory specified acceptance criteria in batch BJH0778. Since di-n-octylphthalate was not detected in the associated samples, no qualifications were applied to the data.

21H0357: The recovery of di-n-octylphthalate in the USEPA 8270E LCS was high and outside of the laboratory specified acceptance criteria in batch BJH0778. Since di-n-octylphthalate was not detected in the associated samples, no qualifications were applied to the data.

The recovery of butyl benzyl phthalate was high and outside of the laboratory specified acceptance criteria in the USEPA 8270E LCSD in batch BJI0101. Since butyl benzyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

21H0371: The recoveries of di-n-butyl phthalate in the USEPA 8270E LCS were high and outside of the laboratory specified acceptance criteria in batch BJI0281. Since di-n-butyl phthalate was not detected in the associated samples, no qualifications were applied to the data.
21I0190: The recoveries of 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and hexachlorobutadiene in the USEPA 8270E LCS were low and outside of the laboratory specified acceptance criteria in batch BJI0471. Therefore, based on professional and technical judgement, the non-detect 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and hexachlorobutadiene results in samples BH-SC-EB-CC and BH-SC-EB-CP were UJ qualified as estimated less than the MDLs.

Additionally, the RPDs for multiple target analytes were high and outside of the laboratory specified acceptance criteria in the USEPA 8270E LCS/LCSD pair in batch BJI0471. Since the affected target analytes were not detected in the associated samples, no qualifications were applied to the data.

The RPD for 2,4-dimethylphenol was high and outside of the laboratory specified acceptance criteria in the USEPA 8270E LCS/LCSD pair in batch BJI0561. Since 2,4-dimethylphenol was not detected in the associated samples, no qualifications were applied to the data.
The RPD for 2,4-dimethylphenol was high and outside of the laboratory specified acceptance criteria in the USEPA 8270E SIM LCS/LCSD pair in batch BJI0561. Therefore, based on professional and technical judgement, the estimated 2,4-dimethylphenol result in sample BH-SC-38-0to1.8 was J qualified as estimated.

21I0192: The RPD for 2,4-dimethylphenol was high and outside of the laboratory specified acceptance criteria in the USEPA 8270E LCS/LCSD pair in batch BJI0565. Since 2,4-dimethylphenol was not detected in the associated samples, no qualifications were applied to the data.
The recoveries of benzo(k)fluoranthene and dibenzo(a,h)anthracene were high and outside of the laboratory specified acceptance criteria in the USEPA 8270E SIM LCS/LCSD pair in batch BJI0564. Therefore, based on professional and technical judgement, the benzo(k)fluoranthene and dibenzo(a,h)anthracene concentrations in the associated samples were J qualified as estimated.

21I0214: The recoveries of di-n-octyl phthalate in the USEPA 8270E LCS/LCSD pair were high and outsidefof the laboratory specified acceptance criteria in batch BJI0524. Since di-n-octyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

21I0225: The recoveries of di-n-octyl phthalate in the USEPA 8270E LCS/LCSD pair were high and outside of the laboratory specified acceptance criteria in batch BJI0524. Since di-n-octyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

21I0246: The recovery of n-nitrosodiphenylamine in the USEPA 8270E LCS was low and outside of the laboratory specified acceptance criteria in batch BJI0673. Therefore, based on professional and technical judgement, the non-detect n-nitrosodiphenylamine results in the associated samples were UJ qualified as estimated less than the MDLs and the estimated n-nitrosodiphenylamine result in sample BH-SC-12-0to1.4 was J qualified as estimated.

21I0278: The recoveries of benzo(k)fluoranthene and dibenzo(a,h)anthracene were high and outside of the laboratory specified acceptance criteria in the USEPA 8270E SIM LCSD in batch BJI0785. Therefore, based on professional and technical judgement, the benzo(k)fluoranthene and dibenzo(a,h)anthracene concentrations in the associated samples were J qualified as estimated.

21I0301: The benzoic acid RPD in the USEPA 8270E LCS/LCSD pair in batch BJI0790 was high and outside of the laboratory specified acceptance criteria. Since benzoic acid was not detected in the associated samples, no qualifications were applied to the data.

The benzoic acid RPD in the USEPA 8270E SIM LCS/LCSD pair in batch BJI0790 was high and outside of the laboratory specified acceptance criteria. Therefore, based on professional and technical judgement, the estimated benzoic acid results in the associated samples were J qualified as estimated.

The recovery of dibenzo(a,h)anthracene in the USEPA 8270E SIM LCSD was high and outside the laboratory specified acceptance criteria in batch BJI0792. Therefore, based on professional and technical judgement, the dibenzo(a,h)anthracene concentrations in samples BH-SC-21-0to1.5, BH-SC-21-1.5to3.7, BH-SC-34-0to1.5, BH-SC-34-1.5to3.3, and BH-SC-34-1.5to3.3-D were J qualified as estimated.

21I0325: The recovery of n-nitrosodiphenylamine in the USEPA 8270E LCSD was low and outside of the laboratory specified acceptance criteria in batch BJJ0040. Therefore, based on professional and technical judgement, the non-detect n-nitrosodiphenylamine results in the associated samples were UJ qualified as estimated less than the MDLs.

L2148255: It was noted that benzo(e)pyrene, biphenyl, dibenzofuran, dibenzothiophene, and perylene were not spiked into the LCS/LCSD pair in batch WG1556147. Based on professional and technical judgment, the non-detect benzo(e)pyrene, biphenyl, dibenzofuran, dibenzothiophene, C1-dibenzothiophenes, C2-dibenzothiophenes, C3-dibenzothiophenes, C4-dibenzothiophenes, and perylene results in samples BH-PS-01-COMP, BH-PS-02-COMP, BH-PS-03-COMP, BH-PS-04-COMP, BH-PS-02-COMP-DUP, andBH-PS-05-COMP were UJ qualified as estimated less than the RLs and the concentrations of C2-dibenzothiophenes, C3-dibenzothiophenes, and C4-dibenzothiophenes results were J qualified as estimated.

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-PS-01-COMP	8270D SIM	Benzo(e)pyrene	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	Biphenyl	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	C1-Dibenzothiophenes	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	C2-Dibenzothiophenes	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	C3-Dibenzothiophenes	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	C4-Dibenzothiophenes	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	Dibenzofuran	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	Dibenzothiophene	0.011	mg/kg	U	0.011	UJ	5
BH-PS-01-COMP	8270D SIM	Perylene	0.011	mg/kg	U	0.011	UJ	5
BH-PS-02-COMP	8270D SIM	Benzo(e)pyrene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP	8270D SIM	Biphenyl	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP	8270D SIM	C1-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP	8270D SIM	C2-Dibenzothiophenes	0.013	mg/kg	NA	0.013	J	5
BH-PS-02-COMP	8270D SIM	C3-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP	8270D SIM	C4-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP	8270D SIM	Dibenzofuran	0.012	mg/kg	U	0.012	UJ	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-PS-02-COMP	8270D SIM	Dibenzothiophene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP	8270D SIM	Perylene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-02-COMP-DUP	8270D SIM	Benzo(e)pyrene	0.011	mg/kg	U	0.011	UJ	5
BH-PS-02-COMP-DUP	8270D SIM	Biphenyl	0.011	mg/kg	U	0.011	UJ	5
BH-PS-02-COMP-DUP	8270D SIM	C1-Dibenzothiophenes	0.011	mg/kg	U	0.011	UJ	5
BH-PS-02-COMP-DUP	8270D SIM	C2-Dibenzothiophenes	0.016	mg/kg	NA	0.016	J	5
BH-PS-02-COMP-DUP	8270D SIM	C3-Dibenzothiophenes	0.016	mg/kg	NA	0.016	J	5
BH-PS-02-COMP-DUP	8270D SIM	C4-Dibenzothiophenes	0.095	mg/kg	NA	0.095	J	5
BH-PS-02-COMP-DUP	8270D SIM	Dibenzofuran	0.011	mg/kg	U	0.011	UJ	5
BH-PS-02-COMP-DUP	8270D SIM	Dibenzothiophene	0.011	mg/kg	U	0.011	UJ	5
BH-PS-02-COMP-DUP	8270D SIM	Perylene	0.011	mg/kg	U	0.011	UJ	5
BH-PS-03-COMP	8270D SIM	Benzo(e)pyrene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	Biphenyl	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	C1-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	C2-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	C3-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	C4-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	Dibenzofuran	0.012	mg/kg	U	0.012	UJ	5
BH-PS-03-COMP	8270D SIM	Dibenzothiophene	0.012	mg/kg	U	0.012	UJ	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-PS-03-COMP	8270D SIM	Perylene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	Benzo(e)pyrene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	Biphenyl	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	C1-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	C2-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	C3-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	C4-Dibenzothiophenes	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	Dibenzofuran	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	Dibenzothiophene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-04-COMP	8270D SIM	Perylene	0.012	mg/kg	U	0.012	UJ	5
BH-PS-05-COMP	8270D SIM	Benzo(e)pyrene	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	Biphenyl	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	C1-Dibenzothiophenes	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	C2-Dibenzothiophenes	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	C3-Dibenzothiophenes	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	C4-Dibenzothiophenes	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	Dibenzofuran	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	Dibenzothiophene	0.028	mg/kg	U	0.028	UJ	5
BH-PS-05-COMP	8270D SIM	Perylene	0.028	mg/kg	U	0.028	UJ	5
BH-SB-17-0to2	8270E SIM	Benzo(k)fluoranthene	63.0	µg/kg	NA	63.0	J	5
BH-SB-17-0to2	8270E SIM	Dibenzo(a,h)anthracene	60.6	µg/kg	NA	60.6	J	5
BH-SB-17-0to2-D	8270E SIM	Benzo(k)fluoranthene	54.4	µg/kg	NA	54.4	J	5
BH-SB-17-0to2-D	8270E SIM	Dibenzo(a,h)anthracene	50.2	µg/kg	NA	50.2	J	5
BH-SB-17-2to4	8270E SIM	Benzo(k)fluoranthene	15.9	µg/kg	J	15.9	J	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SB-17-2to4	8270E SIM	Dibenzo(a,h)anthracene	15.2	µg/kg	J	15.2	J	5
BH-SB-17-4to6	8270E SIM	Benzo(k)fluoranthene	19.7	µg/kg	J	19.7	J	5
BH-SB-17-4to6	8270E SIM	Dibenzo(a,h)anthracene	16.7	µg/kg	J	16.7	J	5
BH-SB-18-0to2	8270E SIM	Benzo(k)fluoranthene	4.92	µg/kg	J	4.92	J	5
BH-SB-18-0to2	8270E SIM	Dibenzo(a,h)anthracene	3.28	µg/kg	J	3.28	J	5
BH-SB-18-2to4	8270E SIM	Benzo(k)fluoranthene	102	µg/kg	NA	102	J	5
BH-SB-18-2to4	8270E SIM	Dibenzo(a,h)anthracene	61.2	µg/kg	NA	61.2	J	5
BH-SB-19-0to2	8270E SIM	Benzo(k)fluoranthene	689	µg/kg	D	689	J	5
BH-SB-19-0to2	8270E SIM	Dibenzo(a,h)anthracene	272	µg/kg	D	272	J	5
BH-SB-19-2to6	8270E SIM	Benzo(k)fluoranthene	96.8	µg/kg	NA	96.8	J	5
BH-SB-19-2to6	8270E SIM	Dibenzo(a,h)anthracene	73.6	µg/kg	NA	73.6	J	5
BH-SB-19-2to6-Dup	8270E SIM	Benzo(k)fluoranthene	61.1	µg/kg	NA	61.1	J	5
BH-SB-19-2to6-Dup	8270E SIM	Dibenzo(a,h)anthracene	61.5	µg/kg	NA	61.5	J	5
BH-SB-20-0to3	8270E SIM	Benzo(k)fluoranthene	77.3	µg/kg	NA	77.3	J	5
BH-SB-20-0to3	8270E SIM	Dibenzo(a,h)anthracene	34.7	µg/kg	NA	34.7	J	5
BH-SB-20-3to5	8270E SIM	Benzo(k)fluoranthene	13.1	µg/kg	J	13.1	J	5
BH-SB-20-3to5	8270E SIM	Dibenzo(a,h)anthracene	10.2	µg/kg	J	10.2	J	5
BH-SB-21-0to2	8270E SIM	Benzo(k)fluoranthene	6590	µg/kg	D	6590	J	5
BH-SB-21-0to2	8270E SIM	Dibenzo(a,h)anthracene	1690	µg/kg	D	1690	J	5
BH-SB-21-2to4	8270E SIM	Benzo(k)fluoranthene	64.3	µg/kg	D	64.3	J	5
BH-SB-21-2to4	8270E SIM	Dibenzo(a,h)anthracene	35.8	µg/kg	D	35.8	J	5
BH-SB-21-4to6	8270E SIM	Benzo(k)fluoranthene	33.9	µg/kg	NA	33.9	J	5
BH-SB-21-4to6	8270E SIM	Dibenzo(a,h)anthracene	20.1	µg/kg	NA	20.1	J	5
BH-SB-22-0to2	8270E SIM	Benzo(k)fluoranthene	86.9	µg/kg	NA	86.9	J	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SB-22-0to2	8270E SIM	Dibenzo(a,h)anthracene	64.8	µg/kg	NA	64.8	J	5
BH-SB-22-2to4	8270E SIM	Benzo(k)fluoranthene	165	µg/kg	NA	165	J	5
BH-SB-22-2to4	8270E SIM	Dibenzo(a,h)anthracene	149	µg/kg	NA	149	J	5
BH-SB-22-4to6	8270E SIM	Benzo(k)fluoranthene	72.9	µg/kg	NA	72.9	J	5
BH-SB-22-4to6	8270E SIM	Dibenzo(a,h)anthracene	62.5	µg/kg	NA	62.5	J	5
BH-SB-22-6to10	8270E SIM	Benzo(k)fluoranthene	3760	µg/kg	D	3760	J	5
BH-SB-22-6to10	8270E SIM	Dibenzo(a,h)anthracene	1540	µg/kg	NA	1540	J	5
BH-SB-22-6to10-D	8270E SIM	Benzo(k)fluoranthene	2100	µg/kg	D	2100	J	5
BH-SB-22-6to10-D	8270E SIM	Dibenzo(a,h)anthracene	1140	µg/kg	NA	1140	J	5
BH-SB-23-0to2	8270E SIM	Benzo(k)fluoranthene	122	µg/kg	NA	122	J	5
BH-SB-23-0to2	8270E SIM	Dibenzo(a,h)anthracene	55.7	µg/kg	NA	55.7	J	5
BH-SB-23-2to4	8270E SIM	Benzo(k)fluoranthene	42.5	µg/kg	NA	42.5	J	5
BH-SB-23-2to4	8270E SIM	Dibenzo(a,h)anthracene	30.8	µg/kg	NA	30.8	J	5
BH-SB-23-4to6	8270E SIM	Benzo(k)fluoranthene	107	µg/kg	NA	107	J	5
BH-SB-23-4to6	8270E SIM	Dibenzo(a,h)anthracene	45.3	µg/kg	NA	45.3	J	5
BH-SC-03-0to1	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-03-1to3	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-03-3to5	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-03-5to7	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-03-7to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-04-0to1.3	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-04-1.3to3	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-04-3to4.2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-05-0to1.6	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-05-1.6to3.2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-05-1.6to3.2-D	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-05-3.2to5.2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-07-0to2.5	8270E	n-Nitrosodiphenylamine	13.1	µg/kg	U	13.1	UJ	5
BH-SC-07-2.5to4.2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-07-4.2to6.2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-12-0to1.4	8270E	n-Nitrosodiphenylamine	5.40	µg/kg	J	5.40	J	5
BH-SC-14-0to1.3	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-14-1.3to2.6	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-21-0to1.5	8270E SIM	Benzoic acid	40.3	µg/kg	J	40.3	J	5
BH-SC-21-0to1.5	8270E SIM	Dibenzo(a,h)anthracene	143	µg/kg	NA	143	J	5
BH-SC-21-1.5to3.7	8270E SIM	Benzoic acid	25.1	µg/kg	J	25.1	J	5
BH-SC-21-1.5to3.7	8270E SIM	Dibenzo(a,h)anthracene	95.1	µg/kg	NA	95.1	J	5
BH-SC-21-3.7to5.8	8270E SIM	Benzoic acid	15.4	µg/kg	J	15.4	J	5
BH-SC-26-0to2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-26-2to4	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-26-4to6	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-26-4to6-D	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-26-6to7.9	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-27-0to1.7	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-27-1.7to3.7	8270E	n-Nitrosodiphenylamine	0.05	µg/kg	U	0.05	UJ	5
BH-SC-27-3.7to5.2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-27-5.2to6.7	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-29-0to2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-29-2to4	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-29-4to6	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-29-6to7.9	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-32-0to2	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-32-2to4	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-32-2to4-D	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-32-4to5.5	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
BH-SC-34-0to1.5	8270E SIM	Benzoic acid	73.7	µg/kg	J	73.7	J	5
BH-SC-34-0to1.5	8270E SIM	Dibenzo(a,h)anthracene	268	µg/kg	NA	268	J	5
BH-SC-34-1.5to3.3	8270E SIM	Benzoic acid	20.6	µg/kg	J	20.6	J	5
BH-SC-34-1.5to3.3	8270E SIM	Dibenzo(a,h)anthracene	141	µg/kg	NA	141	J	5
BH-SC-34-1.5to3.3-D	8270E SIM	Benzoic acid	21.3	µg/kg	J	21.3	J	5
BH-SC-34-1.5to3.3-D	8270E SIM	Dibenzo(a,h)anthracene	92.4	µg/kg	NA	92.4	J	5
BH-SC-38-0to1.8	8270E SIM	2,4-Dimethylphenol	3.40	µg/kg	J	3.40	J	5
BH-SC-EB-CC	8270E	1,2,4-Trichlorobenzene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CC	8270E	1,2-Dichlorobenzene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CC	8270E	1,4-Dichlorobenzene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CC	8270E	Hexachlorobutadiene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CP	8270E	1,2,4-Trichlorobenzene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CP	8270E	1,2-Dichlorobenzene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CP	8270E	1,4-Dichlorobenzene	0.20	µg/kg	U	0.20	UJ	5
BH-SC-EB-CP	8270E	Hexachlorobutadiene	0.20	µg/kg	U	0.20	UJ	5
SG-01-0to10	8270E	Diethyl phthalate	22.2	µg/kg	J	22.2	J	5
SG-02-0to10	8270E	Diethyl phthalate	28.3	µg/kg	J	28.3	J	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
SG-05-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-06-0to10	8270E	Benzoic acid	189	µg/kg	J	189	J	5
SG-06-0to10	8270E	Diethyl phthalate	31.8	µg/kg	J	31.8	J	5
SG-08-0to10	8270E	Diethyl phthalate	38.3	µg/kg	J	38.3	J	5
SG-15-0to10	8270E	Diethyl phthalate	29.1	µg/kg	J	29.1	J	5
SG-15-0to10-D	8270E	Diethyl phthalate	45.6	µg/kg	J	45.6	J	5
SG-18-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-18-0to10	8270E	2,4-Dimethylphenol	6.40	µg/kg	J	6.40	J	5
SG-18-0to10	8270E SIM	2,4-Dimethylphenol	4.80	µg/kg	J	4.80	J	5
SG-19-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-22-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-22-0to10	8270E	2,4-Dimethylphenol	17.9	µg/kg	J	17.9	J	5
SG-22-0to10	8270E SIM	2,4-Dimethylphenol	14.6	µg/kg	J	14.6	J	5
SG-22-0to10-D	8270E	Pentachlorophenol	49.2	µg/kg	J	49.2	J	5
SG-22-0to10-D	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-22-0to10-D	8270E	2,4-Dimethylphenol	12.8	µg/kg	J	12.8	J	5
SG-22-0to10-D	8270E SIM	2,4-Dimethylphenol	11.4	µg/kg	J	11.4	J	5
SG-23-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-23-0to10	8270E	2,4-Dimethylphenol	71.9	µg/kg	J	71.9	J	5
SG-25-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-26-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-27-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-28-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-30-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
SG-31-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-33-0to10	8270E	n-Nitrosodiphenylamine	5.40	µg/kg	U	5.40	UJ	5
SG-33-0to10	8270E	2,4-Dimethylphenol	10.4	µg/kg	J	10.4	J	5
SG-33-0to10	8270E SIM	2,4-Dimethylphenol	11.9	µg/kg	J	11.9	J	5
SG-35-0to10	8270E	Diethyl phthalate	22.9	µg/kg	J	22.9	J	5
SG-37-0to10	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-37-0to10-D	8270E	n-Nitrosodiphenylamine	5.30	µg/kg	U	5.30	UJ	5
SG-41-0to10	8270E	Benzoic acid	64.5	µg/kg	J	64.5	J	5
SG-41-0to10	8270E	Diethyl phthalate	21.2	µg/kg	J	21.2	J	5
SG-42-0to10	8270E	Diethyl phthalate	27.7	µg/kg	J	27.7	J	5

J- laboratory flag indicating an estimated concentration value detected below the reporting limit
mg/kg-milligram per kilogram
NA-not applicable
SIM-selected ion monitoring
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
µg/kg-microgram per kilogram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D
- BH-SC-32-2to4/BH-SC-32-2to4-D
- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D

- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exceptions.

21H0321: Multiple target analyte RPDs in field duplicate pair SG-15-0to10/SG-15-0to10-D were equal to and/or greater than 50% for USEPA 8270E SIM. Therefore, based on professional and technical judgement, the affected target analyte results in samples SG-15-0to10 and SG-15-0to10-D were J qualified as estimated.

4-Methylphenol (p-cresol), acenaphthylene, and phenol were detected in original sample SG-15-0to10 at concentrations greater than the RLs and at estimated concentrations greater than the MDLs and less than the RLs in field duplicate sample SG-15-0to10-D, resulting in noncalculable RPDs between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the 4-methylphenol (p-cresol), acenaphthylene, and phenol concentrations in the field duplicate pair were J qualified as estimated.

Benzoic acid was detected in original sample SG-15-0to10 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample SG-15-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the concentration of benzoic acid was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

4-Methylphenol (p-cresol), dibenzofuran, and phenol were detected in original sample SG-15-0to10 at concentrations greater than the RLs and not detected in field duplicate sample SG-15-0to10-D, resulting in noncalculable RPDs between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentrations of 4-methylphenol (p-cresol), dibenzofuran, and phenol were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.

21H0340: Multiple target analyte RPDs in field duplicate pair SG-22-0to10/SG-22-0to10-D were equal to and/or greater than 50% for USEPA 8270E and 8270E SIM. Due to the difference between the samples' dilutions and RLs and based on professional and technical judgment, no qualifications were applied to the USEPA 8270E SIM acenaphthene, benz(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(j)fluoranthene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene results in in field duplicate samples SG-22-0to10/SG-22-

0to10-D. However, based on professional and technical judgement, the remaining USEPA 8270E SIM target analyte results with RPDs equal to and/or greater than 50% in the field duplicate pairs were J qualified as estimated.

Benzoic acid was detected in original sample SG-22-0to10 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample SG-22-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentration of benzoic acid was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Benzoic acid was not detected in original sample SG-22-0to10 and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample SG-22-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the concentration of benzoic acid was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Benzyl alcohol was detected in original sample SG-22-0to10 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample SG-22-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the benzyl alcohol concentrations in the field duplicate pair were J qualified as estimated.

Bis(2-ethylhexyl) phthalate was detected at an estimated concentration greater than the MDL and less than the RL in original sample SG-22-0to10 at a concentration greater than the RL in field duplicate sample SG-22-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the bis(2-ethylhexyl) phthalate concentrations in the field duplicate pair were J qualified as estimated.

Diethyl phthalate, di-n-octyl phthalate, and pentachlorophenol were not detected in original sample SG-22-0to10 and were detected at estimated concentrations greater than the MDLs and less than the RLs in field duplicate sample SG-22-0to10-D, resulting in noncalculable RPDs between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentrations of diethyl phthalate, di-n-octyl phthalate, and pentachlorophenol were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.

Pentachlorophenol was not detected in original sample SG-22-0to10 and was detected at a concentration greater than the RL in field duplicate sample SG-22-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the concentration of pentachlorophenol was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Butyl benzyl phthalate was detected in original sample SG-37-0to10 at a concentration greater than the RL and was not detected in field duplicate sample SG-37-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the concentration of butyl benzyl phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Dibenzo(a,h)anthracene was detected in original sample SG-37-0to10 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample SG-37-0to10-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the dibenzo(a,h)anthracene concentrations in the field duplicate pair were J qualified as estimated.

21H0357: Multiple target analyte RPDs in field duplicate pairs HA-06-0-12"/HA-06-0-12"-D, HA-10-12-24"/HA-10-12-24"-D, and HA-12-12-24"/HA-12-12-24"-D were equal to and/or greater than 50% for USEPA 8270E and USEPA 8270E SIM. Due to the difference between the samples' dilutions and RLs and based on professional and technical judgment, no qualifications were applied to the USEPA 8270E SIM fluoranthene results in field duplicate samples HA-06-0-12"/HA-06-0-12"-D and the USEPA 8270E SIM acenaphthene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(j)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene, and total (b+k+j) benzofluoranthenes results in field duplicate samples HA-10-12-24"/HA-10-12-24"-D. However, based on professional and technical judgement, the remaining USEPA 8270E SIM target analyte results with RPDs equal to and/or greater than 50% in the field duplicate pairs were J qualified as estimated.

2-Methylnaphthalene and dibenzofuran were detected in original sample HA-06-0-12" at concentrations greater than the RLs and at estimated concentrations greater than the MDLs and less than the RLs in field duplicate sample HA-06-0-12"-D, resulting in noncalculable RPDs between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the 2-methylnaphthalene and dibenzofuran concentrations in the field duplicate pair were J qualified as estimated.

Benzoic acid was detected in original sample HA-06-0-12" at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample HA-06-0-12"-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the estimated concentration of benzoic acid was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

2-Methylnaphthalene was not detected in original sample HA-10-12-24" and detected at a concentration greater than the RL in field duplicate sample HA-10-12-24"-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and

technical judgment, the concentration of 2-methylnaphthalene was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Bis(2-ethylhexyl) phthalate was detected at an estimated concentration greater than the MDL and less than the RL in original sample HA-10-12-24" at a concentration greater than the RL in field duplicate sample HA-10-12-24"-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the bis(2-ethylhexyl) phthalate concentrations in the field duplicate pair were J qualified as estimated.

Diethyl phthalate was detected in original sample HA-10-12-24" at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample HA-10-12-24"-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the estimated concentration of diethyl phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Acenaphthene (USEPA 8270E SIM), dimethyl phthalate (USEPA 8270E), and phenol (USEPA 8270E) were detected in original sample HA-12-12-24" at estimated concentrations greater than the MDLs and less than the RLs and not detected in field duplicate sample HA-12-12-24"-D, resulting in noncalculable RPDs between the results. Therefore, based on professional and technical judgment, the estimated concentrations of acenaphthene, dimethyl phthalate, and phenol were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.

Benzoic acid was not detected in original sample HA-12-12-24" and detected at a concentration greater than the RL in field duplicate sample HA-12-12-24"-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentration of benzoic acid was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Dibutyl phthalate and diethyl phthalate were not detected in original sample HA-12-12-24" and were detected at estimated concentrations greater than the MDLs and less than the RLs in field duplicate sample HA-12-12-24"-D, resulting in noncalculable RPDs between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentrations of dibutyl phthalate and diethyl phthalate were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.
The 2-methylphenol (o-cresol) and anthracene RPDs for field duplicate pair BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D were equal to and/or greater than 50% for USEPA 8270E SIM. Therefore, based on professional and technical judgement, the 2-methylphenol (o-cresol) and anthracene results in samples BH-SC-24-3.8to5.9 and BH-SC-24-3.8to5.9-D were J qualified as estimated.

The dibenzofuran RPD for field duplicate pair BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D was equal to and/or greater than 50% for USEPA 8270E. Therefore, based on professional and

technical judgement, the dibenzofuran results in samples BH-SC-24-3.8to5.9 and BH-SC-24-3.8to5.9-D were J qualified as estimated.

2-Methylphenol (o-cresol) was detected in original sample BH-SC-24-3.8to5.9 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SC-24-3.8to5.9-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the 2-methylphenol (o-cresol) concentrations in the field duplicate pair were J qualified as estimated.

2,4-Dimethylphenol was detected in original sample BH-SC-24-3.8to5.9 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SC-24-3.8to5.9-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the 2,4-dimethylphenol concentrations in the field duplicate pair were J qualified as estimated.

Bis(2-ethylhexyl) phthalate was not detected in original sample BH-SC-24-3.8to5.9 and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SC-24-3.8to5.9-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentration of bis(2-ethylhexyl) phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.
21I0192: 2-Methylnaphthalene and bis(2-ethylhexyl) phthalate were not detected in original sample BH-SB-19-2to6 and at estimated concentrations greater than the MDLs and less than the RLs in field duplicate sample BH-SB-19-2to6-Dup, resulting in noncalculable RPDs between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentrations of 2-methylnaphthalene and bis(2-ethylhexyl) phthalate were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.

Dibutyl phthalate was not detected in original sample BH-SB-19-2to6 and detected at a concentration greater than the RL in field duplicate sample BH-SB-19-2to6-Dup, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentration of dibutyl phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.
Diethyl phthalate was detected in original sample BH-SB-19-2to6 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-SB-19-2to6-Dup, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the estimated concentration of diethyl phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Perylene was detected in original sample BH-SB-19-2to6 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SB-19-2to6-Dup, resulting in a noncalculable RPD between the results for USEPA

8270E SIM. Therefore, based on professional and technical judgment, the perylene concentrations in the field duplicate pair were J qualified as estimated.

1,4-Dichlorobenzene and hexachlorobenzene were detected in original sample BH-SC-26-4to6 at estimated concentrations greater than the MDLs and less than the RLs and not detected in field duplicate sample BH-SC-26-4to6-D, resulting in noncalculable RPDs between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the estimated concentrations of 1,4-dichlorobenzene and hexachlorobenzene were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.

Benzyl alcohol and phenanthrene were not detected in original sample BH-SC-32-2to4 and were detected at estimated concentrations greater than the MDLs and less than the RLs in field duplicate sample BH-SC-32-2to4-D, resulting in noncalculable RPDs between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the estimated concentrations of benzyl alcohol and phenanthrene were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs in the field duplicate pair.

Phenol was not detected in original sample BH-SC-32-2to4 and detected at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SC-32-2to4-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the estimated concentration of phenol was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Phenol was detected at an estimated concentration greater than the MDL and less than the RL in original sample BH-SC-32-2to4 at a concentration greater than the RL in field duplicate sample BH-SC-32-2to4-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the phenol concentrations in the field duplicate pair were J qualified as estimated.

Acenaphthene was detected in original sample BH-SB-17-0to2 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-SB-17-0to2-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the estimated concentration of acenaphthene was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Diethyl phthalate was not detected in original sample BH-SB-17-0to2 and was detected at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SB-17-0to2-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the estimated concentration of diethyl phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Multiple target analyte RPDs for field duplicate pair BH-SB-22-6to10/BH-SB-22-6to10-D were equal to and/or greater than 50% for USEPA 8270E and USEPA 8270E SIM. Therefore, based on professional and technical judgement, the affected USEPA 8270E and USEPA 8270E SIM results in the field duplicate pair were J qualified as estimated.

The 2-methylphenol (o-cresol) RPD in field duplicate pair BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D was equal to and/or greater than 50% for USEPA 8270E SIM. Therefore, based on professional and technical judgement, the 2-methylphenol (o-cresol) results in samples BH-SC-34-1.5to3.3 and BH-SC-34-1.5to3.3-D were J qualified as estimated.

2-Methylphenol (o-cresol) was not detected in original sample BH-SC-34-1.5to3.3 and was detected at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SC-34-1.5to3.3-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the estimated concentration of 2-methylphenol (o-cresol) was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Dibenzofuran was not detected in original sample BH-SC-34-1.5to3.3 and was detected at a concentration greater than the RL in field duplicate sample BH-SC-34-1.5to3.3-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentration of dibenzofuran was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Hexachlorobenzene was detected in original sample BH-SC-34-1.5to3.3 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-SC-34-1.5to3.3-D, resulting in a noncalculable RPD between the results for USEPA 8270E SIM. Therefore, based on professional and technical judgment, the estimated concentration of hexachlorobenzene was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

21I0325: Multiple target analyte RPDs in field duplicate pair BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D were equal to and/or greater than 50% for USEPA 8270E SIM. Therefore, based on professional and technical judgement, the affected USEPA 8270E SIM results in samples BH-SC-05-1.6to3.2 and BH-SC-05-1.6to3.2-D were J qualified as estimated.

Diethyl phthalate was detected in original sample BH-SC-05-1.6to3.2 at a concentration greater than the RL and not detected in field duplicate sample BH-SC-05-1.6to3.2-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical judgment, the concentration of diethyl phthalate was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Phenol was not detected in original sample BH-SC-05-1.6to3.2 and was detected at a concentration greater than the RL in field duplicate sample BH-SC-05-1.6to3.2-D, resulting in a noncalculable RPD between the results for USEPA 8270E. Therefore, based on professional and technical

judgment, the concentration of phenol was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

C3-Chrysenes was detected in original sample BH-PS-02-COMP at a concentration greater than the RL and not detected in field duplicate sample BH-PS-02-COMP-DUP, resulting in a noncalculable RPD between the results for USEPA 8270D SIM. Therefore, based on professional and technical judgment, the concentration of C3-chrysenes was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the RL in the field duplicate pair.

C1-Chrysenes, C2-fluorenes, C3-dibenzothiophenes, C3-phenanthrenes/anthracenes, C4-dibenzothiophenes, and C4-phenanthrenes/anthracenes were not detected in original sample BH-PS-02-COMP and were detected at concentrations greater than the RLs in field duplicate sample BH-PS-02-COMP-DUP, resulting in noncalculable RPDs between the results for USEPA 8270D SIM. Therefore, based on professional and technical judgment, the concentrations of C1-chrysenes, C2-fluorenes, C3-dibenzothiophenes, C3-phenanthrenes/anthracenes, C4-dibenzothiophenes, and C4-phenanthrenes/anthracenes were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the RLs in the field duplicate pair.

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-PS-02-COMP	8270D SIM	C3-Chrysenes	0.050	mg/kg	NA	NC	0.050	J	7
BH-PS-02-COMP-DUP	8270D SIM	C3-Chrysenes	0.011	mg/kg	U		0.011	UJ	7
BH-PS-02-COMP	8270D SIM	C1-Chrysenes	0.012	mg/kg	U	NC	0.012	UJ	7
BH-PS-02-COMP-DUP	8270D SIM	C1-Chrysenes	0.015	mg/kg	NA		0.015	J	7
BH-PS-02-COMP	8270D SIM	C2-Fluorenes	0.012	mg/kg	U	NC	0.012	UJ	7
BH-PS-02-COMP-DUP	8270D SIM	C2-Fluorenes	0.019	mg/kg	NA		0.019	J	7
BH-PS-02-COMP	8270D SIM	C3-Dibenzothiophenes	0.012	mg/kg	U	NC	0.012	UJ	7
BH-PS-02-COMP-DUP	8270D SIM	C3-Dibenzothiophenes	0.016	mg/kg	NA		0.016	J	7
BH-PS-02-COMP	8270D SIM	C3-Phenanthrenes/Anthracenes	0.012	mg/kg	U	NC	0.012	UJ	7
BH-PS-02-COMP-DUP	8270D SIM	C3-Phenanthrenes/Anthracenes	0.073	mg/kg	NA		0.073	J	7
BH-PS-02-COMP	8270D SIM	C4-Dibenzothiophenes	0.012	mg/kg	U	NC	0.012	UJ	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-PS-02-COMP-DUP	8270D SIM	C4-Dibenzothiophenes	0.095	mg/kg	NA		0.095	J	7
BH-PS-02-COMP	8270D SIM	C4-Phenanthrenes/ Anthracenes	0.012	mg/kg	U	NC	0.012	UJ	7
BH-PS-02-COMP-DUP	8270D SIM	C4-Phenanthrenes/ Anthracenes	0.023	mg/kg	NA		0.023	J	7
BH-SB-17-0to2	8270E	Diethyl phthalate	19.7	µg/kg	U	NC	19.7	UJ	7
BH-SB-17-0to2-D	8270E	Diethyl phthalate	21.4	µg/kg	J		21.4	J	7
BH-SB-17-0to2	8270E SIM	Acenaphthene	0.63	µg/kg	J	NC	0.63	J	7
BH-SB-17-0to2-D	8270E SIM	Acenaphthene	0.57	µg/kg	U		0.57	UJ	7
BH-SB-22-6to10	8270E	p-Cresol	417	µg/kg	NA	117	417	J	7
BH-SB-22-6to10-D	8270E	p-Cresol	217	µg/kg	NA		217	J	7
BH-SB-22-6to10	8270E SIM	Total (b+k+j) benzofluoranthenes	11100	µg/kg	D	50	11100	J	7
BH-SB-22-6to10-D	8270E SIM	Total (b+k+j) benzofluoranthenes	6690	µg/kg	D		6690	J	7
BH-SB-19-2to6	8270E	2-Methylnaphthalene	26.5	µg/kg	U	NC	26.5	UJ	7
BH-SB-19-2to6-Dup	8270E	2-Methylnaphthalene	27.0	µg/kg	J		27.0	J	7
BH-SB-19-2to6	8270E	Bis(2-ethylhexyl) phthalate	32.1	µg/kg	U	NC	32.1	UJ	7
BH-SB-19-2to6-Dup	8270E	Bis(2-ethylhexyl) phthalate	258	µg/kg	J		258	J	7
BH-SB-19-2to6	8270E	Dibutyl phthalate	33.0	µg/kg	U	NC	33.0	UJ	7
BH-SB-19-2to6-Dup	8270E	Dibutyl phthalate	660	µg/kg	NA		660	J	7
BH-SB-19-2to6	8270E	Diethyl phthalate	140	µg/kg	J, B	NC	140	J	7
BH-SB-19-2to6-Dup	8270E	Diethyl phthalate	102	µg/kg	U		102	UJ	7
BH-SB-19-2to6	8270E SIM	Perylene	36.2	µg/kg	NA	NC	36.2	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-SB-19-2to6-Dup	8270E SIM	Perylene	18.6	µg/kg	J		18.6	J	7
BH-SC-05-1.6to3.2	8270E	Diethyl phthalate	193	µg/kg	NA	NC	193	J	7
BH-SC-05-1.6to3.2-D	8270E	Diethyl phthalate	19.7	µg/kg	U		19.7	UJ	7
BH-SC-05-1.6to3.2	8270E	Phenol	4.40	µg/kg	U	NC	4.40	UJ	7
BH-SC-05-1.6to3.2-D	8270E	Phenol	45.0	µg/kg	NA		45.0	J	7
BH-SC-05-1.6to3.2	8270E SIM	2-Methylnaphthalene	75.5	µg/kg	NA	69	75.5	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	2-Methylnaphthalene	36.6	µg/kg	NA		36.6	J	7
BH-SC-05-1.6to3.2	8270E SIM	Acenaphthene	31.4	µg/kg	NA	105	31.4	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Acenaphthene	9.75	µg/kg	NA		9.75	J	7
BH-SC-05-1.6to3.2	8270E SIM	Acenaphthylene	98.3	µg/kg	NA	77	98.3	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Acenaphthylene	43.5	µg/kg	NA		43.5	J	7
BH-SC-05-1.6to3.2	8270E SIM	Anthracene	79.8	µg/kg	NA	88	79.8	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Anthracene	31.2	µg/kg	NA		31.2	J	7
BH-SC-05-1.6to3.2	8270E SIM	Benz(a)anthracene	69.1	µg/kg	NA	79	69.1	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Benz(a)anthracene	29.9	µg/kg	NA		29.9	J	7
BH-SC-05-1.6to3.2	8270E SIM	Benzo(a)pyrene	73.5	µg/kg	NA	63	73.5	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Benzo(a)pyrene	38.1	µg/kg	NA		38.1	J	7
BH-SC-05-1.6to3.2	8270E SIM	Benzo(b)fluoranthene	62.4	µg/kg	NA	61	62.4	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Benzo(b)fluoranthene	33.3	µg/kg	NA		33.3	J	7
BH-SC-05-1.6to3.2	8270E SIM	Benzo(j)fluoranthene	31.9	µg/kg	NA	61	31.9	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Benzo(j)fluoranthene	16.9	µg/kg	NA		16.9	J	7
BH-SC-05-1.6to3.2	8270E SIM	Benzo(k)fluoranthene	35.8	µg/kg	NA	71	35.8	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Benzo(k)fluoranthene	16.9	µg/kg	NA		16.9	J	7
BH-SC-05-1.6to3.2	8270E SIM	Chrysene	89.1	µg/kg	NA	80	89.1	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-05-1.6to3.2-D	8270E SIM	Chrysene	38.3	µg/kg	NA		38.3	J	7
BH-SC-05-1.6to3.2	8270E SIM	Fluoranthene	317	µg/kg	NA	98	317	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Fluoranthene	109	µg/kg	NA		109	J	7
BH-SC-05-1.6to3.2	8270E SIM	Fluorene	70.7	µg/kg	NA	85	70.7	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Fluorene	28.7	µg/kg	NA		28.7	J	7
BH-SC-05-1.6to3.2	8270E SIM	Phenanthrene	424	µg/kg	NA	98	424	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Phenanthrene	145	µg/kg	NA		145	J	7
BH-SC-05-1.6to3.2	8270E SIM	Pyrene	397	µg/kg	NA	96	397	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Pyrene	139	µg/kg	NA		139	J	7
BH-SC-05-1.6to3.2	8270E SIM	Total (b+k+j) benzofluoranthenes	113	µg/kg	NA	62	113	J	7
BH-SC-05-1.6to3.2-D	8270E SIM	Total (b+k+j) benzofluoranthenes	59.6	µg/kg	NA		59.6	J	7
BH-SC-24-3.8to5.9	8270E	Bis(2-ethylhexyl) phthalate	5.40	µg/kg	U	NC	5.40	UJ	7
BH-SC-24-3.8to5.9-D	8270E	Bis(2-ethylhexyl) phthalate	26.7	µg/kg	J		26.7	J	7
BH-SC-24-3.8to5.9	8270E	Dibenzofuran	169	µg/kg	NA	76	169	J	7
BH-SC-24-3.8to5.9-D	8270E	Dibenzofuran	75.9	µg/kg	NA		75.9	J	7
BH-SC-24-3.8to5.9	8270E	o-Cresol	33.0	µg/kg	NA	NC	33.0	J	7
BH-SC-24-3.8to5.9-D	8270E	o-Cresol	17.8	µg/kg	J		17.8	J	7
BH-SC-24-3.8to5.9	8270E SIM	2,4-Dimethylphenol	30.6	µg/kg	NA	NC	30.6	J	7
BH-SC-24-3.8to5.9-D	8270E SIM	2,4-Dimethylphenol	17.1	µg/kg	J		17.1	J	7
BH-SC-24-3.8to5.9	8270E SIM	Anthracene	227	µg/kg	NA	63	227	J	7
BH-SC-24-3.8to5.9-D	8270E SIM	Anthracene	118	µg/kg	NA		118	J	7
BH-SC-24-3.8to5.9	8270E SIM	o-Cresol	36.0	µg/kg	NA	61	36.0	J	7
BH-SC-24-3.8to5.9-D	8270E SIM	o-Cresol	19.1	µg/kg	NA		19.1	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-26-4to6	8270E SIM	1,4-Dichlorobenzene	1.20	µg/kg	J	NC	1.2	J	7
BH-SC-26-4to6-D	8270E SIM	1,4-Dichlorobenzene	0.60	µg/kg	U		0.60	UJ	7
BH-SC-26-4to6	8270E SIM	Hexachlorobenzene	1.20	µg/kg	J	NC	1.2	J	7
BH-SC-26-4to6-D	8270E SIM	Hexachlorobenzene	0.70	µg/kg	U		0.70	UJ	7
BH-SC-32-2to4	8270E	Phenol	4.40	µg/kg	U	NC	4.40	UJ	7
BH-SC-32-2to4-D	8270E	Phenol	5.50	µg/kg	J		5.5	J	7
BH-SC-32-2to4	8270E SIM	Benzyl alcohol	2.50	µg/kg	U	NC	2.50	UJ	7
BH-SC-32-2to4-D	8270E SIM	Benzyl alcohol	10.7	µg/kg	J		10.7	J	7
BH-SC-32-2to4	8270E SIM	Phenanthrene	0.72	µg/kg	U	NC	0.72	UJ	7
BH-SC-32-2to4-D	8270E SIM	Phenanthrene	0.86	µg/kg	J		0.86	J	7
BH-SC-32-2to4	8270E SIM	Phenol	3.90	µg/kg	J	NC	3.90	J	7
BH-SC-32-2to4-D	8270E SIM	Phenol	6.30	µg/kg	NA		6.30	J	7
BH-SC-34-1.5to3.3	8270E	Dibenzofuran	14.1	µg/kg	U	NC	14.1	UJ	7
BH-SC-34-1.5to3.3-D	8270E	Dibenzofuran	72.1	µg/kg	NA		72.1	J	7
BH-SC-34-1.5to3.3	8270E	o-Cresol	6.60	µg/kg	U	NC	6.60	UJ	7
BH-SC-34-1.5to3.3-D	8270E	o-Cresol	11.6	µg/kg	J		11.6	J	7
BH-SC-34-1.5to3.3	8270E SIM	Hexachlorobenzene	0.90	µg/kg	J	NC	0.90	J	7
BH-SC-34-1.5to3.3-D	8270E SIM	Hexachlorobenzene	0.70	µg/kg	U		0.70	UJ	7
BH-SC-34-1.5to3.3	8270E SIM	o-Cresol	21.5	µg/kg	NA	59	21.5	J	7
BH-SC-34-1.5to3.3-D	8270E SIM	o-Cresol	11.7	µg/kg	NA		11.7	J	7
HA-06-0-12"	8270E	2-Methylnaphthalene	39.5	µg/kg	NA	NC	39.5	J	7
HA-06-0-12"-D	8270E	2-Methylnaphthalene	16.0	µg/kg	J		16.0	J	7
HA-06-0-12"	8270E	Benzoic acid	39.2	µg/kg	J	NC	39.2	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
HA-06-0-12"-D	8270E	Benzoic acid	200	µg/kg	U		200	UJ	7
HA-06-0-12"	8270E	Dibenzofuran	32.3	µg/kg	NA	NC	32.3	J	7
HA-06-0-12"-D	8270E	Dibenzofuran	19.3	µg/kg	J		19.3	J	7
HA-06-0-12"	8270E SIM	1-Methylnaphthalene	6.87	µg/kg	NA	141	6.87	J	7
HA-06-0-12"-D	8270E SIM	1-Methylnaphthalene	39.9	µg/kg	NA		39.9	J	7
HA-06-0-12"	8270E SIM	2-Methylnaphthalene	8.65	µg/kg	NA	144	8.65	J	7
HA-06-0-12"-D	8270E SIM	2-Methylnaphthalene	53.2	µg/kg	NA		53.2	J	7
HA-06-0-12"	8270E SIM	Acenaphthene	7.75	µg/kg	NA	156	7.75	J	7
HA-06-0-12"-D	8270E SIM	Acenaphthene	62.0	µg/kg	NA		62.0	J	7
HA-06-0-12"	8270E SIM	Anthracene	21.2	µg/kg	NA	120	21.2	J	7
HA-06-0-12"-D	8270E SIM	Anthracene	85.4	µg/kg	NA		85.4	J	7
HA-06-0-12"	8270E SIM	Benz(a)anthracene	96.0	µg/kg	NA	74	96.0	J	7
HA-06-0-12"-D	8270E SIM	Benz(a)anthracene	208	µg/kg	NA		208	J	7
HA-06-0-12"	8270E SIM	Benzo(a)pyrene	130	µg/kg	NA	67	130	J	7
HA-06-0-12"-D	8270E SIM	Benzo(a)pyrene	260	µg/kg	NA		260	J	7
HA-06-0-12"	8270E SIM	Benzo(j)fluoranthene	58.4	µg/kg	NA	58	58.4	J	7
HA-06-0-12"-D	8270E SIM	Benzo(j)fluoranthene	106	µg/kg	NA		106	J	7
HA-06-0-12"	8270E SIM	Benzo(k)fluoranthene	68.5	µg/kg	NA	58	68.5	J	7
HA-06-0-12"-D	8270E SIM	Benzo(k)fluoranthene	124	µg/kg	NA		124	J	7
HA-06-0-12"	8270E SIM	Chrysene	171	µg/kg	NA	61	171	J	7
HA-06-0-12"-D	8270E SIM	Chrysene	321	µg/kg	NA		321	J	7
HA-06-0-12"	8270E SIM	Dibenzo(a,h)anthracene	28.6	µg/kg	NA	59	28.6	J	7
HA-06-0-12"-D	8270E SIM	Dibenzo(a,h)anthracene	52.5	µg/kg	NA		52.5	J	7
HA-06-0-12"	8270E SIM	Fluorene	10.2	µg/kg	NA	144	10.2	J	7
HA-06-0-12"-D	8270E SIM	Fluorene	62.3	µg/kg	NA		62.3	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
HA-06-0-12"	8270E SIM	Naphthalene	34.3	µg/kg	NA	110	34.3	J	7
HA-06-0-12"-D	8270E SIM	Naphthalene	118	µg/kg	NA		118	J	7
HA-06-0-12"	8270E SIM	Phenanthrene	178	µg/kg	NA	94	178	J	7
HA-06-0-12"-D	8270E SIM	Phenanthrene	492	µg/kg	NA		492	J	7
HA-06-0-12"	8270E SIM	Pyrene	238	µg/kg	NA	62	238	J	7
HA-06-0-12"-D	8270E SIM	Pyrene	452	µg/kg	NA		452	J	7
HA-06-0-12"	8270E SIM	Total (b+k+j) benzofluoranthenes	263	µg/kg	NA	55	263	J	7
HA-06-0-12"-D	8270E SIM	Total (b+k+j) benzofluoranthenes	460	µg/kg	NA		460	J	7
HA-10-12-24"	8270E	2-Methylnaphthalene	4.50	µg/kg	U	NC	4.50	UJ	7
HA-10-12-24"-D	8270E	2-Methylnaphthalene	135	µg/kg	NA		135	J	7
HA-10-12-24"	8270E	Bis(2-ethylhexyl) phthalate	42.8	µg/kg	J	NC	42.8	J	7
HA-10-12-24"-D	8270E	Bis(2-ethylhexyl) phthalate	57.6	µg/kg	NA		57.6	J	7
HA-10-12-24"	8270E	Diethyl phthalate	22.0	µg/kg	J	NC	22.0	J	7
HA-10-12-24"-D	8270E	Diethyl phthalate	49.8	µg/kg	U		49.8	UJ	7
HA-10-12-24"	8270E SIM	1-Methylnaphthalene	299	µg/kg	NA	123	299	J	7
HA-10-12-24"-D	8270E SIM	1-Methylnaphthalene	70.8	µg/kg	NA		70.8	J	7
HA-10-12-24"	8270E SIM	2-Methylnaphthalene	308	µg/kg	NA	124	308	J	7
HA-10-12-24"-D	8270E SIM	2-Methylnaphthalene	72.1	µg/kg	NA		72.1	J	7
HA-10-12-24"	8270E SIM	Acenaphthylene	161	µg/kg	NA	40	161	J	7
HA-10-12-24"-D	8270E SIM	Acenaphthylene	107	µg/kg	NA		107	J	7
HA-10-12-24"	8270E SIM	Naphthalene	360	µg/kg	NA	102	360	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
HA-10-12-24"-D	8270E SIM	Naphthalene	117	µg/kg	NA		117	J	7
HA-12-12-24"	8270E	Benzoic acid	200	µg/kg	U	NC	200	UJ	7
HA-12-12-24"-D	8270E	Benzoic acid	719	µg/kg	NA		719	J	7
HA-12-12-24"	8270E	Bis(2-ethylhexyl) phthalate	163	µg/kg	NA	86	163	J	7
HA-12-12-24"-D	8270E	Bis(2-ethylhexyl) phthalate	65.0	µg/kg	NA		65.0	J	7
HA-12-12-24"	8270E	Dibutyl phthalate	5.60	µg/kg	U	NC	5.60	UJ	7
HA-12-12-24"-D	8270E	Dibutyl phthalate	9.50	µg/kg	J		9.50	J	7
HA-12-12-24"	8270E	Diethyl phthalate	19.7	µg/kg	U	NC	19.7	UJ	7
HA-12-12-24"-D	8270E	Diethyl phthalate	21.5	µg/kg	J		21.5	J	7
HA-12-12-24"	8270E	Dimethyl phthalate	5.80	µg/kg	J	NC	5.80	J	7
HA-12-12-24"-D	8270E	Dimethyl phthalate	4.40	µg/kg	U		4.40	UJ	7
HA-12-12-24"	8270E	Phenol	5.10	µg/kg	J	NC	5.10	J	7
HA-12-12-24"-D	8270E	Phenol	4.40	µg/kg	U		4.40	UJ	7
HA-12-12-24"	8270E SIM	Fluoranthene	152	µg/kg	NA	71	152	J	7
HA-12-12-24"-D	8270E SIM	Fluoranthene	72.4	µg/kg	NA		72.4	J	7
HA-12-12-24"	8270E SIM	Acenaphthene	1.44	µg/kg	J	NC	1.44	J	7
HA-12-12-24"-D	8270E SIM	Acenaphthene	0.57	µg/kg	U		0.57	UJ	7
SG-15-0to10	8270E	Dibenzofuran	65.1	µg/kg	NA	NC	65.1	J	7
SG-15-0to10-D	8270E	Dibenzofuran	14.1	µg/kg	U		14.1	UJ	7
SG-15-0to10	8270E	p-Cresol	50.9	µg/kg	NA	NC	50.9	J	7
SG-15-0to10-D	8270E	p-Cresol	7.40	µg/kg	U		7.40	UJ	7
SG-15-0to10	8270E	Phenol	81.3	µg/kg	NA	NC	81.3	J	7
SG-15-0to10-D	8270E	Phenol	4.40	µg/kg	U		4.40	UJ	7
SG-15-0to10	8270E SIM	2-Methylnaphthalene	5.68	µg/kg	NA	64	5.68	J	7
SG-15-0to10-D	8270E SIM	2-Methylnaphthalene	11.0	µg/kg	NA		11.0	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
SG-15-0to10	8270E SIM	Acenaphthene	10.3	µg/kg	NA	142	10.3	J	7
SG-15-0to10-D	8270E SIM	Acenaphthene	60.3	µg/kg	NA		60.3	J	7
SG-15-0to10	8270E SIM	Acenaphthylene	10.2	µg/kg	NA	NC	10.2	J	7
SG-15-0to10-D	8270E SIM	Acenaphthylene	3.18	µg/kg	J		3.18	J	7
SG-15-0to10	8270E SIM	Anthracene	24.1	µg/kg	NA	110	24.1	J	7
SG-15-0to10-D	8270E SIM	Anthracene	83.4	µg/kg	NA		83.4	J	7
SG-15-0to10	8270E SIM	Benz(a)anthracene	59.6	µg/kg	NA	62	59.6	J	7
SG-15-0to10-D	8270E SIM	Benz(a)anthracene	113	µg/kg	NA		113	J	7
SG-15-0to10	8270E SIM	Benzo(a)pyrene	67.5	µg/kg	NA	62	67.5	J	7
SG-15-0to10-D	8270E SIM	Benzo(a)pyrene	128	µg/kg	NA		128	J	7
SG-15-0to10	8270E SIM	Benzo(b)fluoranthene	46.2	µg/kg	NA	56	46.2	J	7
SG-15-0to10-D	8270E SIM	Benzo(b)fluoranthene	82.1	µg/kg	NA		82.1	J	7
SG-15-0to10	8270E SIM	Benzo(j)fluoranthene	24.3	µg/kg	NA	65	24.3	J	7
SG-15-0to10-D	8270E SIM	Benzo(j)fluoranthene	47.7	µg/kg	NA		47.7	J	7
SG-15-0to10	8270E SIM	Benzo(k)fluoranthene	28.9	µg/kg	NA	62	28.9	J	7
SG-15-0to10-D	8270E SIM	Benzo(k)fluoranthene	55.0	µg/kg	NA		55.0	J	7
SG-15-0to10	8270E SIM	Benzoic acid	17.9	µg/kg	J	NC	17.9	J	7
SG-15-0to10-D	8270E SIM	Benzoic acid	13.4	µg/kg	U		13.4	UJ	7
SG-15-0to10	8270E SIM	Chrysene	74.0	µg/kg	NA	65	74.0	J	7
SG-15-0to10-D	8270E SIM	Chrysene	145	µg/kg	NA		145	J	7
SG-15-0to10	8270E SIM	Fluoranthene	155	µg/kg	NA	65	155	J	7
SG-15-0to10-D	8270E SIM	Fluoranthene	305	µg/kg	NA		305	J	7
SG-15-0to10	8270E SIM	Fluorene	10.2	µg/kg	NA	126	10.2	J	7
SG-15-0to10-D	8270E SIM	Fluorene	45.0	µg/kg	NA		45.0	J	7
SG-15-0to10	8270E SIM	Naphthalene	33.2	µg/kg	NA	60	33.2	J	7
SG-15-0to10-D	8270E SIM	Naphthalene	17.8	µg/kg	NA		17.8	J	7
SG-15-0to10	8270E SIM	p-Cresol	51.9	µg/kg	NA	NC	51.9	J	7
SG-15-0to10-D	8270E SIM	p-Cresol	1.10	µg/kg	J		1.10	J	7
SG-15-0to10	8270E SIM	Phenanthrene	99.1	µg/kg	NA	125	99.1	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
SG-15-0to10-D	8270E SIM	Phenanthrene	429	µg/kg	NA		429	J	7
SG-15-0to10	8270E SIM	Phenol	85.0	µg/kg	NA	NC	85.0	J	7
SG-15-0to10-D	8270E SIM	Phenol	3.30	µg/kg	J		3.30	J	7
SG-15-0to10	8270E SIM	Total (b+k+j) benzofluoranthenes	88.9	µg/kg	NA	61	88.9	J	7
SG-15-0to10-D	8270E SIM	Total (b+k+j) benzofluoranthenes	166	µg/kg	NA		166	J	7
SG-22-0to10	8270E	Benzoic acid	39.3	µg/kg	J	NC	39.3	J	7
SG-22-0to10-D	8270E	Benzoic acid	39.0	µg/kg	U		39.0	UJ	7
SG-22-0to10	8270E	Benzyl alcohol	20.8	µg/kg	NA	NC	20.8	J	7
SG-22-0to10-D	8270E	Benzyl alcohol	17.4	µg/kg	J		17.4	J	7
SG-22-0to10	8270E	Bis(2-ethylhexyl) phthalate	47.3	µg/kg	J	NC	47.3	J	7
SG-22-0to10-D	8270E	Bis(2-ethylhexyl) phthalate	71.0	µg/kg	NA		71.0	J	7
SG-22-0to10	8270E	Di-n-octyl phthalate	4.40	µg/kg	U	NC	4.40	UJ	7
SG-22-0to10-D	8270E	Di-n-octyl phthalate	7.60	µg/kg	J		7.60	J	7
SG-22-0to10	8270E	Dibenzofuran	515	µg/kg	NA	55	515	J	7
SG-22-0to10-D	8270E	Dibenzofuran	292	µg/kg	NA		292	J	7
SG-22-0to10	8270E	Diethyl phthalate	19.7	µg/kg	U	NC	19.7	UJ	7
SG-22-0to10-D	8270E	Diethyl phthalate	25.3	µg/kg	J		25.3	J	7
SG-22-0to10	8270E	p-Cresol	189	µg/kg	NA	61	189	J	7
SG-22-0to10-D	8270E	p-Cresol	101	µg/kg	NA		101	J	7
SG-22-0to10	8270E	Pentachlorophenol	31.2	µg/kg	U	NC	31.2	UJ	7
SG-22-0to10-D	8270E	Pentachlorophenol	49.2	µg/kg	J		49.2	J	7
SG-22-0to10	8270E SIM	Benzoic acid	13.4	µg/kg	U	NC	13.4	UJ	7
SG-22-0to10-D	8270E SIM	Benzoic acid	38.9	µg/kg	J		38.9	J	7
SG-22-0to10	8270E SIM	p-Cresol	176	µg/kg	NA	57	176	J	7
SG-22-0to10-D	8270E SIM	p-Cresol	98.0	µg/kg	NA		98.0	J	7

Sample ID	Method	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
SG-22-0to10	8270E SIM	Pentachlorophenol	2.10	µg/kg	U	NC	2.10	UJ	7
SG-22-0to10-D	8270E SIM	Pentachlorophenol	83.4	µg/kg	NA		83.4	J	7
SG-37-0to10	8270E SIM	Butyl benzyl phthalate	20.9	µg/kg	NA	NC	20.9	J	7
SG-37-0to10-D	8270E SIM	Butyl benzyl phthalate	0.70	µg/kg	U		0.70	UJ	7
SG-37-0to10	8270E SIM	Dibenzo(a,h)anthracene	6.18	µg/kg	NA	NC	6.18	J	7
SG-37-0to10-D	8270E SIM	Dibenzo(a,h)anthracene	4.35	µg/kg	J		4.35	UJ	7

B-laboratory flag indicating analyte was detected in the method blank
J-laboratory flag indicating an estimated concentration value detected below the reporting limit
mg/kg-milligram per kilogram
NA-not applicable
NC-noncalculable
RPD-relative percent difference
SIM-selected ion monitoring
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
µg/kg-microgram per kilogram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Rinsate Blank

Six rinsate blanks i.e., equipment blanks, were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. SVOCs were not detected in the equipment blanks above the MDLs, with the following exception.

Naphthalene was detected in equipment blank BH-SC-EB-CP at an estimated concentration greater than the MDL and less than the RL for USEPA 8270E SIM. When the naphthalene concentration was converted from µg/L into µg/kg, the resulting concentration was less than the soil DL. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

1.8 Standard Reference Material (SRM)

SRMs were not reported with the sample sets.

1.9 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

21H0321: For method USEPA 8270E, the recovery of phenol-d5 was high and outside of laboratory specified acceptance criteria in the LCSD in batch BJI0024. Since the phenol-d5 recoveries were within laboratory specified acceptance criteria in the associated samples (excluding samples SG-01-0to10 and SG-42-0to10), no qualifications were applied to the data, based on professional and technical judgment.

The recoveries of phenol-d5 were high and outside of laboratory specified acceptance criteria in sample SG-01-0to10 (USEPA 8270E and USEPA 8270E SIM) and SG-42-0to10 (USEPA 8270E). Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21H0340: For method USEPA 8270E SIM, the recovery of p-terphenyl-d14 was low and outside of laboratory specified acceptance criteria in sample SG-23-0to10. Since the recovery of the remaining surrogate was within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E SIM, the recovery of dibenzo(a,h)anthracene-d14 was high and outside of laboratory specified acceptance criteria in the LCS in batch BJI0080. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21H0343: For method USEPA 8270E, the recovery of p-terphenyl-d14 was high and outside of laboratory specified acceptance criteria in the LCS in batch BJH0778. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E SIM, the recoveries of dibenzo(a,h)anthracene-d14 were high and outside laboratory specified acceptance criteria in the LCS/LCSD pair in batch BJH0780. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21H0357: For method USEPA 8270E, the recovery of p-terphenyl-d14 was high and outside of laboratory specified acceptance criteria in the LCS in batch BJH0778. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E, the recoveries of p-terphenyl-d14 were high and outside of laboratory specified acceptance criteria in the LCS/LCSD pair in batch BJI0101. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E SIM, the recoveries of dibenzo(a,h)anthracene-d14 were high and outside laboratory specified acceptance criteria in the LCS/LCSD pair in batch BJH0780. Since

the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E SIM, the surrogate recoveries for samples HA-02-0-12", HA-10-12-24", and HA-13-12-24" were flagged with D1, to indicate the surrogates were not detected due to sample extract dilution. Since the surrogates were diluted out of samples HA-02-0-12", HA-10-12-24", and HA-13-12-24" and based on professional and technical judgment, no qualifications were applied to the data.

For method USEPA 8270E SIM, the recovery of fluoranthene-d10 was high and outside of laboratory specified acceptance criteria in sample HA-02-12-24". Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21H0371: For method USEPA 8270E, the recoveries of 2,4,6-tribromophenol were high and outside of laboratory specified acceptance criteria in samples SG-03-0to10 and SG-04-0to10. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E, the recoveries of multiple surrogates were high and outside of laboratory specified acceptance criteria in the MS/MSD pair using sample SG-03-0to10. Since the recoveries of the surrogates were within laboratory specified acceptance criteria in the associated parent sample and based on professional and technical judgment, no qualifications were applied to the data.

For method USEPA 8270E, the recovery of nitrobenzene-d5 was high and outside of laboratory specified acceptance criteria in the LCS in batch BJI0281. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.
For method USEPA 8270E SIM, the recoveries of dibenzo(a,h)anthracene-d14 were high and outside of laboratory specified acceptance criteria in the LCS/CSD pair in batch BJI0112. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21I0190: For method USEPA 8270E, the recovery of 1,2-dichlorobenzene-d4 was low and outside of laboratory specified acceptance criteria in the LCS in batch BJI0471. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E SIM, the recoveries of 1,2-dichlorobenzene-d4 were high and outside of laboratory specified acceptance criteria in sample BH-SC-20-1.5to3 and the MS using sample BH-SC-20-3to5. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

For method USEPA 8270E SIM, the recovery of p-terphenyl-d14 was high and outside of laboratory specified acceptance criteria in sample BH-SC-24-3.8to5.9. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21I0192: For method USEPA 8270E SIM, the surrogate recoveries for sample BH-SB-21-0to2 were flagged with D1, to indicate the surrogates were not detected due to sample extract dilution. Since the surrogates were diluted out of sample BH-SB-21-0to2 and based on professional and technical judgment, no qualifications were applied to the data.

For method USEPA 8270E SIM, the recoveries of 1,2-dichlorobenzene-d4 were high and outside laboratory specified acceptance criteria in sample BH-SB-18-4to6 and the LCS/LCSD pair in batch BJI0564. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21I0246: For method USEPA 8270E SIM, the recoveries of 1,2-dichlorobenzene-d4 were high and outside laboratory specified acceptance criteria in sample BH-SC-20-1.5to3. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21I0278: For method USEPA 8270E SIM, the recovery of dibenzo(a,h)anthracene-d14 in sample BH-SB-17-0to2 and the recoveries of 1,2-dichlorobenzene-d4 in the LCS/LCSD pair in batch BJI0785 were high and outside laboratory specified acceptance criteria. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21I0301: For method USEPA 8270E SIM, the recoveries of dibenzo(a,h)anthracene-d14 were high and outside laboratory specified acceptance criteria in samples BH-SC-21-1.5to3.7, BH-SC-34-1.5to3.3, and the LCS/LCSD pair in batch BJI0792. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

21H0325: For method USEPA 8270E, the recoveries of p-terphenyl-d14 were high and outside laboratory specified acceptance criteria in samples BH-SC-03-3to5, BH-SC-03-5to7, and BH-SC-03-7to10. Since the recoveries of the remaining surrogates were within laboratory specified acceptance criteria, no qualifications were applied to the data, based on professional and technical judgment.

1.10 Sensitivity

The samples were reported to the MDLs in the laboratory reports for USEPA 8270E and USEPA 8270E SIM. The samples were reported to the RLs in the laboratory report for USEPA 8270D

SIM. Elevated non-detect results were reported due to the dilutions analyzed. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP, with the following exceptions. The sediments RLs were not met for diethyl phthalate and benzoic acid. However, the screening levels were met.

1.11 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory reports and in the final the EDDs. Additionally, the * flags (indicating the value is not within established control limits), D flags (indicating the reported value is from a dilution), E flags (indicating the analyte concentration exceeded the upper limit of the calibration range of the instrument established by the initial calibration), M flags (indicating the value is estimated for a GC/MS analyte detected and confirmed by an analyst but with low spectral match parameters), Q flags (indicating a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria), and the Y1 flags (indicating a raised reporting limit due to interference), documented in the laboratory reports were missing in the EDDs. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDDs, respectively.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (GRO, DRO, and MRO) per Methods 3510C/NWTPH-Dx, 3546/NWTPH-Dx, and 3580A/NWTPH-HCID.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
⊗ Field Duplicate
✓ Rinsate Blank
✓ Standard Reference Material
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the

ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Seven method blanks were reported (batches BJH0777, BJI0006, BJI0009, BJI0050, BJI0488, BJI0525, and BJI0678). Petroleum hydrocarbons were not detected in the method blanks above the RLs.

2.4 Matrix Spike/Matrix Spike Duplicate

Four sample specific MS/MSD pairs were reported using samples BH-SB-17-2to4, BH-SB-21-0to2, HA-01-0-12", and HA-15-0-12". The recovery and RPD results were within laboratory specified acceptance criteria, with the following exceptions.

21H0357: The recoveries of DRO for the MS/MSD pair using sample HA-15-0-12" were low and outside of the laboratory specified acceptance criteria. Therefore, based on professional and technical judgement, the DRO result in sample HA-15-0-12" was J qualified as estimated.

21I0192: The recoveries of DRO for the MS/MSD pair using sample BH-SB-21-0to2 were high and outside of the laboratory specified acceptance criteria. Based on the difference between the spiked concentration and sample concentration and professional and technical judgment, the recovery limits were not applicable. Therefore, no qualifications were applied to the data based on the MS/MSD recovery results.

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
HA-15-0-12"	DRO	66.9	NA	66.9	J	4

DRO-diesel range organics
mg/kg-milligram per kilogram
NA – not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.5 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). Six LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria with the following exceptions.

21H0357: It was noted that MRO was not spiked into the LCS/LCSD pairs in batches BJH0777, BJI0006, and BJI0009. Based professional and technical judgment, the MRO results in the associated samples were J qualified as estimated and the non-detect MRO results were UJ qualified as estimated less than the RLs.

It was noted that an LCS was not reported in batch BJI0050 for NWTPH-HCID. Based on method protocol and professional and technical judgment, no qualifications were applied to the data.

21I0214: It was noted that MRO was not spiked into the LCS/LCSD pair in batch BJI0525. Based professional and technical judgment, the non-detect MRO results in the associated samples were UJ qualified as estimated less than the RLs.

21I0225: It was noted that MRO was not spiked into the LCS/LCSD pair in batch BJI0525. Based professional and technical judgment, the non-detect MRO results in the associated samples were UJ qualified as estimated less than the RLs.

21I0192: It was noted that MRO was not spiked into the LCS/LCSD pair in batch BJI0488. Based professional and technical judgment, the MRO results in the associated samples were J qualified as estimated and the non-detect MRO result was UJ qualified as estimated less than the RL.

21I0278: It was noted that MRO was not spiked into the LCS/LCSD pair in batch BJI0678. Based professional and technical judgment, the MRO results in the associated samples were J qualified as estimated.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-EB-GW-210916-1500	MRO	0.20	mg/L	U	0.20	UJ	5
BH-EB-SB-210916	MRO	0.20	mg/L	U	0.20	UJ	5
BH-GW-17-210916	MRO	0.20	mg/L	U	0.20	UJ	5
BH-GW-18-210916	MRO	0.20	mg/L	U	0.20	UJ	5
BH-GW-19-210917	MRO	0.20	mg/L	U	0.20	UJ	5
BH-GW-20-210917	MRO	0.20	mg/L	U	0.20	UJ	5
BH-GW-21-210917	MRO	0.20	mg/L	U	0.20	UJ	5
BH-GW-21-210917-D	MRO	0.20	mg/L	U	0.20	UJ	5
BH-SB-17-0to2	MRO	44.4	mg/kg	NA	44.4	J	5
BH-SB-17-0to2-D	MRO	44.2	mg/kg	NA	44.2	J	5

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SB-17-2to4	MRO	878	mg/kg	NA	878	J	5
BH-SB-17-4to6	MRO	588	mg/kg	NA	588	J	5
BH-SB-18-0to2	MRO	39.7	mg/kg	NA	39.7	J	5
BH-SB-18-2to4	MRO	60.4	mg/kg	NA	60.4	J	5
BH-SB-18-4to6	MRO	12.4	mg/kg	U	12.4	UJ	5
BH-SB-19-0to2	MRO	4280	mg/kg	NA	4280	J	5
BH-SB-19-2to6	MRO	4960	mg/kg	NA	4960	J	5
BH-SB-19-2to6-Dup	MRO	3830	mg/kg	NA	3830	J	5
BH-SB-20-0to3	MRO	203	mg/kg	NA	203	J	5
BH-SB-20-3to5	MRO	751	mg/kg	NA	751	J	5
BH-SB-21-0to2	MRO	7930	mg/kg	NA	7930	J	5
BH-SB-21-2to4	MRO	10500	mg/kg	NA	10500	J	5
BH-SB-21-4to6	MRO	1290	mg/kg	NA	1290	J	5
BH-SB-22-0to2	MRO	86.1	mg/kg	NA	86.1	J	5
BH-SB-22-2to4	MRO	21.9	mg/kg	NA	21.9	J	5
BH-SB-22-4to6	MRO	50.2	mg/kg	NA	50.2	J	5
BH-SB-22-6to10	MRO	795	mg/kg	NA	795	J	5
BH-SB-22-6to10-D	MRO	184	mg/kg	NA	184	J	5
BH-SB-23-0to2	MRO	81.8	mg/kg	NA	81.8	J	5
BH-SB-23-2to4	MRO	23.4	mg/kg	NA	23.4	J	5
BH-SB-23-4to6	MRO	52.6	mg/kg	NA	52.6	J	5
EB20210824	MRO	0.20	mg/L	U	0.20	UJ	5
HA-01-0-12"	MRO	87.7	mg/kg	NA	87.7	J	5
HA-01-12-24"	MRO	49.2	mg/kg	NA	49.2	J	5
HA-02-0-12"	MRO	388	mg/kg	NA	388	J	5
HA-02-12-24"	MRO	164	mg/kg	NA	164	J	5
HA-03-0-12"	MRO	13.2	mg/kg	U	13.2	UJ	5
HA-03-12-24"	MRO	11.0	mg/kg	U	11.0	UJ	5
HA-04-0-12"	MRO	124	mg/kg	NA	124	J	5
HA-04-12-24"	MRO	73.9	mg/kg	NA	73.9	J	5
HA-05-0-12"	MRO	82.8	mg/kg	NA	82.8	J	5
HA-05-12-24"	MRO	99.2	mg/kg	NA	99.2	J	5
HA-06-0-12"	MRO	434	mg/kg	D	434	J	5
HA-06-0-12"-D	MRO	630	mg/kg	D	630	J	5
HA-06-12-24"	MRO	11.9	mg/kg	U	11.9	UJ	5
HA-07-0-12"	MRO	196	mg/kg	NA	196	J	5
HA-07-0-12"-D	MRO	255	mg/kg	NA	255	J	5
HA-08-0-12"	MRO	55.9	mg/kg	NA	55.9	J	5
HA-08-12-24"	MRO	27.3	mg/kg	NA	27.3	J	5

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
HA-09-0-12"	MRO	113	mg/kg	NA	113	J	5
HA-09-12-24"	MRO	28.3	mg/kg	NA	28.3	J	5
HA-10-0-12"	MRO	40.5	mg/kg	NA	40.5	J	5
HA-10-12-24"	MRO	195	mg/kg	D	195	J	5
HA-10-12-24"-D	MRO	375	mg/kg	D	375	J	5
HA-11-0-12"	MRO	54.2	mg/kg	NA	54.2	J	5
HA-11-12-24"	MRO	15.1	mg/kg	NA	15.1	J	5
HA-12-0-12"	MRO	231	mg/kg	NA	231	J	5
HA-12-12-24"	MRO	294	mg/kg	NA	294	J	5
HA-12-12-24"-D	MRO	271	mg/kg	D	271	J	5
HA-13-0-12"	MRO	20.1	mg/kg	NA	20.1	J	5
HA-13-12-24"	MRO	599	mg/kg	D	599	J	5
HA-14-0-12"	MRO	14.2	mg/kg	U	14.2	UJ	5
HA-14-12-24"	MRO	20.7	mg/kg	NA	20.7	J	5
HA-15-0-12"	MRO	317	mg/kg	D	317	J	5
HA-15-12-24"	MRO	225	mg/kg	NA	225	J	5
HA-16-0-12"	MRO	76.1	mg/kg	NA	76.1	J	5
HA-16-12-24"	MRO	15.5	mg/kg	NA	15.5	J	5

D-laboratory flag indicating the reported value is from a dilution
MRO-motor oil range organics
mg/kg-milligram per kilogram
mg/L-milligram per liter
NA-not applicable
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.6 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D
- BH-SC-32-2to4/BH-SC-32-2to4-D

- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D
- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exceptions.

21I0278: The DRO and MRO RPDs in field duplicate pair BH-SB-22-6to10/BH-SB-22-6to10-D were equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the affected results in the field duplicate pair were J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-22-6to10	DRO	633	NA	533	633	J	7
BH-SB-22-6to10-D	DRO	116	NA		116	J	7
BH-SB-22-6to10	MRO	795	NA	664	795	J	7
BH-SB-22-6to10-D	MRO	184	NA		184	J	7

DRO-diesel range organics
MRO-motor oil range organics
mg/kg-milligram per kilogram
NA-not applicable
RPD-relative percent difference
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.7 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. Petroleum hydrocarbons were not detected in the equipment blanks above the MDLs.

2.8 Standard Reference Material

SRMs were not reported with the sample sets.

2.9 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.10 Sensitivity

The samples were reported to the RLs in the laboratory reports. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.11 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. It was noted that the samples were reported to the RLs in the level II reports; both the RLs and the MDLs were listed in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level II reports and the EDDs.

3.0 SIMULTANEOUS EXTRACTED, TOTAL, AND DISSOLVED METALS

The samples were analyzed for simultaneous extracted metals per USEPA Methods 3050B/6020B; and total and dissolved metals per 3010A/6020B, 3010A/6020B UCT-KED, USEPA Methods 3050B/6020B, and 3050B /6020B UCT-KED. Additionally, sample BH-SB-20-0to3 was analyzed for lead by TLCP per USEPA Methods 1311/6010D.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
⊗ Rinsate Blank
⊗ Assessment of Total and Dissolved Metals Concentrations
✓ Standard Reference Material
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

3.1 Overall Assessment

3.1.1 Completeness

The SEM, total, and dissolved metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.1.2 Analysis Anomaly

21I0278: The total cadmium result in sample BH-SB-22-6to10 was flagged with Y1, to indicate a raised reporting limit due to interference. Based on professional and technical judgement, no qualifications were applied to the data.

21L0025: TCLP lead was detected in the leachate blank in batch BJL0188 at an estimated concentration greater than the MDL and less than the RL. Since the associated sample result was U qualified at the RL due to method blank contamination, no additional qualifications were applied to the TCLP lead results based on leachate blank contamination.

3.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. Additionally, the holding time for the metal analysis of a TCLP extraction is 6 months from collection to extraction and 6 months from extraction to analysis. The holding times were met for the sample analyses.

3.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Twenty-one method blanks were reported (batches BJI0008, BJI0039, BJI0121, BJI0137, BJI0167, BJI0262, BJI0305, BJI0308, BJI0315, BJI0317, BJI0573, BJI0616, BJI0695, BJI0808, BJI0887, BJI0888, BJI0889, BJI0895, BJJ0048, BJJ0053, and BJL0283). SEM, total, and dissolved metals were not detected in the method blanks above the MDLs, with the following exceptions.

21H0321: SEM zinc was detected in the method blank in batch BJI0315 at an estimated concentration greater than the MDL and less than the RL. Since SEM zinc was detected in the associated samples at concentrations greater than the RLs, based on professional and technical judgement, no qualifications were applied to the data.

21H0340: SEM zinc-66, and zinc-67 were detected in the method blank in batch BJI0317 at estimated concentrations greater than the MDLs and less than the RLs. When the SEM zinc concentrations were converted from mg/kg into µmol/g, the resulting concentrations were less than the soil MDLs. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

21H0371: SEM zinc-66, and zinc-67 were detected in the method blank in batch BJI0317 at estimated concentrations greater than the MDLs and less than the RLs. When the SEM zinc concentrations were converted from mg/kg into µmol/g, the resulting concentrations were less than the soil MDLs. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

21I0190: Total zinc-67 was detected in the method blanks in batches BJI0616 and BJI0808 at estimated concentrations greater than the MDLs and less than the RLs. Since total zinc was either not detected or detected in the associated samples at concentrations greater than the RLs, based on professional and technical judgement, no qualifications were applied to the data.

21I0325: Total lead-208, zinc-66, and zinc-67 were detected in the method blank in batch BJJ0048 at estimated concentrations greater than the MDLs and less than the RLs. Since total lead and zinc were detected in the associated samples at concentrations greater than the RLs, based on professional and technical judgement, no qualifications were applied to the data.

21L0025: TCLP lead was detected in the method blank in batch BJL0188 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated TCLP lead result in sample BH-SB-20-0to3 was U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-SB-20-0to3	Lead	0.0186	J	0.100	U	3

J-laboratory flag indicating estimated concentration value detected below the reporting limit
mg/L-milligram per liter
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.4 Matrix Spike/Matrix Spike Duplicate

Nineteen sample set specific MS/MSD pairs were reported using samples BH-EB-SB-210916, BH-GW-21-210917, BH-GW-21-210917-D, BH-SB-17-2to4, BH-SB-20-0to3, BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, BH-SC-40-0to2, BH-SC-EB-CC, EB20210824, EB-SG-210826, HA-01-0-12", HA-15-0-12", SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. The recovery and RPD results were within laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recoveries of SEM lead were high and outside the laboratory specified acceptance criteria in the MS/MSD pair using sample SG-35-0to10. Therefore, the SEM lead result in sample SG-35-0to10 was J+ qualified as estimated with high bias.

The recoveries of total silver were low and outside the laboratory specified acceptance criteria in the MS/MSD pair using sample SG-35-0to10. Therefore, the estimated total silver result in sample SG-35-0to10 was J- qualified as estimated with low bias.

21H0357: The recoveries of total chromium, copper and lead were outside of the laboratory specified acceptance criteria in the MS/MSD pair using sample HA-01-0-12". Therefore, the total chromium result in sample HA-01-0-12" was J- qualified as estimated with low bias and the total copper and lead results were J+ qualified as estimated with high biases.

The recoveries of total arsenic, chromium, copper, lead, and zinc and the total chromium RPD were outside of the laboratory specified acceptance criteria in the MS/MSD pair using sample HA-15-0-12". The recoveries of total lead were flagged with HC, to indicate the natural concentration of the spiked analyte was so much greater than the concentration spiked that an accurate determination of spike recovery was not possible; therefore, the recovery limits were not applicable. Therefore, no qualifications were applied to the total lead data. However, the total arsenic and zinc results were J- qualified as estimated with low biases, the total copper result in sample HA-15-0-12" was J+ qualified as estimated with high bias, and the total chromium result was J qualified as estimated.

21H0371: The recovery of total silver was low and outside of the laboratory specified acceptance criteria in the MS using sample SG-03-0to10. Therefore, the estimated total silver result in sample SG-03-0to10 was J qualified as estimated.

21I0190: The recoveries of total lead and silver were low and outside of the laboratory specified acceptance criteria in the MS/MSD pair using sample BH-SC-40-0to2. Therefore, the total lead and silver results in sample BH-SC-40-0to2 were J- qualified as estimated with low biases.

The recoveries of total silver were low and outside of the laboratory specified acceptance criteria in the MS/MSD pair using sample BH-SC-20-3to5. Therefore, the estimated total silver result in sample BH-SC-20-3to5 was J qualified as estimated.

21I0246: The recoveries of total silver were low and outside of the laboratory specified acceptance criteria in the MS/MSD pair using sample BH-SC-26-0to2. Therefore, the estimated total silver result in sample BH-SC-26-0to2 was J qualified as estimated.

21I0301: The recoveries of total copper, lead, silver, and zinc were outside of the laboratory specified acceptance criteria in the MS/MSD pair using sample BH-SC-34-0to1.5. The recoveries of total lead were flagged with HC, to indicate the natural concentration of the spiked analyte was so much greater than the concentration spiked that an accurate determination of spike

recovery was not possible; therefore, the recovery limits were not applicable. Therefore, no qualifications were applied to the total lead data. However, based on professional and technical judgement, the total copper and silver results in sample BH-SC-34-0to1.5 were J- qualified as estimated with low biases and the total zinc result in sample BH-SC-34-0to1.5 was J qualified as estimated.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-20-3to5	Silver	0.06	mg/kg	J	0.06	J	4
BH-SC-26-0to2	Silver	0.06	mg/kg	J	0.06	J	4
BH-SC-34-0to1.5	Copper	229	mg/kg	NA	229	J-	4
BH-SC-34-0to1.5	Silver	0.47	mg/kg	J	0.47	J	4
BH-SC-34-0to1.5	Zinc	545	mg/kg	NA	545	J	4
BH-SC-40-0to2	Lead	36.8	mg/kg	NA	36.8	J-	4
BH-SC-40-0to2	Silver	0.11	mg/kg	J	0.11	J	4
HA-01-0-12"	Chromium	26.6	mg/kg	NA	26.6	J-	4
HA-01-0-12"	Copper	72.9	mg/kg	NA	72.9	J+	4
HA-01-0-12"	Lead	51.3	mg/kg	NA	51.3	J+	4
HA-15-0-12"	Arsenic	11.0	mg/kg	NA	11.0	J-	4
HA-15-0-12"	Chromium	29.4	mg/kg	NA	29.4	J	4
HA-15-0-12"	Copper	109	mg/kg	NA	109	J+	4
HA-15-0-12"	Zinc	134	mg/kg	NA	134	J-	4
SG-03-0to10	Silver	0.07	mg/kg	J	0.07	J	4
SG-35-0to10	Lead	12.6	µmol/g	NA	12.6	J+	4
SG-35-0to10	Silver	0.16	mg/kg	J	0.16	J	4

J-laboratory flag indicating estimated concentration value detected below the reporting limit
mg/kg-milligram per kilogram
NA-not applicable
µmol/g-micromole per gram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Twenty LCSs and one LCS/LCSD pair were reported. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recoveries of SEM zinc-66 and zinc-67 in the LCS in batch BJI0315 were high and outside of the laboratory specified acceptance criteria. Therefore, based on professional and technical judgement, the SEM zinc results in the associated samples were J+ qualified as estimated with high biases.

21H0340: The recoveries of SEM zinc-66 and zinc-67 in the LCS in batch BJI0317 were high and outside of the laboratory specified acceptance criteria. Therefore, based on professional and technical judgement, the SEM zinc results in samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were J+ qualified as estimated with high biases.

21H0371: The recoveries of SEM zinc-66 and zinc-67 in the LCS in batch BJI0317 were high and outside of the laboratory specified acceptance criteria. Therefore, based on professional and technical judgement, the SEM zinc results in samples SG-03-0to10 and SG-04-0to10 were J+ qualified as estimated with high biases.

21L0075: It was noted that an LCS was not reported in batch BJL0283. Based on method protocol and professional and technical judgment, no qualifications were applied to the data.

Sample ID	Compound	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
SG-01-0to10	Zinc	3.50	B, D	3.50	J+	5
SG-02-0to10	Zinc	2.60	B, D	2.60	J+	5
SG-03-0to10	Zinc	1.90	B, D	1.90	J+	5
SG-04-0to10	Zinc	2.10	B, D	2.10	J+	5
SG-05-0to10	Zinc	4.00	B, D	4.00	J+	5
SG-06-0to10	Zinc	7.70	B, D	7.70	J+	5
SG-08-0to10	Zinc	3.10	B, D	3.10	J+	5
SG-09-0to10	Zinc	1.40	B, D	1.40	J+	5
SG-10-0to10	Zinc	5.20	B, D	5.20	J+	5
SG-11-0to10	Zinc	3.50	B, D	3.50	J+	5
SG-13-0to10	Zinc	2.80	B, D	2.80	J+	5
SG-15-0to10	Zinc	2.60	B, D	2.60	J+	5
SG-15-0to10-D	Zinc	1.90	B, D	1.90	J+	5
SG-18-0to10	Zinc	2.50	B, D	2.50	J+	5
SG-19-0to10	Zinc	1.20	B, J, D	1.20	J+	5
SG-22-0to10	Zinc	5.30	B, D	5.30	J+	5
SG-22-0to10-D	Zinc	4.20	B, D	4.20	J+	5
SG-23-0to10	Zinc	9.60	B, D	9.60	J+	5
SG-25-0to10	Zinc	3.80	B, D	3.80	J+	5
SG-26-0to10	Zinc	1.70	B, D	1.70	J+	5
SG-27-0to10	Zinc	3.10	B, D	3.10	J+	5
SG-28-0to10	Zinc	1.70	B, D	1.70	J+	5
SG-30-0to10	Zinc	1.90	B, D	1.90	J+	5

Sample ID	Compound	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
SG-31-0to10	Zinc	1.90	B, D	1.90	J+	5
SG-33-0to10	Zinc	6.20	B, D	6.20	J+	5
SG-35-0to10	Zinc	3.50	B, D	3.50	J+	5
SG-36-0to10	Zinc	4.40	B, D	4.40	J+	5
SG-37-0to10	Zinc	1.50	B, J, D	1.50	J+	5
SG-37-0to10-D	Zinc	1.30	B, J, D	1.30	J+	5
SG-39-0to10	Zinc	206	B, D	206	J+	5
SG-41-0to10	Zinc	6.70	B, D	6.70	J+	5
SG-42-0to10	Zinc	3.50	B, D	3.50	J+	5

B- laboratory flag indicating this analyte was detected in the method blank
D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating estimated concentration value detected below the reporting limit
NA-not applicable
µmol/g-micromole per gram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.6 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D
- BH-SC-32-2to4/BH-SC-32-2to4-D
- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D
- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exceptions.

21H0321: The total arsenic and lead and SEM copper and lead RPDs for field duplicate pair SG-15-0to10/SG-15-0to10-D were equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the total arsenic and lead and SEM copper and lead concentrations in samples SG-15-0to10 and SG-15-0to10-D were J qualified as estimated.

Total cadmium was detected in original sample SG-15-0to10 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample SG-15-0to10-D, resulting in a noncalculable RPD between the results. Therefore, based on professional and technical judgment, the total cadmium concentrations in the field duplicate pair were J qualified as estimated.

SEM cadmium was detected in original sample SG-15-0to10 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample SG-15-0to10-D, resulting in a noncalculable RPD between the results. Therefore, based on professional and technical judgment, the concentration of SEM cadmium was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

21H0357: The total copper RPD for field duplicate pair HA-06-0-12"/HA-06-0-12"-D was equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the total copper concentrations in samples HA-06-0-12"and HA-06-0-12"-D were J qualified as estimated.

Total cadmium was detected at an estimated concentration greater than the MDL and less than the RL in original sample HA-06-0-12" and at a concentration greater than the RL in field duplicate sample HA-06-0-12"-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the total cadmium concentrations in the field duplicate pair were J qualified as estimated.

The total copper and zinc RPDs for field duplicate pair HA-10-12-24"/ HA-10-12-24"-D were equal to and/or greater than 50%. Due to the difference between the samples' dilutions and RLs and based on professional and technical judgment, no qualifications were applied to the total copper and zinc results in in field duplicate samples HA-10-12-24"/ HA-10-12-24"-D.

21I0246: The total chromium and copper RPDs for field duplicate pair BH-SC-26-4to6/BH-SC-26-4to6-D were equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the total chromium and copper concentrations in samples BH-SC-26-4to6 and BH-SC-26-4to6-D were J qualified as estimated.

21I0301: The total lead RPD for field duplicate pair BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D was equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the total lead concentrations in samples BH-SC-34-1.5to3.3 and BH-SC-34-1.5to3.3-D were J qualified as estimated.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-26-4to6	Chromium	20.4	mg/kg	NA	58	20.4	J	7
BH-SC-26-4to6-D	Chromium	11.2	mg/kg	NA		11.2	J	7
BH-SC-26-4to6	Copper	12.9	mg/kg	NA	52	12.9	J	7
BH-SC-26-4to6-D	Copper	7.61	mg/kg	NA		7.61	J	7
BH-SC-34-1.5to3.3	Lead	414	mg/kg	NA	69	414	J	7
BH-SC-34-1.5to3.3-D	Lead	201	mg/kg	NA		201	J	7
HA-06-0-12"	Copper	108	mg/kg	D	74	108	J	7
HA-06-0-12"-D	Copper	236	mg/kg	D		236	J	7
HA-06-0-12"	Cadmium	0.29	mg/kg	J, D	NC	0.29	J	7
HA-06-0-12"-D	Cadmium	0.29	mg/kg	D		0.29	J	7
SG-15-0to10	Arsenic	4.57	mg/kg	NA	65	4.57	J	7
SG-15-0to10-D	Arsenic	8.92	mg/kg	NA		8.92	J	7
SG-15-0to10	Cadmium	0.21	mg/kg	NA	NC	0.21	J	7
SG-15-0to10-D	Cadmium	0.08	mg/kg	J		0.08	J	7
SG-15-0to10	Cadmium	0.02	umol/g	J, D	NC	0.02	J	7
SG-15-0to10-D	Cadmium	0.01	umol/g	U		0.01	UJ	7
SG-15-0to10	Copper	0.84	umol/g	D	51	0.84	J	7
SG-15-0to10-D	Copper	0.50	umol/g	D		0.50	J	7
SG-15-0to10	Lead	31.9	mg/kg	NA	95	31.9	J	7
SG-15-0to10-D	Lead	11.3	mg/kg	NA		11.3	J	7
SG-15-0to10	Lead	8.31	umol/g	D	111	8.31	J	7
SG-15-0to10-D	Lead	2.35	umol/g	D		2.35	J	7

D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating estimated concentration value detected below the reporting limit
mg/kg-milligram per kilogram
NA-not applicable
NC-not calculable
RPD-relative percent difference
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
µmol/g-micromole per gram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.7 Laboratory Duplicate

Nineteen sample specific laboratory duplicates were reported using samples BH-EB-SB-210916, BH-GW-21-210917, BH-GW-21-210917-D, BH-SB-17-2to4, BH-SB-20-0to3, BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, BH-SC-40-0to2, BH-SC-EB-CC, EB20210824, EB-SG-210826, HA-01-0-12", HA-15-0-12", SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less

than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

21H0357: The total cadmium and chromium RPDs were high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample HA-01-0-12". Since the total cadmium results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The total chromium result in sample HA-01-0-12" was J qualified as estimated.

The total arsenic and cadmium RPDs were high and outside the laboratory specified acceptance criteria in the laboratory duplicate using sample HA-15-0-12". Therefore, the total arsenic and cadmium results in sample HA-15-0-12" were J qualified as estimated.

The SEM copper RPD was high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample SG-03-0to10. Therefore, the SEM copper result in sample SG-03-0to10 was J qualified as estimated.

21I0190: The total lead and silver RPDs were high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample BH-SC-40-0to2. Since the total silver results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The total lead result in sample BH-SC-40-0to2 was J qualified as estimated.

The total lead, silver, and zinc RPDs were high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample BH-SC-20-3to5. Since the total silver and zinc results in the original sample and laboratory duplicate sample were less than five times the RLs and the absolute difference between the results was less than the RLs, no qualifications were applied to the data. The total lead result in sample BH-SC-20-3to5 was J qualified as estimated.

21I0246: The total arsenic, cadmium, and silver RPDs were high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample BH-SC-26-0to2. Since the total cadmium and silver results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The total arsenic result in sample BH-SC-26-0to2 was J qualified as estimated.

21I0301: The total cadmium, copper, and silver RPDs were high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample BH-SC-34-0to1.5. However, since the total cadmium and silver results in the original sample and laboratory duplicate sample were less than five times the RLs and the absolute difference between the results was less than the RLs, no qualifications were applied to the data. The total copper result in sample BH-SC-34-0to1.5 was J qualified as estimated.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
BH-SC-20-3to5	Lead	1.69	mg/kg	NA	1.69	J	12
BH-SC-26-0to2	Arsenic	6.42	mg/kg	NA	6.42	J	12
BH-SC-34-0to1.5	Copper	229	mg/kg	NA	229	J	12
BH-SC-40-0to2	Lead	36.8	mg/kg	NA	36.8	J	12
HA-01-0-12"	Chromium	26.6	mg/kg	NA	26.6	J	12
HA-15-0-12"	Arsenic	11.0	mg/kg	NA	11.0	J	12
HA-15-0-12"	Cadmium	0.10	mg/kg	J	0.10	J	12
SG-03-0to10	Copper	0.51	umol/g	D	0.51	J	12

D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating an estimated concentration value detected below the reporting limit
mg/kg-milligram per kilogram
NA-not applicable
µmol/g-micromole per gram
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.8 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. The equipment blanks were not analyzed for SEM. Total and dissolved metals were not detected in the equipment blanks above the MDLs, with the following exceptions.

Total chromium was detected in equipment blank EB-SG-210826 at an estimated concentration greater than the MDL and less than the RL. When the total chromium concentration was converted from µg/L into mg/kg, the resulting concentration was less than the soil MDLs. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

Total chromium and copper were detected in equipment blank BH-SC-EB-CC at estimated concentrations greater than the MDLs and less than the RLs. When the total chromium and copper concentrations were converted from µg/L into mg/kg, the resulting concentrations were less than the soil MDLs. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

Total chromium, lead, and copper were detected in equipment blank BH-SC-EB-CP at estimated concentrations greater than the MDLs and less than the RLs. When the total chromium, lead, and copper concentrations were converted from µg/L into mg/kg, the resulting concentrations were less than the soil MDLs. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

Total chromium (0.678 µg/L) and lead (1.97 µg/L) were detected in equipment blank BH-EB-GW-210916-1500 at concentrations greater than the RLs and total copper was detected at an

estimated concentration greater than the MDL and less than the RL. Therefore, the estimated total chromium results in samples BH-GW-20-210917, BH-GW-21-210917, and BH-GW-21-210917-D, the estimated total lead result in sample BH-GW-17-210916, and the estimated total copper results in samples BH-GW-18-210916, BH-GW-19-210917, and BH-GW-20-210917 were U qualified as estimated less than the RLs. Based on professional and technical judgement, the total chromium results in samples BH-GW-17-210916 and BH-GW-18-210916 and the total lead results in samples BH-GW-18-210916, BH-GW-19-210917, BH-GW-21-210917, and BH-GW-21-210917-D were J+ qualified as estimated with high biases.

Dissolved chromium (0.631 ug/L), copper (0.183 ug/L), and lead (0.982 ug/L) were detected in equipment blank BH-EB-GW-210916-1500 at concentrations greater than the RLs and dissolved arsenic was detected at an estimated concentration greater than the MDL and less than the RL. Since dissolved copper and lead were not detected in the associated samples, no qualifications were applied to the data. However, the estimated dissolved arsenic results in samples BH-GW-17-210916, BH-GW-18-210916, BH-GW-19-210917, BH-GW-20-210917, BH-GW-21-210917, and BH-GW-21-210917-D were U qualified as not detected at the RLs. Additionally, based on professional and technical judgement, the dissolved chromium results in samples BH-GW-17-210916 and BH-GW-18-210916 were J+ qualified as estimated with high biases.

Total arsenic was detected in equipment blank EB20210824 at an estimated concentration greater than the MDL and less than the RL. When the total arsenic concentration was converted from µg/L into mg/kg, the resulting concentration was less than the soil MDL. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

Sample ID	Compound	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-17-210916	Chromium	1.88	NA	1.88	J+	3
BH-GW-17-210916	Lead	1.80	D, J	2.00	U	3
BH-GW-17-210916	Chromium	0.987	NA	0.987	J+	3
BH-GW-17-210916	Arsenic	2.70	J, D	4.00	U	3
BH-GW-18-210916	Chromium	4.06	NA	4.06	J+	3
BH-GW-18-210916	Lead	8.30	D	8.30	J+	3
BH-GW-18-210916	Chromium	1.14	NA	1.14	J+	3
BH-GW-18-210916	Arsenic	2.94	J, D	4.00	U	3
BH-GW-19-210917	Lead	7.50	D	7.50	J+	3
BH-GW-19-210917	Arsenic	3.66	J, D	4.00	U	3
BH-GW-20-210917	Chromium	9.36	J, D	10.0	U	3
BH-GW-20-210917	Arsenic	1.70	J, D	4.00	U	3
BH-GW-21-210917	Chromium	8.86	J, D	10.0	U	3
BH-GW-21-210917	Lead	2.84	D	2.84	J+	3
BH-GW-21-210917	Arsenic	1.28	J, D	4.00	U	3
BH-GW-21-210917-D	Chromium	7.16	J, D	10.0	U	3

Sample ID	Compound	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-21-210917-D	Lead	3.72	D	3.72	J+	3
BH-GW-21-210917-D	Arsenic	1.24	J, D	4.00	U	3

D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating an estimated concentration value detected below the reporting limit
NA-not applicable
µg/L-microgram per liter
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.9 Assessment of Total and Dissolved Metals

Samples BH-EB-GW-210916-1500, BH-GW-17-210916, BH-GW-18-210916, BH-GW-19-210917, BH-GW-20-210917, BH-GW-21-210917, BH-GW-21-210917-D, and BH-EB-SB-210916 were analyzed for total and dissolved metals. The samples had total metals concentrations greater than the dissolved metals concentrations, with the following exceptions.

21I0214: Dissolved copper was detected in sample BH-EB-GW-210916-1500 at a concentration greater than the RL and total copper was detected at an estimated concentration greater than the MDL and less than the RL. Therefore, based on professional and technical judgment, the total and dissolved copper results in sample BH-EB-GW-210916-1500 were J qualified as estimated.

21I0225: Dissolved chromium was detected in samples BH-GW-20-210917, BH-GW-21-210917, and BH-GW-21-210917-D at concentrations greater than the RLs and total chromium was detected at estimated concentrations greater than the MDLs and less than the RLs. Therefore, based on professional and technical judgment, the total and dissolved chromium results in samples BH-GW-20-210917, BH-GW-21-210917, and BH-GW-21-210917-D were J qualified as estimated.

Sample ID	Compound	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-210916-1500	Total Copper	0.183	J	0.183	J	13
BH-EB-GW-210916-1500	Dissolved Copper	0.666	NA	0.666	J	13
BH-GW-20-210917	Total Chromium	9.36	J, D	9.36	J	13
BH-GW-20-210917	Dissolved Chromium	14.4	D	14.4	J	13
BH-GW-21-210917	Total Chromium	8.86	J, D	8.86	J	13
BH-GW-21-210917	Dissolved Chromium	14.7	D	14.7	J	13
BH-GW-21-210917-D	Total Chromium	7.16	J, D	7.16	J	13

Sample ID	Compound	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-21-210917-D	Dissolved Chromium	15.40	D	15.40	J	13

D-laboratory flag indicating the reported value is from a dilution
J-laboratory flag indicating estimated concentration value detected below the reporting limit
µg/L-microgram per liter
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Standard Reference Material

Two SRMs were reported with the sample sets. The recoveries were within the laboratory specified acceptance criteria.

3.11 Sensitivity

The samples were reported to the MDLs in the laboratory reports. Elevated non-detect results were reported due to the dilutions analyzed. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. Additionally, the ground water and sediment RLs listed in Tables 9b and 9c of the QAPP were not met for total zinc. However, the screening levels were met.

3.12 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory reports and the final EDDs. Additionally, the * flags (indicating the value is not within established control limits), the D flags (indicating the reported value is from a dilution), HC flags (indicating the natural concentration of the spiked analyte is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible), L flags (indicating the analyte concentration is less than or equal to five times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD), and the Y1 flags (indicating a raised reporting limit due to interference), in the laboratory reports were missing in the EDDs.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods SW7470A and SW7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Assessment of Total and Dissolved Metals
✓ Standard Reference Material
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total and dissolved mercury analysis of a solid sample is 28 days from collection to analysis. Additionally, the holding time for the mercury analysis of a preserved water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Seventeen method blanks were reported (batches BJI0041, BJI0139, BJI0140, BJI0209, BJI0237, BJI0265, BJI0307, BJI0390, BJI0655, BJI0690, BJI0693, BJI0728, BJI0751, BJI0804, BJI0816, BJI0901, and BJJ0061). Total and dissolved mercury were not detected in the method blanks above the MDLs, with the following exceptions.

21I0190: Total mercury was detected in the method blank in batch BJI0751 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated total mercury result in sample BH-SC-40-8to9 was U qualified as not detected at the RL. Additionally, based on

professional and technical judgement, the mercury result in sample BH-SC-40-4to6 was J+ qualified as estimated with high bias.

21I0192: Total mercury was detected in the method blank in batch BJI0751 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated total mercury results in samples BH-SB-19-2to6, BH-SB-19-2to6-Dup, BH-SB-20-3to5, and BH-SB-21-2to4 were U qualified as not detected at the RLs.

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-19-2to6	Mercury	0.0582	J	0.108	U	3
BH-SB-19-2to6-Dup	Mercury	0.118	J	0.137	U	3
BH-SB-20-3to5	Mercury	0.0421	J	0.0708	U	3
BH-SB-21-2to4	Mercury	0.0281	J	0.0321	U	3
BH-SC-40-4to6	Mercury	0.000047	NA	0.000047	J+	3
BH-SC-40-8to9	Mercury	0.0277	J	0.0281	U	3

J-laboratory flag indicating estimated concentration value detected below the reporting limit
mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.4 Matrix Spike/Matrix Spike Duplicate

Twenty-one sample specific MS/MSD pairs were reported using samples BH-EB-SB-210916, BH-GW-18-210916, BH-GW-21-210917-D, BH-SB-17-2to4, BH-SB-21-0to2, BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, BH-SC-40-0to2, BH-SC-EB-CP, EB20210824, EB-SG-210826, HA-01-0-12", HA-04-12-24", HA-15-0-12", SG-03-0to10, SG-15-0to10-D, SG-18-0to10, SG-19-0to10, and SG-35-0to10. The recovery and RPD results were within laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recovery of total mercury was high and outside of the laboratory specified criteria in the MSD using sample SG-35-0to10. Therefore, the total mercury result in sample SG-35-0to10 was J+ qualified as estimated with high bias.

21I0301: The recovery and RPD results for total mercury were high and outside of the laboratory specified criteria in the MS/MSD pair using sample BH-SC-34-0to1.5. Therefore, based on professional and technical judgement, the total mercury result in sample BH-SC-34-0to1.5 was J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-34-0to1.5	Mercury	0.148	NA	0.148	J	4
SG-35-0to10	Mercury	0.231	NA	0.231	J+	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Sixteen LCSs and one LCS/LCSD pair were reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.6 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D
- BH-SC-32-2to4/BH-SC-32-2to4-D
- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D
- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exceptions.

21H0321: Total mercury was detected in original sample SG-15-0to10 at a concentration greater than the RL and at an estimated concentration greater than the MDL and less than the RL in field duplicate sample SG-15-0to10-D, resulting in a noncalculable RPD between the results. Therefore, based on professional and technical judgment, the total mercury concentrations in the field duplicate pair were J qualified as estimated.

21H0357: The total mercury RPD for field duplicate pair HA-12-12-24"/HA-12-12-24"-D was equal to and/or greater than 50%. Due to the difference between the samples' dilutions and RLs and based on professional and technical judgment, no qualifications were applied to the total mercury results in in field duplicate samples HA-12-12-24"/HA-12-12-24"-.

21I0278: Total mercury was not detected in original sample BH-SB-17-0to2 and was detected at an estimated concentration greater than the MDL and less than the RL in field duplicate sample BH-SB-17-0to2-D, resulting in a noncalculable RPD between the results. Therefore, based on professional and technical judgment, the estimated concentration of total mercury was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

21I0225: Dissolved mercury was detected in original sample BH-GW-21-210917 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-GW-21-210917-D, resulting in a noncalculable RPD between the results. Therefore, based on professional and technical judgment, the concentration of dissolved mercury was J qualified as estimated and the non-detect result was UJ qualified as estimated less than the MDL in the field duplicate pair.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
BH-GW-21-210917	Mercury	0.00002	mg/L	J	NC	0.00002	J	7
BH-GW-21-210917-D	Mercury	0.000013	mg/L	U		0.000013	UJ	7
BH-SB-17-0to2	Mercury	0.0069	mg/kg	U	NC	0.0069	UJ	7
BH-SB-17-0to2-D	Mercury	0.0141	mg/kg	J		0.0141	J	7
SG-15-0to10	Mercury	0.0568	mg/kg	NA	NC	0.0568	J	7
SG-15-0to10-D	Mercury	0.0231	mg/kg	J		0.0231	J	7

J-laboratory flag indicating estimated concentration value detected below the reporting limit
mg/L-milligram per liter
mg/kg-milligram per kilogram
NA-not applicable
NC- noncalculable
RPD-relative percent difference
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.7 Laboratory Duplicate

Twenty-one sample specific laboratory duplicates were reported using samples BH-EB-SB-210916, BH-GW-18-210916, BH-GW-21-210917-D, BH-SB-17-2to4, BH-SB-21-0to2, BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-34-0to1.5, BH-SC-40-0to2, BH-SC-EB-CP, EB20210824, EB-SG-210826, HA-01-0-12", HA-04-12-24", HA-15-0-12", SG-03-0to10, SG-18-0to10, SG-19-0to10, SG-15-0to10-D, and SG-35-0to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data.
The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

21H0321: The total mercury RPDs were high and outside of the laboratory specified acceptance criteria in the laboratory duplicates using samples SG-15-0to10-D and SG-35-0to10. However, since the total mercury results in original sample SG-15-0to10-D and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The total mercury concentration in sample SG-35-0to10 was J qualified as estimated.

21H0340: The total mercury RPD was high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample SG-18-0to10. Since the total mercury results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data.

21H0357: The total mercury RPD was high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample HA-15-0-12". Therefore, the total mercury concentration in sample HA-15-0-12" was J qualified as estimated.

21I0192: The total mercury RPD was high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample BH-SB-21-0to2. Therefore, the total mercury result in sample BH-SB-21-0to2 was J qualified as estimated.

.21I0301: The total mercury RPD was high and outside of the laboratory specified acceptance criteria in the laboratory duplicate using sample BH-SC-34-0to1.5. Therefore, the total mercury result in sample BH-SC-34-0to1.5 was J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-21-0to2	Mercury	0.222	NA	0.222	J	12
BH-SC-34-0to1.5	Mercury	0.148	NA	0.148	J	12
HA-15-0-12"	Mercury	0.111	NA	0.111	J	12

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
SG-35-0to10	Mercury	0.231	NA	0.231	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. Total and dissolved mercury were not detected in the equipment blanks above the MDLs.

4.9 Assessment of Total and Dissolved Metals

Samples BH-EB-GW-210916-1500, BH-GW-17-210916, BH-GW-18-210916, BH-GW-19-210917, BH-GW-20-210917, BH-GW-21-210917, BH-GW-21-210917-D, and BH-EB-SB-210916 were analyzed for total and dissolved mercury. The samples had total mercury concentrations greater than the dissolved mercury concentrations, with the following exception.

21I0225: Dissolved mercury was detected in sample BH-GW-21-210917 at an estimated concentration greater than the MDL and less than the RL and total mercury was not detected. Therefore, based on professional and technical judgment, the concentration of dissolved mercury was J qualified as estimated and the non-detect total mercury result was UJ qualified as estimated less than the MDL.

Sample ID	Compound	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-21-210917	Total Mercury	0.000013	U	0.000013	UJ	13
BH-GW-21-210917	Dissolved Mercury	0.00002	J	0.00002	J	13

J-laboratory flag indicating estimated concentration value detected below the reporting limit
mg/L-milligram per liter
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.10 Standard Reference Material

Three SRM samples was reported with the sample sets. The recoveries were within the laboratory specified acceptance criteria.

4.11 Sensitivity

The samples were reported to the MDLs in the laboratory reports. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.12 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The * flags (indicating the value is not within established control limits), D flags (indicating the reported value is from a dilution, and the L flags (indicating the analyte concentration is less than or equal to five times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD) in the laboratory reports were missing in the EDDs.

5.0 HEXAVALENT CHROMIUM

The samples were analyzed for hexavalent chromium by USEPA Methods 3060A/7196A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Equipment Blank
✓ Standard Reference Material
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

5.1 Overall Assessment

5.1.1 Completeness

The hexavalent chromium data reported in this data set are not considered usable for supporting project objectives. The non-detect hexavalent chromium results in samples BH-SB-18-2to4, BH-SB-18-4to6, BH-SB-20-0to3, BH-SB-21-0to2, BH-SB-21-2to4, HA-04-0-12", HA-05-0-12", HA-05-12-24", HA-09-0-12", HA-09-12-24", HA-11-0-12", and HA-16-0-12"were R qualified as

rejected due to holding time exceedances. Therefore, the results are considered not valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 0%.

5.1.2 Analysis Anomaly

The recovery of hexavalent chromium was low and outside of the laboratory specified criteria in the post-spike sample associated with batch BJJ0561. Since the hexavalent chromium result for the associated samples were R qualified as rejected due to a holding time exceedance, no additional qualifications were applied to the data.

5.2 Holding Times

The holding time for the hexavalent chromium analysis of a solid sample is 30 days from collection to analysis. The extraction holding times were not met; the samples were extracted 8-34 days after the method specified holding time. Therefore, the non-detect hexavalent chromium results in samples BH-SB-18-2to4, BH-SB-18-4to6, BH-SB-20-0to3, BH-SB-21-0to2, BH-SB-21-2to4, HA-04-0-12", HA-05-0-12", HA-05-12-24", HA-09-0-12", HA-09-12-24", HA-11-0-12", and HA-16-0-12" were R qualified as rejected.

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier**	Reason Code***
BH-SB-18-2to4	Hexavalent chromium	3.86	*, H, K, U	3.86	R	2
BH-SB-18-4to6	Hexavalent chromium	0.599	H, U	0.599	R	2
BH-SB-20-0to3	Hexavalent chromium	0.913	H, U	0.913	R	2
BH-SB-21-0to2	Hexavalent chromium	1.02	H, U	1.02	R	2
BH-SB-21-2to4	Hexavalent chromium	0.769	H, U	0.769	R	2
HA-04-0-12"	Hexavalent chromium	3.22	H, U	3.22	R	2
HA-05-0-12"	Hexavalent chromium	0.614	H, U	0.614	R	2
HA-05-12-24"	Hexavalent chromium	0.674	H, U	0.674	R	2
HA-09-0-12"	Hexavalent chromium	0.545	H, U	0.545	R	2
HA-09-12-24"	Hexavalent chromium	0.525	H, U	0.525	R	2
HA-11-0-12"	Hexavalent chromium	0.532	H, U	0.532	R	2

Sample ID	Compound	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier**	Reason Code***
HA-16-0-12"	Hexavalent chromium	0.489	H, U	0.489	R	2

H-lab flag indicating hold time was exceeded
K-lab flag indicating post spike performed on a pH adjusted sample to verify matrix interference
mg/kg-milligram per kilogram
NA- not applicable
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
*-lab flag indicating value is not within established control limits
** Validation qualifiers are defined in Attachment 1 at the end of this report
*** Reason codes are defined in Attachment 2 at the end of this report

5.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BJJ0561). Hexavalent chromium was not detected in the method blank above the MDL.

5.4 Matrix Spike/Matrix Spike Duplicate

One sample specific MS/MSD pair was reported using sample BH-SB-20-0to3. The recovery and RPD results were within laboratory specified acceptance criteria, with the following exception.

21J0204: The recoveries of hexavalent chromium were low and RPD high and outside of the laboratory specified criteria in the MS/MSD pair using sample BH-SB-20-0to3. Since the hexavalent chromium result for sample BH-SB-20-0to3 was R qualified as rejected due to a holding time exceedance, no additional qualifications were applied to the data.

5.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

5.6 Field Duplicate

Seventeen field duplicate sample pairs were collected with the sample sets. The field duplicate pairs were not analyzed for hexavalent chromium.

5.7 Laboratory Duplicate

One sample specific laboratory duplicate was reported using sample BH-SB-20-0to3. The RPD result was within the laboratory specified acceptance criteria.

5.8 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event. The equipment blanks were not analyzed for hexavalent chromium.

5.9 Standard Reference Material

SRMs were not reported with the sample sets.

5.10 Sensitivity

The samples were reported to the MDL in the laboratory report. No elevated non-detect results were reported. MDLs, RLs, and screening levels were not listed in the QAPP for hexavalent chromium.

5.11 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The * flags (indicating the value is not within established control limits), D flags (indicating the reported value is from a dilution), H flags (indicating the hold time was exceeded), and the K flags (indicating a post spike performed on a pH adjusted sample to verify matrix interference) in the laboratory reports were missing in the EDDs.

6.0 TOTAL ORGANIC CARBON

The samples were analyzed for TOC by PSEP Method 1986 (modified) and USEPA Method 9060A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
⊗ Holding Times
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
✓ Standard Reference Material
✓ Sensitivity

⊗ Electronic Data Deliverable Review

6.1 Overall Assessment

6.1.1 Completeness

The TOC data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

6.2 Holding Times

According to the QAPP, the holding time for the TOC analysis of a sediment sample is 14 days from collection to analysis and if samples are frozen to -18°C, the holding time for the TOC analysis of sediments are extended to 6 months from collection to analysis. Additionally, the holding time for the TOC analysis of a preserved water sample is 28 days from collection to analysis. The holding times were met for the sample analyses, with the following exceptions.

21I0190: Sample BH-SC-24-3.8to5.9-D was analyzed for TOC ten days past the 14-day holding time due to analyst oversight. Therefore, based on professional and technical judgement, the TOC result in sample BH-SC-24-3.8to5.9-D was J qualified as estimated.

21I0301: Sample BH-SC-34-1.5to3.3-D was analyzed for TOC seven days past the 14-day holding time due to analyst oversight. Therefore, based on professional and technical judgement, the TOC result in sample BH-SC-34-1.5to3.3-D was J qualified as estimated.

Additionally, the MS/MSD pair using sample BH-SC-34-0to1.5 was analyzed for TOC seven days past the 14-day holding time due to analyst oversight. Based on the holding time exceedance and professional and technical judgment, the recovery and precision assessments were not performed for this MS/MSD pair.

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-24-3.8to5.9-D	TOC	7.14	H	7.14	J	2
BH-SC-34-1.5to3.3-D	TOC	5.19	H	5.19	J	2

H-laboratory flag indicating hold time was exceeded
NA- not applicable
TOC-total organic carbon
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

6.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Twelve method blanks were reported (batches BJH0805, BJH0806, BJI0021, BJI0185, BJI0536, BJI0631, BJI0762, BJI0763, BJJ0015, BJJ0016, BJJ0167, and BJJ0341). TOC was not detected in the method blanks above the MDLs.

6.4 Matrix Spike/Matrix Spike Duplicate

Eleven sample specific MS/MSD pairs were reported using samples BH-SC-07-0to2.5, BH-SC-07-2.5to4.2, BH-SC-20-3to5, BH-SC-40-0to2, BH-SC-EB-CP, BH-SC-26-0to2, BH-SC-34-0to1.5, SG-03-0to10, SG-15-0to10-D, and SG-35-0to10. The recovery and RPD results were within laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recovery of TOC in the MS using sample SG-35-0to10 was low and the RPDs in the MS/MSD pairs using samples SG-35-0to10 and SG-15-0to10-D were high and outside of the laboratory specified criteria. Based on the difference between the spiked concentration and sample concentration and professional and technical judgment, the recovery limits were not applicable for the MS/MSD pair using sample SG-35-0to10. Therefore, no qualifications were applied to the data based on the MS/MSD recovery results. However, based on professional and technical judgment, the TOC result in sample SG-15-0to10-D was J qualified as estimated.

21I0301: The recovery of TOC in the MSD using sample BH-SC-34-0to1.5 was high and outside of the laboratory specified criteria. Therefore, based on professional and technical judgment, the TOC result in sample BH-SC-34-0to1.5 was J qualified as estimated.

21I0325: The TOC RPD for the MS/MSD pair using sample BH-SC-07-0to2.5 was high and outside of the laboratory specified criteria. Therefore, based on professional and technical judgment, the TOC result in sample BH-SC-07-0to2.5 was J qualified as estimated.

The recoveries and RPD of TOC in the MS/MSD pair using sample BH-SC-07-2.5to4.2 were outside of the laboratory specified criteria. The TOC result in the MSD using sample BH-SC-07-2.5to4.2 was flagged with E, to indicate the analyte concentration exceeded the upper limit of the calibration range. Therefore, based on professional and technical judgement, the MS/MSD recovery results were considered not applicable, and no qualifications were applied to the data.

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-07-0to2.5	TOC	38.5	NA	38.5	J	4
BH-SC-34-0to1.5	TOC	16.5	NA	16.5	J	4
SG-15-0to10-D	TOC	0.82	NA	0.82	J	4

NA- not applicable

TOC-total organic carbon
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

6.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Twelve LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

6.6 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D
- BH-SC-32-2to4/BH-SC-32-2to4-D
- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D
- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exceptions.

21H0321: The TOC RPD for field duplicate pair SG-15-0to10/SG-15-0to10-D was equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the TOC concentrations in samples SG-15-0to10 and SG-15-0to10-D were J qualified as estimated.

21I0190: The TOC RPD for field duplicate pair BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D was equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the

TOC concentrations in samples BH-SC-24-3.8to5.9 and BH-SC-24-3.8to5.9-D were J qualified as estimated.

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	RPD	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-24-3.8to5.9	TOC	4.05	H	55	4.05	J	7
BH-SC-24-3.8to5.9-D	TOC	7.14	H		7.14	J	7
SG-15-0to10	TOC	2.15	NA	90	2.15	J	7
SG-15-0to10-D	TOC	0.82	NA		0.82	J	7

H-laboratory flag indicating hold time was exceeded
NA- not applicable
NC-not calculable
RPD-relative percent difference
TOC-total organic carbon
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

6.7 Laboratory Duplicate

Nine sample specific laboratory duplicates were reported using samples BH-SC-07-0to2.5, BH-SC-20-3to5, BH-SC-26-0to2, BH-SC-40-0to2, BH-SC-EB-CP, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

21H0321: The TOC RPD was high and outside of the laboratory specified criteria in the laboratory duplicate using sample SG-35-0to10. Therefore, based on professional and technical judgement, the TOC result in sample SG-35-0to10 was J qualified as estimated.

21I0190: The TOC RPD was high and outside of the laboratory specified criteria in the laboratory duplicate using sample BH-SC-20-3to5. Therefore, based on professional and technical judgement, the TOC result in sample BH-SC-20-3to5 was J qualified as estimated.

21I0246: The TOC RPD was high and outside of the laboratory specified criteria in the laboratory duplicate using sample BH-SC-26-0to2. Therefore, based on professional and technical judgement, the TOC result in sample BH-SC-26-0to2 was J qualified as estimated.

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-20-3to5	TOC	0.240	NA	0.240	J	12
BH-SC-26-0to2	TOC	0.460	NA	0.460	J	12
SG-35-0to10	TOC	3.11	NA	3.11	J	12

NA- not applicable

TOC-total organic carbon
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

6.8 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. TOC results were not evaluated in the equipment blanks.

6.9 Standard Reference Material

One SRM was reported with the sample sets. The recoveries were within the laboratory specified acceptance criteria.

6.10 Sensitivity

The samples were reported to the MDL in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Table 9c of the QAPP.

6.11 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The * flags (indicating the value is not within established control limits), H flags (indicating a hold time violation - hold time was exceeded), HC flags (indicating the natural concentration of the spiked analyte is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible), and the E flags (indicating the analyte concentration exceeded the upper limit of the calibration range of the instrument established by the initial calibration) in the laboratory reports were missing in the EDDs.

7.0 WET CHEMISTRY

The samples were analyzed for ammonia by Standard Method 4500-NH3 H and acid volatile sulfide and total sulfide by Standard Method SM 4500-S2 D.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Method Blank

⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
✓ Standard Reference Material
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

7.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect total sulfide results in samples SG-09-0to10, SG-10-0to10, SG-11-0to10, and SG-15-0to10-D, and SG-25-0to10 and the non-detect AVS results in samples SG-01-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, and SG-15-0to10-D, and SG-25-0to10 were R qualified as rejected due to holding time exceedances. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 87%.

7.2 Holding Times

The holding times for the wet chemistry parameters are listed in the table below. The holding times were met for sample analyses, with the following exceptions.

Analysis	Holding Time
Ammonia	28 days from collection to analysis in preserved water samples
Ammonia	7 days from collection to analysis in sediment samples
Acid Volatile Sulfide	14 days from collection to analysis
Total Sulfide	7 days from collection to analysis

21H0321: Samples SG-01-0to10, SG-02-0to10, SG-06-0to10, SG-08-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-13-0to10, SG-15-0to10, SG-15-0to10-D, SG-35-0to10, SG-36-0to10, SG-39-0to10, SG-41-0to10, and SG-42-0to10 were analyzed for total sulfides 6 and 7 days past the QAPP specified holding time of 7-days. Therefore, based on professional and technical judgement, the total sulfide results in samples SG-01-0to10, SG-02-0to10, SG-06-0to10, SG-08-0to10, SG-13-0to10, SG-15-0to10, SG-35-0to10, SG-36-0to10, SG-39-0to10, SG-41-0to10, and SG-42-0to10 were J qualified as estimated and the non-detect total sulfide results in samples SG-09-0to10, SG-10-0to10, SG-11-0to10, and SG-15-0to10-D were R qualified as rejected.

Additionally, samples SG-01-0to10, SG-02-0to10, SG-06-0to10, SG-08-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-13-0to10, SG-15-0to10, SG-15-0to10-D, SG-35-0to10, SG-36-0to10,

SG-39-0to10, SG-41-0to10, and SG-42-0to10 were analyzed for AVS 3 and 4 days past the QAPP specified holding time of 14-days. Therefore, based on professional and technical judgement, the AVS results in samples SG-02-0to10, SG-06-0to10, SG-08-0to10, SG-13-0to10, SG-15-0to10, SG-35-0to10, SG-36-0to10, SG-39-0to10, SG-41-0to10, and SG-42-0to10 were J qualified as estimated and the non-detect AVS results in samples SG-01-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, and SG-15-0to10-D were R qualified as rejected.

21H0340: Samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were analyzed for total sulfides 4 and 5 days past the QAPP specified holding time of 7-days. Therefore, based on professional and technical judgement, the total sulfide results in samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were J qualified as estimated and the non-detect total sulfide result in sample SG-25-0to10 was R qualified as rejected.

Additionally, samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were analyzed for AVS 8 and 9 days past the QAPP specified holding time of 14-days. Therefore, based on professional and technical judgement, the AVS results in samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were J qualified as estimated and the non-detect AVS result in sample SG-25-0to10 was R qualified as rejected.

21H0371: Samples SG-03-0to10 and SG-04-0to10 were analyzed for total sulfides 3 days past the QAPP specified holding time of 7days. Therefore, based on professional and technical judgement, the total sulfide results in samples SG-03-0to10 and SG-04-0to10 were J qualified as estimated.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
SG-01-0to10	Sulfide	4.46	mg/kg	NA	4.46	J	2
SG-01-0to10	Sulfide	0.0348	µmol/g	U	0.0348	R	2
SG-02-0to10	Sulfide	390	mg/kg	D	390	J	2
SG-02-0to10	Sulfide	13.8	µmol/g	D	13.8	J	2
SG-03-0to10	Sulfide	4.74	mg/kg	NA	4.74	J	2
SG-04-0to10	Sulfide	7.65	mg/kg	NA	7.65	J	2
SG-05-0to10	Sulfide	112	mg/kg	D	112	J	2
SG-05-0to10	Sulfide	2.77	µmol/g	D	2.77	J	2
SG-06-0to10	Sulfide	1330	mg/kg	D	1330	J	2
SG-06-0to10	Sulfide	26.40	µmol/g	D	26.40	J	2
SG-08-0to10	Sulfide	105	mg/kg	NA	105	J	2

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
SG-08-0to10	Sulfide	0.891	µmol/g	NA	0.891	J	2
SG-09-0to10	Sulfide	1.18	mg/kg	U	1.18	R	2
SG-09-0to10	Sulfide	0.036	µmol/g	U	0.036	R	2
SG-10-0to10	Sulfide	1.13	mg/kg	U	1.13	R	2
SG-10-0to10	Sulfide	0.038	µmol/g	U	0.038	R	2
SG-11-0to10	Sulfide	1.36	mg/kg	U	1.36	R	2
SG-11-0to10	Sulfide	0.037	µmol/g	U	0.037	R	2
SG-13-0to10	Sulfide	28.1	mg/kg	NA	28.1	J	2
SG-13-0to10	Sulfide	0.215	µmol/g	NA	0.215	J	2
SG-15-0to10	Sulfide	383	mg/kg	D	383	J	2
SG-15-0to10	Sulfide	18.8	µmol/g	D	18.8	J	2
SG-15-0to10-D	Sulfide	1.20	mg/kg	U	1.20	R	2
SG-15-0to10-D	Sulfide	0.038	µmol/g	U	0.038	R	2
SG-18-0to10	Sulfide	196	mg/kg	D	196	J	2
SG-18-0to10	Sulfide	12.1	µmol/g	D	12.1	J	2
SG-19-0to10	Sulfide	182	mg/kg	D	182	J	2
SG-19-0to10	Sulfide	2.11	µmol/g	D	2.11	J	2
SG-22-0to10	Sulfide	245	mg/kg	D	245	J	2
SG-22-0to10	Sulfide	11.9	µmol/g	D	11.9	J	2
SG-22-0to10-D	Sulfide	356	mg/kg	D	356	J	2
SG-22-0to10-D	Sulfide	14.6	µmol/g	D	14.6	J	2
SG-23-0to10	Sulfide	1020	mg/kg	D	1020	J	2
SG-23-0to10	Sulfide	33.4	µmol/g	D	33.4	J	2
SG-25-0to10	Sulfide	1.18	mg/kg	U	1.18	R	2
SG-25-0to10	Sulfide	0.0348	µmol/g	U	0.0348	R	2
SG-26-0to10	Sulfide	133	mg/kg	D	133	J	2
SG-26-0to10	Sulfide	5.69	µmol/g	D	5.69	J	2
SG-27-0to10	Sulfide	211	mg/kg	D	211	J	2
SG-27-0to10	Sulfide	10.4	µmol/g	D	10.4	J	2
SG-28-0to10	Sulfide	427	mg/kg	D	427	J	2
SG-28-0to10	Sulfide	10.1	µmol/g	D	10.1	J	2
SG-30-0to10	Sulfide	134	mg/kg	D	134	J	2
SG-30-0to10	Sulfide	6.48	µmol/g	D	6.48	J	2
SG-31-0to10	Sulfide	150	mg/kg	D	150	J	2
SG-31-0to10	Sulfide	7.71	µmol/g	D	7.71	J	2
SG-33-0to10	Sulfide	871	mg/kg	D	871	J	2
SG-33-0to10	Sulfide	27.4	µmol/g	D	27.4	J	2
SG-35-0to10	Sulfide	131	mg/kg	D	131	J	2
SG-35-0to10	Sulfide	8.05	µmol/g	D	8.05	J	2

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
SG-36-0to10	Sulfide	728	mg/kg	D	728	J	2
SG-36-0to10	Sulfide	37.9	µmol/g	D	37.9	J	2
SG-37-0to10	Sulfide	53.7	mg/kg	D	53.7	J	2
SG-37-0to10	Sulfide	2.30	µmol/g	D	2.30	J	2
SG-37-0to10-D	Sulfide	82.9	mg/kg	D	82.9	J	2
SG-37-0to10-D	Sulfide	2.94	µmol/g	D	2.94	J	2
SG-39-0to10	Sulfide	951	mg/kg	D	951	J	2
SG-39-0to10	Sulfide	29.2	µmol/g	D	29.2	J	2
SG-41-0to10	Sulfide	785	mg/kg	D	785	J	2
SG-42-0to10	Sulfide	46.4	mg/kg	D	46.4	J	2
SG-42-0to10	Sulfide	2.39	µmol/g	D	2.39	J	2

D-laboratory flag indicating the reported value is from a dilution
mg/kg-milligram per kilogram
µmol/g-micromole per gram
NA-not applicable
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

7.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Five method blanks were reported for ammonia as nitrogen (batches BJH0716, BJH0738, BJH0802, BJI0107, and BJI0811). Two method blanks were reported for AVS (batches BJI0142 and BJI0169). Five method blanks were reported for total sulfides (batches BJH0750, BJH0779, BJI0010, BJI0170, and BJI0696). The wet chemistry parameters were not detected in the method blanks above the MDLs.

7.4 Matrix Spike/Matrix Spike Duplicate

Seven sample set specific MS/MSD pairs were reported for ammonia as nitrogen, BH-GW-17-210916, BH-GW-19-210917, EB-SG-210826, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10.

Four sample set specific MS/MSD pairs were reported for AVS, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10.

Six sample set specific MS/MSD pairs were reported for total sulfides, BH-GW-17-210916, EB-SG-210826, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. The recovery and RPD results were within laboratory specified acceptance criteria, with the following exceptions.

21H0321: The recoveries of AVS in the MS/MSD pair using sample SG-15-0to10-D were low and the recovery of AVS in the MSD using sample SG-35-0to10 was high and outside of the laboratory specified criteria. Since the AVS result for sample SG-15-0to10-D was R qualified as rejected due to a holding time exceedance, no additional qualifications were applied to the data. However, based on professional and technical judgment, the AVS result in sample SG-35-0to10 was J+ qualified as estimated with high bias.

The recovery of total sulfide in the MS using sample SG-15-0to10-D was low, outside of the laboratory specified criteria. Since the total sulfide result for sample SG-15-0to10-D was R qualified as rejected due to a holding time exceedance, no additional qualifications were applied to the data.

21H0340: The recovery of total sulfide in the MS using sample SG-18-0to10 was high and outside of the laboratory specified criteria. Therefore, based on professional and technical judgment, the total sulfide result in sample SG-18-0to10 was J+ qualified as estimated with high bias.

The recoveries of AVS in the MS/MSD pair using sample SG-18-0to10 were low and outside of the laboratory specified criteria. Therefore, based on professional and technical judgment, the AVS result in sample SG-18-0to10 was J- qualified as estimated with low bias.

21H0371: The recoveries of AVS in the MS/MSD pair using sample SG-03-0to10 were low and outside of the laboratory specified criteria. Therefore, based on professional and technical judgment, the AVS result in sample SG-03-0to10 was J- qualified as estimated with low bias.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	Validation Result	Validation Qualifier*	Reason Code**
SG-03-0to10	Sulfide	0.0814	µmol/g	NA	0.0814	J-	4
SG-18-0to10	Sulfide	196	mg/kg	D	196	J+	4
SG-18-0to10	Sulfide	12.1	µmol/g	D	12.1	J-	4
SG-35-0to10	Sulfide	8.05	µmol/g	D	8.05	J+	4

D-laboratory flag indicating the reported value is from a dilution
mg/kg-milligram per kilogram
µmol/g-micromole per gram
NA-not applicable
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

7.5 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). LCSs were reported for each analysis and batch. The recovery results were within the laboratory specified acceptance criteria.

7.6 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D
- BH-SC-32-2to4/BH-SC-32-2to4-D
- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D
- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exceptions.

21H0321: Ammonia as nitrogen, AVS, and total sulfide were detected in original sample SG-15-0to10 at concentrations greater than the RLs and not detected in field duplicate sample SG-15-0to10-D, resulting in noncalculable RPDs between the results. Since the AVS and total sulfide results for sample SG-15-0to10-D were R qualified as rejected due to holding time exceedances, based on professional and technical judgment, no additional qualifications were applied to the AVS and total sulfide results in original sample SG-15-0to10.

21H0340: The ammonia as nitrogen RPD for field duplicate pair SG-37-0to10/SG-37-0to10-D was equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the ammonia as nitrogen results in samples SG-37-0to10 and SG-37-0to10-D were J qualified as estimated.

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
SG-15-0to10	Ammonia as Nitrogen	12.7	mg/kg	NA	NC	12.7	J	7

Sample ID	Compound	Laboratory Result	Unit	Laboratory Flag	RPD	Validation Result	Validation Qualifier*	Reason Code**
SG-15-0to10-D	Ammonia as Nitrogen	0.430	mg/kg	U		0.430	UJ	7
SG-37-0to10	Ammonia as Nitrogen	3.88	mg/kg	NA	70	3.88	J	7
SG-37-0to10-D	Ammonia as Nitrogen	8.05	mg/kg	NA		8.05	J	7

mg/kg-milligram per kilogram
NA- not applicable
NC-not calculable
RPD-relative percent difference
U-laboratory flag indicating this analyte is not detected above the reporting limit or if noted, not detected above the method detection limit
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

7.7 Laboratory Duplicate

Seven sample specific laboratory duplicates were reported for ammonia, using samples BH-GW-17-210916, BH-GW-19-210917, EB-SG-210826, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. Four sample specific laboratory duplicates were reported for AVS, using samples SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. Six sample specific laboratory duplicates were reported for total sulfide, using samples BH-GW-17-210916, EB-SG-210826, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

21H0371: The total sulfide RPD was high and outside of the laboratory specified criteria in the laboratory duplicate using sample SG-03-0to10. Since the total sulfide results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL and based on professional and technical judgement, no qualifications were applied to the data.

7.8 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. The wet chemistry parameters were not evaluated in the equipment blanks.

7.9 Standard Reference Material

SRMs were not reported with the sample sets.

7.10 Sensitivity

The samples were reported to the MDLs in the laboratory report for AVS. No elevated non-detect results were reported. The MDLs met those listed in Tables 9b and 9c of the QAPP, with the following exception. The AVS MDLs were not met.

7.11 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The * flags (indicating the value is not within established control limits) and D flags (indicating the reported value is from a dilution) in the laboratory reports were missing in the EDDs.

8.0 TOTAL VOLATILE SOLIDS

The samples were analyzed for TVS by SM 2540 G.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
⊗ Holding Times
✓ Method Blank
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
✓ Standard Reference Material
✓ Sensitivity
⊗ Electronic Data Deliverable Review

8.1 Overall Assessment

The TVS data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

8.2 Holding Times

According to the QAPP, the holding time for the TVS analysis of a sediment sample is 7 days from collection to analysis. Additionally, the holding time for the TVS analysis of a water sample is 7

days from collection to analysis. The holding times were met for the sample analyses, with the following exceptions.

21H0321: Samples SG-01-0to10, SG-02-0to10, SG-06-0to10, SG-08-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-13-0to10, SG-15-0to10, SG-15-0to10-D, SG-35-0to10, SG-36-0to10, SG-39-0to10, SG-41-0to10, and SG-42-0to10 were analyzed for TVS 7 and 8 days past the 7-day holding time due to analyst oversight. Therefore, based on professional and technical judgement, the TVS results in samples SG-01-0to10, SG-02-0to10, SG-06-0to10, SG-08-0to10, SG-09-0to10, SG-10-0to10, SG-11-0to10, SG-13-0to10, SG-15-0to10, SG-15-0to10-D, SG-35-0to10, SG-36-0to10, SG-39-0to10, SG-41-0to10, and SG-42-0to10 were J qualified as estimated.

21H0340: Samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were analyzed for TVS 8 and 9 days past the 7-day holding time due to analyst oversight. Therefore, based on professional and technical judgement, the TVS results in samples SG-05-0to10, SG-18-0to10, SG-19-0to10, SG-22-0to10, SG-22-0to10-D, SG-23-0to10, SG-25-0to10, SG-26-0to10, SG-27-0to10, SG-28-0to10, SG-30-0to10, SG-31-0to10, SG-33-0to10, SG-37-0to10, and SG-37-0to10-D were J qualified as estimated.

21H0371: Samples SG-03-0to10 and SG-04-0to10 were analyzed for TVS 8 days past the 7-day holding time due to analyst oversight. Therefore, based on professional and technical judgement, the TVS results in samples SG-03-0to10 and SG-04-0to10 were J qualified as estimated.

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
SG-01-0to10	TVS	2.05	H	2.05	J	2
SG-02-0to10	TVS	5.36	H	5.36	J	2
SG-03-0to10	TVS	4.25	H	4.25	J	2
SG-04-0to10	TVS	7.30	H	7.30	J	2
SG-05-0to10	TVS	17.6	H	17.6	J	2
SG-06-0to10	TVS	16.3	H	16.3	J	2
SG-08-0to10	TVS	6.45	H	6.45	J	2
SG-09-0to10	TVS	2.41	H	2.41	J	2
SG-10-0to10	TVS	2.16	H	2.16	J	2
SG-11-0to10	TVS	2.86	H	2.86	J	2
SG-13-0to10	TVS	3.31	H	3.31	J	2
SG-15-0to10	TVS	5.47	H	5.47	J	2
SG-15-0to10-D	TVS	2.53	H	2.53	J	2
SG-18-0to10	TVS	8.64	H	8.64	J	2
SG-19-0to10	TVS	1.85	H	1.85	J	2
SG-22-0to10	TVS	26.5	H	26.5	J	2

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
SG-22-0to10-D	TVS	27.7	H	27.7	J	2
SG-23-0to10	TVS	29.9	H	29.9	J	2
SG-25-0to10	TVS	2.73	H	2.73	J	2
SG-26-0to10	TVS	2.41	H	2.41	J	2
SG-27-0to10	TVS	4.75	H	4.75	J	2
SG-28-0to10	TVS	4.36	H	4.36	J	2
SG-30-0to10	TVS	3.87	H	3.87	J	2
SG-31-0to10	TVS	3.50	H	3.50	J	2
SG-33-0to10	TVS	8.23	H	8.23	J	2
SG-35-0to10	TVS	6.06	H	6.06	J	2
SG-36-0to10	TVS	11.3	H	11.3	J	2
SG-37-0to10	TVS	2.05	H	2.05	J	2
SG-37-0to10-D	TVS	2.01	H	2.01	J	2
SG-39-0to10	TVS	5.43	H	5.43	J	2
SG-41-0to10	TVS	11.2	H	11.2	J	2
SG-42-0to10	TVS	2.58	H	2.58	J	2

H-laboratory flag indicating hold time was exceeded
NA- not applicable
TVS-total volatile solids
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

8.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BJI0044, BJI0161, and BJI0321). TVS was not detected in the method blanks above the MDLs.

8.4 Field Duplicate

The following seventeen field duplicate sample pairs were collected with the sample sets:

- BH-GW-21-210917/BH-GW-21-210917-D
- BH-PS-02-COMP/BH-PS-02-COMP-DUP
- BH-SB-17-0to2/BH-SB-17-0to2-D
- BH-SB-19-2to6/BH-SB-19-2to6-Dup
- BH-SB-22-6to10/BH-SB-22-6to10-D
- BH-SC-05-1.6to3.2/BH-SC-05-1.6to3.2-D
- BH-SC-24-3.8to5.9/BH-SC-24-3.8to5.9-D
- BH-SC-26-4to6/BH-SC-26-4to6-D

- BH-SC-32-2to4/BH-SC-32-2to4-D
- BH-SC-34-1.5to3.3/BH-SC-34-1.5to3.3-D
- HA-06-0-12"/HA-06-0-12"-D
- HA-07-0-12"/HA-07-0-12"-D
- HA-10-12-24"/HA-10-12-24"-D
- HA-12-12-24"/HA-12-12-24"-D
- SG-15-0to10/SG-15-0to10-D
- SG-22-0to10/SG-22-0to10-D
- SG-37-0to10/SG-37-0to10-D

Acceptable precision (RPD≤50% for sediments and soils, RPD≤30% for waters) was demonstrated between the field duplicates and the original samples, with the following exception.

21H0321: The TVS RPD for field duplicate pair SG-15-0to10/SG-15-0to10-D was equal to and/or greater than 50%. Therefore, based on professional and technical judgement, the TVS results in samples SG-15-0to10 and SG-15-0to10-D were J qualified as estimated.

Sample ID	Compound	Laboratory Result (%)	Laboratory Flag	RPD	Validation Result (%)	Validation Qualifier*	Reason Code**
SG-15-0to10	TVS	5.47	H	74	5.47	J	7
SG-15-0to10-D	TVS	2.53	H		2.53	J	7

H-laboratory flag indicating hold time was exceeded
NA- not applicable
RPD-relative percent difference
TVS-total volatile solids
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

8.5 Laboratory Duplicate

Five sample specific laboratory duplicates were reported using samples EB-SG-210826, SG-03-0to10, SG-15-0to10-D, SG-18-0to10, and SG-35-0to10. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

21H0343: The TVS RPD was high and outside of the laboratory specified criteria in the laboratory duplicate using sample EB-SG-210826. Therefore, based on professional and technical judgement, the TVS result in sample EB-SG-210826 was J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
EB-SG-210826	TVS	13.0	NA	13.0	J	12

mg/L-milligrams per liter
NA-not applicable

TVS-total volatile solids
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Additionally, the laboratory duplicates using samples SG-15-0to10-D and SG-35-0to10 were analyzed for TVS 7 days past the 7-day holding time due to analyst oversight. Based on the holding time exceedance and professional and technical judgment, the precision assessments were not performed for these laboratory duplicates.

The laboratory duplicate using sample SG-18-0to10 was analyzed for TVS 9 days past the 7-day holding time due to analyst oversight. Based on the holding time exceedance and professional and technical judgment, the precision assessments were not performed for these laboratory duplicates.

The laboratory duplicate using sample SG-03-0to10 was analyzed for TVS 7 days past the 7-day holding time due to analyst oversight. Based on the holding time exceedance and professional and technical judgment, the precision assessments were not performed for these laboratory duplicates.

8.6 Rinsate Blank

Six rinsate blanks i.e., equipment blanks were submitted during the sample event, BH-EB-GW-210916-1500, BH-EB-SB-210916, BH-SC-EB-CC, BH-SC-EB-CP, EB20210824, and EB-SG-210826. TVS was not evaluated in the equipment blanks.

8.7 Standard Reference Material

SRMs were not reported with the sample sets.

8.8 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported. The MDLs met those listed in Table 9c of the QAPP.

8.9 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. The * flags (indicating the value is not within established control limits) and H flags (indicating a hold time violation - hold time was exceeded) in the laboratory reports were missing in the EDDs.

9.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Methods D422 and D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Field Duplicate
- ✓ Laboratory Triplicate
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

9.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

9.2 Field Duplicate

Seventeen field duplicate sample pairs were collected with the sample sets. Grain size was not evaluated in the field duplicate pairs.

9.3 Laboratory Triplicate

Batch laboratory triplicates were reported. Since these were batch QC, no qualifications were applied to the data.

9.4 Sensitivity

The samples were reported to the RLs in the laboratory reports. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9c of the QAPP.

9.5 Electronic Data Deliverable Review

Results and sample IDs in the EDDs were reviewed against the information provided by the associated Level II reports at a minimum of 20%. No discrepancies were identified between the Level II reports and the EDDs.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

ATTACHMENT 3
SAMPLE IDENTIFICATIONS

Laboratory ID	Client ID
21H0321-01	SG-06-0to10
21H0321-02	SG-06-0to10
21H0321-03	SG-01-0to10
21H0321-04	SG-01-0to10
21H0321-05	SG-13-0to10
21H0321-06	SG-13-0to10
21H0321-07	SG-42-0to10
21H0321-08	SG-42-0to10
21H0321-09	SG-41-0to10
21H0321-10	SG-41-0to10
21H0321-11	SG-39-0to10
21H0321-12	SG-39-0to10
21H0321-13	SG-36-0to10
21H0321-14	SG-36-0to10
21H0321-15	SG-35-0to10
21H0321-16	SG-35-0to10
21H0321-17	SG-11-0to10
21H0321-18	SG-11-0to10
21H0321-19	SG-10-0to10
21H0321-20	SG-10-0to10
21H0321-21	SG-09-0to10
21H0321-22	SG-09-0to10
21H0321-23	SG-08-0to10
21H0321-24	SG-08-0to10
21H0321-25	SG-02-0to10
21H0321-26	SG-02-0to10
21H0321-27	SG-15-0to10
21H0321-28	SG-15-0to10
21H0321-29	SG-15-0to10-D
21H0321-30	SG-15-0to10-D
21H0340-01	SG-18-0to10
21H0340-02	SG-18-0to10
21H0340-03	SG-19-0to10
21H0340-04	SG-19-0to10
21H0340-05	SG-33-0to10
21H0340-06	SG-33-0to10
21H0340-07	SG-30-0to10

Laboratory ID	Client ID
21I0190-14	BH-SC-24-0to2
21I0190-15	BH-SC-24-2to3.8
21I0190-16	BH-SC-24-3.8to5.9
21I0190-17	BH-SC-24-3.8to5.9-D
21I0190-18	BH-SC-24-5.9to7.7
21I0190-19	BH-SC-20-0to1.5
21I0190-20	BH-SC-20-1.5to3
21I0190-21	BH-SC-20-3to5
21I0190-22	BH-SC-20-5to7
21I0190-23	BH-SC-20-7to9
21I0190-24	BH-SC-EB-CP
21I0190-25	BH-SC-EB-CC
21I0192-01	BH-SB-21-0to2
21I0192-02	BH-SB-21-2to4
21I0192-03	BH-SB-21-4to6
21I0192-06	BH-SB-20-0to3
21I0192-07	BH-SB-20-3to5
21I0192-10	BH-SB-18-0to2
21I0192-11	BH-SB-18-2to4
21I0192-12	BH-SB-18-4to6
21I0192-16	BH-SB-19-0to2
21I0192-17	BH-SB-19-2to6
21I0192-18	BH-SB-19-2to6-Dup
21I0214-01	BH-GW-17-210916
21I0214-02	BH-GW-17-210916
21I0214-03	BH-GW-18-210916
21I0214-04	BH-GW-18-210916
21I0214-05	BH-EB-GW-210916-1500
21I0214-06	BH-EB-GW-210916-1500
21I0214-07	BH-EB-SB-210916
21I0225-01	BH-GW-19-210917
21I0225-02	BH-GW-19-210917
21I0225-03	BH-GW-20-210917
21I0225-04	BH-GW-20-210917
21I0225-05	BH-GW-21-210917
21I0225-06	BH-GW-21-210917
21I0225-07	BH-GW-21-210917-D

Laboratory ID	Client ID
21H0340-08	SG-30-0to10
21H0340-09	SG-27-0to10
21H0340-10	SG-27-0to10
21H0340-11	SG-23-0to10
21H0340-12	SG-23-0to10
21H0340-13	SG-25-0to10
21H0340-14	SG-25-0to10
21H0340-15	SG-26-0to10
21H0340-16	SG-26-0to10
21H0340-17	SG-22-0to10
21H0340-18	SG-22-0to10
21H0340-19	SG-22-0to10-D
21H0340-20	SG-22-0to10-D
21H0340-21	SG-28-0to10
21H0340-22	SG-28-0to10
21H0340-23	SG-05-0to10
21H0340-24	SG-05-0to10
21H0340-25	SG-37-0to10
21H0340-26	SG-37-0to10
21H0340-27	SG-37-0to10-D
21H0340-28	SG-37-0to10-D
21H0340-29	SG-31-0to10
21H0340-30	SG-31-0to10
21H0343-01	EB-SG-210826
21H0357-01	HA-01-0-12"
21H0357-02	HA-01-12-24"
21H0357-03	HA-06-0-12"
21H0357-04	HA-06-0-12"-D
21H0357-05	HA-06-12-24"
21H0357-06	HA-05-0-12"
21H0357-07	HA-05-12-24"
21H0357-08	HA-03-0-12"
21H0357-09	HA-03-12-24"
21H0357-10	HA-02-0-12"
21H0357-11	HA-02-12-24"
21H0357-12	HA-04-0-12"
21H0357-13	HA-04-12-24"
21H0357-14	HA-16-0-12"
21H0357-15	HA-16-12-24"

Laboratory ID	Client ID
21I0225-08	BH-GW-21-210917-D
21I0246-01	BH-SC-26-0to2
21I0246-02	BH-SC-26-2to4
21I0246-03	BH-SC-26-4to6
21I0246-04	BH-SC-26-4to6-D
21I0246-05	BH-SC-26-6to7.9
21I0246-06	BH-SC-27-0to1.7
21I0246-07	BH-SC-27-1.7to3.7
21I0246-08	BH-SC-27-3.7to5.2
21I0246-09	BH-SC-27-5.2to6.7
21I0246-10	BH-SC-29-0to2
21I0246-11	BH-SC-29-2to4
21I0246-12	BH-SC-29-4to6
21I0246-13	BH-SC-29-6to7.9
21I0246-14	BH-SC-32-0to2
21I0246-15	BH-SC-32-2to4
21I0246-16	BH-SC-32-2to4-D
21I0246-17	BH-SC-32-4to5.5
21I0246-18	BH-SC-14-0to1.3
21I0246-19	BH-SC-14-1.3to2.6
21I0246-20	BH-SC-12-0to1.4
21I0278-01	BH-SB-23-0to2
21I0278-02	BH-SB-23-2to4
21I0278-03	BH-SB-23-4to6
21I0278-07	BH-SB-22-0to2
21I0278-08	BH-SB-22-2to4
21I0278-09	BH-SB-22-4to6
21I0278-10	BH-SB-22-6to10
21I0278-11	BH-SB-22-6to10-D
21I0278-13	BH-SB-17-0to2
21I0278-14	BH-SB-17-0to2-D
21I0278-15	BH-SB-17-2to4
21I0278-16	BH-SB-17-4to6
21I0301-01	BH-SC-21-0to1.5
21I0301-02	BH-SC-21-1.5to3.7
21I0301-03	BH-SC-21-3.7to5.8
21I0301-04	BH-SC-21-5.8to8
21I0301-05	BH-SC-21-8to10
21I0301-06	BH-SC-34-0to1.5

Laboratory ID	Client ID
21H0357-16	HA-12-0-12"
21H0357-17	HA-12-12-24"
21H0357-18	HA-12-12-24"-D
21H0357-19	HA-11-0-12"
21H0357-20	HA-11-12-24"
21H0357-21	HA-15-0-12"
21H0357-22	HA-15-12-24"
21H0357-23	HA-13-0-12"
21H0357-24	HA-13-12-24"
21H0357-25	HA-14-0-12"
21H0357-26	HA-14-12-24"
21H0357-27	HA-10-0-12"
21H0357-28	HA-10-12-24"
21H0357-29	HA-10-12-24"-D
21H0357-30	HA-09-0-12"
21H0357-31	HA-09-12-24"
21H0357-32	HA-08-0-12"
21H0357-33	HA-08-12-24"
21H0357-34	HA-07-0-12"
21H0357-35	HA-07-0-12"-D
21H0357-36	EB20210824
21H0371-01	SG-03-0to10
21H0371-02	SG-03-0to10
21H0371-03	SG-04-0to10
21H0371-04	SG-04-0to10
21I0190-01	BH-SC-40-0to2
21I0190-02	BH-SC-40-2to4
21I0190-03	BH-SC-40-4to6
21I0190-04	BH-SC-40-6to8
21I0190-05	BH-SC-40-8to9
21I0190-06	BH-SC-37-0to2
21I0190-07	BH-SC-37-2to4
21I0190-08	BH-SC-37-4to6
21I0190-09	BH-SC-37-6to8
21I0190-10	BH-SC-38-0to1.8
21I0190-11	BH-SC-38-1.8to3.8
21I0190-12	BH-SC-38-3.8to5.8

Laboratory ID	Client ID
21I0301-07	BH-SC-34-1.5to3.3
21I0301-08	BH-SC-34-1.5to3.3-D
21I0301-09	BH-SC-34-3.3to4.8
21I0301-10	BH-SC-34-4.8to5.6
21I0325-01	BH-SC-04-0to1.3
21I0325-02	BH-SC-04-1.3to3
21I0325-03	BH-SC-04-3to4.2
21I0325-04	BH-SC-05-0to1.6
21I0325-05	BH-SC-05-1.6to3.2
21I0325-06	BH-SC-05-1.6to3.2-D
21I0325-07	BH-SC-05-3.2to5.2
21I0325-08	BH-SC-03-0to1
21I0325-09	BH-SC-03-1to3
21I0325-10	BH-SC-03-3to5
21I0325-11	BH-SC-03-5to7
21I0325-12	BH-SC-03-7to10
21I0325-13	BH-SC-07-0to2.5
21I0325-14	BH-SC-07-2.5to4.2
21I0325-15	BH-SC-07-4.2to6.2
21J0204-01	HA-05-0-12"
21J0204-02	HA-05-12-24"
21J0204-03	HA-04-0-12"
21J0204-04	HA-16-0-12"
21J0204-05	HA-11-0-12"
21J0204-06	HA-09-0-12"
21J0204-07	HA-09-12-24"
21J0204-08	BH-SB-21-0to2
21J0204-09	BH-SB-21-2to4
21J0204-10	BH-SB-20-0to3
21J0204-11	BH-SB-18-2to4
21J0204-12	BH-SB-18-4to6
21L0075-01	BH-SB-20-0to3
L2148255-01	BH-PS-01-COMP
L2148255-02	BH-PS-02-COMP
L2148255-03	BH-PS-03-COMP
L2148255-04	BH-PS-04-COMP
L2148255-05	BH-PS-02-COMP-DUP

Laboratory ID	Client ID
21I0190-13	BH-SC-38-5.8to7.9

Laboratory ID	Client ID
L2148255-29	BH-PS-05-COMP

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	10 May 2023
To:	Cindy Bartlett
From:	Kristoffer Henderson
CC:	J. Klens Caprio
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGX AXYS Analytical Services Data Package Identification DPWG83098, DPWG83139, DPWG84500, DPWG84506, DPWG84843 and DPWG84852**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of forty-two solid samples, five field duplicate samples and one equipment blank, collected on 26 August – 21 September 2022, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, June 18, 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);
- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and

- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L37772-1	SG-37-0to10
L37772-2	SG-37-0to10-D
L37772-3	SG-03-0to10
L37772-4	SG-04-0to10
L37772-5	SG-13-0to10
L37772-7	SG-08-0to10
L37777-1	BH-SC-04-0to1.3
L37777-2	BH-SC-04-1.3to3
L37777-3	BH-SC-04-3to4.2
L37777-4	BH-SC-03-0to1
L37777-5	BH-SC-03-1to3
L37777-6	BH-SC-03-3to5
L37777-7	BH-SC-03-5to7
L37777-8	BH-SC-03-7to10
L37777-10	BH-SC-21-1.5to3.7
L37777-11	BH-SC-21-3.7to5.8
L37777-12	BH-SC-21-5.8to8
L37777-13	BH-SC-21-8to10
L37777-14	BH-SC-34-0to1.5
L37777-15	BH-SC-34-1.5to3.3
L37777-16	BH-SC-34-1.5to3.3-D
L37777-17	BH-SC-34-3.3to4.8
L37777-18	BH-SC-34-4.8to5.6
L37777-19	BH-SC-14-0to1.3

Laboratory ID	Client ID
L37777-20	BH-SC-14-1.3to2.6
L37843-1	SG-09-0to10
L38011-1	BH-HA-35-0to1
L38011-2	BH-HA-35-1to2
L38011-3	BH-HA-48-0to1
L38011-4	BH-HA-48-1to2
L38011-7	BH-HA-36-0to1
L38011-8	BH-HA-37-0to1
L38011-9	BH-HA-37-1to2
L38011-10	BH-HA-31-0to1
L38011-11	BH-HA-31-1to2
L38011-12	BH-HA-31-1to2-D
L38011-13	BH-HA-32-0to1
L38011-14	BH-HA-32-1to2
L38011-15	BH-HA-34-0to1
L38011-25	BH-HA-33-0to1
L38011-26	BH-HA-33-0to1-D
L38011-27	BH-SG-44-0to10
L38011-28	BH-SG-43-0to10
L38011-29	BH-SG-45-0to10
L38011-30	BH-SG-11-0to10
L38011-31	BH-SG-10-0to10
L38011-32	BH-SG-10-0to10-D
L38038-1	BH-EB-092222

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C), with the following exceptions.

- DPWG83098, DPWG83139, DPWG84500 and DPWG84506 – The samples were received at 19°C and 21.4°C. See qualifications in Section 1.1 below.

No other sample preservation issues were noted by the laboratory.

The following issues were noted for the chain of custodies (COCs); however, these did not result in qualifications:

- DPWG83098, DPWG83139, DPWG84500, DPWG84506, DPWG84843 and DPWG84852: Incorrect error corrections were observed on the COC, instead of the proper

procedure of a single strike through, correction, and initials and date of person making the corrections.

- DPWG83098: Sample L37777-9 was broken and sample L37772-6 was not received.
- DPWG83139 - Sample SG-09-0to10 was logged in without a sample collection time. The sample collection time was noted as 08/24/21 1400 on the COC.
- Field duplicates BH-HA-31-1to2-D and BH-HA-33-0to1-D were listed as BH-HA-31-1to2-DUP and BH-HA-33-0to1-D, respectively, on the COCs.
- Samples BH-SG-11A-0to10, BH-SG-10A-0to10 and BH-SG-10A-0to10-D were listed as BH-SG-11-0to10, BH-SG-10-0to10 and BH-SG-10-0to10-D, respectively, on the COC.
- DPWG79106 - The sample IDs were changed per the client's request. The last dashes in the sample IDs were replaced with "to" and the " at the end of the sample ID was removed; for example, HA-01-0-12" was changed to HA-01-0to12.
- DPWG79106 - Per the client's request the samples ending in 12-24" were placed on hold and were not reported.
- DPWG79150 - Sample BH-GW-21-210917 was listed on the COC twice with the collection times of 09/17/21 1050 and 09/17/21 0900. Per the client's request the ID for the sample collected at 09/17/21 0900 was changed to BH-GW-19-210917.
- DPWG79150 – Samples were listed on hold on the COC and were not reported.
- DPWG79307 – Samples SG-23-0to10 and SG-27-0to10 were not listed on the COC. These samples were added to the COC and analyzed per the client's request.
- DPWG79323 – Sample BH-SC-24-5.9to7.7 was mistakenly not analyzed by the laboratory.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD

Analyte	Acronyms
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Equipment Blank
⊗ Field Duplicate
⊗ Isotope Dilution Standards
✓ Target Compound Identifications
⊗ Target Compound Quantitations
⊗ Sensitivity

✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

DPWG83098, DPWG83139, DPWG84500 and DPWG84506: The samples were received at 19.0°C and 21.4°C. Therefore, the non-detect results of the dioxins and furans were UJ qualified as estimated less than the sample detection limits (SDLs), or minimum reporting levels (MRLs) and the concentrations of the dioxins and furans were J qualified as estimated.

See qualifications in Attachment 3 at the end of this report.

The samples were analyzed using gas chromatography (GC) column DB-5. Per the laboratory SOP detections of 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD on GC column DB-5 are confirmed and quantitated by analysis using GC column DB-225. Therefore, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results were considered from the confirmation analysis when analyzed. However, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results that were not detected in the original analysis did not require confirmation and were considered from the original analysis. The results not considered for validation were R qualified as rejected in the electronic data deliverables (EDDs).

DPWG83139: The following results that were reported from GC column DB225 were incorrectly reported in nanograms per gram (ng/g) instead of picograms per gram (pg/g). The laboratory was notified, and the laboratory confirmed the error. A revision was requested but was not available at the time of validation. Therefore, the units were manually updated in the EDD.

Sample	Analyte
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD
BH-SC-14-0to1.3	2,3,7,8-TCDF
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD
BH-SC-14-1.3to2.6	2,3,7,8-TCDF
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD
BH-SC-34-0to1.5	2,3,7,8-TCDF
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD

Sample	Analyte
BH-SC-34-1.5to3.3	2,3,7,8-TCDF
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD
BH-SC-34-1.5to3.3-D	2,3,7,8-TCDF
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD
BH-SC-34-3.3to4.8	2,3,7,8-TCDF
SG-09-0to10	1,2,3,7,8,9-HXCDD
SG-09-0to10	2,3,7,8-TCDF

1.2 Holding Times

The holding times for the dioxin and furans analysis of water and solid samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses, with the following exceptions.

DPWG83098, DPWG83139, DPWG84506: Samples SG-37-0to10, SG-37-0to10-D, SG-03-0to10, SG-04-0to10, SG-13-0to10, SG-08-0to10, SG-09-0to10, BH-SC-34-3.3-4.8 and BH-SC-34-4.8to5.6 were analyzed past holding times. Therefore, based on professional and technical judgment the results were UJ qualified as estimated less than the MRL or SDL and J qualified as estimated.

See qualifications in Attachment 3 at the end of this report.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

DPWG83098: The monitored results of the ending resolution for analysis bracket Data File DX2M_085B-G was acquired seven minutes over the method requirement of twelve hours. The laboratory noted that no adjustments were made to the instrument during the analysis sequence and historical data has shown the instrument to remain stable. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

DPWG83098: The closing CCV for the analysis bracket Data File DX2M_085B-G was run 10 minutes over the method requirement of 12 hours. The determined values were within the method control criteria and showed the instrument to be in a state of control. Therefore, based on professional and technical judgment, no qualifications were applied to the data.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Six method blanks were reported (batches WG82348, WG82549, WG82547, WG83259, WG83261 and WG83321). Dioxins and furans were not detected in the method blanks above the MRLs, with the following exceptions.

DPWG83098: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF were detected in the method blank in batch WG82348 at estimated concentrations greater than the MRLs and less than the limits of quantitation (LOQs). Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG83098: 1,2,3,7,8,9-HXCDD was detected in the method blank in batch WG82348 on GC column DB5 at an estimated concentration greater than the MRL and less than the LOQ. Since the 1,2,3,7,8,9-HXCDD concentrations in the associated samples were reported from GC column DB-225 with no detection of 1,2,3,7,8,9-HXCDD and based on professional and technical judgment, no qualifications were applied to the data.

DPWG83098: TOTAL HEPTA-DIOXINS (0.0933 pg/g) and TOTAL PENTA-FURANS (0.0731 pg/g) were detected in the method blank in batch WG82348 at a concentration greater than the LOQs. Since the TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentration, no qualifications were applied to the TOTAL HEPTA-DIOXINS data. However, the TOTAL PENTA-FURANS concentration in sample SG-08-0to10 was J+ qualified as estimated with high bias.

DPWG84500: 1,2,3,6,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF were detected in the method blank in batch WG82547 at estimated concentrations greater than the MRLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,6,7,8-

HXCDD, 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG84500: 1,2,3,7,8,9-HXCDD and 2,3,7,8-TCDF were detected in the method blank in batch WG82547 at estimated concentrations greater than the MRLs and less than the LOQs on GC column DB5 at concentrations greater than the MRLs and less than the LOQs. Since the 1,2,3,7,8,9-HXCDD and 2,3,7,8-TCDF concentrations in the associated samples were reported from GC column DB-225 with no detection of 1,2,3,7,8,9-HXCDD and 2,3,7,8-TCDF and based on professional and technical judgment, no qualifications were applied to the data.

DPWG84500: TOTAL HEXA-DIOXINS (0.0537 pg/g), TOTAL PENTA-FURANS (0.0692 pg/g), TOTAL HEXA-FURANS (0.0519 pg/g) and TOTAL HEPTA-FURANS (0.0747 pg/g) were detected in the method blank in batch WG82547 at concentrations greater than the LOQs. Since the TOTAL HEXA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentration, no qualifications were applied to the TOTAL HEXA-DIOXINS data. However, the TOTAL PENTA-FURANS concentration in sample BH-SC-21-3.7to5.8, TOTAL HEXA-FURANS concentration in sample BH-SC-03-5to7 and TOTAL HEPTA-FURANS concentrations in samples BH-SC-03-1to3, BH-SC-04-3to4.2 and BH-SC-21-3.7to5.8 were J+ qualified as estimated with high bias and the TOTAL HEXA-FURANS concentration in sample BH-SC-21-3.7to5.8 and TOTAL HEPTA-FURANS concentrations in samples BH-SC-03-5to7 and BH-SC-21-8to10 were U qualified as not detected at the reported concentrations.

DPWG83139: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were detected in the method blank in batch WG82549 at concentrations greater than the MRLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG83139: TOTAL TETRA-DIOXINS (0.135 pg/g), TOTAL HEPTA-DIOXINS (0.193 pg/g) and TOTAL HEPTA-FURANS (0.126 pg/g) were detected in the method blank in batch WG82549 at a concentration greater than the LOQs. Since the TOTAL TETRA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentration, no qualifications were applied to the TOTAL TETRA-DIOXINS and TOTAL HEPTA-DIOXINS data. However, the TOTAL HEPTA-FURANS concentrations in samples BH-SC-14-1.3to2.6 and BH-SC-34-3.3to4.8 were J+ qualified as estimated with high bias.

DPWG84506: 1,2,3,7,8-PECDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF were detected in the method blank in batch WG83259 at estimated concentrations greater than the MRLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HPCDD and OCDD data. However, the estimated concentrations of 1,2,3,7,8-PECDD, 1,2,3,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF and OCDF in the associated samples were U qualified as not detected at the LOQs.

DPWG84506: 1,2,3,7,8,9-HXCDD was detected in the method blank in batch WG83259 on GC column DB5 at a concentration greater than the MRL and less than the LOQ. Since the 1,2,3,7,8,9-HXCDD concentrations in the associated samples were reported from GC column DB-225 with no detection of 1,2,3,7,8,9-HXCDD and based on professional and technical judgment, no qualifications were applied to the data.

DPWG84506: TOTAL TETRA-DIOXINS (0.107 pg/g), TOTAL HEXA-DIOXINS (0.0558 pg/g), TOTAL HEPTA-DIOXINS (0.205 pg/g), TOTAL PENTA-FURANS (0.0712 pg/g), TOTAL HEXA-FURANS (0.0511 pg/g) and TOTAL HEPTA-FURANS (0.082 pg/g) were detected in the method blank in batch WG83259 at a concentration greater than the LOQ. Since these analytes were either not detected or detected in the associated samples at concentrations greater than ten times the method blank concentrations, no qualifications were applied to the data.

DPWG84843: 1,2,3,4,6,7,8-HPCDD and OCDD were detected in the method blank in batch WG83261 at estimated concentrations greater than the MRLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the data.

DPWG84843: TOTAL TETRA-DIOXINS (0.112 pg/g), TOTAL PENTA-DIOXINS (0.0544 pg/g) and TOTAL HEPTA-DIOXINS (0.140 pg/g) were detected in the method blank in batch WG83261 at concentrations greater than the LOQ. Since these analytes were either not detected or detected in the associated samples at concentrations greater than ten times the method blank concentrations, no qualifications were applied to the data.

DPWG84852: 1,2,3,7,8,9-HXCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PECDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were detected in the method blank in batch WG83321 at concentrations greater than the MRLs and less than the LOQs. Since 1,2,3,7,8,9-HXCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PECDD, 1,2,3,4,6,7,8-HPCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were not detected in the associated samples, no qualifications were applied to the 1,2,3,7,8,9-HXCDD, 2,3,7,8-TCDF, 1,2,3,7,8-

PECDD, 1,2,3,4,6,7,8-HPCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF data. However, the estimated OCDD concentrationss in the associated sample were U qualified as not detected at the LOQ.

DPWG84852: TOTAL HEPTA-DIOXINS (1.16 pg/L), TOTAL HEXA-FURANS (0.752 pg/L) and TOTAL HEPTA-FURANS (2.47 pg/L) were detected in the method blank in batch WG83321 at concentrations greater than the LOQs. Since these analytes were not detected in the associated sample, no qualifications were applied to the data.

See qualifications in Attachment 4 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Six LCS/LCS duplicate (LCSD) pairs were reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

DPWG83098: The laboratory noted the recovery of isotope dilution standard 13C-OCDD for the LCS in batch WG82348 was below the range required for accurate quantification. Therefore, OCDD and OCDF were not calculable in the LCS. Since the OCDD and OCDF recoveries in the LCSD were within the QAPP-specified acceptance criteria and based on professional and technical judgment, the OCDD and OCDF concentrations in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
SG-08-0to10	OCDF	0.392	J	0.392	J	5
SG-13-0to10	OCDF	4.7	J	4.7	J	5
SG-03-0to10	OCDD	416	NA	416	J	5
SG-03-0to10	OCDF	5.32	NA	5.32	J	5
SG-04-0to10	OCDD	737	NA	737	J	5
SG-04-0to10	OCDF	8.52	NA	8.52	J	5
SG-08-0to10	OCDD	252	NA	252	J	5
SG-13-0to10	OCDD	890	NA	890	J	5
SG-37-0to10	OCDD	785	NA	785	J	5
SG-37-0to10	OCDF	7.12	NA	7.12	J	5

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
SG-37-0to10-D	OCDD	273	NA	273	J	5
SG-37-0to10-D	OCDF	6.8	NA	6.8	J	5

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NA-not applicable

1.9 Equipment Blank

One equipment blank was submitted with the sample set, BH-EB-092222. Dioxin and furans were not detected in the equipment blank above the SDLs or MRLs, with the following exception.

OCDD was detected in BH-EB-092222 at an estimated concentration greater than the MRL and less than the LOQ. Since the OCDD concentration in BH-EB-092222 was U qualified due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Five field duplicate samples were submitted and analyzed with the sample set, SG-37-0to10-D, BH-SC-34-1.5to3.3-D, BH-HA-31-1to2-D, BH-HA-33-0to1-D and BH-SG-10A-0to10-D. Acceptable precision (RPD $\leq$50%) was demonstrated between the field duplicates and original samples, SG-37-0to10, BH-SC-34-1.5to3.3, BH-HA-31-1to2, BH-HA-33-0to1 and BH-SG-10A-0to10, respectively with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the SDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the SDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SG-10A-0to10	1,2,3,4,7,8-HXCDF	155	NA	51	155	J	7

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SG-10A-0to10-D	1,2,3,4,7,8-HXCDF	261	NA		261	J	7
BH-HA-31-1to2	1,2,3,7,8,9-HXCDF	0.0478	UJ	NC	0.0478	UJ	7
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDF	0.0562	NJ J		0.0562	J	7
SG-37-0to10	1,2,3,7,8,9-HXCDF	0.0505	UJ	NC*	NA	NA	NA
SG-37-0to10-D	1,2,3,7,8,9-HXCDF	0.0566	NJ J		NA	NA	NA
BH-SG-10A-0to10	2,3,7,8-TCDD	7.05	NA	87	7.05	J	7
BH-SG-10A-0to10-D	2,3,7,8-TCDD	2.79	NA		2.79	J	7
SG-37-0to10	OCDD	785	NA	97	785	J	7
SG-37-0to10-D	OCDD	273	NA		273	J	7

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
UJ-not detected at or above the SDL or MRL
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable
NC-not calculable
RPD-relative percent difference
*no qualification, see explanation above
* Validation qualifiers are defined in Attachment 1 at the end of this report
**Reason codes are defined in Attachment 2 at the end of this report

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

DPWG83139: The recoveries of 13C-1,2,3,4,7,8-HXCDD, 13C-1,2,3,4,6,7,8-HPCDD, 13C-OCDD, 13C-1,2,3,4,6,7,8-HPCDF and 13C-1,2,3,4,7,8,9-HPCDF in sample BH-SC-34-0to1.5 were low and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of 1,2,3,4,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF, OCDF, TOTAL HEXA-DIOXINS, TOTAL HEPTA-DIOXINS and TOTAL HEPTA-FURANS in sample BH-SC-34-0to1.5 were J qualified as estimated.

DPWG83139: The recoveries of 13C-2,3,7,8-TCDD, 13C-1,2,3,7,8-PECDD, 13C-1,2,3,4,7,8-HXCDD, 13C-1,2,3,4,6,7,8-HPCDD, 13C-OCDD, 13C-1,2,3,7,8-PECDF, 13C-2,3,4,7,8-PECDF, 13C-1,2,3,7,8,9-HXCDF, 13C-2,3,4,6,7,8-HXCDF, 13C-1,2,3,4,6,7,8-HPCDF, 13C-1,2,3,4,7,8,9-HPCDF and 37CL-2,3,7,8-TCDD in sample BH-SC-34-1.5to3.3-D were low and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of 2,3,7,8-

TCDD, 1,2,3,7,8-PECDD, 1,2,3,4,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF, OCDF, TOTAL TETRA-DIOXINS, TOTAL PENTA-DIOXINS, TOTAL HEXA-DIOXINS, TOTAL HEPTA-DIOXINS, TOTAL PENTA-FURANS, TOTAL HEXA-FURANS and TOTAL HEPTA-FURANS in sample BH-SC-34-1.5to3.3-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-34-0to1.5	1,2,3,4,7,8-HXCDD	2.77	NA	2.77	J	6,11
BH-SC-34-0to1.5	1,2,3,4,6,7,8-HPCDD	48.3	NA	48.3	J	6,11
BH-SC-34-0to1.5	OCDD	466	NA	466	J	6,11
BH-SC-34-0to1.5	1,2,3,4,6,7,8-HPCDF	18.1	NA	18.1	J	6,11
BH-SC-34-0to1.5	OCDF	9.23	NA	9.23	J	6,11
BH-SC-34-0to1.5	TOTAL HEXA-DIOXINS	105	NA	105	J	6,11
BH-SC-34-0to1.5	TOTAL HEPTA-DIOXINS	168	NA	168	J	6,11
BH-SC-34-0to1.5	TOTAL HEPTA-FURANS	27.9	NA	27.9	J	6,11
BH-SC-34-0to1.5	1,2,3,4,7,8,9-HPCDF	1.52	J	1.52	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,4,7,8,9-HPCDF	1.88	J	1.88	J	6,11
BH-SC-34-1.5to3.3-D	2,3,7,8-TCDD	1.25	NA	1.25	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,7,8-PECDD	3.41	NA	3.41	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,4,7,8-HXCDD	2.22	J	2.22	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,4,6,7,8-HPCDD	37.5	NA	37.5	J	6,11
BH-SC-34-1.5to3.3-D	OCDD	490	NA	490	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,7,8-PECDF	9.69	NA	9.69	J	6,11
BH-SC-34-1.5to3.3-D	2,3,4,7,8-PECDF	10.8	NA	10.8	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDF	0.672	J	0.672	J	6,11
BH-SC-34-1.5to3.3-D	2,3,4,6,7,8-HXCDF	6.43	NA	6.43	J	6,11
BH-SC-34-1.5to3.3-D	1,2,3,4,6,7,8-HPCDF	15.8	NA	15.8	J	6,11
BH-SC-34-1.5to3.3-D	OCDF	6.01	NA	6.01	J	6,11

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-34-1.5to3.3-D	TOTAL TETRA-DIOXINS	101	NA	101	J	6,11
BH-SC-34-1.5to3.3-D	TOTAL PENTA-DIOXINS	65.5	NA	65.5	J	6,11
BH-SC-34-1.5to3.3-D	TOTAL HEXA-DIOXINS	83.5	NA	83.5	J	6,11
BH-SC-34-1.5to3.3-D	TOTAL HEPTA-DIOXINS	92.3	NA	92.3	J	6,11
BH-SC-34-1.5to3.3-D	TOTAL PENTA-FURANS	154	NA	154	J	6,11
BH-SC-34-1.5to3.3-D	TOTAL HEXA-FURANS	67.8	NA	67.8	J	6,11
BH-SC-34-1.5to3.3-D	TOTAL HEPTA-FURANS	22.2	NA	22.2	J	6,11

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NA-not applicable

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged NJ by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions. For the concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Six concentrations of 1,2,3,7,8-PECDD and one concentration of 1,2,3,4,6,7,8-HPCDD were flagged G by the laboratory to indicate interference was present. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SG-10A-0to10	1,2,3,7,8-PECDD	21	G	21	J	13
BH-SG-43-0to10	2,3,7,8-TCDD	0.0641	NJ J	0.0641	J	13
BH-SG-43-0to10	1,2,3,7,8-PECDD	0.105	NJ J G	0.105	J	13
BH-SG-43-0to10	1,2,3,4,7,8-HXCDD	0.127	NJ J	0.127	J	13
BH-SG-43-0to10	2,3,4,6,7,8-HXCDF	0.0515	NJ J	0.0515	J	13
BH-SG-44-0to10	1,2,3,7,8-PECDD	0.21	J G	0.21	J	13
BH-SG-44-0to10	1,2,3,4,6,7,8-HPCDD	8.58	G	8.58	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SG-44-0to10	1,2,3,7,8-PECDF	0.101	NJ J	0.101	J	13
BH-SG-45-0to10	1,2,3,7,8-PECDD	0.597	J G	0.597	J	13
SG-08-0to10	1,2,3,6,7,8-HXCDF	0.0623	NJ J	0.0623	J	13
SG-13-0to10	1,2,3,4,7,8,9-HPCDF	0.198	NJ J	0.198	J	13
BH-SC-34-3.3to4.8	2,3,7,8-TCDD	0.0754	NJ J	0.0754	J	13
BH-HA-31-1to2	1,2,3,4,7,8,9-HPCDF	0.24	NJ J	0.24	J	13
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDF	0.0562	NJ J	0.0562	J	13
BH-HA-32-1to2	2,3,4,6,7,8-HXCDF	0.277	NJ J	0.277	J	13
BH-HA-33-0to1	1,2,3,7,8-PECDD	4.37	G	4.37	J	13
BH-HA-37-1to2	1,2,3,7,8-PECDD	42.8	G	42.8	J	13
BH-HA-48-0to1	1,2,3,7,8,9-HXCDF	0.0538	NJ J	0.0538	J	13
BH-HA-48-1to2	2,3,7,8-TCDF	0.184	NJ J	0.184	J	13
BH-HA-48-1to2	1,2,3,7,8,9-HXCDF	0.0833	NJ J	0.0833	J	13
BH-HA-48-1to2	2,3,4,6,7,8-HXCDF	0.123	NJ J	0.123	J	13
BH-SC-03-3to5	2,3,7,8-TCDD	0.324	NJ J	0.324	J	13
BH-SC-04-1.3to3	1,2,3,6,7,8-HXCDF	0.152	NJ J	0.152	J	13
BH-SC-21-3.7to5.8	2,3,7,8-TCDF_C	0.0361	NJ J	0.0361	J	13
BH-SC-21-5.8to8	1,2,3,7,8-PECDD	0.318	NJ J	0.318	J	13
BH-SC-21-8to10	2,3,7,8-TCDD	0.177	NJ J	0.177	J	13

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the SDLs/MRLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for solids. The screening levels were met with the following exception.

The MRL for solids for 2,3,7,8-TCDD of 0.065 pg/g did not meet the screening level of 0.0013 pg/g listed in Table 9a of the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. No discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

X The sample results were affected by serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified. Acceptance or rejection of the data should be decided by the project team (which should include a Project Chemist), but exclusion of the data is recommended.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR RECEIPT TEMPERATURE AND HOLDING TIME EXCEEDANCES

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	1.9	J	1.9	J	1
BH-SC-14-0to1.3	2,3,7,8-TCDF	0.77	NA	0.77	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	1.34	J	1.34	J	1
BH-SC-14-1.3to2.6	2,3,7,8-TCDF	0.152	J	0.152	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	4.13	NA	4.13	J	1
BH-SC-34-0to1.5	2,3,7,8-TCDF	9.49	NA	9.49	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	3.41	NA	3.41	J	1
BH-SC-34-1.5to3.3	2,3,7,8-TCDF	9.4	NA	9.4	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	3.69	NA	3.69	J	1
BH-SC-34-1.5to3.3-D	2,3,7,8-TCDF	9.96	NA	9.96	J	1
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.363	J	0.363	J	1,2
BH-SC-34-3.3to4.8	2,3,7,8-TCDF	0.163	J	0.163	J	1,2
SG-09-0to10	1,2,3,7,8,9-HXCDD	2.4	NA	2.4	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.147	J	0.147	J	1,2
BH-HA-31-0to1	1,2,3,7,8,9-HXCDD	2.74	NA	2.74	J	1
BH-HA-31-0to1	2,3,7,8-TCDF	3.84	NA	3.84	J	1
BH-HA-31-0to1	2,3,7,8-TCDD	0.701	J	0.701	J	1
BH-HA-31-0to1	1,2,3,4,7,8-HXCDD	1.58	J	1.58	J	1
BH-HA-31-0to1	1,2,3,6,7,8-HXCDD	2.95	NA	2.95	J	1
BH-HA-31-0to1	1,2,3,4,6,7,8-HPCDD	37.2	NA	37.2	J	1
BH-HA-31-0to1	OCDD	299	NA	299	J	1
BH-HA-31-0to1	2,3,4,7,8-PECDF	1.61	J	1.61	J	1
BH-HA-31-0to1	1,2,3,6,7,8-HXCDF	1.06	J	1.06	J	1
BH-HA-31-0to1	1,2,3,7,8,9-HXCDF	0.119	J	0.119	J	1
BH-HA-31-0to1	2,3,4,6,7,8-HXCDF	0.913	J	0.913	J	1
BH-HA-31-0to1	1,2,3,4,6,7,8-HPCDF	5.89	NA	5.89	J	1
BH-HA-31-0to1	1,2,3,4,7,8,9-HPCDF	0.56	J	0.56	J	1
BH-HA-31-0to1	OCDF	10.2	NA	10.2	J	1
BH-HA-31-0to1	TOTAL TETRA-DIOXINS	75.7	NA	75.7	J	1
BH-HA-31-0to1	TOTAL PENTA-DIOXINS	50.2	NA	50.2	J	1
BH-HA-31-0to1	TOTAL HEXA-DIOXINS	63.9	NA	63.9	J	1

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-31-0to1	TOTAL HEPTA-DIOXINS	92.8	NA	92.8	J	1
BH-HA-31-0to1	TOTAL TETRA-FURANS	63.8	NA	63.8	J	1
BH-HA-31-0to1	TOTAL PENTA-FURANS	26.5	NA	26.5	J	1
BH-HA-31-0to1	TOTAL HEXA-FURANS	14.9	NA	14.9	J	1
BH-HA-31-0to1	TOTAL HEPTA-FURANS	15.9	NA	15.9	J	1
BH-HA-31-0to1	1,2,3,7,8-PECDD	1.86	J	1.86	J	1
BH-HA-31-0to1	1,2,3,7,8-PECDF	1.6	J	1.6	J	1
BH-HA-31-0to1	1,2,3,4,7,8-HXCDF	1.31	J	1.31	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	1.69	J	1.69	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	2.03	NA	2.03	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.37	J	0.37	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.9	J	0.9	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	1.73	J	1.73	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	28.5	NA	28.5	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	376	NA	376	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.877	J	0.877	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.514	J	0.514	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.45	J	0.45	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	2.58	NA	2.58	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	45.9	NA	45.9	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	31.2	NA	31.2	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	40.9	NA	40.9	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	70.4	NA	70.4	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	35.2	NA	35.2	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	13	NA	13	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	6.83	NA	6.83	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	5.94	NA	5.94	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.24	NJ J	0.24	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	1.15	J G	1.15	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.777	J	0.777	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	0.62	J	0.62	J	1
BH-HA-31-1to2	1,2,3,7,8,9-HXCDD	4.35	J	4.35	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	2.01	J	2.01	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	1.74	NA	1.74	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.457	J	0.457	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	1.04	J	1.04	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	1.96	J	1.96	J	1

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BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	33.7	NA	33.7	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	416	NA	416	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.853	J	0.853	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.529	J	0.529	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.484	J	0.484	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	2.63	NA	2.63	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.278	J	0.278	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	49.2	NA	49.2	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	35.7	NA	35.7	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	54.5	NA	54.5	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	95.4	NA	95.4	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	31.6	NA	31.6	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	12.9	NA	12.9	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	6.83	NA	6.83	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	6.4	NA	6.4	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.0562	NJ J	0.0562	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	1.03	J G	1.03	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.816	J	0.816	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	0.571	J	0.571	J	1
BH-HA-31-1to2-D	1,2,3,7,8,9-HXCDD	4.46	J	4.46	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	4.8	NA	4.8	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	9.39	NA	9.39	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	2.34	NA	2.34	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	4.64	NA	4.64	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	3.47	NA	3.47	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	5.49	NA	5.49	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	43.7	NA	43.7	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	321	NA	321	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	2.81	NA	2.81	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	2.65	NA	2.65	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	1.35	J	1.35	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	0.14	J	0.14	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	0.981	J	0.981	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	3.97	NA	3.97	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	0.46	J	0.46	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	5.37	NA	5.37	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	228	NA	228	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	132	NA	132	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	132	NA	132	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	105	NA	105	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	169	NA	169	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	35.5	NA	35.5	J	1

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BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	13.2	NA	13.2	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	8.99	NA	8.99	J	1
BH-HA-32-0to1	1,2,3,7,8,9-HXCDD	1.44	J	1.44	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	1.49	J	1.49	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	2.62	NA	2.62	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.734	J	0.734	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	1.01	J	1.01	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	1.5	J	1.5	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	13.9	NA	13.9	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	116	NA	116	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.783	J	0.783	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.393	J	0.393	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.0494	UJ	0.0494	UJ	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.119	J	0.119	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	58.7	NA	58.7	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	39.3	NA	39.3	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	36.2	NA	36.2	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	31	NA	31	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	40.4	NA	40.4	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	8.08	NA	8.08	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	2.76	NA	2.76	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	1.95	NA	1.95	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.277	NJ J	0.277	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	1.38	J	1.38	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.934	J	0.934	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.376	J	0.376	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.901	J	0.901	J	1
BH-HA-32-1to2	1,2,3,7,8,9-HXCDD	0.978	J	0.978	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	6.17	NA	6.17	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	15.1	NA	15.1	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	2.47	NA	2.47	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	3.12	NA	3.12	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	6.03	NA	6.03	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	110	NA	110	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	1640	NA	1640	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	4.75	NA	4.75	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	4.75	NA	4.75	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	1.95	J	1.95	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	0.154	J	0.154	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	1.42	J	1.42	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	7.83	NA	7.83	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	0.672	J	0.672	J	1

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BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	18.8	NA	18.8	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	124	NA	124	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	86.4	NA	86.4	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	101	NA	101	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	217	NA	217	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	210	NA	210	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	63.9	NA	63.9	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	22.4	NA	22.4	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	19.2	NA	19.2	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	4.37	G	4.37	J	1
BH-HA-33-0to1	1,2,3,7,8,9-HXCDD	2.13	J	2.13	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	4.98	NA	4.98	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	14.8	NA	14.8	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	2.22	NA	2.22	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	3.74	NA	3.74	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	2.82	NA	2.82	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	5.59	NA	5.59	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	102	NA	102	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	1480	NA	1480	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	4.65	NA	4.65	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	4.37	NA	4.37	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	1.88	J	1.88	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	0.176	J	0.176	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	1.52	J	1.52	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	7.87	NA	7.87	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	0.669	J	0.669	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	20.9	NA	20.9	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	106	NA	106	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	76.3	NA	76.3	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	90.5	NA	90.5	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	245	NA	245	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	185	NA	185	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	57.2	NA	57.2	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	22.2	NA	22.2	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	22.1	NA	22.1	J	1
BH-HA-33-0to1-D	1,2,3,7,8,9-HXCDD	2.23	J	2.23	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	7.52	NA	7.52	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	5.65	NA	5.65	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	1.18	NA	1.18	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	2.77	NA	2.77	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	3.17	NA	3.17	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	6.19	NA	6.19	J	1

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BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	185	NA	185	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	2.38	J	2.38	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	1.28	J	1.28	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	0.094	J	0.094	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	1.18	J	1.18	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	5.8	NA	5.8	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	0.486	J	0.486	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	107	NA	107	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	49.7	NA	49.7	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	106	NA	106	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	417	NA	417	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	98.4	NA	98.4	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	37	NA	37	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	18.5	NA	18.5	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	13.3	NA	13.3	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	6830	D	6830	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	2.26	J	2.26	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	1.41	J	1.41	J	1
BH-HA-34-0to1	1,2,3,7,8,9-HXCDD	12.3	D J	12.3	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	9.5	NA	9.5	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	24.4	NA	24.4	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	3.91	NA	3.91	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	9.31	NA	9.31	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	6.18	NA	6.18	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	10.9	NA	10.9	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	100	NA	100	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	587	NA	587	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	11	NA	11	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	13.4	NA	13.4	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	7.36	NA	7.36	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	8.02	NA	8.02	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	0.617	J	0.617	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	8.58	NA	8.58	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	22	NA	22	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	2.22	J	2.22	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	26.3	NA	26.3	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	213	NA	213	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	148	NA	148	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	239	NA	239	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	203	NA	203	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	434	NA	434	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	195	NA	195	J	1

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BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	81.2	NA	81.2	J	1
BH-HA-35-0to1	1,2,3,7,8,9-HXCDD	38.3	NA	38.3	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	4.7	NA	4.7	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	9.87	NA	9.87	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	1.33	NA	1.33	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	4.06	NA	4.06	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	2.52	NA	2.52	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	4.82	NA	4.82	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	41.5	NA	41.5	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	299	NA	299	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	5.48	NA	5.48	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	5.33	NA	5.33	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	3.1	NA	3.1	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	3.2	NA	3.2	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	0.257	J	0.257	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	3.21	NA	3.21	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	7.72	NA	7.72	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	0.828	J	0.828	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	8.41	NA	8.41	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	118	NA	118	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	66.4	NA	66.4	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	96.2	NA	96.2	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	98.1	NA	98.1	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	184	NA	184	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	74.6	NA	74.6	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	30.8	NA	30.8	J	1
BH-HA-35-1to2	1,2,3,7,8,9-HXCDD	14	NA	14	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	6.48	NA	6.48	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	28.2	NA	28.2	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	1.77	NA	1.77	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	3.27	NA	3.27	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	3.66	NA	3.66	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	6.16	NA	6.16	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	107	NA	107	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	989	NA	989	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	8	NA	8	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	9.8	NA	9.8	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	5.61	NA	5.61	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	4.79	NA	4.79	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	0.302	J	0.302	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	4.75	NA	4.75	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	14.6	NA	14.6	J	1

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BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	0.985	J	0.985	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	9.12	NA	9.12	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	74.5	NA	74.5	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	64.1	NA	64.1	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	130	NA	130	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	287	NA	287	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	325	NA	325	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	102	NA	102	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	47	NA	47	J	1
BH-HA-36-0to1	1,2,3,7,8,9-HXCDD	22	NA	22	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	29.5	NA	29.5	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	297	NA	297	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	28.9	NA	28.9	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	42.6	NA	42.6	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	24	NA	24	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	31.3	NA	31.3	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	339	NA	339	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	2370	NA	2370	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	147	NA	147	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	143	NA	143	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	105	NA	105	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	93.6	NA	93.6	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	4.89	NA	4.89	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	70.4	NA	70.4	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	265	NA	265	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	15.9	NA	15.9	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	69.8	NA	69.8	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	1300	NA	1300	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	624	NA	624	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	697	NA	697	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	899	NA	899	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	1970	NA	1970	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	892	NA	892	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	358	NA	358	J	1
BH-HA-37-0to1	1,2,3,7,8,9-HXCDD	4450	D	4450	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	25.4	NA	25.4	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	347	NA	347	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	32.5	NA	32.5	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	21.4	NA	21.4	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	27	NA	27	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	307	NA	307	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	2710	NA	2710	J	1

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BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	165	NA	165	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	154	NA	154	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	95.1	NA	95.1	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	85.1	NA	85.1	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	4.52	NA	4.52	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	60.6	NA	60.6	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	221	NA	221	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	12.4	NA	12.4	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	50.9	NA	50.9	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	1090	NA	1090	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	598	NA	598	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	565	NA	565	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	734	NA	734	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	2110	NA	2110	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	754	NA	754	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	284	NA	284	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	5530	D	5530	J	1
BH-HA-37-1to2	1,2,3,7,8,9-HXCDD	42.8	G	42.8	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	1.39	J	1.39	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	1.55	NA	1.55	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.492	J	0.492	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.864	J	0.864	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	1.59	J	1.59	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	27.1	NA	27.1	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	198	NA	198	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.793	J	0.793	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.618	J	0.618	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.522	J	0.522	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	6.03	NA	6.03	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.303	J	0.303	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	11.2	NA	11.2	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	36.3	NA	36.3	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	16	NA	16	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	39	NA	39	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	71.9	NA	71.9	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	27.1	NA	27.1	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	10.7	NA	10.7	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	8.69	NA	8.69	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	16.5	NA	16.5	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.0538	NJ J	0.0538	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.809	J	0.809	J	1
BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.791	J	0.791	J	1

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BH-HA-48-0to1	1,2,3,7,8,9-HXCDD	0.844	J	0.844	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	1.2	J	1.2	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.16	J	0.16	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.594	J	0.594	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.834	J	0.834	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	27.3	NA	27.3	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	247	NA	247	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.141	J	0.141	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.127	J	0.127	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.122	J	0.122	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	20.7	NA	20.7	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	5.79	NA	5.79	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	39	NA	39	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	97.5	NA	97.5	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	1.79	NA	1.79	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	1.07	NA	1.07	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	1.01	NA	1.01	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	1.95	NA	1.95	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.184	NJ J	0.184	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.0833	NJ J	0.0833	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.123	NJ J	0.123	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.308	J	0.308	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.173	NJ B J	0.173	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.157	B J	0.157	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	0.785	J	0.785	J	1
BH-HA-48-1to2	1,2,3,7,8,9-HXCDD	1.35	J	1.35	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	1.92	J	1.92	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.514	NA	0.514	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.292	J	0.292	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.558	J	0.558	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.772	J	0.772	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	28.4	NA	28.4	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	247	NA	247	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.317	J	0.317	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.617	J	0.617	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.26	J	0.26	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.0931	J	0.0931	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	80	NA	80	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	14.7	NA	14.7	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	49.1	NA	49.1	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	97	NA	97	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	9.92	NA	9.92	J	1

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BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	5.07	NA	5.07	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	3.74	NA	3.74	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	3.3	NA	3.3	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	1.44	J	1.44	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.345	B J	0.345	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.0627	J	0.0627	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	0.2	B J	0.2	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	2.06	J	2.06	J	1
BH-SC-03-0to1	1,2,3,7,8,9-HXCDD	1.8	J	1.8	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	4.69	NA	4.69	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.307	J	0.307	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.479	J	0.479	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	1.11	J	1.11	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	83.5	NA	83.5	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	1620	NA	1620	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	191	NA	191	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	29.4	NA	29.4	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	142	NA	142	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	389	NA	389	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0886	NA	0.0886	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0475	UJ	0.0475	UJ	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	2.24	J	2.24	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0518	NJ B J	0.0518	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.0507	J	0.0507	J	1
BH-SC-03-1to3	1,2,3,7,8,9-HXCDD	0.112	B	0.112	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	3.37	NA	3.37	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.324	NJ J	0.324	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.43	J	0.43	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.927	J	0.927	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	73.2	NA	73.2	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	1170	NA	1170	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1

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BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.221	UJ	0.221	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	167	NA	167	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	23.4	NA	23.4	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	116	NA	116	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	400	NA	400	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0994	NA	0.0994	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0463	UJ	0.0463	UJ	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	1.81	J	1.81	J	1
BH-SC-03-3to5	1,2,3,7,8,9-HXCDD	0.0579	NJ B J	0.0579	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	6.29	NA	6.29	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.591	J	0.591	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	1.09	J	1.09	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	1.42	J	1.42	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	6.05	NA	6.05	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	91.3	NA	91.3	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	1040	NA	1040	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	429	NA	429	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	49.1	NA	49.1	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	187	NA	187	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	357	NA	357	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.184	NA	0.184	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0486	UJ	0.0486	UJ	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0716	NJ J	0.0716	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0588	B	0.0588	J	1
BH-SC-03-5to7	1,2,3,7,8,9-HXCDD	0.0703	B	0.0703	J	1

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BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	3.36	NA	3.36	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.309	J	0.309	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.473	J	0.473	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.963	J	0.963	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	63.2	NA	63.2	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	893	NA	893	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	116	NA	116	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	25.1	NA	25.1	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	112	NA	112	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	280	NA	280	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0647	NA	0.0647	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0467	UJ	0.0467	UJ	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	1.7	J	1.7	J	1
BH-SC-03-7to10	1,2,3,7,8,9-HXCDD	0.0468	NJ J	0.0468	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	2.22	J	2.22	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	1.65	NA	1.65	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.393	J	0.393	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.972	J	0.972	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	1.14	J	1.14	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	31.7	NA	31.7	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	310	NA	310	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.864	J	0.864	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	2.09	J	2.09	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.743	J	0.743	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	5.65	NA	5.65	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.249	J	0.249	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	82.1	NA	82.1	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	22.4	NA	22.4	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	54	NA	54	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	105	NA	105	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	23.9	NA	23.9	J	1

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BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	13.8	NA	13.8	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	9.29	NA	9.29	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	8.2	NA	8.2	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	2.37	J	2.37	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	1.53	J	1.53	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.102	J	0.102	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	0.504	J	0.504	J	1
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDD	3.72	J	3.72	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	1.26	J	1.26	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.207	J	0.207	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.21	J	0.21	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.318	J	0.318	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.413	J	0.413	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	18.9	NA	18.9	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	200	NA	200	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.112	J	0.112	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.272	J	0.272	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.152	NJ J	0.152	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.0477	UJ	0.0477	UJ	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.0822	J	0.0822	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	62.4	NA	62.4	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	10.5	NA	10.5	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	37.1	NA	37.1	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	69.6	NA	69.6	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	3.38	NA	3.38	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	1.41	NA	1.41	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.723	NA	0.723	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.993	NA	0.993	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.846	J	0.846	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.203	B J	0.203	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.0877	B J	0.0877	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.821	J	0.821	J	1
BH-SC-04-1.3to3	1,2,3,7,8,9-HXCDD	0.636	J	0.636	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	3.03	NA	3.03	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.227	J	0.227	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.366	J	0.366	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.815	J	0.815	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	54.6	NA	54.6	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	419	NA	419	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1

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BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	170	NA	170	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	19.3	NA	19.3	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	81.8	NA	81.8	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	188	NA	188	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0938	NA	0.0938	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0476	UJ	0.0476	UJ	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	2.14	J	2.14	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0815	B J	0.0815	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.0748	J	0.0748	J	1
BH-SC-04-3to4.2	1,2,3,7,8,9-HXCDD	0.131	B	0.131	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.275	J	0.275	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.584	J	0.584	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.766	J	0.766	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	1.73	J	1.73	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	30.2	NA	30.2	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	237	NA	237	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.556	J	0.556	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.394	J	0.394	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	1.14	J	1.14	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.35	J	0.35	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.0535	J	0.0535	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.213	J	0.213	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	2.84	NA	2.84	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	87.9	NA	87.9	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	15.2	NA	15.2	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	44.9	NA	44.9	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	92.8	NA	92.8	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	12.2	NA	12.2	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	6.93	NA	6.93	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	5.09	NA	5.09	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	4.74	NA	4.74	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	0.168	B J	0.168	J	1
BH-SC-14-0to1.3	1,2,3,7,8,9-HXCDD	2.27	J	2.27	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.187	J	0.187	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.38	J	0.38	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.456	J	0.456	J	1

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BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	1.03	J	1.03	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	25.5	NA	25.5	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	257	NA	257	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.141	J	0.141	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.131	J	0.131	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.174	J	0.174	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.0766	J	0.0766	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.0822	J	0.0822	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.103	J	0.103	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	86.6	NA	86.6	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	11	NA	11	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	38.7	NA	38.7	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	99.1	NA	99.1	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	1.57	NA	1.57	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.932	NA	0.932	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.918	NA	0.918	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.368	B J	0.368	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.0983	NJ B J	0.0983	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.423	J	0.423	J	1
BH-SC-14-1.3to2.6	1,2,3,7,8,9-HXCDD	0.638	NA	0.638	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	1.85	J	1.85	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	1.96	NA	1.96	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.496	J	0.496	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.987	J	0.987	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.849	J	0.849	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	25.2	NA	25.2	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	273	NA	273	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	1.09	J	1.09	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	1.08	J	1.08	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.78	J	0.78	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.175	J	0.175	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	76.6	NA	76.6	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	30.2	NA	30.2	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	48.4	NA	48.4	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	73.8	NA	73.8	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	41.7	NA	41.7	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	15	NA	15	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	6.98	NA	6.98	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	2.84	NA	2.84	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	1.69	J	1.69	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	1.01	J	1.01	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.0795	NJ J	0.0795	J	1

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BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.695	J	0.695	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	2.27	J	2.27	J	1
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDD	0.739	J	0.739	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	1.66	NA	1.66	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0361	NJ J	0.0361	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.195	J	0.195	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.28	J	0.28	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.531	J	0.531	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	29.6	NA	29.6	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	624	NA	624	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0326	UJ	0.0326	UJ	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0406	J	0.0406	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0326	UJ	0.0326	UJ	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0326	UJ	0.0326	UJ	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0326	UJ	0.0326	UJ	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0326	UJ	0.0326	UJ	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	50.2	NA	50.2	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	10.4	NA	10.4	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	45.8	NA	45.8	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	105	NA	105	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.371	NA	0.371	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	1.05	J	1.05	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.051	NJ B J	0.051	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0853	B J	0.0853	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0421	NJ J	0.0421	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0382	B	0.0382	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0406	B	0.0406	J	1
BH-SC-21-3.7to5.8	1,2,3,7,8,9-HXCDD	0.0853	B	0.0853	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	3.32	NA	3.32	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.219	J	0.219	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.318	NJ J	0.318	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.767	J	0.767	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	59.3	NA	59.3	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	943	NA	943	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1

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BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0533	UJ	0.0533	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	160	NA	160	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	22.7	NA	22.7	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	103	NA	103	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	240	NA	240	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0722	NA	0.0722	J	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	0.0478	UJ	0.0478	UJ	1
BH-SC-21-5.8to8	1,2,3,7,8,9-HXCDD	1.55	J	1.55	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	2.12	J	2.12	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.177	NJ J	0.177	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.276	J	0.276	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.554	J	0.554	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	37.4	NA	37.4	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	716	NA	716	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	155	NA	155	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	22	NA	22	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	86.9	NA	86.9	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	192	NA	192	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0868	NA	0.0868	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0471	UJ	0.0471	UJ	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.95	J	0.95	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0474	NJ B J	0.0474	J	1
BH-SC-21-8to10	1,2,3,7,8,9-HXCDD	0.0581	B	0.0581	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	1.55	NA	1.55	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	3.92	NA	3.92	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	5.13	NA	5.13	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	7.57	NA	7.57	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	8.51	NA	8.51	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	7.7	NA	7.7	J	1

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BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	6.3	NA	6.3	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	0.499	J	0.499	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	5.88	NA	5.88	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	105	NA	105	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	84.6	NA	84.6	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	203	NA	203	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	109	NA	109	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	60.1	NA	60.1	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	2.77	NA	2.77	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	48.3	NA	48.3	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	466	NA	466	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	18.1	NA	18.1	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	9.23	NA	9.23	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	105	NA	105	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	168	NA	168	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	27.9	NA	27.9	J	1
BH-SC-34-0to1.5	1,2,3,7,8,9-HXCDD	1.52	J	1.52	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	1.1	NA	1.1	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	3.12	NA	3.12	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	2.05	J	2.05	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	3.93	NA	3.93	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	35	NA	35	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	423	NA	423	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	8.58	NA	8.58	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	9.54	NA	9.54	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	9.01	NA	9.01	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	6.78	NA	6.78	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	0.569	J	0.569	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	5.25	NA	5.25	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	14	NA	14	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	5.62	NA	5.62	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	76.6	NA	76.6	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	58.7	NA	58.7	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	76.2	NA	76.2	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	85.9	NA	85.9	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	219	NA	219	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	122	NA	122	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	56.3	NA	56.3	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	19.3	NA	19.3	J	1
BH-SC-34-1.5to3.3	1,2,3,7,8,9-HXCDD	1.55	J	1.55	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	4.14	NA	4.14	J	1

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BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	9.9	NA	9.9	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	7.63	NA	7.63	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	277	NA	277	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	1.88	J	1.88	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	1.25	NA	1.25	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	3.41	NA	3.41	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	2.22	J	2.22	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	37.5	NA	37.5	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	490	NA	490	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	9.69	NA	9.69	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	10.8	NA	10.8	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	0.672	J	0.672	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	6.43	NA	6.43	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	15.8	NA	15.8	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	6.01	NA	6.01	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	101	NA	101	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	65.5	NA	65.5	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	83.5	NA	83.5	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	92.3	NA	92.3	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	154	NA	154	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	67.8	NA	67.8	J	1
BH-SC-34-1.5to3.3-D	1,2,3,7,8,9-HXCDD	22.2	NA	22.2	J	1
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.142	J	0.142	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.142	J	0.142	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.238	J	0.238	J	1,2

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	5.12	NA	5.12	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	62.2	NA	62.2	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.165	J	0.165	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.197	J	0.197	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.159	J	0.159	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.124	J	0.124	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.0197	UJ	0.0197	UJ	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.115	J	0.115	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	6.62	NA	6.62	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	2.49	NA	2.49	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	7.49	NA	7.49	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	15.4	NA	15.4	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	3.71	NA	3.71	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	2.17	NA	2.17	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	1.06	NA	1.06	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.0754	NJ J	0.0754	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.285	J	0.285	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.0477	B J	0.0477	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.171	J	0.171	J	1,2
BH-SC-34-3.3to4.8	1,2,3,7,8,9-HXCDD	0.418	NA	0.418	J	1,2
BH-SC-34-4.8to5.6	1,2,3,7,8,9-HXCDD	0.853	J	0.853	J	1,2
BH-SC-34-4.8to5.6	2,3,7,8-TCDD	0.103	J	0.103	J	1,2
BH-SC-34-4.8to5.6	1,2,3,4,7,8-HXCDD	0.301	J	0.301	J	1,2
BH-SC-34-4.8to5.6	1,2,3,6,7,8-HXCDD	0.484	J	0.484	J	1,2
BH-SC-34-4.8to5.6	1,2,3,4,6,7,8-HPCDD	12.6	NA	12.6	J	1,2
BH-SC-34-4.8to5.6	OCDD	175	NA	175	J	1,2
BH-SC-34-4.8to5.6	2,3,7,8-TCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	2,3,4,7,8-PECDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	1,2,3,4,7,8-HXCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	1,2,3,6,7,8-HXCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	1,2,3,7,8,9-HXCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	2,3,4,6,7,8-HXCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	1,2,3,4,6,7,8-HPCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	1,2,3,4,7,8,9-HPCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	OCDF	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	TOTAL TETRA-DIOXINS	11.8	NA	11.8	J	1,2
BH-SC-34-4.8to5.6	TOTAL PENTA-DIOXINS	1.55	NA	1.55	J	1,2
BH-SC-34-4.8to5.6	TOTAL HEXA-DIOXINS	15.2	NA	15.2	J	1,2
BH-SC-34-4.8to5.6	TOTAL HEPTA-DIOXINS	40.1	NA	40.1	J	1,2

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-34-4.8to5.6	TOTAL TETRA-FURANS	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	TOTAL PENTA-FURANS	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	TOTAL HEXA-FURANS	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	TOTAL HEPTA-FURANS	0.0468	UJ	0.0468	UJ	1,2
BH-SC-34-4.8to5.6	1,2,3,7,8-PECDD	0.225	NJ J	0.225	J	1,2
BH-SC-34-4.8to5.6	1,2,3,7,8-PECDF	0.047	NJ B J	0.047	J	1,2
SG-03-0to10	1,2,3,7,8,9-HXCDD	2.72	NA	2.72	J	1,2
SG-03-0to10	2,3,7,8-TCDF	1.42	NA	1.42	J	1,2
SG-03-0to10	2,3,7,8-TCDD	0.402	J	0.402	J	1,2
SG-03-0to10	1,2,3,7,8-PECDD	1.08	J	1.08	J	1,2
SG-03-0to10	1,2,3,4,7,8-HXCDD	1.35	J	1.35	J	1,2
SG-03-0to10	1,2,3,6,7,8-HXCDD	2.71	NA	2.71	J	1,2
SG-03-0to10	1,2,3,4,6,7,8-HPCDD	46.9	NA	46.9	J	1,2
SG-03-0to10	2,3,4,7,8-PECDF	0.806	J	0.806	J	1,2
SG-03-0to10	1,2,3,4,7,8-HXCDF	2.14	J	2.14	J	1,2
SG-03-0to10	1,2,3,6,7,8-HXCDF	0.75	J	0.75	J	1,2
SG-03-0to10	2,3,4,6,7,8-HXCDF	0.528	J	0.528	J	1,2
SG-03-0to10	1,2,3,4,6,7,8-HPCDF	6.13	NA	6.13	J	1,2
SG-03-0to10	1,2,3,4,7,8,9-HPCDF	0.253	J	0.253	J	1,2
SG-03-0to10	TOTAL TETRA-DIOXINS	102	NA	102	J	1,2
SG-03-0to10	TOTAL PENTA-DIOXINS	23.7	NA	23.7	J	1,2
SG-03-0to10	TOTAL HEXA-DIOXINS	65.5	NA	65.5	J	1,2
SG-03-0to10	TOTAL HEPTA-DIOXINS	147	NA	147	J	1,2
SG-03-0to10	TOTAL TETRA-FURANS	22.7	NA	22.7	J	1,2
SG-03-0to10	TOTAL PENTA-FURANS	11.8	NA	11.8	J	1,2
SG-03-0to10	TOTAL HEXA-FURANS	9.83	NA	9.83	J	1,2
SG-03-0to10	TOTAL HEPTA-FURANS	9.36	NA	9.36	J	1,2
SG-03-0to10	1,2,3,7,8-PECDF	1.27	J	1.27	J	1,2
SG-03-0to10	1,2,3,7,8,9-HXCDF	0.0547	NJ J	0.0547	J	1,2
SG-03-0to10	OCDD	416	NA	416	J	1,2
SG-03-0to10	OCDF	5.32	NA	5.32	J	1,2
SG-04-0to10	1,2,3,7,8,9-HXCDD	3.45	NA	3.45	J	1,2
SG-04-0to10	2,3,7,8-TCDF	2.06	NA	2.06	J	1,2

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SG-04-0to10	2,3,7,8-TCDF	0.517	J	0.517	J	1,2
SG-04-0to10	2,3,7,8-TCDF	1.62	J	1.62	J	1,2
SG-04-0to10	2,3,7,8-TCDF	1.85	J	1.85	J	1,2
SG-04-0to10	2,3,7,8-TCDF	3.72	NA	3.72	J	1,2
SG-04-0to10	2,3,7,8-TCDF	61.3	NA	61.3	J	1,2
SG-04-0to10	2,3,7,8-TCDF	1.19	J	1.19	J	1,2
SG-04-0to10	2,3,7,8-TCDF	4	NA	4	J	1,2
SG-04-0to10	2,3,7,8-TCDF	1.25	J	1.25	J	1,2
SG-04-0to10	2,3,7,8-TCDF	0.773	J	0.773	J	1,2
SG-04-0to10	2,3,7,8-TCDF	11.1	NA	11.1	J	1,2
SG-04-0to10	2,3,7,8-TCDF	0.47	J	0.47	J	1,2
SG-04-0to10	2,3,7,8-TCDF	119	NA	119	J	1,2
SG-04-0to10	2,3,7,8-TCDF	31.3	NA	31.3	J	1,2
SG-04-0to10	2,3,7,8-TCDF	82.4	NA	82.4	J	1,2
SG-04-0to10	2,3,7,8-TCDF	182	NA	182	J	1,2
SG-04-0to10	2,3,7,8-TCDF	32.3	NA	32.3	J	1,2
SG-04-0to10	2,3,7,8-TCDF	18.8	NA	18.8	J	1,2
SG-04-0to10	2,3,7,8-TCDF	17	NA	17	J	1,2
SG-04-0to10	2,3,7,8-TCDF	16.9	NA	16.9	J	1,2
SG-04-0to10	2,3,7,8-TCDF	2.15	J	2.15	J	1,2
SG-04-0to10	2,3,7,8-TCDF	0.079	NJ J	0.079	J	1,2
SG-04-0to10	2,3,7,8-TCDF	737	NA	737	J	1,2
SG-04-0to10	2,3,7,8-TCDF	8.52	NA	8.52	J	1,2
SG-08-0to10	2,3,7,8-TCDF	1.23	J	1.23	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.101	J	0.101	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.145	J	0.145	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.27	J	0.27	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.529	J	0.529	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.901	J	0.901	J	1,2
SG-08-0to10	2,3,7,8-TCDF	26.8	NA	26.8	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.0596	J	0.0596	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.111	J	0.111	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.0495	UJ	0.0495	UJ	1,2
SG-08-0to10	2,3,7,8-TCDF	0.0495	UJ	0.0495	UJ	1,2
SG-08-0to10	2,3,7,8-TCDF	0.0495	UJ	0.0495	UJ	1,2
SG-08-0to10	2,3,7,8-TCDF	74.1	NA	74.1	J	1,2
SG-08-0to10	2,3,7,8-TCDF	8.87	NA	8.87	J	1,2
SG-08-0to10	2,3,7,8-TCDF	33.3	NA	33.3	J	1,2
SG-08-0to10	2,3,7,8-TCDF	88.7	NA	88.7	J	1,2
SG-08-0to10	2,3,7,8-TCDF	1.7	NA	1.7	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.542	NA	0.542	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.63	NA	0.63	J	1,2

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SG-08-0to10	2,3,7,8-TCDF	0.0623	NJ J	0.0623	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.0984	NJ B J	0.0984	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.343	J	0.343	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.407	NA	0.407	J	1,2
SG-08-0to10	2,3,7,8-TCDF	0.392	J	0.392	J	1,2
SG-08-0to10	2,3,7,8-TCDF	252	NA	252	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.307	J	0.307	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.475	J	0.475	J	1,2
SG-09-0to10	2,3,7,8-TCDF	1.08	J	1.08	J	1,2
SG-09-0to10	2,3,7,8-TCDF	1.88	J	1.88	J	1,2
SG-09-0to10	2,3,7,8-TCDF	52.2	NA	52.2	J	1,2
SG-09-0to10	2,3,7,8-TCDF	429	NA	429	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.147	J	0.147	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.0858	J	0.0858	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.183	J	0.183	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.0857	J	0.0857	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.0475	UJ	0.0475	UJ	1,2
SG-09-0to10	2,3,7,8-TCDF	0.088	J	0.088	J	1,2
SG-09-0to10	2,3,7,8-TCDF	207	NA	207	J	1,2
SG-09-0to10	2,3,7,8-TCDF	22.1	NA	22.1	J	1,2
SG-09-0to10	2,3,7,8-TCDF	80.2	NA	80.2	J	1,2
SG-09-0to10	2,3,7,8-TCDF	186	NA	186	J	1,2
SG-09-0to10	2,3,7,8-TCDF	2.65	NA	2.65	J	1,2
SG-09-0to10	2,3,7,8-TCDF	1.4	NA	1.4	J	1,2
SG-09-0to10	2,3,7,8-TCDF	1.26	NA	1.26	J	1,2
SG-09-0to10	2,3,7,8-TCDF	2.4	NA	2.4	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.872	J	0.872	J	1,2
SG-09-0to10	2,3,7,8-TCDF	0.0972	B J	0.0972	J	1,2
SG-09-0to10	2,3,7,8-TCDF	2.63	J	2.63	J	1,2
SG-13-0to10	2,3,7,8-TCDF	2.35	J	2.35	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.681	NA	0.681	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.285	J	0.285	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.755	J	0.755	J	1,2
SG-13-0to10	2,3,7,8-TCDF	1.06	J	1.06	J	1,2
SG-13-0to10	2,3,7,8-TCDF	2.2	J	2.2	J	1,2
SG-13-0to10	2,3,7,8-TCDF	45.2	NA	45.2	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.466	J	0.466	J	1,2
SG-13-0to10	2,3,7,8-TCDF	1.61	J	1.61	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.508	J	0.508	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.0513	UJ	0.0513	UJ	1,2
SG-13-0to10	2,3,7,8-TCDF	0.363	J	0.363	J	1,2
SG-13-0to10	2,3,7,8-TCDF	5.13	NA	5.13	J	1,2

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SG-13-0to10	2,3,7,8-TCDF	90.5	NA	90.5	J	1,2
SG-13-0to10	2,3,7,8-TCDF	18	NA	18	J	1,2
SG-13-0to10	2,3,7,8-TCDF	58.9	NA	58.9	J	1,2
SG-13-0to10	2,3,7,8-TCDF	143	NA	143	J	1,2
SG-13-0to10	2,3,7,8-TCDF	10.7	NA	10.7	J	1,2
SG-13-0to10	2,3,7,8-TCDF	6.98	NA	6.98	J	1,2
SG-13-0to10	2,3,7,8-TCDF	6.62	NA	6.62	J	1,2
SG-13-0to10	2,3,7,8-TCDF	7.1	NA	7.1	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.198	NJ J	0.198	J	1,2
SG-13-0to10	2,3,7,8-TCDF	0.721	J	0.721	J	1,2
SG-13-0to10	2,3,7,8-TCDF	4.7	J	4.7	J	1,2
SG-13-0to10	2,3,7,8-TCDF	890	NA	890	J	1,2
SG-37-0to10	2,3,7,8-TCDF	1.13	J	1.13	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.426	J	0.426	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.4	J	0.4	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.434	J	0.434	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.503	J	0.503	J	1,2
SG-37-0to10	2,3,7,8-TCDF	1.25	J	1.25	J	1,2
SG-37-0to10	2,3,7,8-TCDF	27.2	NA	27.2	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.294	J	0.294	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.653	J	0.653	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.277	J	0.277	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.0505	UJ	0.0505	UJ	1,2
SG-37-0to10	2,3,7,8-TCDF	0.242	J	0.242	J	1,2
SG-37-0to10	2,3,7,8-TCDF	3.46	NA	3.46	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.231	J	0.231	J	1,2
SG-37-0to10	2,3,7,8-TCDF	25.8	NA	25.8	J	1,2
SG-37-0to10	2,3,7,8-TCDF	7.73	NA	7.73	J	1,2
SG-37-0to10	2,3,7,8-TCDF	28.2	NA	28.2	J	1,2
SG-37-0to10	2,3,7,8-TCDF	94.9	NA	94.9	J	1,2
SG-37-0to10	2,3,7,8-TCDF	6.25	NA	6.25	J	1,2
SG-37-0to10	2,3,7,8-TCDF	4.44	NA	4.44	J	1,2
SG-37-0to10	2,3,7,8-TCDF	5.25	NA	5.25	J	1,2
SG-37-0to10	2,3,7,8-TCDF	9.13	NA	9.13	J	1,2
SG-37-0to10	2,3,7,8-TCDF	0.292	B J	0.292	J	1,2
SG-37-0to10	2,3,7,8-TCDF	785	NA	785	J	1,2
SG-37-0to10	2,3,7,8-TCDF	7.12	NA	7.12	J	1,2
SG-37-0to10-D	2,3,7,8-TCDF	1.17	J	1.17	J	1,2
SG-37-0to10-D	2,3,7,8-TCDF	0.504	NA	0.504	J	1,2
SG-37-0to10-D	2,3,7,8-TCDD	0.291	J	0.291	J	1,2
SG-37-0to10-D	1,2,3,7,8-PECDD	0.452	J	0.452	J	1,2
SG-37-0to10-D	1,2,3,4,7,8-HXCDD	0.431	J	0.431	J	1,2

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
SG-37-0to10-D	1,2,3,6,7,8-HXCDD	1.17	J	1.17	J	1,2
SG-37-0to10-D	1,2,3,4,6,7,8-HPCDD	24.4	NA	24.4	J	1,2
SG-37-0to10-D	2,3,4,7,8-PECDF	0.263	J	0.263	J	1,2
SG-37-0to10-D	1,2,3,4,7,8-HXCDF	0.537	J	0.537	J	1,2
SG-37-0to10-D	1,2,3,6,7,8-HXCDF	0.26	J	0.26	J	1,2
SG-37-0to10-D	2,3,4,6,7,8-HXCDF	0.228	J	0.228	J	1,2
SG-37-0to10-D	1,2,3,4,6,7,8-HPCDF	3.36	NA	3.36	J	1,2
SG-37-0to10-D	1,2,3,4,7,8,9-HPCDF	0.209	J	0.209	J	1,2
SG-37-0to10-D	TOTAL TETRA-DIOXINS	23.7	NA	23.7	J	1,2
SG-37-0to10-D	TOTAL PENTA-DIOXINS	5.7	NA	5.7	J	1,2
SG-37-0to10-D	TOTAL HEXA-DIOXINS	22.7	NA	22.7	J	1,2
SG-37-0to10-D	TOTAL HEPTA-DIOXINS	88.9	NA	88.9	J	1,2
SG-37-0to10-D	TOTAL TETRA-FURANS	5.9	NA	5.9	J	1,2
SG-37-0to10-D	TOTAL PENTA-FURANS	3.81	NA	3.81	J	1,2
SG-37-0to10-D	TOTAL HEXA-FURANS	4.27	NA	4.27	J	1,2
SG-37-0to10-D	TOTAL HEPTA-FURANS	6.97	NA	6.97	J	1,2
SG-37-0to10-D	1,2,3,7,8-PECDF	0.265	B J	0.265	J	1,2
SG-37-0to10-D	1,2,3,7,8,9-HXCDF	0.0566	NJ J	0.0566	J	1,2
SG-37-0to10-D	OCDD	273	NA	273	J	1,2
SG-37-0to10-D	OCDF	6.8	NA	6.8	J	1,2

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
UJ-not detected at or above the SDL or MRL
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
D-laboratory flag indicating the analyte was reported from a dilution
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

ATTACHMENT 4
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
SG-03-0to10	1,2,3,7,8-PECDF	1.27	J	2.54	U	3
SG-03-0to10	1,2,3,7,8,9-HXCDF	0.0547	NJ J	2.54	U	3
SG-04-0to10	1,2,3,7,8-PECDF	2.15	J	2.62	U	3
SG-04-0to10	1,2,3,7,8,9-HXCDF	0.079	NJ J	2.62	U	3
SG-08-0to10	1,2,3,7,8-PECDF	0.0984	NJ B J	2.48	U	3
SG-08-0to10	1,2,3,4,6,7,8-HPCDF	0.343	J	2.48	U	3
SG-08-0to10	TOTAL PENTA-FURANS	0.407	NA	0.407	J+	3
SG-13-0to10	1,2,3,7,8-PECDF	0.721	J	2.56	U	3
SG-37-0to10	1,2,3,7,8-PECDF	0.292	B J	2.52	U	3
SG-37-0to10-D	1,2,3,7,8-PECDF	0.265	B J	2.51	U	3
SG-37-0to10-D	1,2,3,7,8,9-HXCDF	0.0566	NJ J	2.51	U	3
BH-SC-03-0to1	1,2,3,6,7,8-HXCDD	1.44	J	2.56	U	3
BH-SC-03-0to1	1,2,3,7,8-PECDF	0.345	B J	2.56	U	3
BH-SC-03-0to1	1,2,3,7,8,9-HXCDF	0.0627	J	0.0627	U	3
BH-SC-03-0to1	2,3,4,6,7,8-HXCDF	0.2	B J	2.56	U	3
BH-SC-03-0to1	1,2,3,4,6,7,8-HPCDF	2.06	J	2.56	U	3
BH-SC-03-0to1	OCDF	1.8	J	5.12	U	3
BH-SC-03-1to3	1,2,3,6,7,8-HXCDD	2.24	J	2.37	U	3
BH-SC-03-1to3	1,2,3,4,6,7,8-HPCDF	0.0518	NJ B J	2.37	U	3
BH-SC-03-1to3	OCDF	0.0507	J	4.75	U	3
BH-SC-03-1to3	TOTAL HEPTA-FURANS	0.112	B	0.112	J+	3
BH-SC-03-3to5	1,2,3,6,7,8-HXCDD	1.81	J	2.31	U	3
BH-SC-03-3to5	1,2,3,4,6,7,8-HPCDF	0.0579	NJ B J	2.31	U	3
BH-SC-03-5to7	OCDF	0.0716	NJ J	4.86	U	3
BH-SC-03-5to7	TOTAL HEXA-FURANS	0.0588	B	0.0588	J+	3
BH-SC-03-5to7	TOTAL HEPTA-FURANS	0.0703	B	0.0703	U	3
BH-SC-03-7to10	1,2,3,6,7,8-HXCDD	1.7	J	2.34	U	3
BH-SC-03-7to10	OCDF	0.0468	NJ J	4.67	U	3
BH-SC-04-0to1.3	1,2,3,6,7,8-HXCDD	2.37	J	2.43	U	3
BH-SC-04-0to1.3	1,2,3,7,8-PECDF	1.53	J	2.43	U	3
BH-SC-04-0to1.3	1,2,3,7,8,9-HXCDF	0.102	J	0.102	U	3
BH-SC-04-0to1.3	2,3,4,6,7,8-HXCDF	0.504	J	2.43	U	3
BH-SC-04-0to1.3	OCDF	3.72	J	4.87	U	3
BH-SC-04-1.3to3	1,2,3,6,7,8-HXCDD	0.846	J	2.39	U	3
BH-SC-04-1.3to3	1,2,3,7,8-PECDF	0.203	B J	2.39	U	3
BH-SC-04-1.3to3	2,3,4,6,7,8-HXCDF	0.0877	B J	2.39	U	3
BH-SC-04-1.3to3	1,2,3,4,6,7,8-HPCDF	0.821	J	2.39	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-04-1.3to3	OCDF	0.636	J	4.77	U	3
BH-SC-04-3to4.2	1,2,3,6,7,8-HXCDD	2.14	J	2.38	U	3
BH-SC-04-3to4.2	1,2,3,4,6,7,8-HPCDF	0.0815	B J	2.38	U	3
BH-SC-04-3to4.2	OCDF	0.0748	J	4.76	U	3
BH-SC-04-3to4.2	TOTAL HEPTA-FURANS	0.131	B	0.131	J+	3
BH-SC-21-1.5to3.7	1,2,3,6,7,8-HXCDD	1.69	J	2.37	U	3
BH-SC-21-1.5to3.7	1,2,3,7,8-PECDF	1.01	J	2.37	U	3
BH-SC-21-1.5to3.7	1,2,3,7,8,9-HXCDF	0.0795	NJ J	0.0795	U	3
BH-SC-21-1.5to3.7	2,3,4,6,7,8-HXCDF	0.695	J	2.37	U	3
BH-SC-21-1.5to3.7	1,2,3,4,6,7,8-HPCDF	2.27	J	2.37	U	3
BH-SC-21-1.5to3.7	OCDF	0.739	J	4.75	U	3
BH-SC-21-3.7to5.8	1,2,3,6,7,8-HXCDD	1.05	J	1.63	U	3
BH-SC-21-3.7to5.8	1,2,3,7,8-PECDF	0.051	NJ B J	1.63	U	3
BH-SC-21-3.7to5.8	1,2,3,4,6,7,8-HPCDF	0.0853	B J	1.63	U	3
BH-SC-21-3.7to5.8	OCDF	0.0421	NJ J	3.26	U	3
BH-SC-21-3.7to5.8	TOTAL PENTA-FURANS	0.0382	B	0.0382	U	3
BH-SC-21-3.7to5.8	TOTAL HEXA-FURANS	0.0406	B	0.0406	U	3
BH-SC-21-3.7to5.8	TOTAL HEPTA-FURANS	0.0853	B	0.0853	J+	3
BH-SC-21-5.8to8	1,2,3,6,7,8-HXCDD	1.55	J	2.39	U	3
BH-SC-21-8to10	1,2,3,6,7,8-HXCDD	0.95	J	2.35	U	3
BH-SC-21-8to10	1,2,3,4,6,7,8-HPCDF	0.0474	NJ B J	2.35	U	3
BH-SC-21-8to10	TOTAL HEPTA-FURANS	0.0581	B	0.0581	U	3
BH-SC-14-0to1.3	1,2,3,4,7,8,9-HPCDF	0.168	B J	2.32	U	3
BH-SC-14-0to1.3	OCDF	2.27	J	4.65	U	3
BH-SC-14-1.3to2.6	1,2,3,4,6,7,8-HPCDF	0.368	B J	2.47	U	3
BH-SC-14-1.3to2.6	1,2,3,4,7,8,9-HPCDF	0.0983	NJ B J	2.47	U	3
BH-SC-14-1.3to2.6	OCDF	0.423	J	4.94	U	3
BH-SC-14-1.3to2.6	TOTAL HEPTA-FURANS	0.638	NA	0.638	J+	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-34-1.5to3.3	1,2,3,4,7,8,9-HPCDF	1.55	J	2.4	U	3
BH-SC-34-3.3to4.8	1,2,3,4,6,7,8-HPCDF	0.285	J	0.985	U	3
BH-SC-34-3.3to4.8	1,2,3,4,7,8,9-HPCDF	0.0477	B J	0.985	U	3
BH-SC-34-3.3to4.8	OCDF	0.171	J	1.97	U	3
BH-SC-34-3.3to4.8	TOTAL HEPTA-FURANS	0.418	NA	0.418	J+	3
SG-09-0to10	1,2,3,4,6,7,8-HPCDF	0.872	J	2.37	U	3
SG-09-0to10	1,2,3,4,7,8,9-HPCDF	0.0972	B J	2.37	U	3
SG-09-0to10	OCDF	2.63	J	4.75	U	3
BH-HA-31-0to1	1,2,3,7,8-PECDD	1.86	J	2.48	U	3
BH-HA-31-0to1	1,2,3,7,8-PECDF	1.6	J	2.48	U	3
BH-HA-31-0to1	1,2,3,4,7,8-HXCDF	1.31	J	2.48	U	3
BH-HA-31-1to2	1,2,3,7,8-PECDD	1.15	J G	2.39	U	3
BH-HA-31-1to2	1,2,3,7,8-PECDF	0.777	J	2.39	U	3
BH-HA-31-1to2	1,2,3,4,7,8-HXCDF	0.62	J	2.39	U	3
BH-HA-31-1to2	OCDF	4.35	J	4.78	U	3
BH-HA-31-1to2-D	1,2,3,7,8-PECDD	1.03	J G	2.43	U	3
BH-HA-31-1to2-D	1,2,3,7,8-PECDF	0.816	J	2.43	U	3
BH-HA-31-1to2-D	1,2,3,4,7,8-HXCDF	0.571	J	2.43	U	3
BH-HA-31-1to2-D	OCDF	4.46	J	4.85	U	3
BH-HA-32-0to1	1,2,3,4,7,8-HXCDF	1.44	J	2.45	U	3
BH-HA-32-1to2	1,2,3,7,8-PECDD	1.38	J	2.47	U	3
BH-HA-32-1to2	1,2,3,7,8-PECDF	0.934	J	2.47	U	3
BH-HA-32-1to2	1,2,3,4,7,8-HXCDF	0.376	J	2.47	U	3
BH-HA-32-1to2	1,2,3,4,6,7,8-HPCDF	0.901	J	2.47	U	3
BH-HA-32-1to2	OCDF	0.978	J	4.94	U	3
BH-HA-33-0to1	1,2,3,4,7,8-HXCDF	2.13	J	2.43	U	3
BH-HA-33-0to1-D	1,2,3,4,7,8-HXCDF	2.23	J	2.47	U	3
BH-HA-34-0to1	1,2,3,7,8-PECDF	2.26	J	2.46	U	3
BH-HA-34-0to1	1,2,3,4,7,8-HXCDF	1.41	J	2.46	U	3
BH-HA-34-0to1	OCDF	12.3	D J	24.6	U	3
BH-HA-48-0to1	1,2,3,7,8-PECDD	0.809	J	2.47	U	3
BH-HA-48-0to1	1,2,3,7,8-PECDF	0.791	J	2.47	U	3
BH-HA-48-0to1	1,2,3,4,7,8-HXCDF	0.844	J	2.47	U	3
BH-HA-48-1to2	1,2,3,7,8-PECDD	0.308	J	2.55	U	3
BH-HA-48-1to2	1,2,3,7,8-PECDF	0.173	NJ B J	2.55	U	3
BH-HA-48-1to2	1,2,3,4,7,8-HXCDF	0.157	B J	2.55	U	3
BH-HA-48-1to2	1,2,3,4,6,7,8-HPCDF	0.785	J	2.55	U	3
BH-HA-48-1to2	OCDF	1.35	J	5.1	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-34-4.8to5.6	1,2,3,7,8-PECDD	0.225	NJ J	2.34	U	3
BH-SC-34-4.8to5.6	1,2,3,7,8-PECDF	0.047	NJ B J	2.34	U	3
SG-08-0to10	OCDF	0.392	J	4.95	U	3
SG-13-0to10	OCDF	4.7	J	5.13	U	3
BH-SC-34-0to1.5	1,2,3,4,7,8,9-HPCDF	1.52	J	2.32	U	3
BH-SC-34-1.5to3.3-D	1,2,3,4,7,8,9-HPCDF	1.88	J	2.36	U	3

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
D-laboratory flag indicating the analyte was reported from a dilution
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-EB-092222	OCDD	1.66	B J	52.3	U	3

pg/L-picograms per liter
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	12 May 2023
To:	Cindy Bartlett
From:	Kristoffer Henderson
CC:	J. Klens Caprio
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverable – SGX AXYS Analytical Services Data Package Identification DPWG85160**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of four groundwater samples, one field duplicate sample and five equipment blanks, collected on 3,7 and 12 October 2022, as part of the Remedial Investigation and Feasibility Study (RI/FS)t for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, June 18, 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);
- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and

- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L38625-1	BH-EB-SB-221003
L38625-2	BH-EB-SG-221012
L38625-3	BH-EB-SC2-221012
L38625-4	BH-EB-SC-221012
L38625-5	BH-GW-24-221007

Laboratory ID	Client ID
L38625-6	BH-GW-26-221007
L38625-7	BH-GW-27-221007
L38625-8	BH-GW-29-221007
L38625-9	BH-GW-29-221007-D
L38625-10	BH-EB-GW-221007

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

The following issue was noted for the chain of custody (COC); however, these did not result in qualifications:

- Portions of the COC were faded and hard to read.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF

Analyte	Acronyms
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
⊗ Equipment Blank
✓ Field Duplicate
✓ Isotope Dilution Standards
✓ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness,

defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

1.2 Holding Times

The holding times for the dioxin and furans analysis of water samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch WG84347). Dioxins and furans were not detected in the method blank above the minimum reporting levels (MRLs), with the following exceptions.

1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF and OCDF were detected in the method blank in batch WG82348 at estimated concentrations greater than the MRLs and less than the limit of quantitations (LOQs). Since 1,2,3,7,8-PECDF was detected above the LOQ in the associated samples and based on professional and technical judgment, no qualifications were applied to the

1,2,3,7,8-PECDF data. However, the estimated concentrations of 1,2,3,4,6,7,8-HPCDD, OCDD and OCDF in the associated samples were U qualified as not detected at the LOQs.

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Laboratory Result (pg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-221007	1,2,3,4,6,7,8-HPCDD	25.6	J	25.6	U	3
BH-EB-GW-221007	OCDD	51.2	B J	51.2	U	3
BH-EB-SB-221003	OCDD	51.1	B J	51.1	U	3
BH-EB-SC-221012	OCDD	53.6	B J	53.6	U	3
BH-EB-SC2-221012	1,2,3,4,6,7,8-HPCDD	26.5	J	26.5	U	3
BH-EB-SC2-221012	OCDD	53.1	B J	53.1	U	3
BH-EB-SC2-221012	OCDF	53.1	J	53.1	U	3
BH-EB-SG-221012	1,2,3,4,6,7,8-HPCDD	31	J	31	U	3
BH-EB-SG-221012	OCDD	62	B J	62	U	3
BH-GW-24-221007	OCDD	50.5	B J	50.5	U	3
BH-GW-26-221007	1,2,3,4,6,7,8-HPCDD	25.1	NJ J	25.1	U	3
BH-GW-26-221007	OCDD	50.2	B J	50.2	U	3
BH-GW-27-221007	1,2,3,4,6,7,8-HPCDD	25.2	J	25.2	U	3
BH-GW-27-221007	OCDD	50.3	NJ B J	50.3	U	3
BH-GW-29-221007	1,2,3,4,6,7,8-HPCDD	25.3	J	25.3	U	3
BH-GW-29-221007	OCDD	50.5	B J	50.5	U	3
BH-GW-29-221007-D	1,2,3,4,6,7,8-HPCDD	25	NJ J	25	U	3
BH-GW-29-221007-D	OCDD	50.1	B J	50.1	U	3

pg/L-picograms per liter
J-estimated concentration greater than the sample specific detection limit (SDL) or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
* Validation qualifiers are defined in Attachment 1 at the end of this report
**Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Six LCS/LCS duplicate (LCSD) pairs were reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

DPWG83098: The laboratory noted the recovery of isotope dilution standard 13C-OCDD for the LCS in batch WG82348 was below the range required for accurate quantification. Therefore, OCDD and OCDF were not calculable in the LCS. Since the OCDD and OCDF recoveries in the LCSD were within the QAPP-specified acceptance criteria and based on professional and technical judgment, the OCDD and OCDF concentrations in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
SG-08-0to10	OCDF	0.392	J	0.392	J	5
SG-13-0to10	OCDF	4.7	J	4.7	J	5
SG-03-0to10	OCDD	416	NA	416	J	5
SG-03-0to10	OCDF	5.32	NA	5.32	J	5
SG-04-0to10	OCDD	737	NA	737	J	5
SG-04-0to10	OCDF	8.52	NA	8.52	J	5
SG-08-0to10	OCDD	252	NA	252	J	5
SG-13-0to10	OCDD	890	NA	890	J	5
SG-37-0to10	OCDD	785	NA	785	J	5
SG-37-0to10	OCDF	7.12	NA	7.12	J	5
SG-37-0to10-D	OCDD	273	NA	273	J	5
SG-37-0to10-D	OCDF	6.8	NA	6.8	J	5

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NA-not applicable

1.9 Equipment Blank

Five equipment blanks were submitted with the sample set, BH-EB-SB-221003, BH-EB-SG-221012, BH-EB-SC2-221012, BH-EB-SC-221012 and BH-EB-GW-221007. Dioxin and furans were not detected in the equipment blanks above the SDLs or MRLs, with the following exception.

OCDD was detected in BH-EB-SB-221003 at an estimated concentration greater than the MRL and less than the LOQ. Since the OCDD concentration in BH-EB-SB-221003 was U qualified due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data.

1,2,3,4,6,7,8-HPCDD and OCDD were detected in BH-EB-SG-221012 at estimated concentrations greater than the MRLs and less than the LOQs. Since the 1,2,3,4,6,7,8-HPCDD and OCDD concentrations in BH-EB-SB-221003 were U qualified due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data.

1,2,3,4,6,7,8-HPCDD, OCDD and OCDF were detected in BH-EB-SC2-221012 at estimated concentrations greater than the MRLs and less than the LOQs. Since the 1,2,3,4,6,7,8-HPCDD, OCDD and OCDF concentrations in BH-EB-SC2-221012 were U qualified due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data.

OCDD was detected in BH-EB-SC-221012 at an estimated concentration greater than the MRL and less than the LOQ. Since the OCDD concentration in BH-EB-SC-221012 was U qualified due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data.

1,2,3,4,6,7,8-HPCDD and OCDD were detected in BH-EB-GW-221007 at estimated concentrations greater than the MRLs and less than the LOQs. Since the 1,2,3,4,6,7,8-HPCDD and OCDD concentrations in BH-EB-GW-221007 were U qualified due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data.

TOTAL HEPTA-DIOXINS was detected in BH-EB-SG-221012 (3.03 pg/L), BH-EB-SC2-221012 (1.21 pg/L) and BH-EB-GW-221007 (0.634 pg/L) at concentrations greater than the LOQ. Therefore, based on professional and technical judgment, the TOTAL HEPTA-DIOXINS concentrations in samples BH-GW-27-221007 and BH-GW-29-221007 were J+ qualified as estimated with high bias.

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Laboratory Result (pg/L)	Validation Qualifier	Reason Code
BH-GW-27-221007	TOTAL HEPTA-DIOXINS	0.646	NA	0.646	J+	3
BH-GW-29-221007	TOTAL HEPTA-DIOXINS	0.765	NA	0.765	J+	3

pg/L-picograms per liter
NA-not applicable

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Field duplicate samples were not submitted.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the SDLs/MRLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9b for groundwater. The screening levels were met.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. No discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

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Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	15 May 2023
To:	Cindy Bartlett
From:	Kristoffer Henderson
CC:	J. Klens Caprio
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGX AXYS Analytical Services Data Package Identifications DPWG85162 and DPWG85180**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of twenty-six solid samples and five field duplicate samples, collected on 28-30 September and 3 October 2022, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, June 18, 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);
- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and

- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L38164-1	BH-SB-27-2.5to3.5
L38164-2	BH-SB-27-4to6
L38164-3	BH-SB-27-8to10
L38164-4	BH-SB-27-12to14
L38164-5	BH-SB-27-14to16
L38164-8	BH-SB-30-3to4
L38164-9	BH-SB-30-4to5
L38164-10	BH-SB-30-8to10
L38164-11	BH-SB-30-8to10-D
L38164-12	BH-SB-30-10to12
L38164-13	BH-SB-30-12to14
L38164-14	BH-SB-38-2to4
L38164-15	BH-SB-38-2to4-D
L38164-16	BH-SB-38-4to5
L38164-17	BH-SB-38-6to8
L38164-18	BH-SB-38-8to10

Laboratory ID	Client ID
L38164-19	BH-SB-38-8to10-D
L38164-20	BH-SB-38-10to12
L38164-21	BH-SB-38-10to12-D
L38164-22	BH-SB-38-12to14
L38164-23	BH-SB-38-14to16
L38164-24	BH-SB-38-16to18
L38164-25	BH-SB-38-16to18-D
L38164-26	BH-SB-38-18to20
L38164-27	BH-SB-29-13to15
L38164-31	BH-SB-24-0to2
L38164-32	BH-SB-24-2to4
L38164-33	BH-SB-24-6to8
L38164-34	BH-SB-24-8to10
L38164-36	BH-SB-24-12to14
L38164-37	BH-SB-24-14to15

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

The following issues were noted for the chain of custodies (COCs); however, these did not result in qualifications:

- DPWG85162 and DPWG85180: Incorrect error corrections were observed on the COCs, instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.
- DPWG85162: Sample BH-SB-30-10to12 was received with a broken lid. Since the container was intact and the ice was bagged, no qualifications were applied to the data.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration

✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Equipment Blank
⊗ Field Duplicate
✓ Isotope Dilution Standards
⊗ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

The samples were analyzed using gas chromatography (GC) column DB-5. Per the laboratory SOP detections of 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD on GC column DB-5 are confirmed and quantitated by analysis using GC column DB-225. Therefore, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results were considered from the confirmation analysis when analyzed. However, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results that were not detected in the original analysis did not require confirmation and were considered from the original analysis. The results not considered for validation were R qualified as rejected in the electronic data deliverables (EDDs).

1.2 Holding Times

The holding times for the dioxin and furans analysis of solid samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs

for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches WG84349 and WG84350). Dioxins and furans were not detected in the method blanks above the minimum reporting levels (MRLs), with the following exceptions.

1,2,3,4,6,7,8-HPCDD and OCDD were detected in the method blank in batch WG84349 at estimated concentrations greater than the MRLs and less than the limit of quantitations (LOQs). Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the data.

TOTAL TETRA-DIOXINS (0.0882 pg/g) and TOTAL HEPTA-DIOXINS (0.0953 pg/g) were detected in the method blank in batch WG84349 at concentrations greater than the LOQs. Since the TOTAL TETRA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentrations, no qualifications were applied to the data.

1,2,3,7,8-PECDD, 1,2,3,4,7,8-HXCDD, 1,2,3,6,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were detected in the method blank in batch WG84350 at estimated concentrations greater than the MRLs and less than the LOQs. Since OCDD was detected above the LOQ in the associated samples and based on professional and technical judgment, no qualifications were applied to the OCDD data. However, the estimated concentration of the remaining of these analytes in the associated sample were U qualified as not detected at the LOQs.

1,2,3,7,8,9-HXCDD was detected in the method blank in batch WG84350 on both GC columns at estimated concentrations greater than the MRL and less than the LOQ. Therefore, the estimated

concentration of 1,2,3,7,8,9-HXCDD in the associated samples were U qualified as not detected at the LOQ.

TOTAL TETRA-DIOXINS (0.109 pg/g), TOTAL HEXA-DIOXINS (0.259 pg/g), TOTAL HEPTA-DIOXINS (0.270 pg/g), TOTAL PENTA-FURANS (0.151 pg/g), TOTAL HEXA-FURANS (0.321 pg/g) and TOTAL HEPTA-FURANS (0.0819 pg/g) were detected in the method blank in batch WG84350 at concentrations greater than the LOQs. Since the TOTAL TETRA-DIOXINS TOTAL, HEXA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentrations, no qualifications were applied to the TOTAL TETRA-DIOXINS TOTAL, HEXA-DIOXINS and TOTAL HEPTA-DIOXINS data. However, based on professional and technical judgment, the TOTAL PENTA-FURANS concentrations in samples BH-SB-38-12to14 and BH-SB-38-14to16; the TOTAL HEXA-FURANS concentrations in samples BH-SB-24-14to15, BH-SB-24-2to4, BH-SB-29-13to15, BH-SB-38-12to14 and BH-SB-38-14to16; and TOTAL HEPTA-FURANS concentrations in samples BH-SB-29-13to15, BH-SB-38-10to12, BH-SB-38-10to12-D, BH-SB-38-12to14, BH-SB-38-14to16 and BH-SB-38-18to20 were J+ qualified as estimated with high bias.

Qualifications are in Attachment 3 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS/LCS duplicate (LCSD) pair was reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Equipment blanks were not submitted with the sample set.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Three field duplicate samples were submitted and analyzed with the sample set; BH-SB-30-8to10-D, BH-SB-38-2to4-D and BH-SB-38-8to10-D. Acceptable precision (RPD $\leq$50%) was demonstrated between the field duplicates and original samples, BH-SB-30-8to10, BH-SB-38-2to4 and BH-SB-38-8to10, respectively with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the sample specific detection limit (SDL) and less than the LOQ and a concentration greater than the LOQ, the RPDs were not calculable. Therefore, for these concentrations in the field duplicate pairs the concentrations were J qualified as estimated.

For analytes with both a concentration greater than the SDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the SDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-30-8to10	1,2,3,4,7,8-HXCDF	0.0533	J	NC	0.0533	J	7
BH-SB-30-8to10-D	1,2,3,4,7,8-HXCDF	0.0467	UJ		0.0467	UJ	7
BH-SB-30-8to10	OCDF	0.0459	UJ	NC	0.0459	UJ	7
BH-SB-30-8to10-D	OCDF	0.0609	J		0.0609	J	7
BH-SB-30-8to10	TOTAL HEPTA-FURANS	0.0459	UJ	NC	0.0459	UJ	7
BH-SB-30-8to10-D	TOTAL HEPTA-FURANS	0.126	NA		0.126	J	7
BH-SB-30-8to10	TOTAL TETRA-FURANS	0.187	NA	95	0.187	J	7
BH-SB-30-8to10-D	TOTAL TETRA-FURANS	0.0666	NA		0.0666	J	7
BH-SB-38-10to12	1,2,3,6,7,8-HXCDD	2.58	NA	NC	2.58	J	7
BH-SB-38-10to12-D	1,2,3,6,7,8-HXCDD	1.86	J		1.86	J	7
BH-SB-38-10to12	2,3,7,8-TCDF	0.0923	NJ J	NC	0.0923	J	7
BH-SB-38-10to12-D	2,3,7,8-TCDF	0.0471	UJ		0.0471	UJ	7
BH-SB-38-10to12	OCDF	0.0476	NJ J	NC*	NA	NA	NA
BH-SB-38-10to12-D	OCDF	0.0471	UJ		NA	NA	NA
BH-SB-38-10to12	TOTAL PENTA-FURANS	0.186	B	NC	0.186	J	7
BH-SB-38-10to12-D	TOTAL PENTA-FURANS	0.0471	UJ		0.0471	UJ	7
BH-SB-38-10to12	TOTAL TETRA-FURANS	1.25	NA	146	1.25	J	7

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-38-10to12-D	TOTAL TETRA-FURANS	0.195	NA		0.195	J	7
BH-SB-38-16to18	1,2,3,4,6,7,8-HPCDF	0.0824	NJ J	NC*	NA	NA	NA
BH-SB-38-16to18-D	1,2,3,4,6,7,8-HPCDF	0.0483	UJ		NA	NA	NA
BH-SB-38-16to18	TOTAL HEPTA-FURANS	0.107	B	NC	0.107	J	7
BH-SB-38-16to18-D	TOTAL HEPTA-FURANS	0.0483	UJ		0.0483	UJ	7
BH-SB-38-16to18	TOTAL TETRA-FURANS	0.279	NA	68	0.279	J	7
BH-SB-38-16to18-D	TOTAL TETRA-FURANS	0.138	NA		0.138	J	7

pg/g-picograms per gram
J-estimated concentration greater than the SDL or RL but less than the LOQ
UJ-not detected at or above the SDL or MRL
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NA-not applicable
NC-not calculable
RPD-relative percent difference
* Validation qualifiers are defined in Attachment 1 at the end of this report
**Reason codes are defined in Attachment 2 at the end of this report

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged NJ by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions; for the concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

The concentrations of 1,2,3,7,8-PECDD in sample BH-SB-24-12to14 was flagged G by the laboratory to indicate interference was present. Therefore, the concentration of 1,2,3,7,8-PECDD

in sample BH-SB-24-12to14 was J qualified as estimated, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-27-8to10	1,2,3,4,6,7,8-HPCDF	0.0945	NJ J	0.0945	J	13
BH-SB-27-8to10	OCDF	0.0644	NJ J	0.0644	J	13
BH-SB-30-10to12	2,3,7,8-TCDD	0.0967	NJ J	0.0967	J	13
BH-SB-30-10to12	1,2,3,7,8-PECDD	0.253	NJ J	0.253	J	13
BH-SB-30-4to5	1,2,3,7,8,9-HXCDD	7.26	NJ	7.26	J	13
BH-SB-38-2to4	2,3,4,7,8-PECDF	0.0832	NJ J	0.0832	J	13
BH-SB-38-4to5	1,2,3,7,8,9-HXCDD	2.92	NJ	2.92	J	13
BH-SB-38-6to8	1,2,3,6,7,8-HXCDF	0.0799	NJ J	0.0799	J	13
BH-SB-30-8to10	1,2,3,4,6,7,8-HPCDF	0.118	NJ J	0.118	J	13
BH-SB-27-8to10	2,3,7,8-TCDD	0.0891	NJ J	0.0891	J	13
BH-SB-38-2to4	2,3,7,8-TCDF	0.0908	NJ J	0.0908	J	13
BH-SB-27-14to16	1,2,3,4,6,7,8-HPCDF	0.0914	NJ J	0.0914	J	13
BH-SB-30-3to4	1,2,3,7,8,9-HXCDD	89.6	NJ	89.6	J	13
BH-SB-27-2.5to3.5	1,2,3,7,8,9-HXCDD	8.12	NJ	8.12	J	13
BH-SB-38-2to4-D	1,2,3,7,8-PECDF	0.0916	NJ J	0.0916	J	13
BH-SB-38-2to4-D	2,3,4,7,8-PECDF	0.0538	NJ J	0.0538	J	13
BH-SB-38-2to4-D	1,2,3,4,6,7,8-HPCDF	0.446	NJ J	0.446	J	13
BH-SB-27-4to6	1,2,3,7,8,9-HXCDD	11.2	NJ	11.2	J	13
BH-SB-24-12to14	1,2,3,7,8-PECDD	8.25	G	8.25	J	13
BH-SB-38-10to12	2,3,7,8-TCDF	0.0923	NJ J	0.0923	J	13
BH-SB-38-16to18-D	2,3,7,8-TCDD	0.294	NJ J	0.294	J	13

pg/g-picograms per gram
J-estimated concentration greater than the SDL or RL but less than the LOQ
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the MRLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9c for sediments. The screening level for total 2,3,7,8-TCDD Toxicity Equivalency Quotients for sediments was met.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. No discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-24-0to2	1,2,3,7,8,9-HXCDD	0.612	J	2.31	U	3
BH-SB-24-0to2	1,2,3,7,8-PECDD	1.5	J	2.31	U	3
BH-SB-24-0to2	1,2,3,4,7,8-HXCDD	0.953	J	2.31	U	3
BH-SB-24-0to2	1,2,3,6,7,8-HXCDD	1.28	J	2.31	U	3
BH-SB-24-0to2	1,2,3,7,8-PECDF	0.948	J	2.31	U	3
BH-SB-24-0to2	2,3,4,7,8-PECDF	0.77	J	2.31	U	3
BH-SB-24-0to2	1,2,3,4,7,8-HXCDF	0.882	NJ J	2.31	U	3
BH-SB-24-0to2	1,2,3,6,7,8-HXCDF	0.534	J	2.31	U	3
BH-SB-24-0to2	1,2,3,7,8,9-HXCDF	0.0663	NJ B J	2.31	U	3
BH-SB-24-0to2	2,3,4,6,7,8-HXCDF	0.413	B J	2.31	U	3
BH-SB-24-0to2	1,2,3,4,6,7,8-HPCDF	2.08	J	2.31	U	3
BH-SB-24-0to2	1,2,3,4,7,8,9-HPCDF	0.226	B J	2.31	U	3
BH-SB-24-0to2	OCDF	1.96	J	4.62	U	3
BH-SB-24-12to14	1,2,3,7,8,9-HXCDF	0.247	B J	2.51	U	3
BH-SB-24-12to14	2,3,4,6,7,8-HXCDF	1.96	J	2.51	U	3
BH-SB-24-12to14	1,2,3,4,7,8,9-HPCDF	0.717	J	2.51	U	3
BH-SB-24-12to14	OCDF	2.9	J	5.02	U	3
BH-SB-24-14to15	1,2,3,7,8,9-HXCDD	1.72	D J	6.24	U	3
BH-SB-24-14to15	1,2,3,7,8-PECDD	0.795	J	2.5	U	3
BH-SB-24-14to15	1,2,3,4,7,8-HXCDD	0.615	J	2.50	U	3
BH-SB-24-14to15	1,2,3,6,7,8-HXCDD	1.12	J	2.5	U	3
BH-SB-24-14to15	1,2,3,7,8-PECDF	0.631	J	2.5	U	3
BH-SB-24-14to15	2,3,4,7,8-PECDF	0.472	J	2.50	U	3
BH-SB-24-14to15	1,2,3,4,7,8-HXCDF	0.554	J	2.50	U	3
BH-SB-24-14to15	1,2,3,6,7,8-HXCDF	0.294	B J	2.5	U	3
BH-SB-24-14to15	2,3,4,6,7,8-HXCDF	0.204	B J	2.5	U	3
BH-SB-24-14to15	1,2,3,4,6,7,8-HPCDF	1.19	J	2.5	U	3
BH-SB-24-14to15	1,2,3,4,7,8,9-HPCDF	0.0869	B J	2.5	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-24-14to15	OCDF	0.716	J	4.99	U	3
BH-SB-24-14to15	TOTAL HEXA-FURANS	2.11		2.11	J+	3
BH-SB-24-2to4	1,2,3,7,8,9-HXCDD	0.943	NJ J	2.26	U	3
BH-SB-24-2to4	1,2,3,7,8-PECDD	0.747	NJ J G	2.26	U	3
BH-SB-24-2to4	1,2,3,4,7,8-HXCDD	0.447	J	2.26	U	3
BH-SB-24-2to4	1,2,3,6,7,8-HXCDD	0.49	J	2.26	U	3
BH-SB-24-2to4	1,2,3,4,6,7,8-HPCDD	2.21	J	2.26	U	3
BH-SB-24-2to4	1,2,3,7,8-PECDF	0.441	J	2.26	U	3
BH-SB-24-2to4	2,3,4,7,8-PECDF	0.32	B J	2.26	U	3
BH-SB-24-2to4	1,2,3,4,7,8-HXCDF	0.512	J	2.26	U	3
BH-SB-24-2to4	1,2,3,6,7,8-HXCDF	0.168	B J	2.26	U	3
BH-SB-24-2to4	2,3,4,6,7,8-HXCDF	0.113	NJ B J	2.26	U	3
BH-SB-24-2to4	1,2,3,4,6,7,8-HPCDF	2.18	J	2.26	U	3
BH-SB-24-2to4	OCDF	1.63	J	4.52	U	3
BH-SB-24-2to4	TOTAL HEXA-FURANS	1.24	B	1.24	J+	3
BH-SB-24-6to8	1,2,3,7,8,9-HXCDD	0.901	J	2.48	U	3
BH-SB-24-6to8	1,2,3,7,8-PECDD	0.961	J	2.48	U	3
BH-SB-24-6to8	1,2,3,4,7,8-HXCDD	0.557	NJ J	2.48	U	3
BH-SB-24-6to8	1,2,3,6,7,8-HXCDD	1.15	J	2.48	U	3
BH-SB-24-6to8	2,3,4,7,8-PECDF	0.861	J	2.48	U	3
BH-SB-24-6to8	1,2,3,6,7,8-HXCDF	0.683	J	2.48	U	3
BH-SB-24-6to8	1,2,3,7,8,9-HXCDF	0.0837	NJ B J	2.48	U	3
BH-SB-24-6to8	2,3,4,6,7,8-HXCDF	0.283	B J	2.48	U	3
BH-SB-24-6to8	1,2,3,4,6,7,8-HPCDF	2.47	J	2.48	U	3
BH-SB-24-6to8	1,2,3,4,7,8,9-HPCDF	0.171	B J	2.48	U	3
BH-SB-24-6to8	OCDF	1.02	J	4.95	U	3
BH-SB-24-8to10	1,2,3,7,8,9-HXCDF	0.351	B J	2.35	U	3
BH-SB-24-8to10	2,3,4,6,7,8-HXCDF	1.32	J	2.35	U	3
BH-SB-24-8to10	1,2,3,4,7,8,9-HPCDF	0.991	J	2.35	U	3
BH-SB-29-13to15	1,2,3,7,8,9-HXCDD	1.49	J	2.43	U	3
BH-SB-29-13to15	1,2,3,7,8-PECDD	0.309	J	2.43	U	3
BH-SB-29-13to15	1,2,3,4,7,8-HXCDD	0.335	B J	2.43	U	3
BH-SB-29-13to15	1,2,3,6,7,8-HXCDD	0.771	J	2.43	U	3
BH-SB-29-13to15	1,2,3,7,8-PECDF	0.0514	NJ B J	2.43	U	3
BH-SB-29-13to15	1,2,3,4,7,8-HXCDF	0.0518	B J	2.43	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-29-13to15	1,2,3,4,6,7,8-HPCDF	0.147	J	2.43	U	3
BH-SB-29-13to15	OCDF	0.0893	J	4.86	U	3
BH-SB-29-13to15	TOTAL HEXA-FURANS	0.126	B	0.126	J+	3
BH-SB-29-13to15	TOTAL HEPTA-FURANS	0.147	B	0.147	J+	3
BH-SB-38-10to12	1,2,3,7,8-PECDD	0.407	J	2.19	U	3
BH-SB-38-10to12	1,2,3,4,7,8-HXCDD	0.968	J	2.19	U	3
BH-SB-38-10to12	1,2,3,7,8-PECDF	0.0569	B J	2.19	U	3
BH-SB-38-10to12	1,2,3,4,6,7,8-HPCDF	0.074	NJ J	2.19	U	3
BH-SB-38-10to12	OCDF	0.0476	NJ J	4.37	U	3
BH-SB-38-10to12	TOTAL HEPTA-FURANS	0.0468	B	0.0468	J+	3
BH-SB-38-10to12-D	1,2,3,7,8-PECDD	0.475	J G	2.35	U	3
BH-SB-38-10to12-D	1,2,3,4,7,8-HXCDD	1.33	J	2.35	U	3
BH-SB-38-10to12-D	1,2,3,6,7,8-HXCDD	1.86	J	2.35	U	3
BH-SB-38-10to12-D	1,2,3,7,8-PECDF	0.0527	NJ B J	2.35	U	3
BH-SB-38-10to12-D	1,2,3,4,6,7,8-HPCDF	0.0509	J	2.35	U	3
BH-SB-38-10to12-D	TOTAL HEPTA-FURANS	0.0509	B	0.0509	J+	3
BH-SB-38-12to14	1,2,3,7,8-PECDD	0.34	NJ J	2.41	U	3
BH-SB-38-12to14	1,2,3,4,7,8-HXCDD	1.16	J	2.41	U	3
BH-SB-38-12to14	1,2,3,6,7,8-HXCDD	1.89	J	2.41	U	3
BH-SB-38-12to14	1,2,3,7,8-PECDF	0.161	B J	2.41	U	3
BH-SB-38-12to14	2,3,4,7,8-PECDF	0.064	NJ B J	2.41	U	3
BH-SB-38-12to14	1,2,3,4,7,8-HXCDF	0.105	NJ B J	2.41	U	3
BH-SB-38-12to14	1,2,3,6,7,8-HXCDF	0.0732	B J	2.41	U	3
BH-SB-38-12to14	1,2,3,4,6,7,8-HPCDF	0.155	J	2.41	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-38-12to14	OCDF	0.0604	J	4.82	U	3
BH-SB-38-12to14	TOTAL PENTA-FURANS	0.42	B	0.42	J+	3
BH-SB-38-12to14	TOTAL HEXA-FURANS	0.186	B	0.186	J+	3
BH-SB-38-12to14	TOTAL HEPTA-FURANS	0.155	B	0.155	J+	3
BH-SB-38-14to16	1,2,3,7,8-PECDD	0.499	J	2.42	U	3
BH-SB-38-14to16	1,2,3,4,7,8-HXCDD	1.23	J	2.42	U	3
BH-SB-38-14to16	1,2,3,6,7,8-HXCDD	2	J	2.42	U	3
BH-SB-38-14to16	1,2,3,7,8-PECDF	0.149	NJ B J	2.42	U	3
BH-SB-38-14to16	2,3,4,7,8-PECDF	0.127	B J	2.42	U	3
BH-SB-38-14to16	1,2,3,4,7,8-HXCDF	0.214	B J	2.42	U	3
BH-SB-38-14to16	1,2,3,6,7,8-HXCDF	0.0957	B J	2.42	U	3
BH-SB-38-14to16	2,3,4,6,7,8-HXCDF	0.0782	B J	2.42	U	3
BH-SB-38-14to16	1,2,3,4,6,7,8-HPCDF	0.612	J	2.42	U	3
BH-SB-38-14to16	OCDF	0.271	J	4.84	U	3
BH-SB-38-14to16	TOTAL PENTA-FURANS	1.21		1.21	J+	3
BH-SB-38-14to16	TOTAL HEXA-FURANS	0.862	B	0.862	J+	3
BH-SB-38-14to16	TOTAL HEPTA-FURANS	0.818		0.818	J+	3
BH-SB-38-16to18	1,2,3,7,8-PECDD	0.318	J	2.47	U	3
BH-SB-38-16to18	1,2,3,4,7,8-HXCDD	0.731	NJ J	2.47	U	3
BH-SB-38-16to18	1,2,3,6,7,8-HXCDD	1.28	J	2.47	U	3
BH-SB-38-16to18	1,2,3,4,6,7,8-HPCDF	0.0824	NJ J	2.47	U	3
BH-SB-38-16to18-D	1,2,3,7,8-PECDD	0.374	J	2.41	U	3
BH-SB-38-16to18-D	1,2,3,4,7,8-HXCDD	0.838	J	2.41	U	3
BH-SB-38-16to18-D	1,2,3,6,7,8-HXCDD	1.55	J	2.41	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-38-18to20	1,2,3,7,8-PECDD	0.636	J	2.4	U	3
BH-SB-38-18to20	1,2,3,4,7,8-HXCDD	1.55	J	2.40	U	3
BH-SB-38-18to20	OCDF	0.0767	J	4.8	U	3
BH-SB-38-18to20	TOTAL HEPTA-FURANS	0.119	B	0.119	J+	3

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
D-laboratory flag indicating the analyte was reported from a dilution
G-laboratory flag indicating lock-mass interference was present
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	2 March 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22I0263**

Matrices: **Soil**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of thirteen soil samples and three field duplicate samples, collected on 13-15 September 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by American Society of Testing Materials (ASTM) D6913

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- US EPA National Functional Guidelines for High Resolution Superfund Methods Data Review, November 2020 (EPA-542-B-20-007)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following sample was analyzed in the data set.

Laboratory IDs	Client IDs
22I0263-01	BH-HA-31-0to1
22I0263-02	BH-HA-31-1to2
22I0263-03	BH-HA-31-1to2-D
22I0263-04	BH-HA-32-0to1
22I0263-05	BH-HA-32-1to2
22I0263-06	BH-HA-34-0to1
22I0263-10	BH-HA-38-0to1-D
22I0263-16	BH-HA-35-0to1

Laboratory IDs	Client IDs
22I0263-17	BH-HA-35-1to2
22I0263-20	BH-HA-33-0to1
22I0263-21	BH-HA-33-0to1-D
22I0263-22	BH-HA-48-0to1
22I0263-23	BH-HA-48-1to2
22I0263-24	BH-HA-36-0to1
22I0263-25	BH-HA-37-0to1
22I0263-26	BH-HA-37-1to2

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 2.8 – 4.3 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

The following issues were noted from the chain of custody (COC) forms:

- Incorrect error corrections were observed on the COC, instead of the proper procedure of single strike through, correction, and initials and date of person making the corrections.
- Per client request, sample IDs were revised from BH-HA-48-0to2 and BH-HA-34-1to2 to BH-HA-48-1to2 and BH-HA-34-0to1, respectively.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
⊗ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria, with the following exceptions.

The r^2 for 2,4-dinitrophenol (0.9887) and diethyl phthalate (0.9888) in the initial calibration were less 0.990. Therefore, based on professional and technical judgment, the non-detect results of 2,4-dinitrophenol and diethyl phthalate in the associated samples were UJ qualified as estimated less than the MDLs.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met, with the following exceptions.

The %Ds for 2,4-dinitrophenol (-64.9%) and diethyl phthalate (-24.1%) in the low initial calibration standard in batch SKJ0192 (SKJ0192-SCV1) were outside of validation specified acceptance criteria with low biases. Since the non-detect results of 2,4-dinitrophenol and diethyl phthalate in the associated samples were UJ qualified as estimated less than the MDLs due to initial calibration exceedances, no additional qualifications were applied to the data.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the low initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Since the bracketing CCVs were acceptable and analyzed at the same concentration as the low initial calibration standard and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-31-0to1	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-HA-31-1to2	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-HA-31-1to2	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-31-1to2-D	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-HA-31-1to2-D	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-32-0to1	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-HA-32-0to1	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-32-1to2	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-32-1to2	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-HA-34-0to1	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-HA-34-0to1	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-35-0to1	2,4-Dinitrophenol	33.4	U	33.4	UJ	9
BH-HA-35-0to1	Diethyl phthalate	19.5	U	19.5	UJ	9
BH-HA-35-1to2	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-35-1to2	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-HA-33-0to1	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-HA-33-0to1	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-33-0to1-D	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-33-0to1-D	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-HA-48-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-48-0to1	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-HA-48-1to2	2,4-Dinitrophenol	33.5	U	33.5	UJ	9
BH-HA-48-1to2	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-36-0to1	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-36-0to1	Diethyl phthalate	19.6	U	19.6	UJ	9
BH-HA-37-0to1	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-37-0to1	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-HA-37-1to2	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-37-1to2	Diethyl phthalate	19.7	U	19.7	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report

** Reason codes are defined in Attachment 2 at the end of this report

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for 2,4-dinitrophenol (38.5%), diethyl phthalate (69.4% and 110%) and pentachlorophenol (20.7%) in the bracketing CCVs in batch SKJ0272 (SKJ0272-ICV1 and SKJ0272-CCV1) were outside of method specified acceptance criteria with high biases. Since the non-detect results of 2,4-dinitrophenol and diethyl phthalate in the associated samples were UJ qualified as estimated less than the MDLs due to initial calibration exceedances and pentachlorophenol was not detected in the associated samples, no additional qualifications were applied to data.

The %Ds for phenol (25.4%), diethyl phthalate (110% and 108%), butylbenzylphthalate (22.7%), bis(2-ethylhexyl)phthalate (30.5%), and p-terphenyl-d14 (25.9%) in the bracketing CCV in batch SKJ0305 (SKJ0305-ICV1 and SKJ0305-CCV1) were outside of method specified acceptance criteria with high biases. Since the non-detect results of diethyl phthalate in the associated samples were UJ qualified as estimated less than the MDLs due to initial calibration exceedances and the surrogate recoveries in the associated samples were assessed individually, no additional qualifications were applied to the diethyl phthalate and p-terphenyl-d14 data. However, the concentrations of phenol, bis(2-ethylhexyl)phthalate and butyl benzyl phthalate in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-36-0to1	bis(2-ethylhexyl) Phthalate	17.5	J	17.5	J	9
BH-HA-36-0to1	Butyl benzyl phthalate	12.9	J	12.9	J	9
BH-HA-36-0to1	Phenol	16.5	J	16.5	J	9
BH-HA-37-0to1	bis(2-ethylhexyl) Phthalate	19.6	J	19.6	J	9
BH-HA-37-1to2	bis(2-ethylhexyl) Phthalate	22.3	J	22.3	J	9
BH-HA-48-1to2	bis(2-ethylhexyl) Phthalate	11.0	J	11.0	J	9
BH-HA-48-1to2	Phenol	5.4	J	5.4	J	9

µg/kg-microgram per kilogram

J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKI0580 and BKI0581). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs), with the following exceptions.

Acenaphthene, fluorene, and 1-methylnaphthalene were detected in the method blank in batch BKI0581 at estimated concentrations greater than the MDLs and less than the reporting limits (RLs). Therefore, the estimated concentrations of 1-methylnaphthalene, acenaphthene and fluorene in the associated samples were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-0to1	1-Methylnaphthalene	2.32	J	5.00	U	3
BH-HA-31-0to1	Acenaphthene	3.96	J	5.00	U	3
BH-HA-31-0to1	Fluorene	2.03	J	5.00	U	3
BH-HA-31-1to2	1-Methylnaphthalene	1.48	J	4.99	U	3
BH-HA-31-1to2	Acenaphthene	2.89	J	4.99	U	3
BH-HA-31-1to2	Fluorene	1.15	J	4.99	U	3
BH-HA-31-1to2-D	1-Methylnaphthalene	1.12	J	4.96	U	3
BH-HA-31-1to2-D	Acenaphthene	1.55	J	4.96	U	3
BH-HA-31-1to2-D	Fluorene	0.90	J	4.96	U	3
BH-HA-32-0to1	Acenaphthene	2.45	J	4.99	U	3
BH-HA-32-0to1	Fluorene	1.80	J	4.99	U	3
BH-HA-32-1to2	1-Methylnaphthalene	1.50	J	5.19	U	3
BH-HA-34-0to1	1-Methylnaphthalene	2.94	J	4.96	U	3
BH-HA-34-0to1	Acenaphthene	1.78	J	4.96	U	3
BH-HA-34-0to1	Fluorene	1.60	J	4.96	U	3
BH-HA-35-1to2	Acenaphthene	0.80	J	4.68	U	3
BH-HA-35-1to2	Fluorene	2.54	J	4.68	U	3
BH-HA-33-0to1	1-Methylnaphthalene	1.98	J	4.99	U	3
BH-HA-33-0to1	Acenaphthene	0.83	J	4.99	U	3
BH-HA-33-0to1	Fluorene	0.74	J	4.99	U	3
BH-HA-33-0to1-D	1-Methylnaphthalene	2.28	J	4.96	U	3
BH-HA-33-0to1-D	Acenaphthene	0.57	J	4.96	U	3
BH-HA-33-0to1-D	Fluorene	0.80	J	4.96	U	3

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-48-0to1	1-Methylnaphthalene	2.33	J	4.86	U	3
BH-HA-48-0to1	Acenaphthene	2.41	J	4.86	U	3
BH-HA-48-0to1	Fluorene	1.47	J	4.86	U	3
BH-HA-48-1to2	1-Methylnaphthalene	0.63	J	4.99	U	3
BH-HA-48-1to2	Acenaphthene	0.82	J	4.99	U	3
BH-HA-36-0to1	1-Methylnaphthalene	2.68	J	4.96	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using sample BH-HA-48-0to1. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of diethyl phthalate in the MS/MSD pair using sample BH-HA-48-0to1 were high and outside of the laboratory specified acceptance criteria. Since diethyl phthalate was not detected in sample BH-HA-48-0to1, no qualifications were applied to the data.

1.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

One or both of the recoveries of 2,4-dinitrophenol and diethyl phthalate in the LCS/LCSD pair in batch BKI0580 were high and outside of the laboratory specified acceptance criteria. Since 2,4-dinitrophenol and diethyl phthalate were not detected in sample BH-HA-48-0to1, no qualifications were applied to the data.

The LCSD recoveries of anthracene and benzo(a)pyrene in the LCS/LCSD pair in batch BKI0581 were low and outside of the laboratory specified acceptance criteria. Additionally, the RPD results for anthracene and benzo(a)pyrene in the LCS/LCSD pair were high and outside of the laboratory specified acceptance criteria. Therefore, the non-detect anthracene result in sample BH-HA-32-1to2 was UJ qualified as estimated less than the MDL, the estimated anthracene and benzo(a)pyrene concentrations in the associated samples greater than the MDLs and less than the

RLs were J qualified as estimated and the anthracene and benzo(a)pyrene concentrations in the associated samples greater than the RLs were J- qualified as estimated with low biases.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-0to1	Anthracene	4.23	J	4.23	J	5
BH-HA-31-0to1	Benzo(a)pyrene	27.6	NA	27.6	J-	5
BH-HA-31-1to2	Anthracene	2.12	J	2.12	J	5
BH-HA-31-1to2-D	Anthracene	2.53	J	2.53	J	5
BH-HA-31-1to2	Benzo(a)pyrene	18.3	NA	18.3	J-	5
BH-HA-31-1to2-D	Benzo(a)pyrene	15.4	NA	15.4	J-	5
BH-HA-32-0to1	Anthracene	2.68	J	2.68	J	5
BH-HA-32-0to1	Benzo(a)pyrene	17.4	NA	17.4	J-	5
BH-HA-32-1to2	Anthracene	0.90	U	0.90	UJ	5
BH-HA-32-1to2	Benzo(a)pyrene	3.76	J	3.76	J	5
BH-HA-34-0to1	Anthracene	3.14	J	3.14	J	5
BH-HA-34-0to1	Benzo(a)pyrene	17.3	NA	17.3	J-	5
BH-HA-35-0to1	Anthracene	23.5	NA	23.5	J-	5
BH-HA-35-0to1	Benzo(a)pyrene	96.9	NA	96.9	J-	5
BH-HA-35-1to2	Anthracene	9.29	NA	9.29	J-	5
BH-HA-35-1to2	Benzo(a)pyrene	76.1	NA	76.1	J-	5
BH-HA-33-0to1	Anthracene	1.20	J	1.20	J	5
BH-HA-33-0to1-D	Anthracene	1.50	J	1.50	J	5
BH-HA-33-0to1	Benzo(a)pyrene	8.67	NA	8.67	J-	5
BH-HA-33-0to1-D	Benzo(a)pyrene	7.88	NA	7.88	J-	5
BH-HA-48-0to1	Anthracene	2.96	J	2.96	J	5
BH-HA-48-0to1	Benzo(a)pyrene	15.1	NA	15.1	J-	5
BH-HA-48-1to2	Anthracene	1.16	J	1.16	J	5
BH-HA-48-1to2	Benzo(a)pyrene	1.95	J	1.95	J	5
BH-HA-36-0to1	Anthracene	40.7	NA	40.7	J-	5
BH-HA-36-0to1	Benzo(a)pyrene	177	NA	177	J-	5
BH-HA-37-0to1	Anthracene	39.1	NA	39.1	J-	5
BH-HA-37-0to1	Benzo(a)pyrene	147	NA	147	J-	5
BH-HA-37-1to2	Anthracene	21.8	NA	21.8	J-	5
BH-HA-37-1to2	Benzo(a)pyrene	102	NA	102	J-	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Three field duplicate samples, BH-HA-31-1to2-D, BH-HA-38-0to1-D and BH-HA-33-0to1-D were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-HA-31-1to2, BH-HA-38-0to1 and BH-HA-33-0to1, respectively, with the following exceptions.

The parent sample, BH-HA-38-0to1, was collected on 6 October 2022 and reported in laboratory report 22J0134. Since the field duplicate and parent sample were collected on separate days and based on professional and technical judgment, the field duplicate pair BH-HA-38-0to1/BH-HA-38-0to1-D was not evaluated for precision.

Phenol was not detected in parent sample BH-HA-33-0to1 and detected in field duplicate sample BH-HA-33-0to1-D at an estimated concentration greater than the MDL and less than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the phenol concentration in sample BH-HA-33-0to1-D was J qualified as estimated, and the non-detect result of phenol in sample BH-HA-33-0to1 was UJ qualified as estimated less than the MDL.

Bis(2-ethylhexyl) phthalate was detected in parent sample BH-HA-33-0to1 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-HA-33-0to1-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the bis(2-ethylhexyl) phthalate concentration in sample BH-HA-33-0to1 was J qualified as estimated, and the non-detect result of phenol in sample BH-HA-33-0to1-D was UJ qualified as estimated less than the MDL.

Phenol was detected in parent sample BH-HA-31-1to2 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-HA-31-1to2-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the phenol concentration in sample BH-HA-31-1to2 was J qualified as estimated, and the non-detect result of phenol in sample BH-HA-31-1to2-D was UJ qualified as estimated less than the MDL.

The RPDs for benzo(b)fluoranthene and total (b+k+j) benzofluoranthenes in field duplicate pair BH-HA-31-1to2-D/BH-HA-31-1to2 were greater than 50%. Therefore, based on professional and technical judgement, the benzo(b)fluoranthene and total (b+k+j) benzofluoranthenes concentrations in samples BH-HA-31-1to2-D and BH-HA-31-1to2 were J qualified as estimated.

Dibenzo[a,h]anthracene was detected in field duplicate sample BH-HA-31-1to2-D at an estimated concentration greater than the MDL and less than the RL and detected in parent sample BH-HA-31-1to2 at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the dibenzo[a,h]anthracene concentrations in samples BH-HA-31-1to2 and BH-HA-31-1to2-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-1to2	Benzo(b)fluoranthene	28.3	NA	60	28.3	J	7
BH-HA-31-1to2-D	Benzo(b)fluoranthene	15.2	NA		15.2	J	7
BH-HA-31-1to2	Benzofluoranthenes, Total (b+k+j)	57	NA	54	57	J	7
BH-HA-31-1to2-D	Benzofluoranthenes, Total (b+k+j)	32.8	NA		32.8	J	7
BH-HA-33-0to1	bis(2-ethylhexyl) Phthalate	20.4	J	NC	20.4	J	7
BH-HA-33-0to1-D	bis(2-ethylhexyl) Phthalate	5.5	U		5.5	UJ	7
BH-HA-31-1to2	Dibenzo(a,h)anthracene	6.1	NA	NC	6.1	J	7
BH-HA-31-1to2-D	Dibenzo(a,h)anthracene	3.9	J		3.9	J	7
BH-HA-31-1to2	Phenol	13.2	J	NC	13.2	J	7
BH-HA-31-1to2-D	Phenol	4.4	U		4.4	UJ	7
BH-HA-33-0to1	Phenol	4.4	U	NC	4.4	UJ	7
BH-HA-33-0to1-D	Phenol	16.5	J		16.5	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3546/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKI0579). DRO and MRO were not detected in the method blank above the RLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-HA-31-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BKI0579. Based professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-0to1	MRO	181	NA	181	J	5
BH-HA-31-1to2	MRO	114	NA	114	J	5
BH-HA-31-1to2-D	MRO	99.3	NA	99.3	J	5
BH-HA-32-0to1	MRO	78.8	NA	78.8	J	5
BH-HA-32-1to2	MRO	32.8	NA	32.8	J	5
BH-HA-34-0to1	MRO	204	NA	204	J	5
BH-HA-35-0to1	MRO	124	NA	124	J	5
BH-HA-35-1to2	MRO	51.7	NA	51.7	J	5
BH-HA-33-0to1	MRO	181	D	181	J	5
BH-HA-33-0to1-D	MRO	139	D	139	J	5
BH-HA-48-0to1	MRO	43.1	NA	43.1	J	5
BH-HA-48-1to2	MRO	14.1	NA	14.1	J	5
BH-HA-36-0to1	MRO	147	NA	147	J	5
BH-HA-37-0to1	MRO	1820	D	1820	J	5
BH-HA-37-1to2	MRO	875	D	875	J	5

mg/kg-milligram per kilogram
D-laboratory flag indicating the reported value is from a dilution
MRO-motor oil range organics
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

Three field duplicate samples, BH-HA-31-1to2-D, BH-HA-38-0to1-D and BH-HA-33-0to1-D were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-HA-31-1to2, BH-HA-38-0to1 and BH-HA-33-0to1, respectively.

The parent sample, BH-HA-38-0to1, was collected on 6 October 2022 and reported in laboratory report 22J0134. Since the field duplicate and parent sample were collected on separate days and based on professional and technical judgment, the field duplicate pair BH-HA-38-0to1/ BH-HA-38-0to1-D was not evaluated for precision.

2.9 Rinsate Blank

An equipment blank was not collected during the sample event.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported to the RLs in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Cadmium was detected in the instrument blank in batch SKK0191 (SKK0191-IBL9) at an estimated concentration greater than the MDL and less than the RL. Since the calibration blanks and instrument blanks bracketing the associated samples were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

Lead (0.213 µg/L and 0.211 µg/L) was detected in the instrument blank in batch SKK0191 (SKK0191-IBL2 and SKK0191-IBL3) at a concentration greater than the RL. Since the calibration blanks and instrument blanks bracketing the associated samples were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits, with the following exceptions.

The recoveries of chromium (87.0%) and lead (89.7%) in the high concentration calibration verification (HCV) in batch SKI0376 (SKI0376-HCV1) were low and outside of the laboratory specified acceptance criteria.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKI0638 and BKK0278). Metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-HA-31-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of chromium in the MS/MSD pair using sample BH-HA-31-0to1 were low and outside of the laboratory specified acceptance criteria. Therefore, the chromium concentration in sample BH-HA-31-0to1 was J- qualified as estimated with low bias.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-0to1	Chromium	39.8	NA	39.8	J-	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Three field duplicate samples, BH-HA-31-1to2-D, BH-HA-38-0to1-D and BH-HA-33-0to1-D were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-HA-31-1to2, BH-HA-38-0to1 and BH-HA-33-0to1, respectively.

The parent sample, BH-HA-38-0to1, was collected on 6 October 2022 and reported in laboratory report 22J0134. Since the field duplicate and parent sample were collected on separate days and based on professional and technical judgment, the field duplicate pair BH-HA-38-0to1/BH-HA-38-0to1-D was not evaluated for precision.

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-HA-31-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for arsenic in the laboratory duplicate using sample BH-HA-31-0to1 was high and outside of the laboratory specified acceptance criteria. Therefore, the arsenic concentration in sample BH-HA-31-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-31-0to1	Arsenic	8.29	NA	8.29	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total and dissolved mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKI0640). Mercury was not detected in the method blank above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-HA-31-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Three field duplicate samples, BH-HA-31-1to2-D, BH-HA-38-0to1-D and BH-HA-33-0to1-D were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-HA-31-1to2, BH-HA-38-0to1 and BH-HA-33-0to1, respectively.

The parent sample, BH-HA-38-0to1, was collected on 6 October 2022 and reported in laboratory report 22J0134. Since the field duplicate and parent sample were collected on separate days and based on professional and technical judgment, the field duplicate pair BH-HA-38-0to1/ BH-HA-38-0to1-D was not evaluated for precision.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-HA-31-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the

RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Method D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

Three field duplicate samples, BH-HA-31-1to2-D, BH-HA-38-0to1-D and BH-HA-33-0to1-D were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-HA-31-1to2, BH-HA-38-0to1 and BH-HA-33-0to1, respectively.

The parent sample, BH-HA-38-0to1, was collected on 6 October 2022 and reported in laboratory report 22J0134. Since the field duplicate and parent sample were collected on separate days and based on professional and technical judgment, the field duplicate pair BH-HA-38-0to1/ BH-HA-38-0to1-D was not evaluated for precision.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-HA-31-0to1. The relative standard deviation (RSD) was less than 20%, with the following exception.

The RSD for % silt/clay in laboratory triplicate using sample BH-HA-31-0to1 was greater than 20%. Therefore, the % silt/clay in sample BH-HA-31-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	RSD	Validation Result (%)	Validation Qualifier	Reason Code
BH-HA-31-0to1	% Silt/Clay	17.4	NA	23	17.4	J	12
BH-HA-31-0to1	% Silt/Clay	12.2	NA		12.2	NA	NA
BH-HA-31-0to1	% Silt/Clay	11.6	NA		11.6	NA	NA

NA-not applicable

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	5 June 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22I0398**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of five sediment samples, one field duplicate sample and one equipment blank, collected on 22 September 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E and 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E and 3520C/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx and 3510C/NWTPH-Dx
- Metals by US EPA Methods 3050B/6020B and 3010A/6020B
- Mercury by US EPA Methods 7471B and 7470A
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500-NH3 H-97
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Solids (TS) by SM 2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exception.

The non-detect result of n-nitrosodiphenylamine in sample BH-SG-10A-0to10-D was R qualified as rejected due to less than 10% matrix spike (MS) recovery .

The qualified data that were not rejected should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following sample was analyzed in the data set.

Laboratory IDs	Client IDs
22I0398-01	BH-SG-44-0to10
22I0398-03	BH-SG-43-0to10
22I0398-05	BH-SG-45-0to10
22I0398-07	BH-SG-11A-0to10

Laboratory IDs	Client IDs
22I0398-09	BH-SG-10A-0to10
22I0398-11	BH-SG-10A-0to10-D
22I0398-16	BH-EB-092222

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 0.2 – 3.2 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
⊗ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives, with the following exception. The non-detect result of n-nitrosodiphenylamine in sample BH-SG-10A-0to10-D was R qualified as rejected due to less than 10% MS recovery. The analytical completeness, defined as the ratio of the number of valid analytical results (valid

analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the SVOC analysis of a water sample is seven days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for benzoic acid (-37.4%) and pentachlorophenol (-22.9%) in the secondary initial calibration standard in batch SKJ0405 (SKJ0405-SCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs).

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with a high bias. Therefore, the concentrations of dibenzofuran and benzo(a)pyrene in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-44-0to10	Benzo(a)pyrene	2.98	J	2.98	J	9
BH-SG-43-0to10	Benzo(a)pyrene	1.19	J	1.19	J	9
BH-SG-45-0to10	Benzo(a)pyrene	80.2	NA	80.2	J	9
BH-SG-11A-0to10	Benzo(a)pyrene	23.0	NA	23.0	J	9
BH-SG-10A-0to10	Benzo(a)pyrene	5.78	NA	5.78	J	9
BH-SG-10A-0to10-D	Benzo(a)pyrene	3.10	J	3.10	J	9
BH-SG-44-0to10	Benzoic Acid	38.8	U	38.8	UJ	9
BH-SG-43-0to10	Benzoic Acid	37.4	U	37.4	UJ	9
BH-SG-45-0to10	Benzoic Acid	39	U	39	UJ	9
BH-SG-11A-0to10	Benzoic Acid	38.7	U	38.7	UJ	9
BH-SG-10A-0to10	Benzoic Acid	38.8	U	38.8	UJ	9
BH-SG-10A-0to10-D	Benzoic Acid	38.6	U	38.6	UJ	9
BH-SG-45-0to10	Dibenzofuran	9.93	NA	9.93	J	9
BH-SG-11A-0to10	Dibenzofuran	1.34	J	1.34	J	9
BH-SG-44-0to10	Pentachlorophenol	31	U	31	UJ	9
BH-SG-43-0to10	Pentachlorophenol	30	U	30	UJ	9
BH-SG-45-0to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SG-11A-0to10	Pentachlorophenol	31	U	31	UJ	9
BH-SG-10A-0to10	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-SG-10A-0to10-D	Pentachlorophenol	30.9	U	30.9	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-092222	Dibenzofuran	0.2	U	0.2	UJ	9
BH-EB-092222	Benzo(a)pyrene	0.06	U	0.06	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four method blanks were reported (batches BKI0559, BKI0674, BKI0560 and BKI0675). SVOCs and PAHs were not detected in the method blanks above the MDLs, with the following exception.

Naphthalene was detected in the method blank in batch BKI0560 at an estimated concentration greater than the MDL and less than the RL. Since naphthalene was not detected in the associated samples, no qualifications were applied to the data.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Four sample set specific MS/MSD pairs were reported, with two each using samples BH-EB-092222 and BH-SG-10A-0to10-D. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of butylbenzylphthalate in the MS/MSD pair using sample BH-EB-092222 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect result of butylbenzylphthalate in sample BH-EB-092222 was UJ qualified as estimated less than the MDL.

The MS recoveries of 2-methylphenol and 4-methylphenol in the MS/MSD pair using sample BH-SG-10A-0to10-D were low and outside of the laboratory specified acceptance criteria. Additionally, the RPD for 2-methylphenol and 4-methylphenol in the MS/MSD pair was high and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of 2-methylphenol and 4-methylphenol in sample BH-SG-10A-0to10-D were UJ qualified as estimated less than the MDLs.

The RPDs for benzyl alcohol, pentachlorophenol and di-n-butylphthalate in the MS/MSD pair using sample BH-SG-10A-0to10-D were high and outside of the laboratory specified acceptance criteria. Since these analytes were not detected in sample BH-SG-10A-0to10-D, no qualifications were applied to the data.

The recoveries of n-nitrosodiphenylamine in the MS/MSD pair using sample BH-SG-10A-0to10-D were low and outside of the laboratory specified acceptance criteria. Additionally, the MS spike of n-nitrosodiphenylamine was not detected, resulting in 0% MS recovery. Therefore, the non-detect result of n-nitrosodiphenylamine in sample BH-SG-10A-0to10-D was R qualified as rejected.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10-D	N-Nitrosodiphenylamine	5.3	U	5.3	R	4

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10-D	2-Methylphenol	6.6	U	6.6	UJ	4
BH-SG-10A-0to10-D	4-Methylphenol	7.3	U	7.3	UJ	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-092222	Butyl benzyl phthalate	0.40	U	0.40	UJ	4

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The LCS recovery of n-nitrosodiphenylamine in the LCS/LCSD pair in batch BKI0674 was low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of N-nitrosodiphenylamine in the associated samples were UJ qualified as estimated less than the MDLs.

The RPDs for 2-methylphenol and 2,4-dimethylphenol in the LCS/LCSD pair in batch BKI0674 were high and outside of the laboratory specified acceptance criteria. Since 2-methylphenol and 2,4-dimethylphenol were not detected in the associated samples, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-11A-0to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SG-10A-0to10-D	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SG-44-0to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SG-10A-0to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SG-43-0to10	N-Nitrosodiphenylamine	5.1	U	5.1	UJ	5
BH-SG-45-0to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision (RPD ≤ 50%) was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10, with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the MDL and less than the RL and a concentration greater than the RL, the RPDs were not calculable. Therefore, for these concentrations in the field duplicate pairs the concentrations were J qualified as estimated.

For analytes with both a concentration greater than the MDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10	Anthracene	0.80	U	NC	0.80	UJ	7
BH-SG-10A-0to10-D	Anthracene	0.93	J		0.93	J	7
BH-SG-10A-0to10	Benz[a]anthracene	5.99	NA	NC	5.99	J	7
BH-SG-10A-0to10-D	Benz[a]anthracene	2.34	J		2.34	J	7
BH-SG-10A-0to10	Benzo(a)pyrene	5.78	NA	NC	5.78	J	7
BH-SG-10A-0to10-D	Benzo(a)pyrene	3.1	J		3.1	J	7
BH-SG-10A-0to10	Benzo(ghi)perylene	6.05	NA	NC	6.05	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10-D	Benzo(ghi)perylene	4.23	J		4.23	J	7
BH-SG-10A-0to10	Benzofluoranthenes, Total (b+k+j)	11.1	NA	NC	11.1	J	7
BH-SG-10A-0to10-D	Benzofluoranthenes, Total (b+k+j)	5.91	J		5.91	J	7
BH-SG-10A-0to10	Chrysene	8.34	NA	NC	8.34	J	7
BH-SG-10A-0to10-D	Chrysene	3.64	J		3.64	J	7
BH-SG-10A-0to10	Dibenzo(a,h)anthracene	1.26	J	NC	1.26	J	7
BH-SG-10A-0to10-D	Dibenzo(a,h)anthracene	0.83	U		0.83	UJ	7
BH-SG-10A-0to10	Fluoranthene	12.3	NA	74	12.3	J	7
BH-SG-10A-0to10-D	Fluoranthene	5.65	NA		5.65	J	7
BH-SG-10A-0to10	Naphthalene	1.17	U	NC	1.17	UJ	7
BH-SG-10A-0to10-D	Naphthalene	1.4	J		1.4	J	7
BH-SG-10A-0to10	Pyrene	11.2	NA	76	11.2	J	7
BH-SG-10A-0to10-D	Pyrene	5.04	NA		5.04	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-092222, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs, with the following exception.

Diethyl phthalate was detected in the equipment blank at estimated concentrations greater than the MDLs and less than the RLs. Since diethyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol in samples BH-SG-10A-0to10 and BH-SG-10A-0to10-D were less than 10% and outside of the laboratory and QAPP specified acceptance criteria. Therefore, the non-detect results of acid extractable SVOCs in samples BH-SG-10A-0to10 and BH-SG-10A-0to10-D were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10	2,4-Dimethylphenol	3.8	U	3.8	UJ	6
BH-SG-10A-0to10	o-cresol	6.6	U	6.6	UJ	6
BH-SG-10A-0to10	p-cresol	7.3	U	7.3	UJ	6
BH-SG-10A-0to10	Pentachlorophenol	31.1	U	31.1	UJ	6
BH-SG-10A-0to10	Phenol	4.4	U	4.4	UJ	6
BH-SG-10A-0to10-D	o-cresol	6.6	U	6.6	UJ	6
BH-SG-10A-0to10-D	p-cresol	7.3	U	7.3	UJ	6
BH-SG-10A-0to10-D	2,4-Dimethylphenol	3.7	U	3.7	UJ	6
BH-SG-10A-0to10-D	Pentachlorophenol	30.9	U	30.9	UJ	6
BH-SG-10A-0to10-D	Phenol	4.3	U	4.3	UJ	6

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3546/NWTPH-Dx and 3510C/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKI0673 and BKI0679). DRO and MRO were not detected in the method blanks above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SG-45-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). Two LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batches BKI0673 and BKI0679. Based on professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated, and the non-detect MRO results in the associated samples were UJ qualified as estimated less than MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-44-0to10	MRO	12.6	NA	12.6	J	5
BH-SG-43-0to10	MRO	3.72	U	3.72	UJ	5
BH-SG-45-0to10	MRO	17.5	NA	17.5	J	5
BH-SG-11A-0to10	MRO	17.8	NA	17.8	J	5
BH-SG-10A-0to10	MRO	3.19	U	3.19	UJ	5
BH-SG-10A-0to10-D	MRO	3.18	U	3.18	UJ	5

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL

MRO-motor oil range organics
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-092222	MRO	0.093	U	0.093	UJ	5

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
MRO-motor oil range organics
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10, respectively.

2.9 Rinsate Blank

One equipment blank, BH-EB-092222, was collected during the sample event. DRO and MRO were not detected in the equipment blank above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDL. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B and 3010A/6020B .

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0074 and BKJ0416). Metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SG-44-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of silver in the MS/MSD pair using sample BH-SG-44-0to10 were low and outside of the laboratory specified acceptance criteria. Therefore, the estimated silver concentration in sample BH-SG-44-0to10 was J qualified as estimated.

One or both of the recoveries of lead, chromium and copper in the MS/MSD pair using sample BH-SG-44-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of lead, chromium and copper in sample BH-SG-44-0to10 were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-44-0to10	Chromium	36.6	NA	36.6	J+	4
BH-SG-44-0to10	Copper	33.7	NA	33.7	J+	4
BH-SG-44-0to10	Lead	23.4	NA	23.4	J+	4
BH-SG-44-0to10	Silver	0.09	J	0.09	J	4

mg/kg-milligram per kilogram
NA-not applicable
NC-not calculable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report

** Reason codes are defined in Attachment 2 at the end of this report

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs and one standard reference material (SRM) were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10, with the following exceptions.

Cadmium was detected in parent sample BH-SG-10A-0to10 at an estimated concentration greater than the MDL and less than the RL and detected in field duplicate sample BH-SG-10A-0to10-D at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the cadmium concentrations in samples BH-SG-10A-0to10-D and BH-SG-10A-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10	Cadmium	0.07	J	NC	0.07	J	7
BH-SG-10A-0to10-D	Cadmium	0.14	NA		0.14	J	7

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SG-44-0to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for arsenic in the laboratory duplicate using sample BH-SG-44-0to10 was high and outside of the laboratory specified acceptance criteria. Therefore, the arsenic concentration in sample BH-SG-44-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-44-0to10	Arsenic	7.68	NA	7.68	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

One equipment blank, BH-EB-092222, was collected during the sample event. Metals were not detected in the equipment blank above the MDLs, with the following exceptions.

Chromium (soil equivalent concentration 0.033 mg/kg) was detected in the equipment blank at a concentration greater than the RL. Since chromium was detected in the associated samples at concentrations greater than ten times the blank contamination, no qualifications were applied to the data.

Copper was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since copper was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

3.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7471B and 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Verification
- ✓ Initial and Continuing Calibration Blanks
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Laboratory Duplicate
- ✓ Rinsate Blank
- ⊗ Sensitivity
- ✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the mercury analysis of a solid sample and water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKI0641 and BKJ0394). Mercury was not detected in the method blanks above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-EB-092222 and BH-SG-44-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10, respectively.

4.10 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported using samples BH-EB-092222 and BH-SG-44-0to10. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

One equipment blank, BH-EB-092222, was collected during the sample event. Mercury was not detected in the equipment blank above the MDL.

4.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect

results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060 ammonia as N by SM4500-NH3 H-97and TS by SM2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
Ammonia	SM4500 NH3 H-97	7 days from collection to analysis in sediment samples 28 days from collection to analysis in preserved water samples
TOC	US EPA Method 9060	14 days from collection to analysis in sediment samples 28 days from collection to analysis in preserved water samples

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported for TOC (batches BKI0639 and BKJ0424). One method blank was reported for ammonia as N (batch BKI0598). One method blank was reported for TS/VS (batch BKI0603). One method blank was reported for TSS (batch BKJ0066). The wet chemistry parameters were not detected in the method blanks above the MDLs.

5.7 Matrix Spike/Matrix Spike Duplicate

Two sample set specific MS/MSD pairs were reported for TOC, using samples BH-EB-092222 and BH-SG-44-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

One sample set specific MS was reported for ammonia as N, using sample BH-SG-44-0to10. The recovery result was within the laboratory specified acceptance criteria.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported for ammonia as N, and two LCS were reported for TOC. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10.

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for ammonia as N using sample BH-SG-44-0to10. One sample set specific laboratory duplicate was reported for TOC using sample BH-EB-092222. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

One equipment blank, BH-EB-092222, was collected during the sample event. TOC (0.55 mg/L soil equivalent concentration 0.000055%) was detected in the equipment blank at a concentration greater than the RL. Since TOC was detected in the associated samples at concentrations greater than ten times the blank contamination, no qualifications were applied to the data.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

6.0 GRAIN SIZE

The samples were analyzed for grain size by PSEP 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

6.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

6.2 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. The field duplicate was not analyzed for grain size.

6.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-SG-10A-0to10. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for Phi Scale <-2.25, Phi Scale -2 to -1, Phi Scale 2 to 3, Phi Scale -2.25 to -2, Phi Scale 3 to 4, Phi Scale 4 to 5,Silt and Gravel in laboratory triplicate using sample BH-SG-10A-0to10 were greater than 20%. Therefore, the results for these particle sizes in sample BH-SG-10A-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10	Particle/Grain Size, Gravel	4.50	NA	4.50	J	12
BH-SG-10A-0to10	Particle/Grain Size, Phi Scale <-2.25	2.00	NA	2.00	J	12
BH-SG-10A-0to10	Particle/Grain Size, Phi Scale -2 to -1	1.90	NA	1.90	J	12
BH-SG-10A-0to10	Particle/Grain Size, Phi Scale 2 to 3	7.40	NA	7.40	J	12

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10	Particle/Grain Size, Phi Scale -2.25 to -2	0.60	NA	0.60	J	12
BH-SG-10A-0to10	Particle/Grain Size, Phi Scale 3 to 4	0.70	NA	0.70	J	12
BH-SG-10A-0to10	Particle/Grain Size, Phi Scale 4 to 5	0.20	NA	0.20	J	12
BH-SG-10A-0to10	Particle/Grain Size, Silt	0.20	NA	0.20	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

6.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	1 March 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0008**

Matrices: **Soil**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of thirty soil samples and two field duplicate samples, collected on 28-29 September 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3050B/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7471B

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by American Society of Testing Materials (ASTM) D6913

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exceptions.

The non-detect hexavalent chromium results in samples BH-SB-25-0to2, BH-SB-25-2to4, BH-SB-25-4to6, BH-SB-24-6to8 and BH-SB-24-8to10 were R qualified as rejected due to 0% MS recovery.

The non-detect hexavalent chromium results in samples BH-SB-25-0to2, BH-SB-25-2to4, BH-SB-25-4to6, BH-SB-24-6to8 and BH-SB-24-8to10 were R qualified as rejected due to holding time exceedances.

The non-detect results of low molecular PAHs (non-SIM) in samples BH-SB-25-10to12, BH-SB-25-12to14, BH-SB-25-14to15, BH-SB-25-2to4-D, BH-SB-25-4to6, BH-SB-25-8to10, BH-SB-26-0to2, BH-SB-26-2to4, BH-SB-26-4to6, BH-SB-26-7to9, BH-SB-26-9to10, BH-SB-28-4to6, BH-SB-28-10to12, BH-SB-28-8to10, BH-SB-28-8to10-D, BH-SB-28-12to14, BH-SB-29-13to15, BH-SB-29-2to4, BH-SB-29-4to6 and BH-SB-29-8to10 were R qualified as rejected due to holding time exceedances.

The non-detect results of acid extractable SVOCs in samples BH-SB-26-4to6, BH-SB-25-14to15, BH-SB-26-9to10 and BH-SB-26-7to9 were R qualified as rejected due to less than 10% surrogate recoveries.

The non-detect results of base neutral extractable PAHs in samples BH-SB-28-10to12 and BH-SB-24-8to10 were R qualified as rejected due to less than 10% surrogate recoveries.

The qualified data that were not rejected should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0008-01	BH-SB-28-0to2
22J0008-02	BH-SB-28-2to4
22J0008-03	BH-SB-28-4to6
22J0008-04	BH-SB-28-6to8
22J0008-05	BH-SB-28-8to10
22J0008-06	BH-SB-28-8to10-D
22J0008-07	BH-SB-28-10to12
22J0008-08	BH-SB-28-12to14
22J0008-09	BH-SB-29-2to4
22J0008-10	BH-SB-29-4to6
22J0008-11	BH-SB-29-8to10
22J0008-12	BH-SB-29-13to15
22J0008-16	BH-SB-24-0to2
22J0008-17	BH-SB-24-2to4
22J0008-18	BH-SB-24-6to8
22J0008-19	BH-SB-24-8to10

Laboratory IDs	Client IDs
22J0008-20	BH-SB-24-10to12
22J0008-21	BH-SB-24-12to14
22J0008-22	BH-SB-24-14to15
22J0008-23	BH-SB-25-0to2
22J0008-24	BH-SB-25-2to4
22J0008-25	BH-SB-25-2to4-D
22J0008-26	BH-SB-25-4to6
22J0008-27	BH-SB-25-8to10
22J0008-28	BH-SB-25-10to12
22J0008-29	BH-SB-25-12to14
22J0008-30	BH-SB-25-14to15
22J0008-31	BH-SB-26-0to2
22J0008-32	BH-SB-26-2to4
22J0008-33	BH-SB-26-4to6
22J0008-34	BH-SB-26-7to9
22J0008-35	BH-SB-26-9to10

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 3.9 – 5.5 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

Incorrect error corrections were observed on the chain of custody (COC), instead of the proper procedure of single strike through, correction, and initials and date of person making the corrections.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per US EPA Methods 3546/8270E and 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample

⊗ Field Duplicate
✓ Rinsate Blank
⊗ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives, with the following exceptions.

- The non-detect results of low molecular PAHs (non-SIM) in samples BH-SB-25-10to12, BH-SB-25-12to14, BH-SB-25-14to15, BH-SB-25-2to4-D, BH-SB-25-4to6, BH-SB-25-8to10, BH-SB-26-0to2, BH-SB-26-2to4, BH-SB-26-4to6, BH-SB-26-7to9, BH-SB-26-9to10, BH-SB-28-4to6, BH-SB-28-10to12, BH-SB-28-8to10, BH-SB-28-8to10-D, BH-SB-28-12to14, BH-SB-29-13to15, BH-SB-29-2to4, BH-SB-29-4to6 and BH-SB-29-8to10 were R qualified as rejected due to holding time exceedances.
- The non-detect results of acid extractable SVOCs in samples BH-SB-26-4to6, BH-SB-25-14to15, BH-SB-26-9to10 and BH-SB-26-7to9 were R qualified as rejected due to less than 10% surrogate recoveries.
- The non-detect results of base neutral extractable PAHs in samples BH-SB-28-10to12 and BH-SB-24-8to10 were R qualified as rejected due to less than 10% surrogate recoveries.

Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 91.5.

1.1.2 Analysis Anomaly

Samples BH-SB-24-12to14 and BH-SB-24-14to15 were analyzed for (non-SIM) SVOCs as undiluted and 1:2 dilution, and both analyses were reported. Naphthalene was flagged E in the undiluted analyses to indicate the concentrations were outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the naphthalene concentrations in samples BH-SB-24-12to14 and BH-SB-24-14to15 from the 1:2 dilutions were considered for validation. The results for the remaining compounds were considered for validation from the undiluted analysis. The results not considered for validation were indicated as not reportable in the electronic data deliverable (EDD).

The samples BH-SB-24-12to14 and BH-SB-24-10to12 were analyzed for (SIM) SVOCs as 1:3 and 1:6 dilutions, and both analyses were reported. Naphthalene was flagged E in the 1:3 analyses to indicate the concentrations were outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the naphthalene concentrations in samples BH-SB-24-12to14 and BH-SB-24-10to12 from the 1:6 dilutions were considered for validation. The results for the remaining compounds were considered for validation from the undiluted analysis. The results not considered for validation were indicated as not reportable in the EDD.

It was noted that the naphthalene concentration in sample BH-SB-24-8to10 was "E" flagged by the laboratory to indicate the result exceeded the calibration range of the instrument. Therefore, based on professional and technical judgment, the naphthalene concentration in sample BH-SB-24-8to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-8to10	Naphthalene	679	E	679	J	10

µg/kg-microgram per kilogram
E-laboratory flag indicating the analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses, with the following exceptions.

The SIM analyses for samples listed in the table below were performed outside of the holding time requirement. Therefore, based on professional and technical judgment, the non-detect results of high molecular PAHs in these samples were UJ qualified as estimated less than the method

detection limits (MDLs), the non-detect results of low molecular PAHs in these samples were R qualified as rejected, and the SVOC concentrations in these samples were J qualified as estimated. See attachment 3 at the end of this report for qualifications.

BH-SB-28-0to2
BH-SB-28-2to4
BH-SB-28-4to6
BH-SB-28-6to8
BH-SB-28-8to10
BH-SB-28-8to10-D
BH-SB-28-10to12
BH-SB-28-12to14
BH-SB-29-2to4

BH-SB-29-4to6
BH-SB-29-8to10
BH-SB-29-13to15
BH-SB-24-12to14
BH-SB-24-14to15
BH-SB-25-0to2
BH-SB-25-2to4
BH-SB-25-2to4-D
BH-SB-25-4to6

BH-SB-25-8to10
BH-SB-25-10to12
BH-SB-25-12to14
BH-SB-25-14to15
BH-SB-26-0to2
BH-SB-26-2to4
BH-SB-26-4to6
BH-SB-26-7to9
BH-SB-26-9to10

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met, with the following exceptions.

The %Ds for 2,4-dinitrophenol (-65.5%), pentachlorophenol (-22.9%) and anthracene (-20.4%) in the low initial calibration standard in batch SKJ0405 (SKJ0405-SCV1) were outside of laboratory specified acceptance criteria with low biases. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no qualifications were applied to the data.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the low initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Since the associated samples were assessed based on their respective

bracketing CCVs and based on professional and technical judgment, no additional qualifications were applied to the data.

The %Ds of 2,4-dinitrophenol (-65.5%), pentachlorophenol (-22.9%), anthracene (-20.4%) in the secondary initial calibration standard in batch SKJ0405-SCV1 for (non-SIM) SVOCs were outside the method specified acceptance criteria with low biases. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no qualifications were applied to the data.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds of 2,4-dinitrophenol (-39.0%), pentachlorophenol (-20.1%), indeno(1,2,3-cd)pyrene (-23.3%) and dibenzo(a,h)anthracene (-24.0%) in CCV standard in batch SKJ0412-CCV1 were outside the method specified acceptance criteria with low biases. Since the %Ds for 2,4-dinitrophenol, pentachlorophenol, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene were within the validation specified acceptance criteria, no qualifications were applied to the data.

The %Ds of pyrene (22.7%) and bis(2-ethylhexyl)phthalate (25.7%) in the CCV standard in batch SKK0006-CCV1 were outside the method specified acceptance criteria with high biases. Since bis(2-ethylhexyl)phthalate was not detected in the associated samples and the %D for pyrene was within the validation specified acceptance criteria, no qualifications were applied to the data.

The %D of 2,4-dinitrophenol (-36.8%) in CCV in batch SKJ0412-CCV2 was outside the method specified acceptance criteria with a low bias. Since the %D for 2,4-dinitrophenol was within the validation specified acceptance criteria, no qualifications were applied to the data.

The %Ds of 2,4-dinitrophenol (-51.5%), 4-nitrophenol (-25.8%), 4,6-dinitro-2-methylphenol (-28.0%), indeno(1,2,3-cd)pyrene (-23.6%), dibenzo(a,h)anthracene (-24.0%) and benzo(g,h,i)perylene (-29.4%) in CCV in batch SKK0006-CCV2 were outside the method specified acceptance criteria with low biases. Since the %Ds for 4-nitrophenol, 4,6-dinitro-2-methylphenol, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene were within the validation specified acceptance criteria, no qualifications were applied to the 4-nitrophenol, 4,6-dinitro-2-methylphenol, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene data. However, the non-detect 2,4-dinitrophenol results in the associated samples were UJ qualified as estimated less than the MDL.

The %D of 2,4-dinitrophenol (-48.3%) in CCV in batch SKK0006-CCV3 was outside the method specified acceptance criteria with a low bias. Since the %D for 2,4-dinitrophenol was within the validation specified acceptance criteria, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-12to14	2,4-Dinitrophenol	33.0	U	33.0	UJ	9
BH-SB-24-14to15	2,4-Dinitrophenol	32.4	U	32.4	UJ	9
BH-SB-25-0to2	2,4-Dinitrophenol	32.4	U	32.4	UJ	9
BH-SB-25-2to4	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-SB-25-2to4-D	2,4-Dinitrophenol	31.6	U	31.6	UJ	9
BH-SB-25-4to6	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-SB-25-8to10	2,4-Dinitrophenol	31.5	U	31.5	UJ	9
BH-SB-25-10to12	2,4-Dinitrophenol	32.0	U	32.0	UJ	9
BH-SB-26-0to2	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-SB-26-2to4	2,4-Dinitrophenol	129	U	129	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Six method blanks were reported (two each from batches BKJ0266 and BKJ0300 and one each from batches BKJ0267 and BKJ0304). SVOCs and PAHs were not detected in the method blanks above the MDLs, with the following exceptions.

1-Methylnaphthalene was detected in the method blank in batch BKJ0267 at an estimated concentration greater than the MDL and less than the reporting limit (RL). Therefore, the estimated 1-methylnaphthalene concentrations in samples BH-SB-28-0to2, BH-SB-28-2to4, BH-SB-28-4to6, BH-SB-28-6to8, BH-SB-29-2to4, BH-SB-29-8to10, BH-SB-29-13to15, BH-SB-24-0to2 and BH-SB-24-2to4 were U qualified as not detected at the RLs.

Acenaphthene, naphthalene, and 1-methylnaphthalene were detected in the method blank in batch BKJ0304 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated 1-methylnaphthalene concentrations in samples BH-SB-25-0to2, BH-SB-25-2to4 and BH-SB-25-2to4-D; the estimated acenaphthene concentration in sample BH-SB-25-0to2 and the estimated naphthalene concentrations in samples BH-SB-25-4to6, BH-SB-25-8to10, BH-SB-25-10to12, BH-SB-25-12to14, BH-SB-26-0to2 and BH-SB-26-2to4 were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-0to2	1-Methylnaphthalene	5.29	H,J,D	14.8	U	3
BH-SB-28-2to4	1-Methylnaphthalene	2.66	H,J	4.96	U	3
BH-SB-28-4to6	1-Methylnaphthalene	0.91	H,J	4.98	U	3
BH-SB-28-6to8	1-Methylnaphthalene	1.13	H, J	4.89	U	3
BH-SB-29-2to4	1-Methylnaphthalene	0.79	H, J	4.96	U	3
BH-SB-29-8to10	1-Methylnaphthalene	0.56	H, J	4.97	U	3
BH-SB-29-13to15	1-Methylnaphthalene	0.55	H, J	4.95	U	3
BH-SB-24-0to2	1-Methylnaphthalene	2.62	J	4.98	U	3
BH-SB-24-2to4	1-Methylnaphthalene	2.01	J	4.98	U	3
BH-SB-25-0to2	1-Methylnaphthalene	4.58	H,J,D	14.7	U	3
BH-SB-25-2to4	1-Methylnaphthalene	8.4	H,J,D	14.9	U	3
BH-SB-25-2to4-D	1-Methylnaphthalene	1.46	H,J,D	14.9	U	3
BH-SB-25-0to2	Acenaphthene	2.52	H,J,D	14.7	U	3
BH-SB-25-4to6	Naphthalene	2.05	H, J	5	U	3
BH-SB-25-8to10	Naphthalene	1.67	H, J	4.9	U	3
BH-SB-25-10to12	Naphthalene	2.37	H, J	4.87	U	3
BH-SB-25-12to14	Naphthalene	2.29	H, J	4.98	U	3
BH-SB-26-0to2	Naphthalene	12.3	H,J,D	15	U	3
BH-SB-26-2to4	Naphthalene	7.96	H, J	19.1	U	3

µg/kg-microgram per kilogram
H-laboratory flag indicating holding time violation
D-laboratory flag indicating the reported value is from a dilution
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Four sample set specific MS/MSD pairs were reported, using sample BH-SB-29-4to6, BH-SB-25-4to6, BH-SB-29-2to4 and BH-SB-25-12to14. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for 2,4-dimethylphenol in the MS/MSD pair using sample BH-SB-29-4to6 was high and outside of the laboratory specified acceptance criteria. Since 2,4-dimethylphenol was not detected in sample BH-SB-29-4to6, no qualifications were applied to the data.

The MS recovery of pentachlorophenol in the MS/MSD pair using sample BH-SB-25-4to6 was high and outside of the laboratory specified acceptance criteria. Since pentachlorophenol was not detected in sample BH-SB-25-4to6, no qualifications were applied to the data.

The RPDs for 2-methylphenol and 2,4-dimethylphenol in the MS/MSD pair using sample BH-SB-25-4to6 were high and outside of the laboratory specified acceptance criteria. Since 2-methylphenol and 2,4-dimethylphenol were not detected in sample BH-SB-25-4to6, no qualifications were applied to the data.

One or both of the recoveries of acenaphthene, anthracene, pyrene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene in the MS/MSD pair using sample BH-SB-29-2to4 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect acenaphthene result in sample BH-SB-29-2to4 was UJ qualified as estimated less than the MDL, and the concentrations of anthracene, pyrene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene in sample BH-SB-29-2to4 were J qualified as estimated.

One or both of the recoveries of acenaphthene, pyrene, chrysene and indeno(1,2,3-cd)pyrene in the MS/MSD pair using sample BH-SB-25-12to14 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of acenaphthene, pyrene, chrysene and indeno(1,2,3-cd)pyrene in sample BH-SB-25-12to14 were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-2to4	Acenaphthene	0.57	J,U	0.57	UJ	4
BH-SB-29-2to4	Anthracene	4.48	J	4.48	J	4
BH-SB-29-2to4	Pyrene	11.5	J	11.5	J	4
BH-SB-29-2to4	Benzo(a)pyrene	2.91	J	2.91	J	4
BH-SB-29-2to4	Indeno(1,2,3-cd)pyrene	3.73	J	3.73	J	4
BH-SB-25-12to14	Acenaphthene	0.57	J,U	0.57	UJ	4
BH-SB-25-12to14	Pyrene	0.62	J,U	0.62	UJ	4
BH-SB-25-12to14	Chrysene	1.05	J,U	1.05	UJ	4
BH-SB-25-12to14	Indeno(1,2,3-cd)pyrene	1.05	J,U	1.05	UJ	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for pyrene and butylbenzylphthalate in the LCS/LCSD pair in batch BKJ0266 were high and outside of the laboratory specified acceptance criteria. Since butylbenzylphthalate was not detected in the associated samples, no qualifications were applied to the butylbenzylphthalate data. However, the pyrene concentrations in the associated samples were J qualified as estimated.

The RPDs for the compounds listed in the table below in the LCS/LCSD pair in batch BKJ0300 were high and outside of the laboratory specified acceptance criteria. Since 2-chlorophenol, 2,4-dichlorophenol, 4-chloro-3-methylphenol, 2,4,5-trichlorophenol, 2-chloronaphthalene, 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, pentachlorophenol, di-n-butylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate were not detected in the associated samples, no qualifications were applied to the 2-chlorophenol, 2,4-dimethylphenol, 2,4-dichlorophenol, 4-chloro-3-methylphenol, 2,4,5-trichlorophenol, 2-chloronaphthalene, 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, pentachlorophenol, di-n-butylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate data. However, the concentrations of 2,4-dimethylphenol, phenol, naphthalene, 2-methylnaphthalene, acenaphthene, dibenzofuran, diethyl phthalate, anthracene, fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, total benzofluoranthenes (b+k+j) and 1-methylnaphthalene in the associated samples were J qualified as estimated.

Phenol
2-Chlorophenol
2,4-Dimethylphenol
2,4-Dichlorophenol
Naphthalene
4-Chloro-3-methylphenol
2-Methylnaphthalene
2,4,5-Trichlorophenol

2-Chloronaphthalene
Acenaphthene
2,4-Dinitrophenol
Dibenzofuran
Diethyl phthalate
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Anthracene

Di-n-butylphthalate
Fluoranthene
Benzo(a)anthracene
Chrysene
Bis(2-ethylhexyl)phthalate
Di-n-octylphthalate
Benzo(b)fluoranthene
1-Methylnaphthalene

The LCSD recoveries of 2,4-dichlorophenol, 4-chloro-3-methylphenol, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, diethyl phthalate, 4,6-dinitro-2-methylphenol, pentachlorophenol, di-n-octylphthalate and bis(2-ethylhexyl)phthalate in the LCS/LCSD pair in batch BKJ0300 were high and outside of the laboratory specified acceptance criteria. Since 2,4-dichlorophenol, 4-chloro-3-methylphenol, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, 4,6-dinitro-2-methylphenol, pentachlorophenol, di-n-octylphthalate and bis(2-ethylhexyl)phthalate were not detected in the associated samples, no qualifications were applied to the 2,4-dichlorophenol, 4-chloro-3-methylphenol, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, 4,6-dinitro-2-methylphenol, pentachlorophenol, di-n-octylphthalate and bis(2-ethylhexyl)phthalate data. However, the estimated diethyl phthalate concentration in the associated sample was J qualified as estimated.

The recoveries of anthracene and benzo(a)pyrene in the LCS/LCSD pair in batch BKJ0267 were low and outside of the laboratory specified acceptance criteria. Therefore, the anthracene and

benzo(a)pyrene concentrations in the associated samples were J- qualified as estimated with low biases, and the non-detect results of anthracene and benzo(a)pyrene in the associated samples were UJ qualified as estimated less than the MDLs.

The LCS recovery of pyrene in the LCS/LCSD pair in batch BKJ0304 was low and outside of the laboratory specified acceptance criteria. Therefore, the pyrene concentrations in the associated samples were J- qualified as estimated with low biases, and the non-detect results of pyrene in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-0to2	Anthracene	547	H,D	547	J-	5
BH-SB-28-0to2	Benzo(a)pyrene	160	H,D	160	J-	5
BH-SB-28-0to2	Pyrene	811	NA	811	J-	5
BH-SB-28-2to4	Anthracene	9.12	H	9.12	J-	5
BH-SB-28-2to4	Benzo(a)pyrene	12.9	H	12.9	J-	5
BH-SB-28-2to4	Pyrene	41.0	NA	41.0	J-	5
BH-SB-28-4to6	Anthracene	1.05	J,H	1.05	J	5
BH-SB-28-4to6	Benzo(a)pyrene	2.85	J,H	2.85	J	5
BH-SB-28-4to6	Pyrene	7.2	J	7.2	J	5
BH-SB-28-6to8	Anthracene	1.91	J,H	1.91	J	5
BH-SB-28-6to8	Benzo(a)pyrene	1.55	J,H	1.55	J	5
BH-SB-28-6to8	Pyrene	8.2	J	8.2	J	5
BH-SB-28-8to10	Anthracene	2.59	J,H	2.59	J	5
BH-SB-28-8to10	Benzo(a)pyrene	0.61	U,H	0.61	UJ	5
BH-SB-28-8to10	Pyrene	6.2	J	6.2	J	5
BH-SB-28-8to10-D	Anthracene	1.36	J,H	1.36	J	5
BH-SB-28-8to10-D	Benzo(a)pyrene	0.60	U,H	0.60	UJ	5
BH-SB-28-10to12	Anthracene	1.40	J,H	1.40	J	5
BH-SB-28-10to12	Benzo(a)pyrene	0.61	U,H	0.61	UJ	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-12to14	Anthracene	6.80	H	6.80	J-	5
BH-SB-28-12to14	Benzo(a)pyrene	3.05	J,H	3.05	J	5
BH-SB-28-12to14	Pyrene	132	NA	132	J-	5
BH-SB-29-2to4	Anthracene	4.48	J,H	4.48	J	5
BH-SB-29-2to4	Benzo(a)pyrene	2.91	J,H	2.91	J	5
BH-SB-29-2to4	Pyrene	17.8	J	17.8	J	5
BH-SB-29-4to6	Anthracene	0.87	U,H	0.87	UJ	5
BH-SB-29-4to6	Benzo(a)pyrene	0.61	U,H	0.61	UJ	5
BH-SB-29-8to10	Anthracene	0.87	U,H	0.87	UJ	5
BH-SB-29-8to10	Benzo(a)pyrene	0.61	U,H	0.61	UJ	5
BH-SB-29-13to15	Anthracene	0.86	U,H	0.86	UJ	5
BH-SB-29-13to15	Benzo(a)pyrene	0.61	U,H	0.61	UJ	5
BH-SB-24-0to2	Anthracene	1.48	J	1.48	J	5
BH-SB-24-0to2	Benzo(a)pyrene	4.85	J	4.85	J	5
BH-SB-24-0to2	Pyrene	17.7	J	17.7	J	5
BH-SB-24-2to4	Anthracene	0.87	U	0.87	UJ	5
BH-SB-24-2to4	Benzo(a)pyrene	1.50	J	1.50	J	5
BH-SB-24-6to8	Anthracene	3.05	J	3.05	J	5
BH-SB-24-6to8	Benzo(a)pyrene	5.24	NA	5.24	J-	5
BH-SB-24-6to8	Pyrene	42.5	NA	42.5	J-	5
BH-SB-24-8to10	Anthracene	4.77	J	4.77	J	5
BH-SB-24-8to10	Benzo(a)pyrene	1.65	J	1.65	J	5
BH-SB-24-8to10	Pyrene	116	NA	116	J-	5
BH-SB-24-10to12	Anthracene	57.2	D	57.2	J-	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-10to12	Benzo(a)pyrene	46.4	D	46.4	J-	5
BH-SB-24-12to14	1-Methylnaphthalene	126	NA	126	J-	5
BH-SB-24-12to14	2,4-Dimethylphenol	36.5	J	36.5	J	5
BH-SB-24-12to14	2-Methylnaphthalene	187	NA	187	J-	5
BH-SB-24-12to14	Acenaphthene	43.9	NA	43.9	J-	5
BH-SB-24-12to14	Anthracene	120	NA	120	J-	5
BH-SB-24-12to14	Benz[a]anthracene	76.2	NA	76.2	J-	5
BH-SB-24-12to14	Benzo(b)fluoranthene	133	NA	133	J-	5
BH-SB-24-12to14	Benzofluoranthenes, Total (b+k+j)	276	NA	276	J-	5
BH-SB-24-12to14	Chrysene	105	NA	105	J-	5
BH-SB-24-12to14	Dibenzofuran	149	NA	149	J-	5
BH-SB-24-12to14	Fluoranthene	438	NA	438	J-	5
BH-SB-24-12to14	Phenol	92.2	NA	92.2	J-	5
BH-SB-24-12to14	Pyrene	339	H,D	339	J-	5
BH-SB-24-12to14	Naphthalene	2540	D	2540	J-	5
BH-SB-24-14to15	1-Methylnaphthalene	104	NA	104	J-	5
BH-SB-24-14to15	2,4-Dimethylphenol	15.8	J	15.8	J	5
BH-SB-24-14to15	2-Methylnaphthalene	144	NA	144	J-	5
BH-SB-24-14to15	Acenaphthene	47.6	NA	47.6	J-	5
BH-SB-24-14to15	Anthracene	69.3	NA	69.3	J-	5
BH-SB-24-14to15	Benz[a]anthracene	36.6	NA	36.6	J-	5
BH-SB-24-14to15	Benzo(b)fluoranthene	51.2	NA	51.2	J-	5
BH-SB-24-14to15	Benzofluoranthenes, Total (b+k+j)	108	NA	108	J-	5
BH-SB-24-14to15	Chrysene	47.9	NA	47.9	J-	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-14to15	Dibenzofuran	99.1	NA	99.1	J-	5
BH-SB-24-14to15	Fluoranthene	261	NA	261	J-	5
BH-SB-24-14to15	Phenol	36.8	NA	36.8	J-	5
BH-SB-24-14to15	Pyrene	82.5	H,D	82.5	J-	5
BH-SB-24-14to15	Naphthalene	2120	D	2120	J-	5
BH-SB-25-0to2	1-Methylnaphthalene	6.3	J	6.3	J	5
BH-SB-25-0to2	2-Methylnaphthalene	10.7	J	10.7	J	5
BH-SB-25-0to2	Anthracene	27.1	NA	27.1	J-	5
BH-SB-25-0to2	Benz[a]anthracene	109	NA	109	J-	5
BH-SB-25-0to2	Benzo(b)fluoranthene	374	NA	374	J-	5
BH-SB-25-0to2	Benzofluoranthenes, Total (b+k+j)	645	NA	645	J-	5
BH-SB-25-0to2	Chrysene	245	NA	245	J-	5
BH-SB-25-0to2	Dibenzofuran	18.5	J	18.5	J	5
BH-SB-25-0to2	Fluoranthene	432	NA	432	J-	5
BH-SB-25-0to2	Naphthalene	104	NA	104	J-	5
BH-SB-25-0to2	Pyrene	162	H,D	162	J-	5
BH-SB-25-2to4	Benz[a]anthracene	39.3	NA	39.3	J-	5
BH-SB-25-2to4	Benzo(b)fluoranthene	60.0	NA	60.0	J-	5
BH-SB-25-2to4	Benzofluoranthenes, Total (b+k+j)	105	NA	105	J-	5
BH-SB-25-2to4	Chrysene	47.4	NA	47.4	J-	5
BH-SB-25-2to4	Fluoranthene	76.9	NA	76.9	J-	5
BH-SB-25-2to4	Naphthalene	12.1	J	12.1	J	5
BH-SB-25-2to4	Pyrene	199	H,D	199	J-	5
BH-SB-25-2to4-D	Anthracene	8.6	J	8.6	J	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-2to4-D	Benz[a]anthracene	27.1	NA	27.1	J-	5
BH-SB-25-2to4-D	Benzo(b)fluoranthene	64.3	NA	64.3	J-	5
BH-SB-25-2to4-D	Benzofluoranthenes, Total (b+k+j)	116	NA	116	J-	5
BH-SB-25-2to4-D	Chrysene	43.6	NA	43.6	J-	5
BH-SB-25-2to4-D	Fluoranthene	63.2	NA	63.2	J-	5
BH-SB-25-2to4-D	Naphthalene	17.5	J	17.5	J	5
BH-SB-25-2to4-D	Phenol	7.1	J	7.1	J	5
BH-SB-25-2to4-D	Pyrene	34.7	H,D	34.7	J-	5
BH-SB-25-4to6	Fluoranthene	7.1	J	7.1	J	5
BH-SB-25-4to6	Pyrene	4.16	J,H	4.16	J	5
BH-SB-25-8to10	Pyrene	0.76	J,H	0.76	J	5
BH-SB-25-10to12	Pyrene	1.56	J,H	1.56	J	5
BH-SB-25-12to14	Pyrene	0.62	U,H	0.62	UJ	5
BH-SB-25-14to15	Pyrene	0.62	U,H	0.62	UJ	5
BH-SB-26-0to2	Benz[a]anthracene	13.1	J	13.1	J	5
BH-SB-26-0to2	Benzo(b)fluoranthene	30.2	NA	30.2	J-	5
BH-SB-26-0to2	Benzofluoranthenes, Total (b+k+j)	59.8	NA	59.8	J-	5
BH-SB-26-0to2	Chrysene	23.2	NA	23.2	J-	5
BH-SB-26-0to2	Fluoranthene	45.7	NA	45.7	J-	5
BH-SB-26-0to2	Naphthalene	22.2	NA	22.2	J-	5
BH-SB-26-0to2	Phenol	14.4	J	14.4	J	5
BH-SB-26-0to2	Pyrene	11.0	J,H,D	11.0	J	5
BH-SB-26-2to4	Phenol	60.7	J	60.7	J	5
BH-SB-26-2to4	Pyrene	4.28	J,H	4.28	J	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-26-4to6	Phenol	16.2	J	16.2	J	5
BH-SB-26-4to6	Pyrene	0.63	U,H	0.63	UJ	5
BH-SB-26-7to9	Phenol	13.4	J	13.4	J	5
BH-SB-26-7to9	Pyrene	0.61	U,H	0.61	UJ	5
BH-SB-26-9to10	Diethyl phthalate	28.9	J	28.9	J	5
BH-SB-26-9to10	Phenol	21.8	NA	21.8	J-	5
BH-SB-26-9to10	Pyrene	0.62	U,H	0.62	UJ	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
H-laboratory flag indicating holding time violation
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Two field duplicate samples, BH-SB-25-2to4-D and BH-SB-28-8to10-D were collected with the sample set. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SB-25-2to4 and BH-SB-28-8to10, respectively, with the following exceptions.

Phenol and anthracene were detected in field duplicate sample BH-SB-25-2to4-D at estimated concentrations greater than the MDLs and less than the RLs and not detected in parent sample BH-SB-25-2to4, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the phenol and anthracene concentrations in sample BH-SB-25-2to4-D were J qualified as estimated, and the non-detect results of phenol and anthracene in sample BH-SB-25-2to4 were UJ qualified as estimated less than the MDLs.

SIM: The RPDs for benz[a]anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, chrysene, fluoranthene and pyrene in field duplicate pair BH-SB-25-2to4-D/BH-SB-25-2to4 were greater

than 50%. Therefore, based on professional and technical judgement, the concentrations of benz[a]anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, chrysene, fluoranthene and pyrene in samples BH-SB-25-2to4-D and BH-SB-25-2to4 were J qualified as estimated.

SIM: Acenaphthene and fluorene were detected in parent sample BH-SB-25-2to4 at concentrations greater than the RLs and not detected in field duplicate sample BH-SB-25-2to4-D, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the acenaphthene and fluorene concentrations in sample BH-SB-25-2to4 were J qualified as estimated, and the non-detect results of acenaphthene and fluorene in sample BH-SB-25-2to4-D were UJ qualified as estimated less than the MDLs.

SIM: Anthracene was detected in parent sample BH-SB-25-2to4 at a concentration greater than the RL and detected in field duplicate sample BH-SB-25-2to4-D at an estimated concentration greater than the MDL and less than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the anthracene concentrations in samples BH-SB-25-2to4 and BH-SB-25-2to4-D were J qualified as estimated.

The RPDs for 1-methylnaphthalene and naphthalene in field duplicate pair BH-SB-28-8to10-D/BH-SB-28-8to10 were greater than 50%. Therefore, based on professional and technical judgement, the 1-methylnaphthalene and naphthalene concentrations in samples BH-SB-28-8to10-D and BH-SB-28-8to10 were J qualified as estimated.

SIM: Fluoranthene, fluorene and pyrene were detected in field duplicate sample BH-SB-28-8to10-D at estimated concentrations greater than the MDLs and less than the RLs and detected in parent sample BH-SB-28-8to10 at concentrations greater than the RLs, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the concentrations of fluoranthene, fluorene and pyrene in sample BH-SB-28-8to10-D and BH-SB-28-8to10 were J qualified as estimated.

4-Methylphenol was detected in field duplicate sample BH-SB-28-8to10-D at an estimated concentration greater than the MDL and less than the RL and not detected in parent sample BH-SB-28-8to10, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the 4-methylphenol concentration in sample BH-SB-28-8to10-D was J qualified as estimated, and the non-detect 4-methylphenol result in sample BH-SB-28-8to10 was UJ qualified as estimated less than the MDL.

Pyrene was detected in parent sample BH-SB-28-8to10 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-SB-28-8to10-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the pyrene concentration in sample BH-SB-28-8to10 was J qualified as estimated, and the non-detect pyrene result in sample BH-SB-28-8to10-D was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-2to4-D	Acenaphthene	1.71	U,H	NC	1.71	UJ	7
BH-SB-25-2to4	Acenaphthene	27.9	H,D		27.9	J	7
BH-SB-25-2to4	Anthracene	57.3	H,D	175	57.3	J	7
BH-SB-25-2to4-D	Anthracene	3.84	J,H,D		3.84	J	7
BH-SB-25-2to4	Benz[a]anthracene	99.2	H,D	135	99.2	J	7
BH-SB-25-2to4-D	Benz[a]anthracene	19.4	H,D		19.4	J	7
BH-SB-25-2to4	Benzo(a)pyrene	88.8	H,D	96	88.8	J	7
BH-SB-25-2to4-D	Benzo(a)pyrene	31.4	H,D		31.4	J	7
BH-SB-25-2to4	Benzo(b)fluoranthene	79.2	H,D	59	79.2	J	7
BH-SB-25-2to4-D	Benzo(b)fluoranthene	43.3	H,D		43.3	J	7
BH-SB-25-2to4	Benzo(j)fluoranthene	53.8	H,D	70	53.8	J	7
BH-SB-25-2to4-D	Benzo(j)fluoranthene	26	H,D		26	J	7
BH-SB-25-2to4	Benzo(k)fluoranthene	45.8	H,D	72	45.8	J	7
BH-SB-25-2to4-D	Benzo(k)fluoranthene	21.6	H,D		21.6	J	7
BH-SB-25-2to4	Benzofluoranthenes, Total (b+k+j)	179	H,D	65	179	J	7
BH-SB-25-2to4-D	Benzofluoranthenes, Total (b+k+j)	91.2	H,D		91.2	J	7
BH-SB-25-2to4	Chrysene	122	H,D	124	122	J	7
BH-SB-25-2to4-D	Chrysene	28.5	H,D		28.5	J	7
BH-SB-25-2to4	Fluoranthene	206	H,D	134	206	J	7
BH-SB-25-2to4-D	Fluoranthene	40.6	H,D		40.6	J	7
BH-SB-25-2to4	Fluorene	23.8	H,D	NC	23.8	J	7
BH-SB-25-2to4-D	Fluorene	1.88	U,H		1.88	UJ	7
BH-SB-25-2to4	Pyrene	199	H,D	141	199	J	7
BH-SB-25-2to4-D	Pyrene	34.7	H,D		34.7	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-2to4	Anthracene	7.2	U	NC	7.2	UJ	7
BH-SB-25-2to4-D	Anthracene	8.6	J		8.6	J	7
BH-SB-25-2to4	Phenol	4.4	U	NC	4.4	UJ	7
BH-SB-25-2to4-D	Phenol	7.1	J		7.1	J	7
BH-SB-28-8to10	p-cresol	7.3	U	NC	7.3	UJ	7
BH-SB-28-8to10-D	p-cresol	11.5	J		11.5	J	7
BH-SB-28-8to10	Pyrene	6.2	J	NC	6.2	J	7
BH-SB-28-8to10-D	Pyrene	5.7	U		5.7	UJ	7
BH-SB-28-8to10	1-Methylnaphthalene	14	H	53	14	J	7
BH-SB-28-8to10-D	1-Methylnaphthalene	8.15	H		8.15	J	7
BH-SB-28-8to10	Fluoranthene	9.99	H	73	9.99	J	7
BH-SB-28-8to10-D	Fluoranthene	4.66	J,H		4.66	J	7
BH-SB-28-8to10	Fluorene	5.23	H	58	5.23	J	7
BH-SB-28-8to10-D	Fluorene	2.87	J,H		2.87	J	7
BH-SB-28-8to10	Naphthalene	158	H	66	158	J	7
BH-SB-28-8to10-D	Naphthalene	79.2	H		79.2	J	7
BH-SB-28-8to10	Pyrene	8.32	H	85	8.32	J	7
BH-SB-28-8to10-D	Pyrene	3.34	J,H		3.34	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
H-laboratory flag indicating holding time violation
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol, 2-chlorophenol-d4 and 2-fluorophenol in sample BH-SB-26-4to6 were low and outside of the laboratory specified acceptance criteria. Additionally, the recovery of 2,4,6-tribromophenol was not detected, resulting in 0% recovery, and the recovery of 2-fluorophenol was less than 10%. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SB-26-4to6 were R qualified as rejected, and the estimated phenol concentration in sample BH-SB-26-4to6 was J qualified as estimated.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol, 2-chlorophenol-d4 and 2-fluorophenol in sample BH-SB-29-13to15 were low and outside of the laboratory specified acceptance criteria. Additionally, the recovery of 2,4,6-tribromophenol was not detected, resulting in 0% recovery. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SB-29-13to15 were UJ qualified as estimated less than the MDLs.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol, 2-chlorophenol-d4, phenol-d5 and 2-fluorophenol in samples BH-SB-25-14to15 and BH-SB-26-9to10 were low, less than 10% and outside of the laboratory specified acceptance criteria. Additionally, the recoveries of 2,4,6-tribromophenol, 2-chlorophenol-d4 and 2-fluorophenol were not detected, resulting in 0% recoveries. Therefore, the non-detect results of acid extractable SVOCs in samples BH-SB-25-14to15 and BH-SB-26-9to10 were R qualified as rejected, and the phenol concentration in sample BH-SB-26-9to10 was J- qualified as estimated with a low bias.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol, 2-chlorophenol-d4, phenol-d5 and 2-fluorophenol in sample BH-SB-26-7to9 were low, less than 10% and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SB-26-7to9 were R qualified as rejected, and the estimated phenol concentration in sample BH-SB-26-7to9 was J qualified as estimated.

The surrogate recovery of acid extractable 2,4,6-tribromophenol in sample BH-SB-29-8to10 was less than 10% and outside of the laboratory and QAPP specified acceptance criteria. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SB-29-8to10 were UJ qualified as estimated less than the MDLs.

The surrogate recovery of acid extractable 2,4,6-tribromophenol in sample BH-SB-25-10to12 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining three acid extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol and 2-fluorophenol in sample BH-SB-25-12to14 were low and outside of the laboratory specified acceptance criteria. Additionally, the recovery of 2,4,6-tribromophenol was less than 10%. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SB-25-12to14 were UJ qualified as estimated less than the MDLs.

The surrogate recovery of base neutral extractable 2-methylnaphthalene-d10 in sample BH-SB-28-4to6 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining two base neutral extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The surrogate recoveries of base neutral extractables fluoranthene-d10 and dibenzo[a,h]anthracene-d14 in samples BH-SB-28-8to10 and BH-SB-28-8to10-D were low and outside of the laboratory and QAPP specified acceptance criteria. Additionally, the recoveries of dibenzo[a,h]anthracene-d14 were less than 10%. Therefore, the non-detect results of base neutral extractable PAHs in samples BH-SB-28-8to10 and BH-SB-28-8to10-D were UJ qualified as estimated less than the MDLs, and the estimated concentrations of base neutral extractable PAHs in samples BH-SB-28-8to10 and BH-SB-28-8to10-D were J qualified as estimated and the concentrations greater than the RL were J- qualified as estimated with low biases.

The surrogate recoveries of base neutral extractables 2-methylnaphthalene-d10, fluoranthene-d10 and dibenzo[a,h]anthracene-d14 in samples BH-SB-28-10to12 and BH-SB-24-8to10 were low and outside of the laboratory and QAPP specified acceptance criteria. Additionally, the recoveries of dibenzo[a,h]anthracene-d14 and fluoranthene-d10 were less than 10%. Therefore, the non-detect results of base neutral extractable PAHs in samples BH-SB-28-10to12 and BH-SB-24-8to10 were R qualified as rejected, and the concentrations of base neutral extractable PAHs in samples BH-SB-28-10to12 and BH-SB-24-8to10 were J qualified as estimated and J- qualified as estimated with a low bias, as appropriate.

The surrogate recoveries of base neutral extractables 2-methylnaphthalene-d10, fluoranthene-d10 and dibenzo[a,h]anthracene-d14 in sample BH-SB-28-12to14 were low and outside of the laboratory and QAPP specified acceptance criteria. Additionally, the recovery of dibenzo[a,h]anthracene-d14 was less than 10%. Therefore, the non-detect results of base neutral extractable PAHs in sample BH-SB-28-12to14 were UJ qualified as estimated less than the MDLs,

and the concentrations of base neutral extractable PAHs in sample BH-SB-28-12to14 were J-qualified as estimated with low biases.

The surrogate recovery of base neutral extractable fluoranthene-d10 in sample BH-SB-24-10to12 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining two base neutral extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-8to10	1-Methylnaphthalene	14.0	H	14.0	J-	6
BH-SB-28-8to10	Acenaphthene	4.78	J,H	4.78	J	6
BH-SB-28-8to10	Anthracene	2.59	J,H	2.59	J	6
BH-SB-28-8to10	Benz[a]anthracene	0.98	J,H	0.98	J	6
BH-SB-28-8to10	Benzo(a)pyrene	0.61	U,H	0.61	R	6
BH-SB-28-8to10	Benzo(b)fluoranthene	1.36	U,H	1.36	R	6
BH-SB-28-8to10	Benzo(j)fluoranthene	0.67	U,H	0.67	R	6
BH-SB-28-8to10	Benzo(k)fluoranthene	0.75	U,H	0.75	R	6
BH-SB-28-8to10	Benzofluoranthenes, Total (b+k+j)	2.98	U,H	2.98	R	6
BH-SB-28-8to10	Chrysene	1.77	J,H	1.77	J	6
BH-SB-28-8to10	Dibenzo(a,h)anthracene	0.88	U,H	0.88	R	6
BH-SB-28-8to10	Fluoranthene	9.99	H	9.99	J-	6
BH-SB-28-8to10	Fluorene	5.23	H	5.23	J-	6
BH-SB-28-8to10	Indeno(1,2,3-cd)pyrene	1.04	U,H	1.04	R	6
BH-SB-28-8to10	Naphthalene	158	H	158	J-	6
BH-SB-28-8to10	Pyrene	8.32	H	8.32	J-	6
BH-SB-28-8to10-D	1-Methylnaphthalene	8.15	H	8.15	J-	6
BH-SB-28-8to10-D	Acenaphthene	3.13	J,H	3.13	J	6
BH-SB-28-8to10-D	Anthracene	1.36	J,H	1.36	J	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-8to10-D	Benz[a]anthracene	0.81	U,H	0.81	R	6
BH-SB-28-8to10-D	Benzo(a)pyrene	0.60	U,H	0.60	R	6
BH-SB-28-8to10-D	Benzo(b)fluoranthene	1.35	U,H	1.35	R	6
BH-SB-28-8to10-D	Benzo(j)fluoranthene	0.67	U,H	0.67	R	6
BH-SB-28-8to10-D	Benzo(k)fluoranthene	0.75	U,H	0.75	R	6
BH-SB-28-8to10-D	Benzofluoranthenes, Total (b+k+j)	2.96	U,H	2.96	R	6
BH-SB-28-8to10-D	Chrysene	1.41	J,H	1.41	J	6
BH-SB-28-8to10-D	Dibenzo(a,h)anthracene	0.88	U,H	0.88	R	6
BH-SB-28-8to10-D	Fluoranthene	4.66	J,H	4.66	J	6
BH-SB-28-8to10-D	Fluorene	2.87	J,H	2.87	J	6
BH-SB-28-8to10-D	Indeno(1,2,3-cd)pyrene	1.03	U,H	1.03	R	6
BH-SB-28-8to10-D	Naphthalene	79.2	H	79.2	J-	6
BH-SB-28-8to10-D	Pyrene	3.34	J,H	3.34	J	6
BH-SB-28-10to12	1-Methylnaphthalene	21.8	H	21.8	J-	6
BH-SB-28-10to12	Acenaphthene	6.18	H	6.18	J-	6
BH-SB-28-10to12	Anthracene	1.40	J,H	1.40	J	6
BH-SB-28-10to12	Benz[a]anthracene	0.82	U,H	0.82	R	6
BH-SB-28-10to12	Benzo(a)pyrene	0.61	U,H	0.61	R	6
BH-SB-28-10to12	Benzo(b)fluoranthene	1.37	U,H	1.37	R	6
BH-SB-28-10to12	Benzo(j)fluoranthene	0.68	U,H	0.68	R	6
BH-SB-28-10to12	Benzo(k)fluoranthene	0.76	U,H	0.76	R	6
BH-SB-28-10to12	Benzofluoranthenes, Total (b+k+j)	3.00	U,H	3.00	R	6
BH-SB-28-10to12	Chrysene	1.05	U,H	1.05	R	6
BH-SB-28-10to12	Dibenzo(a,h)anthracene	0.89	U,H	0.89	R	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-10to12	Fluoranthene	2.47	J,H	2.47	J	6
BH-SB-28-10to12	Fluorene	8.08	H	8.08	J-	6
BH-SB-28-10to12	Indeno(1,2,3-cd)pyrene	1.05	U,H	1.05	R	6
BH-SB-28-10to12	Naphthalene	90.2	H	90.2	J-	6
BH-SB-28-10to12	Pyrene	1.80	J,H	1.80	J	6
BH-SB-28-12to14	1-Methylnaphthalene	41.1	H	41.1	J-	6
BH-SB-28-12to14	Acenaphthene	18.2	H	18.2	J-	6
BH-SB-28-12to14	Anthracene	6.80	H	6.80	J-	6
BH-SB-28-12to14	Benz[a]anthracene	3.33	J,H	3.33	J	6
BH-SB-28-12to14	Benzo(a)pyrene	3.05	J,H	3.05	J	6
BH-SB-28-12to14	Benzo(b)fluoranthene	2.45	J,H	2.45	J	6
BH-SB-28-12to14	Benzo(j)fluoranthene	1.80	J,H	1.80	J	6
BH-SB-28-12to14	Benzo(k)fluoranthene	1.15	J,H	1.15	J	6
BH-SB-28-12to14	Benzofluoranthenes, Total (b+k+j)	6.45	J,H	6.45	J	6
BH-SB-28-12to14	Chrysene	4.40	J,H	4.40	J	6
BH-SB-28-12to14	Dibenzo(a,h)anthracene	0.89	U,H	0.89	R	6
BH-SB-28-12to14	Fluoranthene	23.6	H	23.6	J-	6
BH-SB-28-12to14	Fluorene	21.3	H	21.3	J-	6
BH-SB-28-12to14	Indeno(1,2,3-cd)pyrene	2.63	J,H	2.63	J	6
BH-SB-28-12to14	Naphthalene	314	H	314	J-	6
BH-SB-28-12to14	Pyrene	20.1	H	20.1	J-	6
BH-SB-29-8to10	2,4,5-Trichlorophenol	25.6	U	25.6	UJ	6
BH-SB-29-8to10	2,4,6-Trichlorophenol	8.9	U	8.9	UJ	6
BH-SB-29-8to10	2,4-Dichlorophenol	15.2	U	15.2	UJ	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-8to10	2,4-Dimethylphenol	3.8	U	3.8	UJ	6
BH-SB-29-8to10	2,4-Dinitrophenol	33.5	U	33.5	UJ	6
BH-SB-29-8to10	2-Chlorophenol	13.7	U	13.7	UJ	6
BH-SB-29-8to10	4,6-Dinitro-2-Methylphenol	37.7	U	37.7	UJ	6
BH-SB-29-8to10	4-Chloro-3-Methylphenol	12.3	U	12.3	UJ	6
BH-SB-29-8to10	Pentachlorophenol	31.0	U	31.0	UJ	6
BH-SB-29-8to10	Phenol	4.4	U	4.4	UJ	6
BH-SB-29-13to15	2,4,5-Trichlorophenol	25.4	U	25.4	UJ	6
BH-SB-29-13to15	2,4,6-Trichlorophenol	8.9	U	8.9	UJ	6
BH-SB-29-13to15	2,4-Dichlorophenol	15.1	U	15.1	UJ	6
BH-SB-29-13to15	2,4-Dimethylphenol	3.7	U	3.7	UJ	6
BH-SB-29-13to15	2,4-Dinitrophenol	33.4	U	33.4	UJ	6
BH-SB-29-13to15	2-Chlorophenol	13.7	U	13.7	UJ	6
BH-SB-29-13to15	4,6-Dinitro-2-Methylphenol	37.5	U	37.5	UJ	6
BH-SB-29-13to15	4-Chloro-3-Methylphenol	12.3	U	12.3	UJ	6
BH-SB-29-13to15	Pentachlorophenol	30.9	U	30.9	UJ	6
BH-SB-29-13to15	Phenol	4.3	U	4.3	UJ	6
BH-SB-24-8to10	1-Methylnaphthalene	54.8	NA	54.8	J-	6
BH-SB-24-8to10	Acenaphthene	7.75	NA	7.75	J-	6
BH-SB-24-8to10	Anthracene	4.77	J	4.77	J	6
BH-SB-24-8to10	Benz[a]anthracene	1.58	J	1.58	J	6
BH-SB-24-8to10	Benzo(a)pyrene	1.65	J	1.65	J	6
BH-SB-24-8to10	Benzo(b)fluoranthene	1.90	J	1.90	J	6
BH-SB-24-8to10	Benzo(j)fluoranthene	1.39	J	1.39	J	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-8to10	Benzo(k)fluoranthene	0.81	J	0.81	J	6
BH-SB-24-8to10	Benzofluoranthenes, Total (b+k+j)	4.01	J	4.01	J	6
BH-SB-24-8to10	Chrysene	2.63	J	2.63	J	6
BH-SB-24-8to10	Dibenzo(a,h)anthracene	0.86	U	0.86	R	6
BH-SB-24-8to10	Fluoranthene	19.7	NA	19.7	J-	6
BH-SB-24-8to10	Fluorene	16.9	NA	16.9	J-	6
BH-SB-24-8to10	Indeno(1,2,3-cd)pyrene	2.38	J	2.38	J	6
BH-SB-24-8to10	Naphthalene	679	E	679	J-	6
BH-SB-24-8to10	Pyrene	15.5	NA	15.5	J-	6
BH-SB-25-12to14	2,4,5-Trichlorophenol	25.6	U	25.6	UJ	6
BH-SB-25-12to14	2,4,6-Trichlorophenol	8.9	U	8.9	UJ	6
BH-SB-25-12to14	2,4-Dichlorophenol	15.2	U	15.2	UJ	6
BH-SB-25-12to14	2,4-Dimethylphenol	3.8	U	3.8	UJ	6
BH-SB-25-12to14	2,4-Dinitrophenol	33.6	U	33.6	UJ	6
BH-SB-25-12to14	2-Chlorophenol	13.8	U	13.8	UJ	6
BH-SB-25-12to14	4,6-Dinitro-2-Methylphenol	37.8	U	37.8	UJ	6
BH-SB-25-12to14	4-Chloro-3-Methylphenol	12.3	U	12.3	UJ	6
BH-SB-25-12to14	Pentachlorophenol	31.1	U	31.1	UJ	6
BH-SB-25-12to14	Phenol	4.4	U	4.4	UJ	6
BH-SB-25-14to15	2,4,5-Trichlorophenol	25.7	U	25.7	R	6
BH-SB-25-14to15	2,4,6-Trichlorophenol	8.9	U	8.9	R	6
BH-SB-25-14to15	2,4-Dichlorophenol	15.3	U	15.3	R	6
BH-SB-25-14to15	2,4-Dimethylphenol	3.8	U	3.8	R	6
BH-SB-25-14to15	2,4-Dinitrophenol	33.7	U	33.7	R	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-14to15	2-Chlorophenol	13.8	U	13.8	R	6
BH-SB-25-14to15	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	R	6
BH-SB-25-14to15	4-Chloro-3-Methylphenol	12.4	U	12.4	R	6
BH-SB-25-14to15	Pentachlorophenol	31.1	U	31.1	R	6
BH-SB-25-14to15	Phenol	4.4	U	4.4	R	6
BH-SB-26-4to6	2,4,5-Trichlorophenol	25.7	U	25.7	R	6
BH-SB-26-4to6	2,4,6-Trichlorophenol	9.0	U	9.0	R	6
BH-SB-26-4to6	2,4-Dichlorophenol	15.3	U	15.3	R	6
BH-SB-26-4to6	2,4-Dimethylphenol	3.8	U	3.8	R	6
BH-SB-26-4to6	2,4-Dinitrophenol	33.7	U	33.7	R	6
BH-SB-26-4to6	2-Chlorophenol	13.8	U	13.8	R	6
BH-SB-26-4to6	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	R	6
BH-SB-26-4to6	4-Chloro-3-Methylphenol	12.4	U	12.4	R	6
BH-SB-26-4to6	Pentachlorophenol	31.2	U	31.2	R	6
BH-SB-26-4to6	Phenol	16.2	J	16.2	J	6
BH-SB-26-7to9	2,4,5-Trichlorophenol	25.6	U	25.6	R	6
BH-SB-26-7to9	2,4,6-Trichlorophenol	8.9	U	8.9	R	6
BH-SB-26-7to9	2,4-Dichlorophenol	15.2	U	15.2	R	6
BH-SB-26-7to9	2,4-Dimethylphenol	3.8	U	3.8	R	6
BH-SB-26-7to9	2,4-Dinitrophenol	33.6	U	33.6	R	6
BH-SB-26-7to9	2-Chlorophenol	13.8	U	13.8	R	6
BH-SB-26-7to9	4,6-Dinitro-2-Methylphenol	37.7	U	37.7	R	6
BH-SB-26-7to9	4-Chloro-3-Methylphenol	12.3	U	12.3	R	6
BH-SB-26-7to9	Pentachlorophenol	31.0	U	31.0	R	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-26-7to9	Phenol	13.4	J	13.4	J	6
BH-SB-26-9to10	2,4,5-Trichlorophenol	25.1	U	25.1	R	6
BH-SB-26-9to10	2,4,6-Trichlorophenol	8.8	U	8.8	R	6
BH-SB-26-9to10	2,4-Dichlorophenol	14.9	U	14.9	R	6
BH-SB-26-9to10	2,4-Dimethylphenol	3.7	U	3.7	R	6
BH-SB-26-9to10	2,4-Dinitrophenol	33.0	U	33.0	R	6
BH-SB-26-9to10	2-Chlorophenol	13.5	U	13.5	R	6
BH-SB-26-9to10	4,6-Dinitro-2-Methylphenol	37.1	U	37.1	R	6
BH-SB-26-9to10	4-Chloro-3-Methylphenol	12.1	U	12.1	R	6
BH-SB-26-9to10	Pentachlorophenol	30.5	U	30.5	R	6
BH-SB-26-9to10	Phenol	21.8	NA	21.8	J-	6

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
H-laboratory flag indicating holding time violation
E-laboratory flag indicating the analyte concentration exceeds the upper limit of the calibration range of the instrument established by the ICAL
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were reported due to the dilutions analyzed. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3546/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0265 and BKJ0302). DRO and MRO were not detected in the method blanks above the RLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-SB-28-2to4 and BH-SB-25-8to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). Two LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batches BKJ0265 and BKJ0302. Based professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-0to2	MRO	251	NA	251	J	5
BH-SB-28-2to4	MRO	26.9	NA	26.9	J	5
BH-SB-28-4to6	MRO	6.88	U	6.88	UJ	5
BH-SB-28-6to8	MRO	5.68	U	5.68	UJ	5
BH-SB-28-8to10	MRO	5.78	U	5.78	UJ	5
BH-SB-28-8to10-D	MRO	5.25	U	5.25	UJ	5
BH-SB-28-10to12	MRO	41.3	NA	41.3	J	5
BH-SB-28-12to14	MRO	191	NA	191	J	5
BH-SB-29-2to4	MRO	3.22	U	3.22	UJ	5
BH-SB-29-4to6	MRO	3.17	U	3.17	UJ	5
BH-SB-29-8to10	MRO	3.36	U	3.36	UJ	5

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-13to15	MRO	3.42	U	3.42	UJ	5
BH-SB-24-0to2	MRO	8.28	U	8.28	UJ	5
BH-SB-24-2to4	MRO	11.0	U	11.0	UJ	5
BH-SB-24-6to8	MRO	9.48	U	9.48	UJ	5
BH-SB-24-8to10	MRO	34.8	NA	34.8	J	5
BH-SB-24-10to12	MRO	144	NA	144	J	5
BH-SB-24-12to14	MRO	103	NA	103	J	5
BH-SB-24-14to15	MRO	101	NA	101	J	5
BH-SB-25-0to2	MRO	147	NA	147	J	5
BH-SB-25-2to4	MRO	20.7	NA	20.7	J	5
BH-SB-25-2to4-D	MRO	24.5	NA	24.5	J	5
BH-SB-25-4to6	MRO	3.26	U	3.26	UJ	5
BH-SB-25-8to10	MRO	3.28	U	3.28	UJ	5
BH-SB-25-10to12	MRO	3.34	U	3.34	UJ	5
BH-SB-25-12to14	MRO	3.41	U	3.41	UJ	5
BH-SB-25-14to15	MRO	3.37	U	3.37	UJ	5
BH-SB-26-0to2	MRO	55.3	NA	55.3	J	5
BH-SB-26-2to4	MRO	17.1	U	17.1	UJ	5
BH-SB-26-4to6	MRO	3.49	U	3.49	UJ	5
BH-SB-26-7to9	MRO	3.44	U	3.44	UJ	5
BH-SB-26-9to10	MRO	3.43	U	3.43	UJ	5

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
MRO-motor oil range organics
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

Two field duplicate samples, BH-SB-25-2to4-D and BH-SB-28-8to10-D were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SB-25-2to4 and BH-SB-28-8to10, respectively.

2.9 Rinsate Blank

An equipment blank was not collected during the sample event.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDL. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Blank
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Lead was detected in the instrument blank in batch SKJ0184 (SKJ0184-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Lead was detected in the calibration blank in batch SKJ0202 (SKJ0202-CCBB) at an estimated concentration greater than the MDL and less than the RL. Since the lead data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

The cadmium results in the instrument blanks and calibration blanks in batch SKJ0202 (SKJ0202-IBL4, SKJ0202-CCB4, SKJ0202-IBL5, SKJ0202-CCB5, SKJ0202-CCB6 and SKJ0202-IBL7) were more negative than the MDL and less than the RL. Therefore, the non-detect cadmium result in sample BH-SB-24-0to2 was UJ qualified as estimated less than the MDL.

Cadmium was detected in the calibration blank in batch SKJ0202 (SKJ0202-CCBH) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the calibration blank in batch SKJ0248 (SKJ0248-CCB3) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data

Cadmium was detected in the instrument blank in batch SKJ0270 (SKJ0270-IBLF) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-0to2	Cadmium	0.20	U	0.20	UJ	3

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits, with the following exceptions.

The recovery of lead (125.2%) in the high concentration calibration standard (HCV) in batch SKJ0202 (SKJ0202-HCV1) was high and outside of the laboratory specified acceptance criteria. Therefore, based on professional and technical judgment, the lead concentrations in samples BH-SB-25-0to2 and BH-SB-25-2to4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-0to2	Lead	243	D	243	J	9
BH-SB-25-2to4	Lead	724	D	724	J	9

mg/kg-milligram per kilogram
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0165 and BKJ0383). Metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-SB-29-8to10 and BH-SB-24-0to2. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The MSD recovery of copper in the MS/MSD pair using sample BH-SB-24-0to2 was high and outside of the laboratory specified acceptance criteria. Therefore, the copper concentration in sample BH-SB-24-0to2 was J+ qualified as estimated with a high bias.

The MS recovery of arsenic in the MS/MSD pair using sample BH-SB-29-8to10 was low and outside of the laboratory specified acceptance criteria. Therefore, the arsenic concentration in sample BH-SB-29-8to10 was J- qualified as estimated with a low bias.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-8to10	Arsenic	5.07	NA	5.07	J-	4
BH-SB-24-0to2	Copper	35.6	D	35.6	J+	4

mg/kg-milligram per kilogram
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Two field duplicate samples, BH-SB-25-2to4-D and BH-SB-28-8to10-D were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and

the original samples, BH-SB-25-2to4 and BH-SB-28-8to10, respectively, with the following exceptions.

The RPD for lead in field duplicate pair BH-SB-28-8to10-D/BH-SB-28-8to10 was greater than 50%. Therefore, based on professional and technical judgement, the lead concentrations in samples BH-SB-28-8to10-D and BH-SB-28-8to10 were J qualified as estimated.

The RPD for cadmium in field duplicate pair BH-SB-25-2to4-D/ BH-SB-25-2to4 was greater than 50%. Therefore, based on professional and technical judgement, the cadmium concentrations in samples BH-SB-25-2to4-D and BH-SB-25-2to4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-2to4	Cadmium	0.76	D	79	0.76	J	7
BH-SB-25-2to4-D	Cadmium	0.33	D		0.33	J	7
BH-SB-28-8to10	Lead	8.46	NA	54	8.46	J	7
BH-SB-28-8to10-D	Lead	14.7	NA		14.7	J	7

mg/kg-milligram per kilogram
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported using samples BH-SB-29-8to10 and BH-SB-24-0to2. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for copper and lead in the laboratory duplicate using sample BH-SB-24-0to2 were high and outside of the laboratory specified acceptance criteria. Therefore, the copper and lead concentrations in sample BH-SB-24-0to2 were J qualified as estimated.

The absolute difference of the sample and duplicate results for arsenic and chromium in the laboratory duplicate using sample BH-SB-24-0to2 were greater than the RLs. Therefore, the arsenic and chromium concentrations in sample BH-SB-24-0to2 were J qualified as estimated.

The RPD for lead in the laboratory duplicate using sample BH-SB-29-8to10 was high and outside of the laboratory specified acceptance criteria. Therefore, the lead concentration in sample BH-SB-29-8to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-8to10	Lead	1.56	NA	1.56	J	12
BH-SB-24-0to2	Arsenic	2.09	D	2.09	J	12
BH-SB-24-0to2	Chromium	5.04	D	5.04	J	12
BH-SB-24-0to2	Copper	35.6	D	35.6	J	12
BH-SB-24-0to2	Lead	8.78	D	8.78	J	12

mg/kg-milligram per kilogram
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. for total zinc. However, the screening levels were met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. Additionally, the D flags (indicating the reported value is from a dilution) in the laboratory report were not reported in the EDD.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Blanks
- ✓ Initial and Continuing Calibration Verification
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Laboratory Duplicate
- ✓ Rinsate Blank
- ⊗ Sensitivity
- ✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total and dissolved mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0393 and BKJ0394). Mercury was not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SB-29-8to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Two field duplicate samples, BH-SB-25-2to4-D and BH-SB-28-8to10-D were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SB-25-2to4 and BH-SB-28-8to10, respectively.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SB-29-8to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 HEXAVALENT CHROMIUM

The samples were analyzed for hexavalent chromium by USEPA Methods 7196A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
✓ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The hexavalent chromium data reported in this data set are not considered usable for supporting project objectives, with the following exceptions. The non-detect hexavalent chromium result in sample BH-SB-24-6to8 was R qualified as rejected due to 0% MS recovery, and the non-detect hexavalent chromium results in samples BH-SB-25-0to2, BH-SB-25-2to4, BH-SB-25-4to6, BH-SB-24-6to8 and BH-SB-24-8to10 were R qualified as rejected due to holding time exceedances. Therefore, analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 0%.

5.2 Holding Times

The holding time for the hexavalent chromium analysis of a solid sample is 30 days from collection to extraction and 168 hours from extraction to analysis. The holding times were not met for the sample analyses. Therefore, the non-detect hexavalent chromium results in samples BH-SB-25-0to2, BH-SB-25-2to4, BH-SB-25-4to6, BH-SB-24-6to8 and BH-SB-24-8to10 were R qualified as rejected.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-0to2	Chromium, Hexavalent	7.39	U	7.39	R	2
BH-SB-25-2to4	Chromium, Hexavalent	0.623	U	0.623	R	2
BH-SB-25-4to6	Chromium, Hexavalent	0.547	U	0.547	R	2
BH-SB-24-6to8	Chromium, Hexavalent	1.69	U	1.69	R	2
BH-SB-24-8to10	Chromium, Hexavalent	1.47	U	1.47	R	2

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0816). Hexavalent chromium was not detected in the method blank above the MDL.

5.7 Matrix Spike/Matrix Spike Duplicate

MSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MSs were reported, both using sample BH-SB-24-6to8. The hexavalent chromium spike in the initial MS using sample BH-SB-24-6to8 was not detected, resulting in 0% MS recovery. The recoveries of hexavalent chromium in the reanalysis MS and post spike (PS) using sample BH-SB-24-6to8 was low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect hexavalent chromium result in sample BH-SB-24-6to8 was R qualified as rejected.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-6to8	Chromium, Hexavalent	1.69	U	1.69	R	4

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D were collected with the sample set. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, respectively.

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SB-24-6to8. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

An equipment blank was not collected during the sample event.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

6.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Method D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
✓ Laboratory Triplicate
✓ Electronic Data Deliverable Review

6.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

6.2 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, respectively.

6.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-SB-26-9to10. The relative standard deviation (RSD) was less than 20%.

6.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

ATTACHMENT 3
PAHs Holding Time Qualifications

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-0to2	1-Methylnaphthalene	14.8	J,H,D	14.8	UJ	2
BH-SB-28-0to2	Acenaphthene	13.0	J,H,D	13.0	J	2
BH-SB-28-0to2	Anthracene	547	H,D	547	J	2
BH-SB-28-0to2	Benz[a]anthracene	202	H,D	202	J	2
BH-SB-28-0to2	Benzo(a)pyrene	160	H,D	160	J	2
BH-SB-28-0to2	Benzo(b)fluoranthene	171	H,D	171	J	2
BH-SB-28-0to2	Benzo(j)fluoranthene	107	H,D	107	J	2
BH-SB-28-0to2	Benzo(k)fluoranthene	104	H,D	104	J	2
BH-SB-28-0to2	Benzofluoranthenes, Total (b+k+j)	380	H,D	380	J	2
BH-SB-28-0to2	Chrysene	552	H,D	552	J	2
BH-SB-28-0to2	Dibenzo(a,h)anthracene	43.4	H,D	43.4	J	2
BH-SB-28-0to2	Fluoranthene	569	H,D	569	J	2
BH-SB-28-0to2	Fluorene	66.6	H,D	66.6	J	2
BH-SB-28-0to2	Indeno(1,2,3-cd)pyrene	126	H,D	126	J	2
BH-SB-28-0to2	Naphthalene	36.0	H,D	36.0	J	2
BH-SB-28-0to2	Pyrene	515	H,D	515	J	2
BH-SB-28-2to4	1-Methylnaphthalene	4.96	J,H	4.96	UJ	2
BH-SB-28-2to4	Acenaphthene	0.67	J,H	0.67	J	2
BH-SB-28-2to4	Anthracene	9.12	H	9.12	J	2
BH-SB-28-2to4	Benz[a]anthracene	12.7	H	12.7	J	2
BH-SB-28-2to4	Benzo(a)pyrene	12.9	H	12.9	J	2
BH-SB-28-2to4	Benzo(b)fluoranthene	32.2	H	32.2	J	2
BH-SB-28-2to4	Benzo(j)fluoranthene	14.7	H	14.7	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-2to4	Benzo(k)fluoranthene	11.7	H	11.7	J	2
BH-SB-28-2to4	Benzofluoranthenes, Total (b+k+j)	59.0	H	59.0	J	2
BH-SB-28-2to4	Chrysene	35.0	H	35.0	J	2
BH-SB-28-2to4	Dibenzo(a,h)anthracene	6.41	H	6.41	J	2
BH-SB-28-2to4	Fluoranthene	43.6	H	43.6	J	2
BH-SB-28-2to4	Fluorene	2.08	J,H	2.08	J	2
BH-SB-28-2to4	Indeno(1,2,3-cd)pyrene	28.6	H	28.6	J	2
BH-SB-28-2to4	Naphthalene	20.8	H	20.8	J	2
BH-SB-28-2to4	Pyrene	31.4	H	31.4	J	2
BH-SB-28-4to6	1-Methylnaphthalene	4.98	J,H	4.98	UJ	2
BH-SB-28-4to6	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-28-4to6	Anthracene	1.05	J,H	1.05	J	2
BH-SB-28-4to6	Benz[a]anthracene	2.58	J,H	2.58	J	2
BH-SB-28-4to6	Benzo(a)pyrene	2.85	J,H	2.85	J	2
BH-SB-28-4to6	Benzo(b)fluoranthene	11.7	H	11.7	J	2
BH-SB-28-4to6	Benzo(j)fluoranthene	5.75	H	5.75	J	2
BH-SB-28-4to6	Benzo(k)fluoranthene	4.59	J,H	4.59	J	2
BH-SB-28-4to6	Benzofluoranthenes, Total (b+k+j)	24.3	H	24.3	J	2
BH-SB-28-4to6	Chrysene	8.30	H	8.30	J	2
BH-SB-28-4to6	Dibenzo(a,h)anthracene	2.16	J,H	2.16	J	2
BH-SB-28-4to6	Fluoranthene	10.5	H	10.5	J	2
BH-SB-28-4to6	Fluorene	0.63	U,H	0.63	R	2
BH-SB-28-4to6	Indeno(1,2,3-cd)pyrene	12.1	H	12.1	J	2
BH-SB-28-4to6	Naphthalene	16.5	H	16.5	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-4to6	Pyrene	5.34	H	5.34	J	2
BH-SB-28-6to8	1-Methylnaphthalene	4.89	J,H	4.89	UJ	2
BH-SB-28-6to8	Acenaphthene	0.83	J,H	0.83	J	2
BH-SB-28-6to8	Anthracene	1.91	J,H	1.91	J	2
BH-SB-28-6to8	Benz[a]anthracene	2.04	J,H	2.04	J	2
BH-SB-28-6to8	Benzo(a)pyrene	1.55	J,H	1.55	J	2
BH-SB-28-6to8	Benzo(b)fluoranthene	4.33	J,H	4.33	J	2
BH-SB-28-6to8	Benzo(j)fluoranthene	2.50	J,H	2.50	J	2
BH-SB-28-6to8	Benzo(k)fluoranthene	2.44	J,H	2.44	J	2
BH-SB-28-6to8	Benzofluoranthenes, Total (b+k+j)	9.27	J,H	9.27	J	2
BH-SB-28-6to8	Chrysene	5.57	H	5.57	J	2
BH-SB-28-6to8	Dibenzo(a,h)anthracene	0.95	J,H	0.95	J	2
BH-SB-28-6to8	Fluoranthene	5.81	H	5.81	J	2
BH-SB-28-6to8	Fluorene	0.92	J,H	0.92	J	2
BH-SB-28-6to8	Indeno(1,2,3-cd)pyrene	2.90	J,H	2.90	J	2
BH-SB-28-6to8	Naphthalene	18.2	H	18.2	J	2
BH-SB-28-6to8	Pyrene	4.92	H	4.92	J	2
BH-SB-28-8to10	1-Methylnaphthalene	14.0	H	14.0	J	2
BH-SB-28-8to10	Acenaphthene	4.78	J,H	4.78	J	2
BH-SB-28-8to10	Anthracene	2.59	J,H	2.59	J	2
BH-SB-28-8to10	Benz[a]anthracene	0.98	J,H	0.98	J	2
BH-SB-28-8to10	Benzo(a)pyrene	0.61	U,H	0.61	R	2
BH-SB-28-8to10	Benzo(b)fluoranthene	1.36	U,H	1.36	R	2
BH-SB-28-8to10	Benzo(j)fluoranthene	0.67	U,H	0.67	R	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-8to10	Benzo(k)fluoranthene	0.75	U,H	0.75	R	2
BH-SB-28-8to10	Benzofluoranthenes, Total (b+k+j)	2.98	U,H	2.98	R	2
BH-SB-28-8to10	Chrysene	1.77	J,H	1.77	J	2
BH-SB-28-8to10	Dibenzo(a,h)anthracene	0.88	U,H	0.88	R	2
BH-SB-28-8to10	Fluoranthene	9.99	H	9.99	J	2
BH-SB-28-8to10	Fluorene	5.23	H	5.23	J	2
BH-SB-28-8to10	Indeno(1,2,3-cd)pyrene	1.04	U,H	1.04	R	2
BH-SB-28-8to10	Naphthalene	158	H	158	J	2
BH-SB-28-8to10	Pyrene	8.32	H	8.32	J	2
BH-SB-28-8to10-D	1-Methylnaphthalene	8.15	H	8.15	J	2
BH-SB-28-8to10-D	Acenaphthene	3.13	J,H	3.13	J	2
BH-SB-28-8to10-D	Anthracene	1.36	J,H	1.36	J	2
BH-SB-28-8to10-D	Benz[a]anthracene	0.81	U,H	0.81	R	2
BH-SB-28-8to10-D	Benzo(a)pyrene	0.60	U,H	0.60	R	2
BH-SB-28-8to10-D	Benzo(b)fluoranthene	1.35	U,H	1.35	R	2
BH-SB-28-8to10-D	Benzo(j)fluoranthene	0.67	U,H	0.67	R	2
BH-SB-28-8to10-D	Benzo(k)fluoranthene	0.75	U,H	0.75	R	2
BH-SB-28-8to10-D	Benzofluoranthenes, Total (b+k+j)	2.96	U,H	2.96	R	2
BH-SB-28-8to10-D	Chrysene	1.41	J,H	1.41	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-8to10-D	Dibenzo(a,h)anthracene	0.88	U,H	0.88	R	2
BH-SB-28-8to10-D	Fluoranthene	4.66	J,H	4.66	J	2
BH-SB-28-8to10-D	Fluorene	2.87	J,H	2.87	J	2
BH-SB-28-8to10-D	Indeno(1,2,3-cd)pyrene	1.03	U,H	1.03	R	2
BH-SB-28-8to10-D	Naphthalene	79.2	H	79.2	J	2
BH-SB-28-8to10-D	Pyrene	3.34	J,H	3.34	J	2
BH-SB-28-10to12	1-Methylnaphthalene	21.8	H	21.8	J	2
BH-SB-28-10to12	Acenaphthene	6.18	H	6.18	J	2
BH-SB-28-10to12	Anthracene	1.40	J,H	1.40	J	2
BH-SB-28-10to12	Benz[a]anthracene	0.82	U,H	0.82	R	2
BH-SB-28-10to12	Benzo(a)pyrene	0.61	U,H	0.61	R	2
BH-SB-28-10to12	Benzo(b)fluoranthene	1.37	U,H	1.37	R	2
BH-SB-28-10to12	Benzo(j)fluoranthene	0.68	U,H	0.68	R	2
BH-SB-28-10to12	Benzo(k)fluoranthene	0.76	U,H	0.76	R	2
BH-SB-28-10to12	Benzofluoranthenes, Total (b+k+j)	3.00	U,H	3.00	R	2
BH-SB-28-10to12	Chrysene	1.05	U,H	1.05	R	2
BH-SB-28-10to12	Dibenzo(a,h)anthracene	0.89	U,H	0.89	R	2
BH-SB-28-10to12	Fluoranthene	2.47	J,H	2.47	J	2
BH-SB-28-10to12	Fluorene	8.08	H	8.08	J	2
BH-SB-28-10to12	Indeno(1,2,3-cd)pyrene	1.05	U,H	1.05	R	2
BH-SB-28-10to12	Naphthalene	90.2	H	90.2	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-28-10to12	Pyrene	1.80	J,H	1.80	J	2
BH-SB-28-12to14	1-Methylnaphthalene	41.1	H	41.1	J	2
BH-SB-28-12to14	Acenaphthene	18.2	H	18.2	J	2
BH-SB-28-12to14	Anthracene	6.80	H	6.80	J	2
BH-SB-28-12to14	Benz[a]anthracene	3.33	J,H	3.33	J	2
BH-SB-28-12to14	Benzo(a)pyrene	3.05	J,H	3.05	J	2
BH-SB-28-12to14	Benzo(b)fluoranthene	2.45	J,H	2.45	J	2
BH-SB-28-12to14	Benzo(j)fluoranthene	1.80	J,H	1.80	J	2
BH-SB-28-12to14	Benzo(k)fluoranthene	1.15	J,H	1.15	J	2
BH-SB-28-12to14	Benzofluoranthenes, Total (b+k+j)	6.45	J,H	6.45	J	2
BH-SB-28-12to14	Chrysene	4.40	J,H	4.40	J	2
BH-SB-28-12to14	Dibenzo(a,h)anthracene	0.89	U,H	0.89	R	2
BH-SB-28-12to14	Fluoranthene	23.6	H	23.6	J	2
BH-SB-28-12to14	Fluorene	21.3	H	21.3	J	2
BH-SB-28-12to14	Indeno(1,2,3-cd)pyrene	2.63	J,H	2.63	J	2
BH-SB-28-12to14	Naphthalene	314	H	314	J	2
BH-SB-28-12to14	Pyrene	20.1	H	20.1	J	2
BH-SB-29-2to4	1-Methylnaphthalene	4.96	J,H	4.96	UJ	2
BH-SB-29-2to4	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-29-2to4	Anthracene	4.48	J,H	4.48	J	2
BH-SB-29-2to4	Benz[a]anthracene	3.87	J,H	3.87	J	2
BH-SB-29-2to4	Benzo(a)pyrene	2.91	J,H	2.91	J	2
BH-SB-29-2to4	Benzo(b)fluoranthene	4.14	J,H	4.14	J	2
BH-SB-29-2to4	Benzo(j)fluoranthene	2.69	J,H	2.69	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-2to4	Benzo(k)fluoranthene	2.47	J,H	2.47	J	2
BH-SB-29-2to4	Benzofluoranthenes, Total (b+k+j)	9.43	J,H	9.43	J	2
BH-SB-29-2to4	Chrysene	7.75	H	7.75	J	2
BH-SB-29-2to4	Dibenzo(a,h)anthracene	0.91	J,H	0.91	J	2
BH-SB-29-2to4	Fluoranthene	12.6	H	12.6	J	2
BH-SB-29-2to4	Fluorene	0.89	J,H	0.89	J	2
BH-SB-29-2to4	Indeno(1,2,3-cd)pyrene	3.73	J,H	3.73	J	2
BH-SB-29-2to4	Naphthalene	3.29	J,H	3.29	J	2
BH-SB-29-2to4	Pyrene	11.5	H	11.5	J	2
BH-SB-29-4to6	1-Methylnaphthalene	0.40	U,H	0.40	R	2
BH-SB-29-4to6	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-29-4to6	Anthracene	0.87	U,H	0.87	R	2
BH-SB-29-4to6	Benz[a]anthracene	0.82	U,H	0.82	R	2
BH-SB-29-4to6	Benzo(a)pyrene	0.61	U,H	0.61	R	2
BH-SB-29-4to6	Benzo(b)fluoranthene	1.36	U,H	1.36	UJ	2
BH-SB-29-4to6	Benzo(j)fluoranthene	0.68	U,H	0.68	UJ	2
BH-SB-29-4to6	Benzo(k)fluoranthene	0.76	U,H	0.76	UJ	2
BH-SB-29-4to6	Benzofluoranthenes, Total (b+k+j)	2.99	U,H	2.99	UJ	2
BH-SB-29-4to6	Chrysene	1.05	U,H	1.05	UJ	2
BH-SB-29-4to6	Dibenzo(a,h)anthracene	0.89	U,H	0.89	UJ	2
BH-SB-29-4to6	Fluoranthene	0.70	J,H	0.70	J	2
BH-SB-29-4to6	Fluorene	0.63	U,H	0.63	R	2
BH-SB-29-4to6	Indeno(1,2,3-cd)pyrene	1.04	U,H	1.04	UJ	2
BH-SB-29-4to6	Naphthalene	1.86	J,H	1.86	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-4to6	Pyrene	0.62	U,H	0.62	R	2
BH-SB-29-8to10	1-Methylnaphthalene	4.97	J,H	4.97	UJ	2
BH-SB-29-8to10	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-29-8to10	Anthracene	0.87	U,H	0.87	R	2
BH-SB-29-8to10	Benz[a]anthracene	0.82	U,H	0.82	R	2
BH-SB-29-8to10	Benzo(a)pyrene	0.61	U,H	0.61	R	2
BH-SB-29-8to10	Benzo(b)fluoranthene	1.36	U,H	1.36	UJ	2
BH-SB-29-8to10	Benzo(j)fluoranthene	0.68	U,H	0.68	UJ	2
BH-SB-29-8to10	Benzo(k)fluoranthene	0.75	U,H	0.75	UJ	2
BH-SB-29-8to10	Benzofluoranthenes, Total (b+k+j)	2.99	U,H	2.99	UJ	2
BH-SB-29-8to10	Chrysene	1.05	U,H	1.05	UJ	2
BH-SB-29-8to10	Dibenzo(a,h)anthracene	0.88	U,H	0.88	UJ	2
BH-SB-29-8to10	Fluoranthene	1.08	J,H	1.08	J	2
BH-SB-29-8to10	Fluorene	0.63	U,H	0.63	R	2
BH-SB-29-8to10	Indeno(1,2,3-cd)pyrene	1.04	U,H	1.04	UJ	2
BH-SB-29-8to10	Naphthalene	1.27	U,H	1.27	R	2
BH-SB-29-8to10	Pyrene	0.84	J,H	0.84	J	2
BH-SB-29-13to15	1-Methylnaphthalene	4.95	J,H	4.95	UJ	2
BH-SB-29-13to15	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-29-13to15	Anthracene	0.86	U,H	0.86	R	2
BH-SB-29-13to15	Benz[a]anthracene	0.82	U,H	0.82	R	2
BH-SB-29-13to15	Benzo(a)pyrene	0.61	U,H	0.61	R	2
BH-SB-29-13to15	Benzo(b)fluoranthene	1.36	U,H	1.36	UJ	2
BH-SB-29-13to15	Benzo(j)fluoranthene	0.67	U,H	0.67	UJ	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-29-13to15	Benzo(k)fluoranthene	0.75	U,H	0.75	UJ	2
BH-SB-29-13to15	Benzofluoranthenes, Total (b+k+j)	2.98	U,H	2.98	UJ	2
BH-SB-29-13to15	Chrysene	1.04	U,H	1.04	UJ	2
BH-SB-29-13to15	Dibenzo(a,h)anthracene	0.88	U,H	0.88	UJ	2
BH-SB-29-13to15	Fluoranthene	0.47	U,H	0.47	UJ	2
BH-SB-29-13to15	Fluorene	0.62	U,H	0.62	R	2
BH-SB-29-13to15	Indeno(1,2,3-cd)pyrene	1.04	U,H	1.04	UJ	2
BH-SB-29-13to15	Naphthalene	1.47	J,H	1.47	J	2
BH-SB-29-13to15	Pyrene	0.62	U,H	0.62	R	2
BH-SB-24-12to14	1-Methylnaphthalene	125	H,D	125	J	2
BH-SB-24-12to14	Acenaphthene	37.2	H,D	37.2	J	2
BH-SB-24-12to14	Anthracene	107	H,D	107	J	2
BH-SB-24-12to14	Benz[a]anthracene	87.6	H,D	87.6	J	2
BH-SB-24-12to14	Benzo(a)pyrene	124	H,D	124	J	2
BH-SB-24-12to14	Benzo(b)fluoranthene	130	H,D	130	J	2
BH-SB-24-12to14	Benzo(j)fluoranthene	94.1	H,D	94.1	J	2
BH-SB-24-12to14	Benzo(k)fluoranthene	67.7	H,D	67.7	J	2
BH-SB-24-12to14	Benzofluoranthenes, Total (b+k+j)	294	H,D	294	J	2
BH-SB-24-12to14	Chrysene	117	H,D	117	J	2
BH-SB-24-12to14	Dibenzo(a,h)anthracene	31.1	H,D	31.1	J	2
BH-SB-24-12to14	Fluoranthene	368	H,D	368	J	2
BH-SB-24-12to14	Fluorene	102	H,D	102	J	2
BH-SB-24-12to14	Indeno(1,2,3-cd)pyrene	246	H,D	246	J	2
BH-SB-24-12to14	Pyrene	339	H,D	339	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-24-12to14	Naphthalene	1960	H,D	1960	J	2
BH-SB-24-14to15	1-Methylnaphthalene	39.7	H,D	39.7	J	2
BH-SB-24-14to15	Acenaphthene	16.9	H,D	16.9	J	2
BH-SB-24-14to15	Anthracene	26.4	H,D	26.4	J	2
BH-SB-24-14to15	Benz[a]anthracene	12.7	J,H,D	12.7	J	2
BH-SB-24-14to15	Benzo(a)pyrene	14.4	J,H,D	14.4	J	2
BH-SB-24-14to15	Benzo(b)fluoranthene	11.7	J,H,D	11.7	J	2
BH-SB-24-14to15	Benzo(j)fluoranthene	9.81	J,H,D	9.81	J	2
BH-SB-24-14to15	Benzo(k)fluoranthene	6.47	J,H,D	6.47	J	2
BH-SB-24-14to15	Benzofluoranthenes, Total (b+k+j)	28.6	J,H,D	28.6	J	2
BH-SB-24-14to15	Chrysene	15.2	H,D	15.2	J	2
BH-SB-24-14to15	Dibenzo(a,h)anthracene	2.71	J,H,D	2.71	J	2
BH-SB-24-14to15	Fluoranthene	89.6	H,D	89.6	J	2
BH-SB-24-14to15	Fluorene	29.1	H,D	29.1	J	2
BH-SB-24-14to15	Indeno(1,2,3-cd)pyrene	19.8	H,D	19.8	J	2
BH-SB-24-14to15	Naphthalene	682	H,D	682	J	2
BH-SB-24-14to15	Pyrene	82.5	H,D	82.5	J	2
BH-SB-25-0to2	1-Methylnaphthalene	14.7	J,H,D	14.7	UJ	2
BH-SB-25-0to2	Acenaphthene	14.7	J,H,D	14.7	UJ	2
BH-SB-25-0to2	Anthracene	22.5	H,D	22.5	J	2
BH-SB-25-0to2	Benz[a]anthracene	69.2	H,D	69.2	J	2
BH-SB-25-0to2	Benzo(a)pyrene	140	H,D	140	J	2
BH-SB-25-0to2	Benzo(b)fluoranthene	168	H,D	168	J	2
BH-SB-25-0to2	Benzo(j)fluoranthene	96.9	H,D	96.9	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-0to2	Benzo(k)fluoranthene	76.6	H,D	76.6	J	2
BH-SB-25-0to2	Benzofluoranthenes, Total (b+k+j)	345	H,D	345	J	2
BH-SB-25-0to2	Chrysene	130	H,D	130	J	2
BH-SB-25-0to2	Dibenzo(a,h)anthracene	56.5	H,D	56.5	J	2
BH-SB-25-0to2	Fluoranthene	190	H,D	190	J	2
BH-SB-25-0to2	Fluorene	9.59	J,H,D	9.59	J	2
BH-SB-25-0to2	Indeno(1,2,3-cd)pyrene	482	H,D	482	J	2
BH-SB-25-0to2	Naphthalene	39.6	H,D	39.6	J	2
BH-SB-25-0to2	Pyrene	162	H,D	162	J	2
BH-SB-25-2to4	1-Methylnaphthalene	14.9	J,H,D	14.9	UJ	2
BH-SB-25-2to4	Acenaphthene	27.9	H,D	27.9	J	2
BH-SB-25-2to4	Anthracene	57.3	H,D	57.3	J	2
BH-SB-25-2to4	Benz[a]anthracene	99.2	H,D	99.2	J	2
BH-SB-25-2to4	Benzo(a)pyrene	88.8	H,D	88.8	J	2
BH-SB-25-2to4	Benzo(b)fluoranthene	79.2	H,D	79.2	J	2
BH-SB-25-2to4	Benzo(j)fluoranthene	53.8	H,D	53.8	J	2
BH-SB-25-2to4	Benzo(k)fluoranthene	45.8	H,D	45.8	J	2
BH-SB-25-2to4	Benzofluoranthenes, Total (b+k+j)	179	H,D	179	J	2
BH-SB-25-2to4	Chrysene	122	H,D	122	J	2
BH-SB-25-2to4	Dibenzo(a,h)anthracene	24.7	H,D	24.7	J	2
BH-SB-25-2to4	Fluoranthene	206	H,D	206	J	2
BH-SB-25-2to4	Fluorene	23.8	H,D	23.8	J	2
BH-SB-25-2to4	Indeno(1,2,3-cd)pyrene	117	H,D	117	J	2
BH-SB-25-2to4	Naphthalene	21.7	H,D	21.7	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-2to4	Pyrene	199	H,D	199	J	2
BH-SB-25-2to4-D	1-Methylnaphthalene	14.9	J,H,D	14.9	UJ	2
BH-SB-25-2to4-D	Acenaphthene	1.71	U,H	1.71	R	2
BH-SB-25-2to4-D	Anthracene	3.84	J,H,D	3.84	J	2
BH-SB-25-2to4-D	Benz[a]anthracene	19.4	H,D	19.4	J	2
BH-SB-25-2to4-D	Benzo(a)pyrene	31.4	H,D	31.4	J	2
BH-SB-25-2to4-D	Benzo(b)fluoranthene	43.3	H,D	43.3	J	2
BH-SB-25-2to4-D	Benzo(j)fluoranthene	26.0	H,D	26.0	J	2
BH-SB-25-2to4-D	Benzo(k)fluoranthene	21.6	H,D	21.6	J	2
BH-SB-25-2to4-D	Benzofluoranthenes, Total (b+k+j)	91.2	H,D	91.2	J	2
BH-SB-25-2to4-D	Chrysene	28.5	H,D	28.5	J	2
BH-SB-25-2to4-D	Dibenzo(a,h)anthracene	14.9	J,H,D	14.9	J	2
BH-SB-25-2to4-D	Fluoranthene	40.6	H,D	40.6	J	2
BH-SB-25-2to4-D	Fluorene	1.88	U,H	1.88	R	2
BH-SB-25-2to4-D	Indeno(1,2,3-cd)pyrene	103	H,D	103	J	2
BH-SB-25-2to4-D	Naphthalene	16.6	H,D	16.6	J	2
BH-SB-25-2to4-D	Pyrene	34.7	H,D	34.7	J	2
BH-SB-25-4to6	1-Methylnaphthalene	0.40	U,H	0.40	R	2
BH-SB-25-4to6	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-25-4to6	Anthracene	1.07	J,H	1.07	J	2
BH-SB-25-4to6	Benz[a]anthracene	1.29	J,H	1.29	J	2
BH-SB-25-4to6	Benzo(a)pyrene	2.11	J,H	2.11	J	2
BH-SB-25-4to6	Benzo(b)fluoranthene	4.34	J,H	4.34	J	2
BH-SB-25-4to6	Benzo(j)fluoranthene	2.30	J,H	2.30	J	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-4to6	Benzo(k)fluoranthene	1.89	J,H	1.89	J	2
BH-SB-25-4to6	Benzofluoranthenes, Total (b+k+j)	8.67	J,H	8.67	J	2
BH-SB-25-4to6	Chrysene	3.66	J,H	3.66	J	2
BH-SB-25-4to6	Dibenzo(a,h)anthracene	1.09	J,H	1.09	J	2
BH-SB-25-4to6	Fluoranthene	4.78	J,H	4.78	J	2
BH-SB-25-4to6	Fluorene	0.63	U,H	0.63	R	2
BH-SB-25-4to6	Indeno(1,2,3-cd)pyrene	6.56	H	6.56	J	2
BH-SB-25-4to6	Naphthalene	5	J,H	5	UJ	2
BH-SB-25-4to6	Pyrene	4.16	J,H	4.16	J	2
BH-SB-25-8to10	1-Methylnaphthalene	0.39	U,H	0.39	R	2
BH-SB-25-8to10	Acenaphthene	0.56	U,H	0.56	R	2
BH-SB-25-8to10	Anthracene	0.85	U,H	0.85	R	2
BH-SB-25-8to10	Benz[a]anthracene	0.81	U,H	0.81	R	2
BH-SB-25-8to10	Benzo(a)pyrene	0.60	U,H	0.60	UJ	2
BH-SB-25-8to10	Benzo(b)fluoranthene	1.35	U,H	1.35	UJ	2
BH-SB-25-8to10	Benzo(j)fluoranthene	0.67	U,H	0.67	UJ	2
BH-SB-25-8to10	Benzo(k)fluoranthene	0.75	U,H	0.75	UJ	2
BH-SB-25-8to10	Benzofluoranthenes, Total (b+k+j)	2.95	U,H	2.95	UJ	2
BH-SB-25-8to10	Chrysene	1.03	U,H	1.03	UJ	2
BH-SB-25-8to10	Dibenzo(a,h)anthracene	0.87	U,H	0.87	UJ	2
BH-SB-25-8to10	Fluoranthene	1.02	J,H	1.02	J	2
BH-SB-25-8to10	Fluorene	0.62	U,H	0.62	R	2
BH-SB-25-8to10	Indeno(1,2,3-cd)pyrene	1.03	U,H	1.03	UJ	2
BH-SB-25-8to10	Naphthalene	4.9	J,H	4.9	UJ	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-8to10	Pyrene	0.76	J,H	0.76	J	2
BH-SB-25-10to12	1-Methylnaphthalene	0.39	U,H	0.39	R	2
BH-SB-25-10to12	Acenaphthene	0.56	U,H	0.56	R	2
BH-SB-25-10to12	Anthracene	0.85	U,H	0.85	R	2
BH-SB-25-10to12	Benz[a]anthracene	0.80	U,H	0.80	R	2
BH-SB-25-10to12	Benzo(a)pyrene	0.78	J,H	0.78	J	2
BH-SB-25-10to12	Benzo(b)fluoranthene	2.33	J,H	2.33	J	2
BH-SB-25-10to12	Benzo(j)fluoranthene	1.13	J,H	1.13	J	2
BH-SB-25-10to12	Benzo(k)fluoranthene	0.90	J,H	0.90	J	2
BH-SB-25-10to12	Benzofluoranthenes, Total (b+k+j)	4.46	J,H	4.46	J	2
BH-SB-25-10to12	Chrysene	1.90	J,H	1.90	J	2
BH-SB-25-10to12	Dibenzo(a,h)anthracene	0.87	U,H	0.87	UJ	2
BH-SB-25-10to12	Fluoranthene	2.04	J,H	2.04	J	2
BH-SB-25-10to12	Fluorene	0.61	U,H	0.61	R	2
BH-SB-25-10to12	Indeno(1,2,3-cd)pyrene	3.76	J,H	3.76	J	2
BH-SB-25-10to12	Naphthalene	4.87	J,H	4.87	UJ	2
BH-SB-25-10to12	Pyrene	1.56	J,H	1.56	J	2
BH-SB-25-12to14	1-Methylnaphthalene	0.40	U,H	0.40	R	2
BH-SB-25-12to14	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-25-12to14	Anthracene	0.87	U,H	0.87	R	2
BH-SB-25-12to14	Benz[a]anthracene	0.82	U,H	0.82	R	2
BH-SB-25-12to14	Benzo(a)pyrene	0.61	U,H	0.61	UJ	2
BH-SB-25-12to14	Benzo(b)fluoranthene	1.37	U,H	1.37	UJ	2
BH-SB-25-12to14	Benzo(j)fluoranthene	0.68	U,H	0.68	UJ	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-12to14	Benzo(k)fluoranthene	0.76	U,H	0.76	UJ	2
BH-SB-25-12to14	Benzofluoranthenes, Total (b+k+j)	3.00	U,H	3.00	UJ	2
BH-SB-25-12to14	Chrysene	1.05	U,H	1.05	UJ	2
BH-SB-25-12to14	Dibenzo(a,h)anthracene	0.89	U,H	0.89	UJ	2
BH-SB-25-12to14	Fluoranthene	0.47	U,H	0.47	UJ	2
BH-SB-25-12to14	Fluorene	0.63	U,H	0.63	R	2
BH-SB-25-12to14	Indeno(1,2,3-cd)pyrene	1.05	U,H	1.05	UJ	2
BH-SB-25-12to14	Naphthalene	4.98	J,H	4.98	UJ	2
BH-SB-25-12to14	Pyrene	0.62	U,H	0.62	R	2
BH-SB-25-14to15	1-Methylnaphthalene	0.39	U,H	0.39	R	2
BH-SB-25-14to15	Acenaphthene	0.56	U,H	0.56	R	2
BH-SB-25-14to15	Anthracene	0.86	U,H	0.86	R	2
BH-SB-25-14to15	Benz[a]anthracene	0.81	U,H	0.81	R	2
BH-SB-25-14to15	Benzo(a)pyrene	0.60	U,H	0.60	UJ	2
BH-SB-25-14to15	Benzo(b)fluoranthene	1.35	U,H	1.35	UJ	2
BH-SB-25-14to15	Benzo(j)fluoranthene	0.67	U,H	0.67	UJ	2
BH-SB-25-14to15	Benzo(k)fluoranthene	0.75	U,H	0.75	UJ	2
BH-SB-25-14to15	Benzofluoranthenes, Total (b+k+j)	2.96	U,H	2.96	UJ	2
BH-SB-25-14to15	Chrysene	1.04	U,H	1.04	UJ	2
BH-SB-25-14to15	Dibenzo(a,h)anthracene	0.88	U,H	0.88	UJ	2
BH-SB-25-14to15	Fluoranthene	0.46	U,H	0.46	UJ	2
BH-SB-25-14to15	Fluorene	0.62	U,H	0.62	R	2
BH-SB-25-14to15	Indeno(1,2,3-cd)pyrene	1.03	U,H	1.03	UJ	2
BH-SB-25-14to15	Naphthalene	1.25	U,H	1.25	R	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-25-14to15	Pyrene	0.62	U,H	0.62	R	2
BH-SB-26-0to2	1-Methylnaphthalene	1.20	U,H	1.20	R	2
BH-SB-26-0to2	Acenaphthene	1.71	U,H	1.71	R	2
BH-SB-26-0to2	Anthracene	2.77	J,H,D	2.77	J	2
BH-SB-26-0to2	Benz[a]anthracene	7.37	J,H,D	7.37	J	2
BH-SB-26-0to2	Benzo(a)pyrene	29.6	H,D	29.6	J	2
BH-SB-26-0to2	Benzo(b)fluoranthene	32.0	H,D	32.0	J	2
BH-SB-26-0to2	Benzo(j)fluoranthene	20.9	H,D	20.9	J	2
BH-SB-26-0to2	Benzo(k)fluoranthene	16.4	H,D	16.4	J	2
BH-SB-26-0to2	Benzofluoranthenes, Total (b+k+j)	69.4	H,D	69.4	J	2
BH-SB-26-0to2	Chrysene	17.0	H,D	17.0	J	2
BH-SB-26-0to2	Dibenzo(a,h)anthracene	15.5	H,D	15.5	J	2
BH-SB-26-0to2	Fluoranthene	23.6	H,D	23.6	J	2
BH-SB-26-0to2	Fluorene	1.89	U,H	1.89	R	2
BH-SB-26-0to2	Indeno(1,2,3-cd)pyrene	121	H,D	121	J	2
BH-SB-26-0to2	Naphthalene	15	J,H,D	15	UJ	2
BH-SB-26-0to2	Pyrene	11.0	J,H,D	11.0	J	2
BH-SB-26-2to4	1-Methylnaphthalene	1.53	U,H	1.53	R	2
BH-SB-26-2to4	Acenaphthene	2.18	U,H	2.18	R	2
BH-SB-26-2to4	Anthracene	3.33	U,H	3.33	R	2
BH-SB-26-2to4	Benz[a]anthracene	3.15	U,H	3.15	R	2
BH-SB-26-2to4	Benzo(a)pyrene	2.35	U,H	2.35	UJ	2
BH-SB-26-2to4	Benzo(b)fluoranthene	5.24	U,H	5.24	UJ	2
BH-SB-26-2to4	Benzo(j)fluoranthene	2.60	U,H	2.60	UJ	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-26-2to4	Benzo(k)fluoranthene	2.90	U,H	2.90	UJ	2
BH-SB-26-2to4	Benzofluoranthenes, Total (b+k+j)	11.5	U,H	11.5	UJ	2
BH-SB-26-2to4	Chrysene	4.02	U,H	4.02	UJ	2
BH-SB-26-2to4	Dibenzo(a,h)anthracene	3.40	U,H	3.40	UJ	2
BH-SB-26-2to4	Fluoranthene	5.56	J,H	5.56	J	2
BH-SB-26-2to4	Fluorene	2.41	U,H	2.41	R	2
BH-SB-26-2to4	Indeno(1,2,3-cd)pyrene	4.01	U,H	4.01	UJ	2
BH-SB-26-2to4	Naphthalene	19.1	J,H	19.1	UJ	2
BH-SB-26-2to4	Pyrene	4.28	J,H	4.28	J	2
BH-SB-26-4to6	1-Methylnaphthalene	0.40	U,H	0.40	R	2
BH-SB-26-4to6	Acenaphthene	0.57	U,H	0.57	R	2
BH-SB-26-4to6	Anthracene	0.87	U,H	0.87	R	2
BH-SB-26-4to6	Benz[a]anthracene	0.82	U,H	0.82	R	2
BH-SB-26-4to6	Benzo(a)pyrene	0.61	U,H	0.61	UJ	2
BH-SB-26-4to6	Benzo(b)fluoranthene	1.37	U,H	1.37	UJ	2
BH-SB-26-4to6	Benzo(j)fluoranthene	0.68	U,H	0.68	UJ	2
BH-SB-26-4to6	Benzo(k)fluoranthene	0.76	U,H	0.76	UJ	2
BH-SB-26-4to6	Benzofluoranthenes, Total (b+k+j)	3.00	U,H	3.00	UJ	2
BH-SB-26-4to6	Chrysene	1.05	U,H	1.05	UJ	2
BH-SB-26-4to6	Dibenzo(a,h)anthracene	0.89	U,H	0.89	UJ	2
BH-SB-26-4to6	Fluoranthene	0.47	U,H	0.47	UJ	2
BH-SB-26-4to6	Fluorene	0.63	U,H	0.63	R	2
BH-SB-26-4to6	Indeno(1,2,3-cd)pyrene	1.05	U,H	1.05	UJ	2
BH-SB-26-4to6	Naphthalene	1.27	U,H	1.27	R	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-26-4to6	Pyrene	0.63	U,H	0.63	R	2
BH-SB-26-7to9	1-Methylnaphthalene	0.39	U,H	0.39	R	2
BH-SB-26-7to9	Acenaphthene	0.56	U,H	0.56	R	2
BH-SB-26-7to9	Anthracene	0.85	U,H	0.85	R	2
BH-SB-26-7to9	Benz[a]anthracene	0.81	U,H	0.81	R	2
BH-SB-26-7to9	Benzo(a)pyrene	0.60	U,H	0.60	UJ	2
BH-SB-26-7to9	Benzo(b)fluoranthene	1.35	U,H	1.35	UJ	2
BH-SB-26-7to9	Benzo(j)fluoranthene	0.67	U,H	0.67	UJ	2
BH-SB-26-7to9	Benzo(k)fluoranthene	0.75	U,H	0.75	UJ	2
BH-SB-26-7to9	Benzofluoranthenes, Total (b+k+j)	2.95	U,H	2.95	UJ	2
BH-SB-26-7to9	Chrysene	1.03	U,H	1.03	UJ	2
BH-SB-26-7to9	Dibenzo(a,h)anthracene	0.87	U,H	0.87	UJ	2
BH-SB-26-7to9	Fluoranthene	0.46	U,H	0.46	UJ	2
BH-SB-26-7to9	Fluorene	0.62	U,H	0.62	R	2
BH-SB-26-7to9	Indeno(1,2,3-cd)pyrene	1.03	U,H	1.03	UJ	2
BH-SB-26-7to9	Naphthalene	1.25	U,H	1.25	R	2
BH-SB-26-7to9	Pyrene	0.61	U,H	0.61	R	2
BH-SB-26-9to10	1-Methylnaphthalene	0.40	U,H	0.40	R	2
BH-SB-26-9to10	Acenaphthene	0.56	U,H	0.56	R	2
BH-SB-26-9to10	Anthracene	0.86	U,H	0.86	R	2
BH-SB-26-9to10	Benz[a]anthracene	0.81	U,H	0.81	R	2
BH-SB-26-9to10	Benzo(a)pyrene	0.61	U,H	0.61	UJ	2
BH-SB-26-9to10	Benzo(b)fluoranthene	1.35	U,H	1.35	UJ	2
BH-SB-26-9to10	Benzo(j)fluoranthene	0.67	U,H	0.67	UJ	2

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-26-9to10	Benzo(k)fluoranthene	0.75	U,H	0.75	UJ	2
BH-SB-26-9to10	Benzofluoranthenes, Total (b+k+j)	2.97	U,H	2.97	UJ	2
BH-SB-26-9to10	Chrysene	1.04	U,H	1.04	UJ	2
BH-SB-26-9to10	Dibenzo(a,h)anthracene	0.88	U,H	0.88	UJ	2
BH-SB-26-9to10	Fluoranthene	0.46	U,H	0.46	UJ	2
BH-SB-26-9to10	Fluorene	0.62	U,H	0.62	R	2
BH-SB-26-9to10	Indeno(1,2,3-cd)pyrene	1.04	U,H	1.04	UJ	2
BH-SB-26-9to10	Naphthalene	1.26	U,H	1.26	R	2
BH-SB-26-9to10	Pyrene	0.62	U,H	0.62	R	2

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
H-laboratory flag indicating holding time violation
D-laboratory flag indicating the reported value is from a dilution
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	1 March 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0052**

Matrices: **Soil**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of one field duplicate sample, collected on 22 September 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the sample for the following analytical tests:

- Metals by United States Environmental Protection Agency (USEPA) Methods 3050B/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following sample was analyzed in the data set.

Laboratory IDs	Client IDs
22J0052-03	BH-HA-43-1to2-D

The solids data used to report the sample on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The sample was received at the laboratory between 0.2 – 3.7 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

1.0 METALS

The sample was analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

1.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

1.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Cadmium was detected in the instrument blank in batch SKK0191 (SKK0191-IBL9) at an estimated concentration greater than the MDL and less than the RL. Since the calibration blanks and instrument blanks bracketing the associated samples were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

Lead (0.213 µg/L and 0.211 µg/L) was detected in the instrument blank in batch SKK0191 (SKK0191-IBL2 and SKK0191-IBL3) at a concentration greater than the RL. Since the calibration blanks and instrument blanks bracketing the associated samples were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKK0278). Metals were not detected in the method blank above the method detection limits (MDLs).

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-HA-43-1to2-D. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

1.9 Field Duplicate

One field duplicate sample, BH-HA-43-1to2-D, was collected with the sample set. The parent sample, BH-HA-43-1to2, was collected on 9 September 2022 and reported in laboratory report 22J0132. Since the field duplicate and parent sample were collected on separate days and based on professional and technical judgment, the field duplicate pair was not evaluated for precision.

1.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-HA-43-1to2-D. In cases where results in the original sample and laboratory duplicate sample were less than five times the reporting limit (RL) and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for arsenic in the laboratory duplicate using sample BH-HA-43-1to2-D was high and outside of the laboratory specified acceptance criteria. Therefore, the arsenic concentration in sample BH-HA-43-1to2-D was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-43-1to2-D	Arsenic	16.1	NA	16.1	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Sensitivity

The sample was reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. However, the screening levels were met.

1.13 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	22 February 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0098**

Matrices: **Soil**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of ten soil samples and one field duplicate sample, collected on 30 September 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3050B/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7471B
- Hexavalent Chromium by US EPA Method 7196A
- Total Solids by Standard Methods (SM) 2540G

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by American Society of Testing Materials (ASTM) D6913

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exceptions.

The non-detect results of acid extractable SVOCs in sample BH-SB-30-8to10 were R qualified as estimated less than the MDLs due to less than 10% surrogate recoveries.

The non-detect hexavalent chromium result in sample BH-SB-27-2.5to3.5 was R qualified as rejected due to holding time exceedance.

The qualified data that were not rejected should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0098-01	BH-SB-27-2.5to3.5
22J0098-02	BH-SB-27-4to6
22J0098-03	BH-SB-27-8to10
22J0098-04	BH-SB-27-12to14
22J0098-05	BH-SB-27-14to16

Laboratory IDs	Client IDs
22J0098-06	BH-SB-27-16to18
22J0098-07	BH-SB-27-18to20
22J0098-08	BH-SB-30-3to4
22J0098-09	BH-SB-30-4to5
22J0098-10	BH-SB-30-8to10

Laboratory IDs	Client IDs
22J0098-11	BH-SB-30-8to10-D
22J0098-12	BH-SB-30-10to12

Laboratory IDs	Client IDs
22J0098-13	BH-SB-30-12to14

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 0.4 degrees Celsius (ºC) and 3.6 ºC within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

Samples BH-SB-27-16to18 and BH-SB-27-18to20 were listed in the laboratory report as analyzed. However, the samples were archived and not analyzed per client's request.

Incorrect error corrections were observed on the chain of custody (COC), instead of the proper procedure of single strike through, correction, and initials and date of person making the corrections.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E and 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
⊗ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect results of acid extractable SVOCs in sample BH-SB-30-8to10 were R qualified as estimated less than the MDLs due to less than 10% surrogate recoveries. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 97.5%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met, with the following exceptions.

The %Ds for 2,4-dinitrophenol (-65.5%), pentachlorophenol (-22.9%) and anthracene (-20.4%) in the low initial calibration standard in batch SKJ0405 (SKJ0405-SCV1) were outside of validation specified acceptance criteria with low biases. Since the bracketing CCVs were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the low initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of laboratory specified acceptance criteria with high biases. Since the bracketing CCVs were acceptable and analyzed at the same

concentration as the low initial calibration standard and based on professional and technical judgment, no qualifications were applied to the data.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (two for batch BKJ0385 and one for batch BKJ0387). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs), with the following exceptions.

Phenol was detected in the method blank in batch BKJ0385 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated phenol concentrations in the associated samples were U qualified as not detected at the RL.

1-Methylnaphthalene was detected in the method blank in batch BKJ0387 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated phenol concentrations in the associated samples were U qualified as not detected at the RLs

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-27-4to6	1-Methylnaphthalene	23.2	J, D	38.8	U	3
BH-SB-30-3to4	1-Methylnaphthalene	44.1	J, D	49.9	U	3
BH-SB-30-4to5	1-Methylnaphthalene	8.35	J, D	61.7	U	3
BH-SB-27-8to10	Phenol	9.4	J	19.8	U	3
BH-SB-27-14to16	Phenol	5.6	J	19.9	U	3
BH-SB-30-3to4	Phenol	73.8	J	99.4	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-SB-27-8to10 and BH-SB-30-12to14. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for 2,4-dimethylphenol in the MS/MSD pair using sample BH-SB-27-8to10 was high and outside of the laboratory specified acceptance criteria. Since 2,4-dimethylphenol was not detected in sample BH-SB-27-8to10, no qualifications were applied to the data

One or both of the recoveries of naphthalene, 1-methylnaphthalene, acenaphthene, fluorene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene in the MS/MSD pair using sample BH-SB-30-12to14 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of naphthalene, 1-methylnaphthalene, acenaphthene, fluorene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene in sample BH-SB-30-12to14 were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-30-12to14	Naphthalene	1.28	U	1.28	UJ	4
BH-SB-30-12to14	1-Methylnaphthalene	0.40	U	0.40	UJ	4
BH-SB-30-12to14	Acenaphthene	0.57	U	0.57	UJ	4
BH-SB-30-12to14	Fluorene	0.63	U	0.63	UJ	4
BH-SB-30-12to14	Anthracene	0.87	U	0.87	UJ	4
BH-SB-30-12to14	Fluoranthene	0.47	U	0.47	UJ	4
BH-SB-30-12to14	Pyrene	0.63	U	0.63	UJ	4
BH-SB-30-12to14	Benz[a]anthracene	0.82	U	0.82	UJ	4
BH-SB-30-12to14	Chrysene	1.05	U	1.05	UJ	4
BH-SB-30-12to14	Benzo(b)fluoranthene	1.37	U	1.37	UJ	4
BH-SB-30-12to14	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	4
BH-SB-30-12to14	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for 2-methylphenol and 2,4-dimethylphenol in the LCS/LCSD pair in batch BKJ0385 were high and outside of the laboratory specified acceptance criteria. Since 2-methylphenol and 2,4-dimethylphenol were not detected in the associated samples, no qualifications were applied to the data.

The LCSD recoveries of 4,6-dinitro-2-methylphenol and pentachlorophenol in the LCS/LCSD pair in batch BKJ0385 were high and outside of the laboratory specified acceptance criteria. Since 4,6-dinitro-2-methylphenol and pentachlorophenol were not detected in the associated samples, no qualifications were applied to the data.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-SB-30-8to10-D, was collected with the sample set. Acceptable precision (RPD ≤ 50%) was demonstrated between the field duplicate and the original sample, BH-SB-30-8to10, with the following exception.

Diethyl phthalate was detected in field duplicate sample BH-SB-30-8to10-D at an estimated concentration greater than the MDL and less than the RL and not detected in parent sample BH-SB-30-8to10, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the diethyl phthalate concentration in sample BH-SB-30-8to10-D was J qualified as estimated, and the non-detect result of diethyl phthalate in sample BH-SB-30-8to10 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-30-8to10	Diethyl phthalate	19.6	U	NC	19.6	UJ	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-30-8to10-D	Diethyl phthalate	20.2	J		20.2	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The surrogate recoveries of acid extractable 2,4,6-tribromophenol, 2-chlorophenol-d4 and 2-fluorophenol in sample BH-SB-30-8to10 were low and outside of the laboratory specified acceptance criteria. Additionally, the recovery of 2,4,6-tribromophenol was not detected, resulting in 0% recovery, and the recovery of 2-fluorophenol was less than 10%. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SB-30-8to10 were R qualified as estimated less than the MDLs.

The surrogate recovery of acid extractable 2,4,6-tribromophenol in sample BH-SB-30-12to14 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining three acid extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The surrogate recoveries of base neutral extractable fluoranthene-d10 in samples BH-SB-30-3to4 and BH-SB-30-12to14 were low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining two base neutral extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-30-8to10	Phenol	4.4	U	4.4	R	6

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-30-8to10	2-Chlorophenol	13.8	U	13.8	R	6
BH-SB-30-8to10	2,4-Dimethylphenol	3.8	U	3.8	R	6
BH-SB-30-8to10	2,4-Dichlorophenol	15.2	U	15.2	R	6
BH-SB-30-8to10	4-Chloro-3-Methylphenol	12.3	U	12.3	R	6
BH-SB-30-8to10	2,4,6-Trichlorophenol	8.9	U	8.9	R	6
BH-SB-30-8to10	2,4,5-Trichlorophenol	25.6	U	25.6	R	6
BH-SB-30-8to10	2,4-Dinitrophenol	33.6	U	33.6	R	6
BH-SB-30-8to10	4,6-Dinitro-2-Methylphenol	37.8	U	37.8	R	6
BH-SB-30-8to10	Pentachlorophenol	31.1	U	31.1	R	6

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3546/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times

✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0386). DRO and MRO were not detected in the method blank above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-SB-30-8to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pairs in batch BKJ0386. Based professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated, and the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-27-2.5to3.5	MRO	49.8	NA	49.8	J	5
BH-SB-27-4to6	MRO	193	NA	193	J	5
BH-SB-27-8to10	MRO	3.46	U	3.46	UJ	5
BH-SB-27-12to14	MRO	3.55	U	3.55	UJ	5
BH-SB-27-14to16	MRO	3.58	U	3.58	UJ	5
BH-SB-30-3to4	MRO	140	NA	140	J	5
BH-SB-30-4to5	MRO	72.4	NA	72.4	J	5
BH-SB-30-8to10	MRO	3.56	U	3.56	UJ	5
BH-SB-30-8to10-D	MRO	3.68	U	3.68	UJ	5
BH-SB-30-10to12	MRO	3.70	U	3.70	UJ	5
BH-SB-30-12to14	MRO	3.53	U	3.53	UJ	5

mg/kg-milligram per kilogram
MRO-motor oil range organics
U-not detected at a concentration greater than or equal to the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-SB-30-8to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SB-30-8to10-D.

2.9 Rinsate Blank

An equipment blank was not collected during the sample event.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification

✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0580). Metals were not detected in the method blank above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this method.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-SB-30-8to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SB-30-8to10-D, with the following exception.

The RPD for chromium in field duplicate pair was greater than 50%. Therefore, the chromium concentrations in samples BH-SB-30-8to10-D and BH-SB-30-8to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-30-8to10	Chromium	51.9	NA	54	51.9	J	7
BH-SB-30-8to10-D	Chromium	29.7	NA		29.7	J	7

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

Laboratory duplicates were not reported for this method.

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. However, the screening levels were met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to

the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0583). Mercury was not detected in the method blank above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-SB-30-8to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SB-30-8to10-D.

4.10 Laboratory Duplicate

Laboratory duplicates were not reported for this method.

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 HEXAVALENT CHROMIUM

The sample BH-SB-27-2.5to3.5 was analyzed for hexavalent chromium by USEPA Methods 7196A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blank
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
✓ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The hexavalent chromium data reported in this data set are not considered usable for supporting project objectives. The non-detect hexavalent chromium result in sample BH-SB-27-2.5to3.5 was R qualified as rejected due to holding time exceedance. Therefore, analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 0%.

5.2 Holding Times

The holding time for the hexavalent chromium analysis of a solid sample is 30 days from collection to extraction and 168 hours from extraction to analysis. The holding times were not met for the sample analysis. Therefore, the non-detect hexavalent chromium result in sample BH-SB-27-2.5to3.5 was R qualified as rejected.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-27-2.5to3.5	Chromium, Hexavalent	0.648	U	0.648	R	2

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0816). Hexavalent chromium was not detected in the method blank above the MDL.

5.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

One field duplicate sample, BH-SB-30-8to10-D, was collected with the sample set. The field duplicate pair was not analyzed for hexavalent chromium.

5.10 Laboratory Duplicate

Laboratory duplicates were not reported for this method.

5.11 Rinsate Blank

An equipment blank was not collected during the sample event.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

6.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Method D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Field Duplicate
- ✓ Laboratory Triplicate
- ✓ Electronic Data Deliverable Review

6.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

6.2 Field Duplicate

One field duplicate sample, BH-SB-30-8to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SB-30-8to10-D.

6.3 Laboratory Triplicate

Laboratory triplicates were not reported.

6.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	1 March 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0132**

Matrices: **Soil**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of nine soil samples and three field duplicate samples, collected on 3 and 6 October 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3050B/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7471B
- Hexavalent Chromium by US EPA Method 7196A

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by American Society of Testing Materials (ASTM) D6913

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exceptions.

The non-detect 2,4-dimethylphenol results in samples BH-SB-38-2to4, BH-SB-38-2to4-D, BH-SB-38-4to5, BH-SB-38-6to8, BH-SB-38-8to10, BH-SB-38-8to10-D, BH-SB-38-10to12, BH-SB-38-10to12-D, BH-SB-38-12to14 and BH-SB-38-14to16 were R qualified as rejected due to less than 10% LCS recovery.

The non-detect 2,4-dimethylphenol result in sample BH-SB-38-2to4 was R qualified as rejected due to less than 10% MSD recovery.

The non-detect hexavalent chromium result in sample BH-SB-38-2to4 was R qualified as rejected due to holding time exceedance.

The qualified data that were not rejected should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0132-01	BH-SB-38-2to4
22J0132-02	BH-SB-38-2to4-D
22J0132-03	BH-SB-38-4to5
22J0132-04	BH-SB-38-6to8
22J0132-05	BH-SB-38-8to10
22J0132-06	BH-SB-38-8to10-D

Laboratory IDs	Client IDs
22J0132-07	BH-SB-38-10to12
22J0132-08	BH-SB-38-10to12-D
22J0132-09	BH-SB-38-12to14
22J0132-10	BH-SB-38-14to16
22J0132-11	BH-HA-43-0to1
22J0132-12	BH-HA-43-1to2

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 1.2 – 3.3 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

The following issues were noted from the chain of custody (COC) forms:

- Incorrect error corrections were observed on the COC, instead of the proper procedure of single strike through, correction, and initials and date of person making the corrections.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate

✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect 2,4-dimethylphenol results in samples BH-SB-38-2to4, BH-SB-38-2to4-D, BH-SB-38-4to5, BH-SB-38-6to8, BH-SB-38-8to10, BH-SB-38-8to10-D, BH-SB-38-10to12, BH-SB-38-10to12-D, BH-SB-38-12to14 and BH-SB-38-14to16 were R qualified as rejected due to less than 10% LCS recovery, and the non-detect 2,4-dimethylphenol result in sample BH-SB-38-2to4 was R qualified as rejected due to less than 10% MSD recovery. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 97.8%.

1.1.2 Analysis Anomaly

Two sets of sample results were reported for sample BH-SB-38-4to5 for SVOCs per USEPA Methods 3546/8270E; one set from a 1:3 dilution and the second from a 1:15 dilution. The concentrations of fluoranthene and pyrene in the 1:3 dilution analysis of sample BH-SB-38-4to5 were E-flagged by the laboratory to indicate the results exceeded the calibration range. Therefore, the 1:15 dilution analysis for fluoranthene and pyrene in sample BH-SB-38-4to5 were the results considered for validation. The data to use were also indicated in the Reportable column of the electronic data deliverable (EDD) with qualifiers added file.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met, with the following exceptions.

The %Ds for 2,4-dinitrophenol (-65.5%), pentachlorophenol (-22.9%) and anthracene (-20.4%) in the low initial calibration standard in batch SKJ0405 (SKJ0405-SCV1) were outside of laboratory specified acceptance criteria with low biases. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no additional qualifications were applied to the data.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the low initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Since the bracketing CCVs were acceptable and analyzed at the same concentration as the low initial calibration standard and based on professional and technical judgment, no qualifications were applied to the data.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria ,with the following exceptions.

The %Ds for 2,4-dinitrophenol (-96.8%), 4,6-dinitro-2-methylphenol (-55.8) and pentachlorophenol (-77.7%) in the low level CCV in batch SKK0267 (SKK0267-LCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol and pentachlorophenol in the associated samples were UJ qualified as estimated less than the MDLs.

The %Ds for 2,4-dinitrophenol (-96.9%), 4,6-dinitro-2-methylphenol (-70.8%) and pentachlorophenol (-82.8%) in the low level CCV in batch SKK0267 (SKK0267-LCV2) were outside of laboratory specified acceptance criteria with low

biases. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no additional qualifications were applied to the data.

The %D for bis(2-ethylhexyl)phthalate (24.5%) in the ICV in batch SKK0158 (SKK0158-ICV1) was outside of laboratory specified acceptance criteria with a high bias. Since the %D of bis(2-ethylhexyl)phthalate was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %Ds for 2,4-dinitrophenol (-68.7%), 4,6-dinitro-2-methylphenol (-35.5%) and pentachlorophenol (-23.2%) in the ICV in batch SKK0205 (SKK0205-ICV1) were outside of laboratory specified acceptance criteria with low biases. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no additional qualifications were applied to the data.

The %D for pentachlorophenol (-28.4%) in the ICV in batch SKK0267 (SKK0267-ICV1) was outside of validation specified acceptance criteria with a low bias. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no additional qualifications were applied to the data.

The %Ds for indeno(1,2,3-cd)pyrene (22.0%), dibenzo(a,h)anthracene (21.5%), and benzo(g,h,i)perylene (24.5%) in the ICV in batch SKK0267 (SKK0267-ICV1) were outside of validation specified acceptance criteria with high biases. Since the associated samples were assessed based on their respective bracketing CCVs and based on professional and technical judgment, no additional qualifications were applied to the data.

The %D for pentachlorophenol (-32.1%) in the ICV in batch SKK0267 (SKK0267-ICV2) was outside of validation specified acceptance criteria with a low bias. Since the pentachlorophenol data in the associated samples were UJ qualified due to low level CCV exceedance and based on professional and technical judgment, no additional qualifications were applied to the data.

The %Ds for indeno(1,2,3-cd)pyrene (20.6%) and dibenzo(a,h)anthracene (21.0%) in the ICV in batch SKK0267 (SKK0267-ICV2) were outside of validation specified acceptance criteria with high biases. Therefore, the non-detect results of indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene in the associated samples were UJ qualified as estimated less than the MDLs and the concentrations were J qualified as estimated.

The %Ds for diethyl phthalate (22.9%) and bis(2-ethylhexyl)phthalate (28.3%) in the CCV in batch SKK0158 (SKK0158-CCV3) were outside of validation specified acceptance criteria with high biases. Therefore, the non-detect results of diethyl phthalate and bis(2-ethylhexyl)phthalate in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier	Reason Code
BH-SB-38-2to4	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-SB-38-2to4	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-2to4-D	Diethyl phthalate	30.1	J	30.1	J	9
BH-SB-38-2to4-D	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-4to5	Diethyl phthalate	22.3	J	22.3	J	9
BH-SB-38-4to5	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-6to8	Diethyl phthalate	56.8	NA	56.8	J	9
BH-SB-38-6to8	bis(2-ethylhexyl) Phthalate	5.5	U	5.5	UJ	9
BH-SB-38-8to10	Diethyl phthalate	23.6	J	23.6	J	9
BH-SB-38-8to10	bis(2-ethylhexyl) Phthalate	5.5	U	5.5	UJ	9
BH-SB-38-8to10-D	Diethyl phthalate	26.7	J	26.7	J	9
BH-SB-38-8to10-D	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-10to12	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-10to12	Diethyl phthalate	34.1	J	34.1	J	9
BH-SB-38-10to12-D	Diethyl phthalate	161	Q	161	J	9
BH-SB-38-10to12-D	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-12to14	Diethyl phthalate	24.9	J	24.9	J	9
BH-SB-38-12to14	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-14to16	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-SB-38-14to16	bis(2-ethylhexyl) Phthalate	5.5	U	5.5	UJ	9
BH-HA-43-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-43-0to1	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-43-0to1	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-HA-43-0to1	Indeno(1,2,3-cd)pyrene	13.6	J,D	13.6	J	9
BH-HA-43-0to1	Dibenzo(a,h)anthracene	2.74	J,D	2.74	J	9
BH-HA-43-1to2	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-43-1to2	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	UJ	9
BH-HA-43-1to2	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-43-1to2	Indeno(1,2,3-cd)pyrene	12.5	J,D	12.5	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier	Reason Code
BH-HA-43-1to2	Dibenzo(a,h)anthracene	3.25	J,D	3.25	J	9

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
Q-laboratory flag indicating a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria
U-not detected at a concentration greater than or equal to the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Five method blanks were reported (two for batch BKJ0419 and one each for batches BKJ0523, BKJ0421 and BKJ0524). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs), with the following exceptions.

Phenol (24.5 µg/kg and 21.4 µg/kg) was detected in the method blanks in batch BKJ0419 at concentrations greater than the reporting limits (RLs). Therefore, the estimated phenol concentrations in the associated samples were U qualified as not detected at the RLs.

Bis(2-ethylhexyl)phthalate was detected in the method blank in batch BKJ0523 at an estimated concentration greater than the MDL and less than the RL. Since bis(2-ethylhexyl)phthalate was not detected in the associated samples, no qualifications were applied to the data.

Benzo(b)fluoranthene, benzo(j)fluoranthene, total benzofluoranthenes, benzo(a)pyrene and indeno(1,2,3-cd)pyrene were detected in the method blank in batch BKJ0524 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of benzo(b)fluoranthene, benzo(j)fluoranthene, total benzofluoranthenes, benzo(a)pyrene and indeno(1,2,3-cd)pyrene in the associated samples were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-4to5	Phenol	9.7	J,B	19.9	U	3
BH-SB-38-8to10	Phenol	9.7	J,B	20.0	U	3
BH-SB-38-10to12-D	Phenol	9.0	J,B	19.9	U	3
BH-SB-38-12to14	Phenol	11.2	J,B	19.9	U	3
BH-SB-38-14to16	Phenol	10.8	J,B	20.0	U	3
BH-HA-43-0to1	Benzo(a)pyrene	7.31	J,D	15.0	U	3

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-43-1to2	Benzo(a)pyrene	5.51	J,D	15.0	U	3
BH-HA-43-0to1	Benzo(b)fluoranthene	14.1	J,D	15.0	U	3
BH-HA-43-1to2	Benzo(b)fluoranthene	11.2	J,D	15.0	U	3
BH-HA-43-0to1	Benzo(j)fluoranthene	6.00	J,D	15.0	U	3
BH-HA-43-1to2	Benzo(j)fluoranthene	5.11	J,D	15.0	U	3
BH-HA-43-0to1	Benzofluoranthenes, Total (b+k+j)	29.0	J,D	30.0	U	3
BH-HA-43-1to2	Benzofluoranthenes, Total (b+k+j)	23.1	J,D	30.0	U	3
BH-HA-43-0to1	Indeno(1,2,3-cd)pyrene	13.6	J,D	15.0	U	3
BH-HA-43-1to2	Indeno(1,2,3-cd)pyrene	12.5	J,D	15.0	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
B-laboratory flag indicating this analyte was detected in the method blank
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-SB-38-2to4 and BH-SB-38-2to4-D. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for 2-methylphenol, 4-methylphenol, 2,4-dimethylphenol and 2,4,6-trichlorophenol in the MS/MSD pair using sample BH-SB-38-2to4 were high and outside of the laboratory specified acceptance criteria. Since these analytes were not detected in sample BH-SB-38-2to4, no qualifications were applied to the data.

The MSD recovery of 2-methylphenol in the MS/MSD pair using sample BH-SB-38-2to4 was low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect 2-methylphenol result in sample BH-SB-38-2to4 was UJ qualified as estimated less than the RL.

The MSD recovery of 2,4-dimethylphenol in the MS/MSD pair using sample BH-SB-38-2to4 was low, less than 10% and outside of the laboratory specified acceptance criteria. Therefore, the non-detect 2,4-dimethylphenol result in sample BH-SB-38-2to4 was R qualified as rejected.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4	2-Methylphenol	6.6	U	6.6	UJ	4
BH-SB-38-2to4	2,4-Dimethylphenol	3.8	U	3.8	R	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for 2-methylphenol in the LCS/LCSD pair in batch BKJ0419 was high and outside of the laboratory specified acceptance criteria. Since 2-methylphenol was not detected in the associated samples, no additional qualifications were applied to the data

The LCSD recovery of 2,4-dimethylphenol in the LCS/LCSD pair in batch BKJ0419 was low, less than 10% and outside of the laboratory specified acceptance criteria. Additionally, the RPD for 2,4-dimethylphenol in the LCS/LCSD pair was high and outside of the laboratory specified acceptance criteria. Therefore, the non-detect 2,4-dimethylphenol results in the associated samples were R qualified as rejected.

The LCSD recovery of benzo(a)pyrene in the LCS/LCSD pair in batch BKJ0421 was low and outside of the laboratory specified acceptance criteria. Therefore, the benzo(a)pyrene concentrations in the associated samples greater than the RL were J- qualified as estimated with low biases and the estimated concentrations were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-2to4-D	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-4to5	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-6to8	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-8to10	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-8to10-D	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-10to12	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-10to12-D	2,4-Dimethylphenol	3.80	U	3.80	R	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-12to14	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-14to16	2,4-Dimethylphenol	3.80	U	3.80	R	5
BH-SB-38-2to4	Benzo(a)pyrene	1.17	J	1.17	J	5
BH-SB-38-2to4-D	Benzo(a)pyrene	1.59	J	1.59	J	5
BH-SB-38-4to5	Benzo(a)pyrene	716	D	716	J-	5
BH-SB-38-6to8	Benzo(a)pyrene	3.69	J	3.69	J	5
BH-SB-38-8to10	Benzo(a)pyrene	2.44	J	2.44	J	5
BH-SB-38-8to10-D	Benzo(a)pyrene	2.08	J	2.08	J	5
BH-SB-38-10to12	Benzo(a)pyrene	21.2	J	21.2	J-	5
BH-SB-38-10to12-D	Benzo(a)pyrene	4.63	J	4.63	J	5
BH-SB-38-12to14	Benzo(a)pyrene	4.72	J	4.72	J	5
BH-SB-38-14to16	Benzo(a)pyrene	147	D	147	J-	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
D-laboratory flag indicating the reported value is from a dilution
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D, were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, respectively, with the following exceptions.

The RPDs for benz[a]anthracene, benzo(b)fluoranthene, total (b+k+j) benzofluoranthenes, chrysene, fluoranthene and pyrene in field duplicate pair BH-SB-38-10to12-D/BH-SB-38-10to12 were greater than 50%. Therefore, the concentrations of benz[a]anthracene, benzo(b)fluoranthene, total (b+k+j) benzofluoranthenes, chrysene, fluoranthene and pyrene in samples BH-SB-38-10to12-D and BH-SB-38-10to12 were J qualified as estimated.

2-Methylnaphthalene was detected in parent sample BH-SB-38-10to12 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-SB-38-10to12-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the 2-methylnaphthalene concentration in sample BH-SB-38-10to12 was J

qualified as estimated, and the non-detect result of 2-methylnaphthalene in sample BH-SB-38-10to12-D was UJ qualified as estimated less than the MDL.

Anthracene, benzo(a)pyrene, benzo(j)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene were detected in parent sample BH-SB-38-10to12 at concentrations greater than the RLs and detected in field duplicate sample BH-SB-38-10to12-D at estimated concentrations greater than the MDLs and less than the RLs, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the anthracene, benzo(a)pyrene, benzo(j)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene concentrations in samples BH-SB-38-10to12 and BH-SB-38-10to12-D were J qualified as estimated.

Diethyl phthalate was detected in parent sample BH-SB-38-10to12 at an estimated concentration greater than the MDL and less than the RL and detected in field duplicate sample BH-SB-38-10to12-D at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the diethyl phthalate concentrations in samples BH-SB-38-10to12 and BH-SB-38-10to12-D were J qualified as estimated.

Anthracene and dibenzo(a,h)anthracene were detected in parent sample BH-SB-38-2to4 at estimated concentrations greater than the MDLs and less than the RLs and not detected in field duplicate sample BH-SB-38-2to4-D, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the anthracene and dibenzo(a,h)anthracene concentrations in sample BH-SB-38-2to4 were J qualified as estimated, and the non-detect results of anthracene and dibenzo(a,h)anthracene in sample BH-SB-38-2to4-D were UJ qualified as estimated less than the MDLs.

Diethyl phthalate was detected in field duplicate sample BH-SB-38-2to4-D at an estimated concentration greater than the MDL and less than the RL and not detected in parent sample BH-SB-38-2to4, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the diethyl phthalate concentration in sample BH-SB-38-2to4-D was J qualified as estimated, and the non-detect result of diethyl phthalate in sample BH-SB-38-2to4 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-10to12	2-Methylnaphthalene	6.1	J	NC	6.1	J	7
BH-SB-38-10to12-D	2-Methylnaphthalene	19.9	U		19.9	UJ	7
BH-SB-38-10to12	Anthracene	6.24	NA	NC	6.24	J	7
BH-SB-38-10to12-D	Anthracene	3.73	J		3.73	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-10to12	Benz[a]anthracene	24.6	NA	121	24.6	J	7
BH-SB-38-10to12-D	Benz[a]anthracene	6.03	NA		6.03	J	7
BH-SB-38-10to12	Benzo(a)pyrene	21.2	NA	NC	21.2	J	7
BH-SB-38-10to12-D	Benzo(a)pyrene	4.63	J		4.63	J	7
BH-SB-38-10to12	Benzo(b)fluoranthene	14.1	NA	95	14.1	J	7
BH-SB-38-10to12-D	Benzo(b)fluoranthene	5.02	NA		5.02	J	7
BH-SB-38-10to12	Benzo(j)fluoranthene	11.3	NA	NC	11.3	J	7
BH-SB-38-10to12-D	Benzo(j)fluoranthene	3.17	J		3.17	J	7
BH-SB-38-10to12	Benzo(k)fluoranthene	9.97	NA	NC	9.97	J	7
BH-SB-38-10to12-D	Benzo(k)fluoranthene	2.33	J		2.33	J	7
BH-SB-38-10to12	Benzofluoranthenes, Total (b+k+j)	35.2	NA	101	35.2	J	7
BH-SB-38-10to12-D	Benzofluoranthenes, Total (b+k+j)	11.6	NA		11.6	J	7
BH-SB-38-10to12	Chrysene	26.4	NA	101	26.4	J	7
BH-SB-38-10to12-D	Chrysene	8.7	NA		8.7	J	7
BH-SB-38-10to12	Diethyl phthalate	34.1	J	NC	34.1	J	7
BH-SB-38-10to12-D	Diethyl phthalate	161	J		161	J	7
BH-SB-38-10to12	Fluoranthene	32	NA	74	32	J	7
BH-SB-38-10to12-D	Fluoranthene	14.8	NA		14.8	J	7
BH-SB-38-10to12	Indeno(1,2,3-cd)pyrene	11.4	NA	NC	11.4	J	7
BH-SB-38-10to12-D	Indeno(1,2,3-cd)pyrene	3.51	J		3.51	J	7
BH-SB-38-10to12	Pyrene	34.4	NA	75	34.4	J	7
BH-SB-38-10to12-D	Pyrene	15.7	NA		15.7	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4	Anthracene	1.03	J	NC	1.03	J	7
BH-SB-38-2to4-D	Anthracene	4.98	U		4.98	UJ	7
BH-SB-38-2to4	Dibenzo(a,h)anthracene	1.46	J	NC	1.46	J	7
BH-SB-38-2to4-D	Dibenzo(a,h)anthracene	4.98	U		4.98	UJ	7
BH-SB-38-2to4	Diethyl phthalate	49.9	U	NC	49.9	UJ	7
BH-SB-38-2to4-D	Diethyl phthalate	30.1	J		30.1	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3546/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0420 and BKJ0525). DRO and MRO were not detected in the method blanks above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-SB-38-12to14 and BH-HA-43-1to2. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). Two LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pairs in batches BKJ0420 and BKJ0525. Based professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated, and the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4	MRO	3.30	U	3.30	UJ	5
BH-SB-38-2to4-D	MRO	3.37	U	3.37	UJ	5
BH-SB-38-4to5	MRO	24.9	NA	24.9	J	5
BH-SB-38-6to8	MRO	3.61	U	3.61	UJ	5
BH-SB-38-8to10	MRO	15.2	NA	15.2	J	5
BH-SB-38-8to10-D	MRO	13.1	NA	13.1	J	5
BH-SB-38-10to12	MRO	45.9	NA	45.9	J	5
BH-SB-38-10to12-D	MRO	20.8	NA	20.8	J	5
BH-SB-38-12to14	MRO	26.7	NA	26.7	J	5
BH-SB-38-14to16	MRO	17.1	NA	17.1	J	5
BH-HA-43-0to1	MRO	274	NA	274	J	5

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-43-1to2	MRO	176	NA	176	J	5

mg/kg-milligram per kilogram
MRO-motor oil range organics
U-not detected at a concentration greater than or equal to the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D, were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, with the following exceptions.

The RPD for MRO in field duplicate pair BH-SB-38-10to12-D/BH-SB-38-10to12 was greater than 50%. Therefore, the MRO concentrations in samples BH-SB-38-10to12-D and BH-SB-38-10to12 were J qualified as estimated.

DRO was detected in parent sample BH-SB-38-10to12 at a concentration greater than the RL and not detected in field duplicate sample BH-SB-38-10to12-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the DRO concentration in sample BH-SB-38-10to12 was J qualified as estimated, and the non-detect result of DRO in sample BH-SB-38-10to12-D was UJ qualified as estimated less than the MDL.

DRO was detected in parent sample BH-SB-38-8to10 at a concentration greater than the RL and not detected in field duplicate sample BH-SB-38-8to10-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the DRO concentration in sample BH-SB-38-8to10 was J qualified as estimated, and the non-detect result of DRO in sample BH-SB-38-8to10-D was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-10to12	DRO	14.5	NA	NC	14.5	J	7
BH-SB-38-10to12-D	DRO	2.81	U		2.81	UJ	7
BH-SB-38-10to12	MRO	45.9	NA	75	45.9	J	7
BH-SB-38-10to12-D	MRO	20.8	NA		20.8	J	7
BH-SB-38-8to10	DRO	6.86	NA	NC	6.86	J	7

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-8to10-D	DRO	2.93	U		2.93	UJ	7

mg/kg-milligram per kilogram
DRO-diesel range organics
MRO-motor oil range organics
U-not detected at a concentration greater than or equal to the RL
NA-not applicable
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.9 Rinsate Blank

An equipment blank was not collected during the sample event.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Arsenic was detected in the instrument blank in batch SKK0060 (SKK0060-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic and copper were detected in the calibration blank in batch SKK0060 (SKK0060-CCBG) at estimated concentrations greater than the MDLs and less than the RLs. Since the arsenic and copper data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0580, BKJ0611 and BKK0156). Metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

Two sample set specific MS/MSD pairs were reported, using samples BH-SB-38-2to4-D and BH-HA-43-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D, were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, respectively, with the following exceptions.

Cadmium was detected in field duplicate sample BH-SB-38-10to12-D at an estimated concentration greater than the MDL and less than the RL and detected in parent sample BH-SB-38-10to12 at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore,

based on professional and technical judgment, the cadmium concentrations in samples BH-SB-38-10to12 and BH-SB-38-10to12-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-10to12	Cadmium	0.19	NA	NC	0.19	J	7
BH-SB-38-10to12-D	Cadmium	0.11	J		0.11	J	7

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported using samples BH-SB-38-2to4-D and BH-HA-43-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for chromium and zinc in the laboratory duplicate using sample BH-SB-38-2to4-D were high and outside of the laboratory specified acceptance criteria. Therefore, the chromium and zinc concentrations in sample BH-SB-38-2to4-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4-D	Chromium	9.60	NA	9.60	J	12
BH-SB-38-2to4-D	Zinc	40.0	NA	40.0	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were reported due to the dilutions analyzed. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. However, the screening levels were met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to

the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0583, BKJ0609 and BKK0152). Mercury was not detected in the method blanks above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

Two sample set specific MS/MSD pairs were reported, using samples BH-SB-38-2to4-D and BH-HA-43-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The MS recovery and RPD for mercury in the MS/MSD pair using sample BH-HA-43-0to1 were high and outside of the laboratory specified acceptance criteria. Therefore, the mercury concentration in sample BH-HA-43-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-43-0to1	Mercury	0.0892	NA	0.0892	J	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D, were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, respectively, with the following exception.

Mercury was detected in field duplicate sample BH-SB-38-2to4-D at an estimated concentration greater than the MDL and less than the RL and detected in parent sample BH-SB-38-2to4 at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the mercury concentrations in samples BH-SB-38-2to4-D and BH-SB-38-2to4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4	Mercury	0.0306	NA	NC	0.0306	J	7
BH-SB-38-2to4-D	Mercury	0.00811	J		0.00811	J	7

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.10 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported using samples BH-SB-38-2to4-D and BH-HA-43-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the

RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The absolute difference between the mercury results in sample BH-HA-43-0to1 and its laboratory duplicate was greater than the RL. Therefore, the mercury concentration in sample BH-HA-43-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-43-0to1	Mercury	0.0892	NA	0.0892	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 HEXAVALENT CHROMIUM

The sample BH-SB-38-2to4 was analyzed for hexavalent chromium by USEPA Methods 7196A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Initial Calibration

- ✓ Initial and Continuing Calibration Blanks
- ✓ Initial and Continuing Calibration Verification
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Laboratory Duplicate
- ✓ Rinsate Blank
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The hexavalent chromium data reported in this data set are not considered usable for supporting project objectives. The non-detect hexavalent chromium result in sample BH-SB-38-2to4 was R qualified as rejected due to holding time exceedance. Therefore, analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 0%.

5.2 Holding Times

The holding time for the hexavalent chromium analysis of a solid sample is 30 days from collection to extraction and 168 hours from extraction to analysis. Sample BH-SB-38-2to4 was analyzed outside of the extraction to analysis holding time. Therefore, the non-detect hexavalent chromium result in sample BH-SB-38-2to4 was R qualified as rejected.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-2to4	Chromium, Hexavalent	0.618	U	0.618	R	2

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0816). Hexavalent chromium was not detected in the method blank above the MDL.

5.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this method.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D, were collected with the sample sets. The field duplicate pairs were not analyzed for hexavalent chromium.

5.10 Laboratory Duplicate

Laboratory duplicates were not reported for this method.

5.11 Rinsate Blank

An equipment blank was not collected during the sample event.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

6.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Method D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

6.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

6.2 Field Duplicate

Three field duplicate samples, BH-SB-38-2to4-D, BH-SB-38-8to10-D and BH-SB-38-10to12-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SB-38-2to4, BH-SB-38-8to10 and BH-SB-38-10to12, respectively.

6.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-HA-43-0to1. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for % silt/clay and % gravel in the laboratory triplicate using sample BH-HA-43-0to1 were greater than 20%. Therefore, the % silt/clay and % gravel in sample BH-HA-43-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	RSD	Validation Result (%)	Validation Qualifier	Reason Code
BH-HA-43-0to1	% Silt/Clay	7.3	NA	77	7.3	J	12
BH-HA-43-0to1	% Silt/Clay	12.7	NA		NA	NA	NA
BH-HA-43-0to1	% Silt/Clay	33.2	NA		NA	NA	NA
BH-HA-43-0to1	% Gravel	59.8	NA	66	59.8	J	12
BH-HA-43-0to1	% Gravel	34.1	NA		NA	NA	NA
BH-HA-43-0to1	% Gravel	13.1	NA		NA	NA	NA

NA-not applicable

6.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	1 March 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0134**

Matrices: **Soil and Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of twelve soil samples, one field duplicate sample and one equipment blank, collected on 3 and 6 October 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Methods 7470A and 7471B

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by American Society of Testing Materials (ASTM) D6913

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exceptions.

The non-detect 2,4-dimethylphenol results in the associated samples were R qualified as rejected due to less than 10% laboratory control sample (LCS) duplicate (LCSD) recovery of 2,4-dimethylphenol.

The qualified data that were not rejected should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0134-01	BH-HA-38-0to1
22J0134-02	BH-HA-38-1to2
22J0134-03	BH-HA-39-0to1
22J0134-04	BH-HA-39-1to2
22J0134-05	BH-HA-40-0to1
22J0134-06	BH-HA-40-1to2
22J0134-07	BH-HA-41-0to1

Laboratory IDs	Client IDs
22J0134-08	BH-HA-41-1to2
22J0134-09	BH-HA-42-0to1
22J0134-10	BH-HA-42-1to2
22J0134-11	BH-SB-38-16to18
22J0134-12	BH-SB-38-16to18-D
22J0134-13	BH-SB-38-18to20
22J0134-14	BH-EB-SB-221003

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 1.2 – 3.3 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
⊗ Rinsate Blank
✓ Surrogates
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect 2,4-dimethylphenol results in the associated samples were R qualified as rejected due to less than 10% LCSD recovery of 2,4-dimethylphenol. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 99.4%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the SVOC analysis of a water sample

is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met, with the following exceptions.

The %D for benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) was outside of validation specified acceptance criteria with a high bias. Since the bracketing CCVs were acceptable and analyzed at the same concentration as the low initial calibration standard and based on professional and technical judgment, no qualifications were applied to the data

The %Ds for 2,4-dinitrophenol (-65.5%), pentachlorophenol (-22.9%) and anthracene (-20.4%) in the secondary initial calibration standard in batch SKJ0405 (SKJ0405-SCV1) were outside of laboratory specified acceptance criteria with low biases. Since the bracketing CCVs were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for 2,4-dinitrophenol (-96.8%), 4,6-dinitro-2-methylphenol (-55.8%) and pentachlorophenol (-77.7%) in the low concentration calibration standard in batch SKK0267 (SKK0267-LCV1) were outside of laboratory specified acceptance criteria with low biases. Since the associated sample data was assessed based on the bracketing low concentration calibration standard, no additional qualifications were applied to the data.

The %Ds for 2,4-dinitrophenol (-96.9%), 4,6-dinitro-2-methylphenol (-70.8%) and pentachlorophenol (-82.8%) in the low concentration calibration standard in batch SKK0267 (SKK0267-LCV2) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol and pentachlorophenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs).

The %D for 2,4-dinitrophenol (-36.1%) in the ICV standard in batch SKJ0208 (SKJ0208-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the %D for 2,4-dinitrophenol was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %D for bis(2-ethylhexyl)phthalate (24.5%) in the ICV standard in batch SKK0158 (SKK0158-ICV1) was outside of laboratory specified acceptance criteria with a high bias. Since the %D for bis(2-ethylhexyl)phthalate was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %Ds for 2-methylphenol (-20.9%), 2,4-dinitrophenol (-68.7%), 4-nitrophenol (-21.4%), 4,6-dinitro-2-methylphenol (-35.5%) and pentachlorophenol (-23.2%) in the ICV standard in batch SKK0205 (SKK0205-ICV1) were outside of laboratory specified acceptance criteria with low biases. Since the %Ds for 4-nitrophenol and pentachlorophenol were within the validation specified acceptance criteria and the 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data were UJ qualified due to the %Ds in the low concentration calibration standard, no additional qualifications were applied to the 4-nitrophenol, pentachlorophenol 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data. However, the non-detect 2-methylphenol results in the associated samples were UJ qualified as estimated less than the MDL.

The %D for pentachlorophenol (-28.4%) in the ICV standard in batch SKK0267 (SKK0267-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the %D for pentachlorophenol was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %Ds for indeno(1,2,3-cd)pyrene (22.0%), dibenzo(a,h)anthracene (21.5%) and benzo(g,h,i)perylene (24.5%) in the ICV standard in batch SKK0267 (SKK0267-ICV1) were outside of laboratory specified acceptance criteria with high biases. Since the associated sample

data was assessed based on the bracketing ICV standard, no additional qualifications were applied to the data.

The %Ds for pentachlorophenol (32.1%), indeno(1,2,3-cd)pyrene (20.6%) and dibenzo(a,h)anthracene (21.0%) in the ICV standard in batch SKK0267 (SKK0267-ICV2) were outside of laboratory specified acceptance criteria with high biases. Since the %Ds for pentachlorophenol, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %Ds for diethyl phthalate (22.9%) and bis(2-ethylhexyl)phthalate (28.3%) in the CCV standard in batch SKK0158 (SKK0158-CCV3) were outside of validation specified acceptance criteria with high biases. Therefore, the non-detect results of diethyl phthalate and bis(2-ethylhexyl)phthalate in the associated samples were UJ qualified as estimated less than the MDLs and the diethyl phthalate concentrations were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-38-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-38-0to1	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-38-0to1	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-HA-38-1to2	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-38-1to2	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-38-1to2	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-HA-39-0to1	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-39-0to1	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	UJ	9
BH-HA-39-0to1	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-39-1to2	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-39-1to2	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	UJ	9
BH-HA-39-1to2	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-40-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-40-0to1	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-40-0to1	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-40-1to2	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-40-1to2	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-40-1to2	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-41-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-41-0to1	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-41-0to1	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-HA-41-1to2	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-41-1to2	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	UJ	9
BH-HA-41-1to2	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-42-0to1	2,4-Dinitrophenol	33.8	U	33.8	UJ	9
BH-HA-42-0to1	4,6-Dinitro-2-Methylphenol	38.0	U	38.0	UJ	9
BH-HA-42-0to1	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-HA-42-1to2	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-42-1to2	4,6-Dinitro-2-Methylphenol	37.9	U	37.9	UJ	9
BH-HA-42-1to2	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SB-38-16to18	bis(2-ethylhexyl) Phthalate	5.5	U	5.5	UJ	9
BH-SB-38-16to18	Diethyl phthalate	19.7	U	19.7	UJ	9
BH-SB-38-16to18-D	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-SB-38-16to18-D	Diethyl phthalate	20.4	J	20.4	UJ	9
BH-SB-38-18to20	Diethyl phthalate	20.5	J	20.5	UJ	9
BH-SB-38-18to20	bis(2-ethylhexyl) Phthalate	5.4	U	5.4	UJ	9
BH-HA-38-0to1	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-38-1to2	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-39-0to1	2-Methylphenol	6.6	U	6.6	UJ	9
BH-HA-39-1to2	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-40-0to1	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-40-1to2	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-41-0to1	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-41-1to2	2-Methylphenol	6.6	U	6.6	UJ	9
BH-HA-42-0to1	2-Methylphenol	6.7	U	6.7	UJ	9
BH-HA-42-1to2	2-Methylphenol	6.6	U	6.6	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Seven method blanks were reported (two for batch BKJ0419 and one each for batches BKJ0212, BKJ0523, BKJ0211, BKJ0421 and BKJ0524). SVOCs and PAHs were not detected in the method blanks above the MDLs, with the following exceptions.

Phenol (24.5 µg/kg and 21.4 µg/kg) was detected in the method blanks in batch BKJ0419 at concentrations greater than the RLs. Therefore, the estimated phenol concentrations in the associated samples were U qualified as not detected at the RLs.

Bis(2-ethylhexyl)phthalate was detected in the method blank in batch BKJ0523 at an estimated concentration greater than the MDL and less than the RL. Since bis(2-ethylhexyl)phthalate was not detected in the associated samples, no qualifications were applied to the data.

Benzo(b)fluoranthene, benzo(j)fluoranthene, total benzofluoranthenes, benzo(a)pyrene and indeno(1,2,3-cd)pyrene were detected in the method blank in batch BKJ0524 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of benzo(b)fluoranthene, benzo(j)fluoranthene, total benzofluoranthenes, benzo(a)pyrene and indeno(1,2,3-cd)pyrene in the associated samples were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-38-0to1	Benzo(b)fluoranthene	4.46	J, D	15.0	U	3
BH-HA-38-0to1	Benzo(j)fluoranthene	2.15	J, D	15.0	U	3
BH-HA-38-0to1	Benzo(a)pyrene	2.96	J, D	15.0	U	3
BH-HA-38-0to1	Indeno(1,2,3-cd)pyrene	4.67	J, D	15.0	U	3
BH-HA-38-1to2	Benzo(b)fluoranthene	2.38	J	5.00	U	3
BH-HA-38-1to2	Benzo(j)fluoranthene	1.10	J	5.00	U	3
BH-HA-38-1to2	Benzofluoranthenes, Total (b+k+j)	4.75	J	9.99	U	3
BH-HA-38-1to2	Benzo(a)pyrene	1.66	J	5.00	U	3
BH-HA-38-1to2	Indeno(1,2,3-cd)pyrene	2.49	J	5.00	U	3
BH-HA-39-0to1	Benzo(b)fluoranthene	9.31	J, D	15.0	U	3
BH-HA-39-0to1	Benzo(j)fluoranthene	3.99	J, D	15.0	U	3
BH-HA-39-0to1	Benzofluoranthenes, Total (b+k+j)	18.1	J, D	30.0	U	3
BH-HA-39-0to1	Benzo(a)pyrene	3.90	J, D	15.0	U	3
BH-HA-39-0to1	Indeno(1,2,3-cd)pyrene	10.4	J, D	15.0	U	3

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-40-0to1	Benzo(j)fluoranthene	8.80	J, D	15.0	U	3
BH-HA-40-0to1	Benzo(a)pyrene	12.3	J, D	15.0	U	3
BH-HA-40-1to2	Benzo(b)fluoranthene	10.6	J, D	15.0	U	3
BH-HA-40-1to2	Benzo(j)fluoranthene	4.35	J, D	15.0	U	3
BH-HA-40-1to2	Benzofluoranthenes, Total (b+k+j)	22.5	J, D	30.0	U	3
BH-HA-40-1to2	Benzo(a)pyrene	6.38	J, D	15.0	U	3
BH-HA-41-0to1	Benzo(j)fluoranthene	6.12	J, D	15.0	U	3
BH-HA-41-0to1	Benzo(a)pyrene	5.87	J, D	15.0	U	3
BH-HA-41-0to1	Indeno(1,2,3-cd)pyrene	14.3	J, D	15.0	U	3
BH-HA-41-1to2	Benzo(b)fluoranthene	6.66	J, D	15.0	U	3
BH-HA-41-1to2	Benzo(j)fluoranthene	2.49	J, D	15.0	U	3
BH-HA-41-1to2	Benzofluoranthenes, Total (b+k+j)	13.3	J, D	29.9	U	3
BH-HA-41-1to2	Benzo(a)pyrene	2.63	J, D	15.0	U	3
BH-HA-41-1to2	Indeno(1,2,3-cd)pyrene	5.66	J, D	15.0	U	3
BH-HA-42-0to1	Benzo(b)fluoranthene	5.95	J, D	15.0	U	3
BH-HA-42-0to1	Benzo(j)fluoranthene	2.91	J, D	15.0	U	3
BH-HA-42-0to1	Benzofluoranthenes, Total (b+k+j)	11.9	J, D	30.0	U	3
BH-HA-42-0to1	Benzo(a)pyrene	5.05	J, D	15.0	U	3
BH-HA-42-0to1	Indeno(1,2,3-cd)pyrene	6.43	J, D	15.0	U	3
BH-HA-42-1to2	Benzo(b)fluoranthene	1.39	J	4.97	U	3
BH-HA-42-1to2	Benzo(j)fluoranthene	0.76	J	4.97	U	3
BH-HA-42-1to2	Benzo(a)pyrene	0.94	J	4.97	U	3
BH-HA-42-1to2	Indeno(1,2,3-cd)pyrene	1.77	J	4.97	U	3
BH-SB-38-16to18	Phenol	8.4	J,B	20.0	U	3
BH-SB-38-18to20	Phenol	8.7	J,B	20.0	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
B-laboratory flag indicating this analyte was detected in the method blank
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Two sample set specific MS/MSD pairs were reported, using samples BH-HA-38-0to1 and BH-HA-38-1to2. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for 2-methylphenol and 2,4-dimethylphenol in the MS/MSD pair using sample BH-HA-38-1to2 were high and outside of the laboratory specified acceptance criteria. Since 2-methylphenol and 2,4-dimethylphenol were not detected in sample BH-HA-38-1to2, no qualifications were applied to the data.

1.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Six LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for 2-methylphenol in the LCS/LCSD pair in batch BKJ0419 was high and outside of the laboratory specified acceptance criteria. Since 2-methylphenol was not detected in the associated samples, no additional qualifications were applied to the data

The LCSD recovery of 2,4-dimethylphenol in the LCS/LCSD pair in batch BKJ0419 was low, less than 10% and outside of the laboratory specified acceptance criteria. Additionally, the RPD for 2,4-dimethylphenol in the LCS/LCSD pair was high and outside of the laboratory specified acceptance criteria. Therefore, the non-detect 2,4-dimethylphenol results in the associated samples were R qualified as rejected.

The LCSD recovery of benzo(a)pyrene in the LCS/LCSD pair in batch BKJ0421 was low and outside of the laboratory specified acceptance criteria. Therefore, the benzo(a)pyrene concentrations in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-16to18	2,4-Dimethylphenol	3.8	U	3.8	R	5
BH-SB-38-16to18-D	2,4-Dimethylphenol	3.8	U	3.8	R	5
BH-SB-38-16to18	Benzo(a)pyrene	3.8	J	3.8	J	5
BH-SB-38-16to18-D	Benzo(a)pyrene	1.21	J	1.21	J	5
BH-SB-38-18to20	2,4-Dimethylphenol	3.8	U	3.8	R	5
BH-SB-38-18to20	Benzo(a)pyrene	0.62	J	0.62	J	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-SB-38-16to18-D, was collected with the sample set. Acceptable precision (RPD ≤ 50%) was demonstrated between the field duplicate and the original sample, BH-SB-38-16to18, with the following exceptions.

Acenaphthene, benzo(b)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, dibenzo(a,h)anthracene, fluorene and indeno(1,2,3-cd)pyrene were detected in parent sample BH-SB-38-16to18 at estimated concentrations greater than the MDLs and less than the RLs and not detected in field duplicate sample BH-SB-38-16to18-D, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the concentrations of acenaphthene, benzo(b)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, dibenzo(a,h)anthracene, fluorene and indeno(1,2,3-cd)pyrene in sample BH-SB-38-16to18 were J qualified as estimated, and the non-detect results of acenaphthene, benzo(b)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, dibenzo(a,h)anthracene, fluorene and indeno(1,2,3-cd)pyrene in sample BH-SB-38-16to18-D were UJ qualified as estimated less than the MDLs.

Benz[a]anthracene, chrysene, fluoranthene and pyrene were detected in parent sample BH-SB-38-16to18 at concentrations greater than the RLs and detected in field duplicate sample BH-SB-38-16to18-D at estimated concentrations greater than the MDLs and less than the RLs, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the concentrations of benz[a]anthracene, chrysene, fluoranthene and pyrene in samples BH-SB-38-16to18 and BH-SB-38-16to18-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-16to18	Acenaphthene	0.82	J	NC	0.82	J	7
BH-SB-38-16to18-D	Acenaphthene	0.57	U		0.57	UJ	7
BH-SB-38-16to18	Benz[a]anthracene	5.10	NA	NC	5.10	J	7
BH-SB-38-16to18-D	Benz[a]anthracene	1.32	J		1.32	J	7
BH-SB-38-16to18	Benzo(b)fluoranthene	3.37	J	NC	3.37	J	7
BH-SB-38-16to18-D	Benzo(b)fluoranthene	1.37	U		1.37	UJ	7
BH-SB-38-16to18	Benzo(k)fluoranthene	2.13	J	NC	2.13	J	7
BH-SB-38-16to18-D	Benzo(k)fluoranthene	0.76	U		0.76	UJ	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-16to18	Benzofluoranthenes, Total (b+k+j)	8.13	J	NC	8.13	J	7
BH-SB-38-16to18-D	Benzofluoranthenes, Total (b+k+j)	3.00	U		3.00	UJ	7
BH-SB-38-16to18	Chrysene	6.14	NA	NC	6.14	J	7
BH-SB-38-16to18-D	Chrysene	1.90	J		1.90	J	7
BH-SB-38-16to18	Dibenzo(a,h)anthracene	1.18	J	NC	1.18	J	7
BH-SB-38-16to18-D	Dibenzo(a,h)anthracene	0.89	U		0.89	UJ	7
BH-SB-38-16to18	Fluoranthene	10.6	NA	NC	10.6	J	7
BH-SB-38-16to18-D	Fluoranthene	3.54	J		3.54	J	7
BH-SB-38-16to18	Fluorene	1.39	J	NC	1.39	J	7
BH-SB-38-16to18-D	Fluorene	0.63	U		0.63	UJ	7
BH-SB-38-16to18	Indeno(1,2,3-cd)pyrene	4.15	J	NC	4.15	J	7
BH-SB-38-16to18-D	Indeno(1,2,3-cd)pyrene	1.05	U		1.05	UJ	7
BH-SB-38-16to18	Pyrene	9.95	NA	NC	9.95	J	7
BH-SB-38-16to18-D	Pyrene	3.90	J		3.90	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-SB-221003, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs, with the following exceptions.

Diethyl phthalate and dibutyl phthalate were detected in the equipment blank at estimated concentrations greater than the MDLs and less than the RLs. Since dibutyl phthalate was not detected in the associated samples, no qualifications were applied to the dibutyl phthalate data.

However, the estimated concentrations of diethyl phthalate in the associated samples were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-38-1to2	Diethyl phthalate	39.1	J	50	U	3
BH-HA-39-0to1	Diethyl phthalate	20.3	J	49.9	U	3
BH-HA-40-0to1	Diethyl phthalate	19.9	J	50	U	3
BH-HA-41-0to1	Diethyl phthalate	31.2	J	50	U	3
BH-SB-38-16to18-D	Diethyl phthalate	20.4	J	49.7	U	3
BH-SB-38-18to20	Diethyl phthalate	20.5	J	49.9	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3546/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Verification
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ⊗ Laboratory Control Sample
- ⊗ Field Duplicate
- ✓ Rinsate Blank
- ✓ Surrogates
- ✓ Sensitivity
- ⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0210, BKJ0420 and BKJ0525). DRO and MRO were not detected in the method blanks above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). Three LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pairs in batches BKJ0210, BKJ0420 and BKJ0525. Based professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated, and the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-38-0to1	MRO	104	NA	104	J	5
BH-HA-38-1to2	MRO	45.6	NA	45.6	J	5
BH-HA-39-0to1	MRO	101	NA	101	J	5
BH-HA-39-1to2	MRO	27.4	NA	27.4	J	5
BH-HA-40-0to1	MRO	159	NA	159	J	5
BH-HA-40-1to2	MRO	76.3	NA	76.3	J	5
BH-HA-41-0to1	MRO	101	NA	101	J	5
BH-HA-41-1to2	MRO	43.8	NA	43.8	J	5
BH-HA-42-0to1	MRO	81.7	NA	81.7	J	5
BH-HA-42-1to2	MRO	31.6	NA	31.6	J	5
BH-SB-38-16to18	MRO	13.6	NA	13.6	J	5
BH-SB-38-16to18-D	MRO	4.06	U	4.06	UJ	5
BH-SB-38-18to20	MRO	16.2	NA	16.2	J	5

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
MRO-motor oil range organics
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-SB-221003	MRO	0.056	U	0.056	UJ	5

mg/L -milligram per liter
U-not detected at a concentration greater than or equal to the MDL
MRO-motor oil range organics
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-SB-38-16to18-D, was collected with the sample set. Acceptable precision (RPD $\leq$ 50%) was not demonstrated between the field duplicate and the original sample, BH-SB-38-16to18.

DRO and MRO were detected in parent sample BH-SB-38-16to18 at concentrations greater than the RLs and not detected in field duplicate sample BH-SB-38-16to18-D, resulting in noncalculable RPDs. Therefore, based on professional and technical judgment, the DRO and MRO concentrations in sample BH-SB-38-16to18 were J qualified as estimated, and the non-detect results of DRO and MRO in sample BH-SB-38-16to18-D were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-16to18	DRO	10.9	NA	NC	10.9	J	7
BH-SB-38-16to18-D	DRO	3.18	U		3.18	UJ	7
BH-SB-38-16to18	MRO	13.6	NA	NC	13.6	J	7
BH-SB-38-16to18-D	MRO	4.06	U		4.06	UJ	7

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
DRO-diesel range organics
MRO-motor oil range organics
NA-not applicable
NC-not calculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.9 Rinsate Blank

One equipment blank, BH-EB-SB-221003, was collected during the sample event. DRO and MRO were not detected in the equipment blank above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Chromium was detected in the instrument blank in batch SKJ0421 (SKJ0421-IBLO) at an estimated concentration greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Lead was detected in the instrument blank in batch SKK0191 (SKK0191-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic was detected in the instrument blank in batch SKJ0421 (SKJ0421-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic and copper were detected in the calibration blank in batch SKK0060 (SKK0060-CCBG) at estimated concentrations greater than the MDLs and less than the RLs. Since the arsenic and copper data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the instrument blank in batch SKK0191 (SKK0191-IBL9) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits, with the following exceptions.

The recovery of lead (125.2%) in the high concentration calibration standard (HCV) in batch SKK0201 (SKK0201-HCV2) was high and outside of the laboratory specified acceptance criteria. Since the lead data in the associated samples were bracketed with an acceptable HCV and based on professional and technical judgment, no qualifications were applied to the data.

The recoveries of copper (89.0% and 86.8%) and zinc (88.9% and 86.1%) in the HCV in batch SKK0201 (SKK0201-HCV2) were low and outside of the laboratory specified acceptance criteria. Since the copper and zinc data in the associated samples were bracketed with an acceptable HCV and based on professional and technical judgment, no qualifications were applied to the data.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0611, BKJ0615 and BKK0156). Metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-EB-SB-221003. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-SB-38-16to18-D, was collected with the sample set. Acceptable precision (RPD ≤ 50%) was demonstrated between the field duplicate and the original sample, BH-SB-38-16to18, with the following exception.

The RPD for lead in the field duplicate pair was greater than 50%. Therefore, the lead concentrations in samples BH-SB-38-16to18-D and BH-SB-38-16to18 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-38-16to18	Lead	9.32	NA	130	9.32	J	7
BH-SB-38-16to18-D	Lead	44.1	NA		44.1	J	7

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-EB-SB-221003. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

One equipment blank, BH-EB-SB-221003, was collected during the sample event. Metals were not detected in the equipment blank above the MDLs, with the following exceptions.

Chromium (0.601 µg/L) was detected in the equipment blank at a concentration greater than the RL. Since chromium was detected in the associated samples at concentrations greater than ten times the blank contamination, no qualifications were applied to the data.

Copper was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since copper was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7470A and 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total

number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the mercury analysis of a solid and water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0436, BKJ0609 and BKK0152). Mercury was not detected in the method blanks above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-SB-38-16to18-D, was collected with the sample set. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicate and the original sample, BH-SB-38-16to18.

4.10 Laboratory Duplicate

Laboratory duplicates were not reported for this analysis.

4.11 Rinsate Blank

One equipment blank, BH-EB-SB-221003, was collected during the sample event. Mercury was not detected in the equipment blank above the MDL.

4.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Method D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total

number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

One field duplicate sample, BH-SB-38-16to18-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SB-38-16to18.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-HA-38-0to1. The relative standard deviation (RSD) was less than 20%, with the following exception.

The RSD for % gravel in laboratory triplicate using sample BH-HA-38-0to1 was greater than 20%. Therefore, the % gravel in sample BH-HA-38-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	RSD	Validation Result (%)	Validation Qualifier	Reason Code
BH-HA-38-0to1	% Gravel	59.1	NA	51	59.1	J	12
BH-HA-38-0to1	% Gravel	29	NA		29	NA	NA
BH-HA-38-0to1	% Gravel	23.7	NA		23.7	NA	NA

NA-not applicable

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0136**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of eleven sediment samples, collected on 5 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Solids (TS) by SM2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following sample was analyzed in the data set.

Laboratory IDs	Client IDs
22J0136-01	BH-SC-11-2to4
22J0136-02	BH-SC-11-4to6
22J0136-03	BH-SC-11-6to8
22J0136-04	BH-SC-11-8to10
22J0136-05	BH-SC-10-2to4
22J0136-06	BH-SC-10-4to6

Laboratory IDs	Client IDs
22J0136-07	BH-SC-10-6to8
22J0136-08	BH-SC-10-8to10
22J0136-09	BH-SC-17-0to2
22J0136-10	BH-SC-17-2to3
22J0136-11	BH-SC-17-9to10

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 0.4 – 1.3 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E and 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.1.2 Analysis Anomaly

Sample BH-SC-10-8to10 was analyzed for PAHs as 1:3 and 1:6 dilutions, and both analyses were reported. Naphthalene was flagged E in the 1:3 analyses to indicate the concentrations were outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the naphthalene concentration in sample BH-SC-10-8to10 from the 1:6 dilution was considered for validation. The results for the remaining compounds were considered for validation from the 1:3

analysis. The results not considered for validation were indicated as not reportable in the electronic data deliverable (EDD).

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. Additionally, the QAPP specified holding time for the SVOC analysis of a sediment sample is one year from sample collection to extraction, if samples are frozen to -18°C. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for benzoic acid (-37.4%) and pentachlorophenol (-22.9%) in the secondary initial calibration standard in batch SKJ0405 (SKJ0405-SCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs), and the concentrations of pentachlorophenol in the associated samples were J qualified as estimated.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Dibenzofuran was not reported as SIM-SVOC in the associated samples. However, the concentrations of benzo(a)pyrene in the associated samples were J qualified as estimated.

The %Ds for benzoic acid (-88.6%) and pentachlorophenol (-77.3%) in the low level CCV in batch SKK0181 (SKK0181-LCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the MDLs, and the benzoic acid concentrations in the associated samples were J qualified as estimated.

The %Ds for benzoic acid (-97.7% and -97.9%) and pentachlorophenol (-80.3% and -91.3%) in the low level CCVs in batch SKL0053 (SKL0053-LCV1 and SKL0053-LCV2) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect pentachlorophenol result in the associated sample was UJ qualified as estimated less than the MDL, and the benzoic acid concentration in the associated sample was J qualified as estimated.

The %Ds for butylbenzylphthalate (57.9%) in the low level CCV in batch SKL0053 (SKL0053-LCV1) was outside of laboratory specified acceptance criteria with a high bias. Since butylbenzylphthalate was not detected in the associated sample, no qualifications were applied to the data.

The %Ds for bis(2-ethylhexyl)phthalate (58.4%) in the low level CCV in batch SKL0053 (SKL0053-LCV2) was outside of laboratory specified acceptance criteria with a high bias. Since bis(2-ethylhexyl)phthalate was not detected in the associated sample, no qualifications were applied to the data.

The %Ds for 1,4-dichlorobenzene (22.0%), diethyl phthalate (26.4%), butylbenzylphthalate (25.7%) and bis(2-ethylhexyl)phthalate (36.4%) in the bracketing CCV in batch SKK0181 (SKK0181-ICV1) were outside of laboratory specified acceptance criteria with high biases. Since 1,4-dichlorobenzene and butylbenzylphthalate were not detected in the associated samples and bis(2-ethylhexyl)phthalate was U qualified as not detected due to blank contamination, no qualifications were applied to the 1,4-dichlorobenzene, butylbenzylphthalate and bis(2-ethylhexyl)phthalate data. However, the diethyl phthalate concentrations in the associated samples were J qualified as estimated.

The %D for benzoic acid (-29.3%) in the bracketing CCV in batch SKK0181 (SKK0181-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Therefore, the non-detect results of benzoic acid in the associated samples were UJ qualified as estimated less than the MDLs, and the benzoic acid concentrations in the associated samples were J qualified as estimated.

The %D for benzoic acid (-36.1%) in the secondary initial calibration standard in batch SKL0038 (SKL0038-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the non-detect result of benzoic acid in the associated sample was UJ qualified as estimated less than the MDLs due to ICV and bracketing CCV exceedances, no additional qualifications were applied to data.

The %D for diethyl phthalate (23.3%) in the bracketing CCV in batch SKL0038 (SKL0038-ICV1) was outside of laboratory specified acceptance criteria with a high bias. Since diethyl phthalate was not detected in the associated sample, no qualifications were applied to the data.

The %Ds for benzoic acid (-22.2% and -52.6%), pentachlorophenol (-23.7%, -68.4% and -60.7%) and di-n-butylphthalate (-25.0%) in the bracketing CCVs in batch SKL0053 (SKL0053-ICV2, SKL0053-ICV3 and SKL0053-CCV1) were outside of laboratory specified acceptance criteria with low biases. Since the non-detect results of benzoic acid and pentachlorophenol in the associated sample were UJ qualified as estimated less than the MDLs due to ICV and bracketing low level CCV exceedances, no additional qualifications were applied to benzoic acid and pentachlorophenol data. However, the non-detect result of di-n-butylphthalate in the associated sample was UJ qualified as estimated less than the MDL.

The %D for butylbenzylphthalate (54.2%) in the bracketing CCV in batch SKL0053 (SKL0053-CCV1) was outside of laboratory specified acceptance criteria with a high bias. Since butylbenzylphthalate was not detected in the associated sample, no qualifications were applied to the data.

The %Ds for N-nitrosodiphenylamine (35.9%) and bis(2-ethylhexyl)phthalate (29.9%) in the bracketing CCV in batch SKL0053 (SKL0053-ICV3) were outside of method specified acceptance criteria with high biases. Since N-nitrosodiphenylamine and bis(2-ethylhexyl)phthalate were not detected in the associated sample, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-11-2to4	Benzo(a)pyrene	86.0	D	86.0	J	9
BH-SC-11-4to6	Benzo(a)pyrene	80.7	D	80.7	J	9
BH-SC-11-6to8	Benzo(a)pyrene	119	D	119	J	9
BH-SC-11-8to10	Benzo(a)pyrene	5.83	J	5.83	J	9
BH-SC-10-2to4	Benzo(a)pyrene	407	D	407	J	9
BH-SC-10-4to6	Benzo(a)pyrene	213	D	213	J	9
BH-SC-10-6to8	Benzo(a)pyrene	67.3	D	67.3	J	9
BH-SC-10-8to10	Benzo(a)pyrene	28.7	NA	28.7	J	9
BH-SC-17-0to2	Benzo(a)pyrene	351	D	351	J	9
BH-SC-17-2to3	Benzo(a)pyrene	23.9	NA	23.9	J	9
BH-SC-17-9to10	Benzo(a)pyrene	282	D	282	J	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-11-2to4	Benzoic Acid	105	J	105	J	9
BH-SC-11-4to6	Benzoic Acid	97.7	J	97.7	J	9
BH-SC-11-6to8	Benzoic Acid	68.3	U	68.3	UJ	9
BH-SC-11-8to10	Benzoic Acid	1140	NA	1140	J	9
BH-SC-10-2to4	Benzoic Acid	39	U	39	UJ	9
BH-SC-10-4to6	Benzoic Acid	39	U	39	UJ	9
BH-SC-10-6to8	Benzoic Acid	38.9	U	38.9	UJ	9
BH-SC-10-8to10	Benzoic Acid	38.9	U	38.9	UJ	9
BH-SC-17-0to2	Benzoic Acid	79.5	J	79.5	J	9
BH-SC-17-2to3	Benzoic Acid	77.4	J	77.4	J	9
BH-SC-17-9to10	Benzoic Acid	39	U	39	UJ	9
BH-SC-11-8to10	dibutyl phthalate	9.6	U	9.6	UJ	9
BH-SC-10-6to8	Diethyl phthalate	27.5	J	27.5	J	9
BH-SC-10-8to10	Diethyl phthalate	28.7	J	28.7	J	9
BH-SC-17-2to3	Diethyl phthalate	27.6	J	27.6	J	9
BH-SC-17-9to10	Diethyl phthalate	28.0	J	28.0	J	9
BH-SC-11-2to4	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-11-4to6	Pentachlorophenol	49	U	49	UJ	9
BH-SC-11-6to8	Pentachlorophenol	54.7	U	54.7	UJ	9
BH-SC-11-8to10	Pentachlorophenol	53.7	U	53.7	UJ	9
BH-SC-10-2to4	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-10-4to6	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-SC-10-6to8	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-SC-10-8to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-17-0to2	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-17-2to3	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-17-9to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-49-0.7to2.8-D	Pentachlorophenol	10.8	U	10.8	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0487,

BKK0723 and BKJ0489). SVOCs and PAHs were not detected in the method blanks above the MDLs, with the following exceptions.

Bis(2-Ethylhexyl)phthalate was detected in the method blank in batch BKJ0487 at an estimated concentration greater than the MDL and less than the reporting limit (RL). Therefore, the estimated concentrations of bis(2-ethylhexyl)phthalate in the associated samples were U qualified as not detected at the RL.

Naphthalene was detected in the method blank in batch BKJ0489 at an estimated concentration greater than the MDL and less than the RL. Since naphthalene was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-11-2to4	bis(2-ethylhexyl) Phthalate	37.9	J	49.9	U	3
BH-SC-11-4to6	bis(2-ethylhexyl) Phthalate	72	J	78.4	U	3
BH-SC-11-6to8	bis(2-ethylhexyl) Phthalate	46.4	J	87.5	U	3
BH-SC-10-2to4	bis(2-ethylhexyl) Phthalate	13.6	J	49.9	U	3
BH-SC-10-4to6	bis(2-ethylhexyl) Phthalate	24.5	J	50	U	3
BH-SC-10-6to8	bis(2-ethylhexyl) Phthalate	14.6	J	49.8	U	3
BH-SC-10-8to10	bis(2-ethylhexyl) Phthalate	18.9	J	49.8	U	3
BH-SC-17-0to2	bis(2-ethylhexyl) Phthalate	33	J	50	U	3
BH-SC-17-2to3	bis(2-ethylhexyl) Phthalate	12.3	J	50	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three sample set specific MS/MSD pairs were reported, using samples BH-SC-17-0to2, BH-SC-11-8to10 and BH-SC-10-2to4. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The MS recovery and RPD for 4-methylphenol in the MS/MSD pair using sample BH-SC-11-8to10 were high and outside of the laboratory specified acceptance criteria. Additionally, the MSD recovery of 4-methylphenol in the MS/MSD pair was low and outside of the laboratory specified acceptance criteria. Therefore, the 4-methylphenol concentration in sample BH-SC-11-8to10 was J qualified as estimated.

The MS recovery of pentachlorophenol and the MSD recovery of hexachlorobenzene in the MS/MSD pair using sample BH-SC-11-8to10 were high and outside of the laboratory specified acceptance criteria. Since pentachlorophenol and hexachlorobenzene were not detected in sample BH-SC-11-8to10, no qualifications were applied to the data.

The recoveries of N-nitrosodiphenylamine in the MS/MSD pair using sample BH-SC-11-8to10 were low, less than 10% and outside of the laboratory specified acceptance criteria. Therefore, the non-detect result of N-nitrosodiphenylamine in sample BH-SC-11-8to10 was R qualified as rejected.

One or both of the recoveries of acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene and naphthalene in the MS/MSD pair using sample BH-SC-10-2to4 were low and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(j)fluoranthene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene and naphthalene in sample BH-SC-10-2to4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-11-8to10	p-cresol	2480	NA	2480	J	4
BH-SC-11-8to10	N-Nitrosodiphenylamine	9.2	U	9.2	R	4
BH-SC-10-2to4	Naphthalene	80.9	D	80.9	J	4
BH-SC-10-2to4	Acenaphthene	167	D	167	J	4
BH-SC-10-2to4	Fluorene	123	D	123	J	4
BH-SC-10-2to4	Phenanthrene	1100	D	1100	J	4
BH-SC-10-2to4	Anthracene	262	D	262	J	4
BH-SC-10-2to4	Fluoranthene	1060	D	1060	J	4
BH-SC-10-2to4	Pyrene	1000	D	1000	J	4
BH-SC-10-2to4	Benz[a]anthracene	419	D	419	J	4
BH-SC-10-2to4	Chrysene	478	D	478	J	4
BH-SC-10-2to4	Benzo(b)fluoranthene	256	D	256	J	4
BH-SC-10-2to4	Benzo(k)fluoranthene	168	D	168	J	4
BH-SC-10-2to4	Benzo(j)fluoranthene	189	D	189	J	4

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-10-2to4	Benzofluoranthenes, Total (b+k+j)	614	D	614	J	4
BH-SC-10-2to4	Benzo(a)pyrene	407	D	407	J	4
BH-SC-10-2to4	Indeno(1,2,3-cd)pyrene	246	D	246	J	4
BH-SC-10-2to4	Benzo(ghi)perylene	281	D	281	J	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/LCS duplicate (LCSD) pairs and one LCS were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The LCS recovery of N-nitrosodiphenylamine in the LCS/LCSD pair in batch BKJ0487 was low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of N-nitrosodiphenylamine in the associated samples were UJ qualified as estimated less than the MDLs.

One or both of the recoveries of acenaphthylene, acenaphthene, phenanthrene, pyrene and indeno(1,2,3-cd)pyrene in the LCS/LCSD pair in batch BKJ0489 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect result of acenaphthylene in sample BH-SC-17-2to3 was UJ qualified as estimated less than the MDL, the estimated concentrations of acenaphthene, acenaphthylene and indeno(1,2,3-cd)pyrene) in the associated samples greater than the MDLs and less than the RLs were J qualified as estimated and the concentrations of acenaphthylene, acenaphthene, phenanthrene, pyrene and indeno(1,2,3-cd)pyrene in the associated samples greater than the RLs were J- qualified as estimated with low biases.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-11-2to4	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-11-2to4	Acenaphthylene	178	D	178	J-	5
BH-SC-11-2to4	Acenaphthene	59.2	D	59.2	J-	5
BH-SC-11-2to4	Phenanthrene	506	D	506	J-	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-11-2to4	Pyrene	366	D	366	J-	5
BH-SC-11-2to4	Indeno(1,2,3-cd)pyrene	124	D	124	J-	5
BH-SC-11-4to6	N-Nitrosodiphenylamine	8.3	U	8.3	UJ	5
BH-SC-11-4to6	Acenaphthylene	103	D	103	J-	5
BH-SC-11-4to6	Acenaphthene	32.4	D	32.4	J-	5
BH-SC-11-4to6	Phenanthrene	254	D	254	J-	5
BH-SC-11-4to6	Pyrene	205	D	205	J-	5
BH-SC-11-4to6	Indeno(1,2,3-cd)pyrene	154	D	154	J-	5
BH-SC-11-6to8	N-Nitrosodiphenylamine	9.3	U	9.3	UJ	5
BH-SC-11-6to8	Acenaphthylene	42.9	D	42.9	J-	5
BH-SC-11-6to8	Acenaphthene	19.8	J,D	19.8	J	5
BH-SC-11-6to8	Phenanthrene	279	D	279	J-	5
BH-SC-11-6to8	Pyrene	293	D	293	J-	5
BH-SC-11-6to8	Indeno(1,2,3-cd)pyrene	131	D	131	J-	5
BH-SC-11-8to10	Acenaphthylene	4.28	J	4.28	J	5
BH-SC-11-8to10	Acenaphthene	3.84	J	3.84	J	5
BH-SC-11-8to10	Phenanthrene	24.6	NA	24.6	J-	5
BH-SC-11-8to10	Pyrene	18.7	NA	18.7	J-	5
BH-SC-11-8to10	Indeno(1,2,3-cd)pyrene	4.54	J	4.54	J	5
BH-SC-10-2to4	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-10-2to4	Acenaphthylene	17.8	J,D	17.8	J	5
BH-SC-10-2to4	Acenaphthene	167	D	167	J-	5
BH-SC-10-2to4	Phenanthrene	1100	D	1100	J-	5
BH-SC-10-2to4	Pyrene	1000	D	1000	J-	5
BH-SC-10-2to4	Indeno(1,2,3-cd)pyrene	246	D	246	J-	5
BH-SC-10-4to6	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-10-4to6	Acenaphthylene	32.3	D	32.3	J-	5
BH-SC-10-4to6	Acenaphthene	52.5	D	52.5	J-	5
BH-SC-10-4to6	Phenanthrene	430	D	430	J-	5
BH-SC-10-4to6	Pyrene	446	D	446	J-	5
BH-SC-10-4to6	Indeno(1,2,3-cd)pyrene	148	D	148	J-	5
BH-SC-10-6to8	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-10-6to8	Acenaphthylene	28.6	D	28.6	J-	5
BH-SC-10-6to8	Acenaphthene	15.1	D	15.1	J-	5
BH-SC-10-6to8	Phenanthrene	142	D	142	J-	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-10-6to8	Pyrene	198	D	198	J-	5
BH-SC-10-6to8	Indeno(1,2,3-cd)pyrene	48.7	D	48.7	J-	5
BH-SC-10-8to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-10-8to10	Acenaphthylene	215	NA	215	J-	5
BH-SC-10-8to10	Acenaphthene	52.2	NA	52.2	J-	5
BH-SC-10-8to10	Phenanthrene	267	NA	267	J-	5
BH-SC-10-8to10	Pyrene	179	NA	179	J-	5
BH-SC-10-8to10	Indeno(1,2,3-cd)pyrene	21.3	NA	21.3	J-	5
BH-SC-17-0to2	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-17-0to2	Acenaphthylene	44.9	D	44.9	J-	5
BH-SC-17-0to2	Acenaphthene	93.5	D	93.5	J-	5
BH-SC-17-0to2	Phenanthrene	834	D	834	J-	5
BH-SC-17-0to2	Pyrene	855	D	855	J-	5
BH-SC-17-0to2	Indeno(1,2,3-cd)pyrene	250	D	250	J-	5
BH-SC-17-2to3	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-17-2to3	Acenaphthylene	1.08	U	1.08	UJ	5
BH-SC-17-2to3	Acenaphthene	3.29	J	3.29	J	5
BH-SC-17-2to3	Phenanthrene	157	NA	157	J-	5
BH-SC-17-2to3	Pyrene	51.6	NA	51.6	J-	5
BH-SC-17-2to3	Indeno(1,2,3-cd)pyrene	22.1	NA	22.1	J-	5
BH-SC-17-9to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-17-9to10	Acenaphthylene	18.1	D	18.1	J-	5
BH-SC-17-9to10	Acenaphthene	123	D	123	J-	5
BH-SC-17-9to10	Phenanthrene	865	D	865	J-	5
BH-SC-17-9to10	Pyrene	685	D	685	J-	5
BH-SC-17-9to10	Indeno(1,2,3-cd)pyrene	165	D	165	J-	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

A field duplicate sample was not collected with the sample set.

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exception.

The surrogate recovery of base neutral extractable 2-methylnaphthalene-d10 in sample BH-SC-17-9to10 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining two base neutral extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0611). Metals were not detected in the method blank above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-SC-17-9to10. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of silver in the MS/MSD pair using sample BH-SC-17-9to10 were low and outside of the laboratory specified acceptance criteria. Additionally, the RPD for silver was high and outside of the laboratory specified acceptance criteria. Therefore, the silver concentration in sample BH-SC-17-9to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-17-9to10	Silver	0.43	J	0.43	J	4

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

2.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SC-17-9to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for chromium in the laboratory duplicate using sample BH-SC-17-9to10 was high and outside of the laboratory specified acceptance criteria. Therefore, the chromium concentration in sample BH-SC-17-9to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-17-9to10	Chromium	29.7	NA	29.7	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.11 Rinsate Blank

An equipment blank was not collected during the sample event.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total and dissolved mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0609). Mercury was not detected in the method blank above the MDL.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-SC-17-9to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

3.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SC-17-9to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060 and TS by SM2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
TOC	US EPA Method 9060	14 days from collection to analysis

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0395). One method blank was reported for TOC (batch BKJ0423). The wet chemistry parameters were not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for TOC, using sample BH-SC-11-2to4. The RPD result was within the laboratory specified acceptance criteria. However, the recoveries of TOC in the MS/MSD pair using sample BH-SC-11-2to4 were high and outside of the laboratory specified acceptance criteria. Therefore, the TOC concentration in sample BH-SC-11-2to4 was J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-11-2to4	TOC	8.64	NA	8.64	J+	4

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported for TOC. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for TOC, using sample BH-SC-11-2to4. The RPD result was within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by ASTM Method D6913.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

A field duplicate sample was not collected with the sample set.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-SC-10-2to4. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for , Phi Scale -1 to 0, Phi Scale -2.25 to -2, Phi Scale 1 to 2, Phi Scale 3 to 4, Phi Scale 4 to 5, Phi Scale -2 to -1, Phi Scale 5 to 6, Phi Scale 6 to 7 and Silt in laboratory triplicate using sample BH-SC-10-2to4 were greater than 20%. Therefore, the results for these particle sizes in sample BH-SC-10-2to4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-10-2to4	Particle/Grain Size, Phi Scale -1 to 0	18.8	NA	18.8	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale -2.25 to -2	5.90	NA	5.90	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale 1 to 2	2.50	NA	2.50	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale 3 to 4	2.40	NA	2.40	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale 4 to 5	2.00	NA	2.00	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale -2 to -1	23.1	NA	23.1	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale 5 to 6	1.20	NA	1.20	J	12
BH-SC-10-2to4	Particle/Grain Size, Phi Scale 6 to 7	0.10	NA	0.10	J	12

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-10-2to4	Particle/Grain Size, Silt	3.80	NA	3.80	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	23 February 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverables – Analytical Resources, Incorporated Work Orders 22J0140 and 22J0170**

Matrices: **Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of four groundwater samples, one field duplicate sample and one equipment blank, including dissolved groundwater, field duplicate and equipment blank samples, collected on 7 and 11 October 2022, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3520C/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3510C/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3010A/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7470A
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500NH_3H
- Sulfide by SM4500S^2D
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Suspended Solids (TSS) by SM2540D

- Total Dissolved Solids (TDS) by SM2540C
- Total Solids (TS) by SM2540B
- Total Volatile Solids (TVS) by SM2540E

The following analysis was performed at MTC Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by American Society of Testing Materials (ASTM) D6913

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exceptions.

The non-detect sulfide results in samples BH-GW-24-221007, BH-GW-26-221007, BH-GW-27-221007, BH-GW-29-221007 and BH-GW-29-221007-D were R qualified as rejected due to holding time exceedances.

The qualified data that were not rejected should be used within the limitations of the qualifications.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0140-01	BH-GW-24-221007
22J0140-02	BH-GW-26-221007
22J0140-03	BH-GW-27-221007
22J0140-04	BH-GW-29-221007
22J0140-05	BH-GW-29-221007-D
22J0140-06	BH-EB-GW-221007

Laboratory IDs	Client IDs
22J0140-07	BH-GW-24-221007 (dissolved)
22J0140-08	BH-GW-26-221007 (dissolved)
22J0140-09	BH-GW-27-221007 (dissolved)
22J0140-10	BH-GW-29-221007 (dissolved)
22J0140-11	BH-GW-29-221007-D (dissolved)
22J0140-12	BH-EB-GW-221007 (dissolved)

Laboratory IDs	Client IDs
22J0170-01	BH-EB-GW-221011

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

Due to absence of field filtration, the equipment blank BH-EB-GW-221007 was recollected and reported in laboratory report 22J0170

The samples were received at the laboratory between 0.3 – 9.4 degrees Celsius (ºC) both within and outside the criteria of 0-6.0 ºC. Since the sample outside of criteria was received by the laboratory within hours of collection and the cooling process had begun, no qualifications were applied to the data. No other sample preservation issues were noted by the laboratory.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3510C/8270E and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met, with the following exceptions.

The %D for benzo(a)pyrene (26.5%) in the low initial calibration standard in batch SKD0159 (SKD0159-SCV1) was outside of validation specified acceptance criteria with a high bias. Since the bracketing CCVs were acceptable and analyzed at the same concentration as the low initial calibration standard and based on professional and technical judgment, no qualifications were applied to the data.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %D for 4,6-dinitro-2-methylphenol (-36.2%) in the low concentration calibration standard in batch SKJ0208 (SKJ0208-LCV1) was outside of validation specified acceptance criteria with a low bias. Since the associated sample data was assessed based on the bracketing low concentration calibration standard, no additional qualifications were applied to the data.

The %D for 2,4-dinitrophenol (-36.1%) in the ICV standard in batch SKJ0208 (SKJ0208-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the %D for 2,4-dinitrophenol was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %D for 2,4-dinitrophenol (-35.0%) in the ICV standard in batch SKJ0237 (SKJ0237-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the %D for 2,4-dinitrophenol was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The %D for 2,4-dinitrophenol (-37.8%) in the CCV standard in batch SKJ0208 (SKJ0208-CCV1) was outside of laboratory specified acceptance criteria with a low bias. Since the %D for 2,4-dinitrophenol was within the validation specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0318 and BKJ0317). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs).

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported for this analysis.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-GW-29-221007-D, was collected with the sample set. Acceptable precision (RPD ≤ 50%) was demonstrated between the field duplicate and the original sample, BH-GW-29-221007, with the following exception.

Bis(2-ethylhexyl) phthalate was detected in parent sample BH-GW-29-221007 at an estimated concentration greater than the MDL and less than the reporting limit (RL) and not detected in field duplicate sample BH-GW-29-221007-D, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the bis(2-ethylhexyl) phthalate concentration in sample BH-GW-29-221007 was J qualified as estimated, and the non-detect result of bis(2-ethylhexyl) phthalate in sample BH-GW-29-221007-D was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-221007	bis(2-ethylhexyl) Phthalate	0.70	J	NC	0.70	J	7
BH-GW-29-221007-D	bis(2-ethylhexyl) Phthalate	0.30	U		0.30	UJ	7

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-GW-221007, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3510C/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0316). DRO and MRO were not detected in the method blank above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BKJ0316. Based professional and technical judgment, the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-221007	MRO	0.056	U	0.056	UJ	5
BH-GW-26-221007	MRO	0.056	U	0.056	UJ	5
BH-GW-27-221007	MRO	0.056	U	0.056	UJ	5
BH-GW-29-221007	MRO	0.056	U	0.056	UJ	5
BH-GW-29-221007-D	MRO	0.056	U	0.056	UJ	5
BH-EB-GW-221007	MRO	0.056	U	0.056	UJ	5

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report

** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-GW-29-221007-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-GW-29-221007.

2.9 Rinsate Blank

One equipment blank, BH-EB-GW-221007, was collected during the sample event. DRO and MRO were not detected in the equipment blank above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported to the RLs in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for total and dissolved metals per USEPA Methods 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration

✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
⊗ Rinsate Blank
✓ Assessment of Total Metals vs. Dissolved Metals
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a preserved water sample is 6 months from collection to analysis. The holding time for the dissolved metal analysis of a preserved water sample is 15 minutes from collection to filtration and 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Arsenic was detected in the calibration blanks in batch SKJ0378 (SKJ0378-CCB4 and SKJ0378-CCBA) at an estimated concentration greater than the MDL and less than the RL. Since the arsenic data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic was detected in the instrument blank in batch SKJ0421 (SKJ0421-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blank in batch SKJ0421 (SKJ0421-IBLO) at an estimated concentration greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Lead was detected in the instrument blank in batch SKK0099 (SKK0099-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Lead was detected in the calibration blanks in batch SKK0136 (SKK0136-CCB8 and SKK0136-CCBI) at estimated concentrations greater than the MDLs and less than the RLs. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits, with the following exceptions.

The recoveries of copper (89.0%) and zinc (88.9%) in the high concentration calibration standard (HCV) in batch SKJ0340 (SKJ0340-HCV1) were low and outside of the laboratory specified acceptance criteria. Since the copper and zinc data in the associated samples were not detected or detected at concentrations lower than the HCV and based on professional and technical judgment, no qualifications were applied to the data.

The recoveries of copper (86.8%) and zinc (86.1%) in the HCV in batch SKJ0340 (SKJ0340-HCV2) were low and outside of the laboratory specified acceptance criteria. Since the copper and zinc data in the associated samples were bracketed with an acceptable HCV and based on professional and technical judgment, no qualifications were applied to the data.

The recoveries of copper (86.8%) and zinc (89.8%) in the HCV in batch SKJ0378 (SKJ0378-HCV2) were low and outside of the laboratory specified acceptance criteria. Since the copper and zinc data in the associated samples were bracketed with an acceptable HCV and based on professional and technical judgment, no qualifications were applied to the data.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0628 and BKJ0584). Total and dissolved metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total metals, using sample BH-GW-24-221007. One sample set specific MS/MSD pair was reported for dissolved metals, using sample BH-EB-GW-221011. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-GW-29-221007-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-GW-29-221007, with the following exception.

Dissolved zinc was detected in parent sample BH-GW-29-221007 at an estimated concentration greater than the MDL and less than the RL and not detected in field duplicate sample BH-GW-29-221007-D, resulting in a noncalculable RPD. Therefore, the non-detect result of dissolved zinc in sample BH-GW-29-221007-D was UJ qualified as estimated less than the MDL, and the zinc concentration in sample BH-GW-29-221007 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-221007	Dissolved Zinc	42.2	J,D	NC	42.2	J	7

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-221007-D	Dissolved Zinc	29.2	U		29.2	UJ	7

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total metals using sample BH-GW-24-221007. One sample set specific laboratory duplicate was reported for dissolved metals using sample BH-EB-GW-221011. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

Two equipment blanks, BH-EB-GW-221007 and BH-EB-GW-221011, were collected during the sample event. Total and dissolved metals were not detected in the equipment blanks above the MDLs, with the following exceptions.

Dissolved arsenic was detected in the equipment blank, BH-EB-GW-221011, at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated concentrations of dissolved arsenic in the associated samples were U qualified as not detected at the RL.

Dissolved chromium (0.905 µg/L), dissolved copper (1.71 µg/L) and dissolved lead (0.193 µg/L) were detected in the equipment blank, BH-EB-GW-221011, at concentrations greater than the RLs. Since dissolved lead was not detected in the associated samples, no qualifications were applied to the dissolved lead data. However, the concentrations of dissolved chromium in the associated samples that were greater than the RL and less than ten times the blank contamination were J+ qualified as estimated with high biases, and the estimated concentration of dissolved copper in sample BH-GW-26-221007 was U qualified as not detected at the RL.

Total copper and total zinc were detected in the equipment blank, BH-EB-GW-221007, at estimated concentrations greater than the MDLs and less than the RLs. Since total zinc was not detected in the associated samples, no qualifications were applied to the total zinc data. However, the estimated concentration of total copper in sample BH-GW-26-221007 was U qualified as not detected at the RL.

Total chromium (0.979 µg/L) was detected in the equipment blank, BH-EB-GW-221007, at a concentration greater than the RL. Therefore, the concentrations of total chromium in the associated samples that were greater than the RL and less than ten times the blank contamination were J+ qualified as estimated with high biases.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-221007	Arsenic, Dissolved	0.75	J,D	2.00	U	3
BH-GW-29-221007-D	Arsenic, Dissolved	0.81	J,D	2.00	U	3
BH-GW-27-221007	Arsenic, Dissolved	1.49	J,D	2.00	U	3
BH-GW-24-221007	Chromium	8.16	D	8.16	J+	3
BH-GW-29-221007	Chromium	7.75	D	7.75	J+	3
BH-GW-29-221007-D	Chromium	6.02	D	6.02	J+	3
BH-GW-29-221007	Chromium, Dissolved	5.65	D	5.65	J+	3
BH-GW-29-221007-D	Chromium, Dissolved	5.44	D	5.44	J+	3
BH-GW-24-221007	Chromium, Dissolved	7.70	D	7.70	J+	3
BH-GW-26-221007	Chromium, Dissolved	8.28	D	8.28	J+	3
BH-GW-26-221007	Copper	4.14	J,D	10	U	3
BH-GW-26-221007	Copper, Dissolved	3.06	J,D	5.00	U	3

µg/L-microgram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.12 Assessment of Total Metals vs. Dissolved Metals

The samples were analyzed for total and dissolved metals. The concentrations of total metals were greater than or equal to the concentrations of dissolved metals in the samples.

For samples with estimated concentrations of total metals less than the estimated concentrations of dissolved metals, no qualifications were applied to the data. These data are not presented in the table below.

3.13 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The ground water and sediment RLs listed in Tables 9b and 9c of the QAPP were not met for total zinc. However, the screening levels were met

3.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
✓ Assessment of Total Mercury vs. Dissolved Mercury
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as

estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total mercury analysis of a preserved water sample is 28 days from collection to analysis. The holding time for the dissolved mercury analysis of a preserved water sample is 15 minutes from collection to filtration and 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs did not meet the method acceptance criteria. Mercury was detected in the ICBs and CCBs in batch SKJ0267 at estimated concentrations more negative than the MDL and less negative than the RL. Therefore, the non-detect mercury results in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-26-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-27-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-221007-D	Mercury	0.000013	U	0.000013	UJ	3
BH-EB-GW-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-24-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-26-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-27-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-221007	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-221007-D	Mercury	0.000013	U	0.000013	UJ	3

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-221011	Mercury	0.000013	U	0.000013	UJ	3

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0505 and BKJ0436). Total and dissolved mercury were not detected in the method blanks above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total mercury, using sample BH-GW-24-221007. One sample set specific MS/MSD pair was reported for dissolved mercury, using sample BH-EB-GW-221011. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-GW-29-221007-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-GW-29-221007.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total mercury using sample BH-GW-24-221007. One sample set specific laboratory duplicate was reported for dissolved mercury using sample BH-EB-GW-221011. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

Two equipment blanks, BH-EB-GW-221007 and BH-EB-GW-221011, were collected during the sample event. Total and dissolved mercury were not detected in the equipment blank above the MDLs.

4.12 Assessment of Total Mercury vs. Dissolved Mercury

The samples were analyzed for total and dissolved mercury. The concentrations of total mercury were greater than or equal to the concentrations of dissolved mercury in the samples.

4.13 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met

4.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 WET CHEMISTRY

The samples were analyzed for ammonia as N by SM 4500 NH_3H, TOC by US EPA method 9060, sulfide by SM4500S^2D, TDS by SM2540C, TS by SM2540B, TVS by SM2540E and TSS by SM2540D.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample

⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

5.1.1 Completeness

The wet chemistry data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect sulfide results in samples BH-GW-24-221007, BH-GW-26-221007, BH-GW-27-221007, BH-GW-29-221007 and BH-GW-29-221007-D were R qualified as rejected due to holding time exceedances. Therefore, the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 87.5%.

5.1.2 Analysis Anomaly

The samples were analyzed for TDS twice. The reanalysis was performed outside of the holding time requirement, and both sets of results were reported. The results considered for validation were marked "Yes" in the Reportable column of the EDD.

5.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses, with the following exceptions.

Analyte	Method	Holding Time
Sulfide	SM4500S^2D	7 days from collection to analysis
Ammonia as N	SM 4500NH_3H	28 days from collection to analysis
TS	SM2540B	7 days from collection to analysis
TVS	SM2540E	7 days from collection to analysis
TDS	SM 2540C	7 days from collection to analysis
TSS	SM 2540D	7 days from collection to analysis
TOC	US EPA Method 9060	28 days from collection to analysis

The samples were analyzed for sulfide outside of the holding time requirements. Therefore, the non-detect sulfide results in samples BH-GW-24-221007, BH-GW-26-221007, BH-GW-27-221007, BH-GW-29-221007 and BH-GW-29-221007-D were R qualified as rejected.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-221007	Sulfide	0.050	H,U	0.050	R	2
BH-GW-26-221007	Sulfide	0.050	H,U	0.050	R	2
BH-GW-27-221007	Sulfide	0.050	H,U	0.050	R	2
BH-GW-29-221007	Sulfide	0.050	H,U	0.050	R	2
BH-GW-29-221007-D	Sulfide	0.050	H,U	0.050	R	2

mg/L-milligram per liter
H-laboratory flag indicating hold time violation
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exception.

TOC was detected in the instrument blank in batch SKG0286 (SKG0286-ICB1) at an estimated concentration greater than the MDL and less than the RL. Since the TOC data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TSS (batch BKJ0285). Two method blanks were reported for TDS (batches BKJ0322 and BKK0034). One method blank was reported for TS and TVS (batch BKJ0333). One method blank was reported for ammonia (batch BKJ0417). One method blank was reported for sulfide (batch BKJ0522). One method blank was reported for TOC (batch BKK0067). The wet chemistry parameters were not detected in the method blanks above the MDLs.

5.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS was reported for sulfide, using sample BH-GW-24-221007. The recovery result was within the laboratory specified acceptance criteria.

One sample set specific MS was reported for TOC, using sample BH-GW-24-221007. The recovery result was within the laboratory specified acceptance criteria.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). LCSs were reported for each analytical method. The recovery results were within the laboratory specified acceptance criteria, with the following exception.

The LCS recovery of TDS in batch BKJ0322 was low and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of TDS in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-221007	TDS	21200	NA	21200	J	5
BH-GW-26-221007	TDS	29500	NA	29500	J	5
BH-GW-27-221007	TDS	27300	NA	27300	J	5
BH-GW-29-221007	TDS	23000	NA	23000	J	5
BH-GW-29-221007-D	TDS	20600	NA	20600	J	5

mg/L-milligram per liter
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.9 Field Duplicate

One field duplicate sample, BH-GW-29-221007-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-GW-29-221007, with the following exception.

The RPD for TSS in the field duplicate pair was greater than 30%. Therefore, the TSS concentrations in samples BH-GW-29-221007-D and BH-GW-29-221007 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	RPD	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-221007	TSS	6.0	NA	67	6.0	J	7
BH-GW-29-221007-D	TSS	3.0	NA		3.0	J	7

mg/L-milligram per liter
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for sulfide, using sample BH-GW-24-221007. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TOC, using sample BH-GW-24-221007. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TS and TVS, using sample BH-GW-24-221007. The RPD results were within the laboratory specified acceptance criteria.

In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

One equipment blank, BH-EB-GW-221007, was collected during the sample event. The wet chemistry parameters were not detected in the equipment blank above the MDLs.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0154**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of five sediment samples, collected on 10 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Solids (TS) by Standard Methods (SM) 2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0154-01	BH-SC-51-0to2
22J0154-02	BH-SC-51-2to4
22J0154-03	BH-SC-51-4to5.2

Laboratory IDs	Client IDs
22J0154-04	BH-SC-51-5.2to7.2
22J0154-05	BH-SC-51-7.2to9.4

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 0.4 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E and 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.1.2 Analysis Anomaly

Sample BH-SC-51-2to4 was analyzed for PAHs as 1:3 and 1:15 dilution, and both analyses were reported. Phenanthrene, fluoranthene and pyrene were flagged E in the 1:3 analyses to indicate the concentrations were outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the phenanthrene, fluoranthene and pyrene concentrations in sample BH-SC-51-2to4 from the 1:15 dilution were considered for validation. The results for the remaining compounds were considered for validation from the 1:3 analysis. The results not considered for validation were indicated as not reportable in the electronic data deliverable (EDD).

Sample BH-SC-51-4to5.2 was analyzed for PAHs as 1:3 and 1:6 dilutions, and both analyses were reported. Phenanthrene was flagged E in the 1:3 analyses to indicate the concentrations were outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the naphthalene concentration in sample BH-SC-51-4to5.2 from the 1:6 dilution was considered for validation. The results for the remaining compounds were considered for validation from the 1:3 analysis. The results not considered for validation were indicated as not reportable in the EDD.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Dibenzofuran was not reported as SIM-SVOC in the

associated samples. However, the concentrations of benzo(a)pyrene in the associated samples were J qualified as estimated.

The %Ds for 2-methylphenol (-20.9%), benzoic acid (-49.4%) and pentachlorophenol (-23.2%) in the secondary initial calibration standard in batch SKK0205 (SKK0205-ICV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2-methylphenol, pentachlorophenol and benzoic acid in the associated samples were UJ qualified as estimated less than the MDLs, and the concentrations of benzoic acid in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-51-0to2	Benzo(a)pyrene	231	NA	231	J	9
BH-SC-51-2to4	Benzo(a)pyrene	838	NA	838	J	9
BH-SC-51-4to5.2	Benzo(a)pyrene	956	NA	956	J	9
BH-SC-51-5.2to7.2	Benzo(a)pyrene	1.98	J	1.98	J	9
BH-SC-51-7.2to9.4	Benzo(a)pyrene	0.87	J	0.87	J	9
BH-SC-51-0to2	Benzoic Acid	317	NA	317	J	9
BH-SC-51-2to4	Benzoic Acid	163	J	163	J	9
BH-SC-51-4to5.2	Benzoic Acid	86.6	J	86.6	J	9
BH-SC-51-5.2to7.2	Benzoic Acid	38.6	U	38.6	UJ	9
BH-SC-51-7.2to9.4	Benzoic Acid	38.8	U	38.8	UJ	9
BH-SC-51-0to2	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-51-2to4	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-51-4to5.2	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-51-5.2to7.2	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-51-7.2to9.4	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-51-0to2	Pentachlorophenol	30.8	U	30.8	UJ	9
BH-SC-51-2to4	Pentachlorophenol	31	U	31	UJ	9
BH-SC-51-4to5.2	Pentachlorophenol	31	U	31	UJ	9
BH-SC-51-5.2to7.2	Pentachlorophenol	30.9	U	30.9	UJ	9
BH-SC-51-7.2to9.4	Pentachlorophenol	31.1	U	31.1	UJ	9

µg/kg-microgram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0595 and

BKJ0596). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs), with the following exception.

Acenaphthene was detected in the method blank in batch BKJ0596 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated concentration of acenaphthene in the associated sample was U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-51-5.2to7.2	Acenaphthene	0.64	J	4.98	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using sample BH-SC-51-5.2to7.2. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for 2,4-dimethylphenol in the MS/MSD pair using sample BH-SC-51-5.2to7.2 was high and outside of the laboratory specified acceptance criteria. Since 2,4-dimethylphenol was not detected in sample BH-SC-51-5.2to7.2, no qualifications were applied to the data.

The MSD recovery of diethyl phthalate in the MS/MSD pair using sample BH-SC-51-5.2to7.2 was high and outside of the laboratory specified acceptance criteria. Since diethyl phthalate was not detected in sample BH-SC-51-5.2to7.2, no qualifications were applied to the data.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

A field duplicate sample was not collected with the sample set.

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity

✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Arsenic and copper were detected in the calibration blank in batch SKK0060 (SKK0060-CCBG) at estimated concentrations greater than the MDLs and less than the RLs. Since arsenic and copper were detected in the associated sample at concentrations greater than the RLs and based on professional and technical judgment, no qualifications were applied to the data.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0611). Metals were not detected in the method blank above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported.

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

2.10 Laboratory Duplicate

A laboratory duplicate was not reported with the sample set.

2.11 Rinsate Blank

An equipment blank was not collected during the sample event.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Verification
- ✓ Initial and Continuing Calibration Blanks
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Laboratory Duplicate
- ✓ Rinsate Blank
- ⊗ Sensitivity
- ✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0609). Mercury was not detected in the method blank above the MDL.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

3.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

3.10 Laboratory Duplicate

A laboratory duplicate was not reported with the sample set.

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060 and TS by SM2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
TOC	US EPA Method 9060	14 days from collection to analysis

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0372). One method blank was reported for TOC (batch BKJ0388). The wet chemistry parameters were not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for TOC, using sample BH-SC-51-0to2. The RPD result was within the laboratory specified acceptance criteria. However, the MS recovery of TOC in the MS/MSD pair using sample BH-SC-51-0to2 was high and outside of the laboratory specified acceptance criteria. Therefore, the TOC concentration in sample BH-SC-51-0to2 was J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-51-0to2	TOC	11.5	NA	11.5	J+	4

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported for TOC. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for TOC, using sample BH-SC-51-0to2. The RPD result was within the laboratory specified acceptance criteria.

In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by PSEP 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
✓ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

A field duplicate sample was not collected with the sample set.

5.3 Laboratory Triplicate

Batch laboratory triplicates were reported. Since these were batch QC, the results do not affect the samples in this data set and qualifications were not applied to the data.

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0156**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of five sediment samples and one field duplicate sample, collected on 10 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Simultaneously Extracted Metals (SEM) by United States Environmental Protection Agency (USEPA) Methods 3050B/6020B
- Acid Volatile Sulfide (AVS) and Sulfide by Standard Methods (SM) 4500-S2 D-00
- Total Sulfide Solids (TSS) by PSEP 1986
- Total Solids (TS) by SM2540G-97

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exceptions.

The non-detect sulfide results in samples BH-SG-11A-0to10, BH-SG-43-0to10, BH-SG-44-0to10, BH-SG-45-0to10, BH-SG-10A-0to10 and BH-SG-10A-0to10-D were R qualified as rejected due to holding time exceedances.

The qualified data that were not rejected should be used within the limitations of the qualifications. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0156-01	BH-SG-43-0to10
22J0156-02	BH-SG-43-0to10
22J0156-03	BH-SG-44-0to10
22J0156-04	BH-SG-44-0to10
22J0156-05	BH-SG-45-0to10
22J0156-06	BH-SG-45-0to10

Laboratory IDs	Client IDs
22J0156-07	BH-SG-10A-0to10
22J0156-08	BH-SG-10A-0to10
22J0156-09	BH-SG-10A-0to10-D
22J0156-10	BH-SG-10A-0to10-D
22J0156-11	BH-SG-11A-0to10
22J0156-12	BH-SG-11A-0to10

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 1.7 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

1.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

1.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0865). Metals were not detected in the method blank above the method detection limits (MDLs).

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

1.9 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision [relative percent difference (RPD) $\leq$ 50%] was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10, with the following exception.

The RPD for copper in field duplicate pair was greater than 50%. Therefore, based on professional and technical judgement, the copper concentrations in samples BH-SG-10A-0to10-D and BH-SG-10A-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	RPD	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-10A-0to10-D	Copper	1.90	NA	102	1.90	J	7
BH-SG-10A-0to10	Copper	5.85	NA		5.85	J	7

µmol/g- micromole per gram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.10 Laboratory Duplicate

A laboratory duplicate was not reported with the sample set.

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The reporting limits (RLs) met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

1.13 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

2.0 WET CHEMISTRY

The samples were analyzed for AVS and sulfide by SM4500-S2-D00, TSS by PSEP 1986 and TS by SM2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate

✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives, with the following exceptions. The non-detect sulfide results in samples BH-SG-11A-0to10, BH-SG-43-0to10, BH-SG-44-0to10, BH-SG-45-0to10, BH-SG-10A-0to10 and BH-SG-10A-0to10-D were R qualified as rejected due to holding time exceedances. The analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 75%.

2.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses, with the following exceptions.

Analyte	Method	Holding Time
Sulfide	SM4500-S2-D00	7 days from collection to analysis
TS	SM2540G-97	7 days from collection to analysis
TSS	PSEP 1986	7 days from collection to analysis

Samples BH-SG-11A-0to10, BH-SG-43-0to10, BH-SG-44-0to10, BH-SG-45-0to10, BH-SG-10A-0to10 and BH-SG-10A-0to10-D were analyzed for sulfide outside of the holding time criteria. Therefore, the non-detect sulfide results in samples BH-SG-11A-0to10, BH-SG-43-0to10, BH-SG-44-0to10, BH-SG-45-0to10, BH-SG-10A-0to10 and BH-SG-10A-0to10-D were R qualified as rejected.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-11A-0to10	Sulfide	1.05	U,H	1.05	R	2
BH-SG-43-0to10	Sulfide	1.03	U,H	1.03	R	2
BH-SG-44-0to10	Sulfide	1.19	U,H	1.19	R	2
BH-SG-45-0to10	Sulfide	1.13	U,H	1.13	R	2
BH-SG-10A-0to10	Sulfide	1.03	U,H	1.03	R	2
BH-SG-10A-0to10-D	Sulfide	1.15	U,H	1.15	R	2

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
H-laboratory flag indicating hold time violation
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.3 Initial Calibration

The initial calibration requirements were met.

2.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

2.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0372). One method blank was reported for TSS (batch BKJ0409). Two method blanks were reported for sulfide (batches BKJ0462 and BKJ0672). The wet chemistry parameters were not detected in the method blanks above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for sulfide, using sample BH-SG-43-0to10. The RPD result was within the laboratory specified acceptance criteria. However, the recoveries of sulfide in the MS/MSD pair using sample BH-SG-43-0to10 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect sulfide result in sample BH-SG-43-0to10 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-43-0to10	Sulfide	0.072	U	0.072	UJ	4

µmol/g- micromole per gram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported for sulfide. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

One field duplicate sample, BH-SG-10A-0to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicate and the original sample, BH-SG-10A-0to10.

2.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for sulfide, using sample BH-SG-43-0to10. The RPD result was within the laboratory specified acceptance criteria.

In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

2.11 Rinsate Blank

An equipment blank was not collected during the sample event.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0194**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of seven sediment samples, three field duplicate samples and one equipment blank, collected on 11-12 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E and 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E and 3520C/8270E using Selective Ion Monitoring (SIM)
- Metals by US EPA Methods 3050B/6020B and 3010A/6020B
- Mercury by US EPA Method 7471B and 7470A
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Solids (TS) by SM2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0194-01	BH-SC-53-0to1
22J0194-02	BH-SC-53-1to2.4
22J0194-03	BH-SC-53-1to2.4-D
22J0194-04	BH-SC-53-2.4to4.4
22J0194-05	BH-SC-52-0to1.8
22J0194-06	BH-SC-52-0to1.8-D

Laboratory IDs	Client IDs
22J0194-07	BH-SC-52-1.8to2.8
22J0194-08	BH-SC-49-0to0.7
22J0194-09	BH-SC-49-0.7to2.8
22J0194-10	BH-SC-49-0.7to2.8-D
22J0194-11	BH-EB-SC-221012

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 0.6 – 2.1 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
⊗ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the SVOC analysis of a water sample is seven days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with a high bias. Dibenzofuran was not reported as SIM-SVOC in the associated samples. However, the concentrations of benzo(a)pyrene in the associated samples were J qualified as estimated.

The %Ds for 2-methylphenol (-20.9%), benzoic acid (-49.4%) and pentachlorophenol (-23.2%) in the secondary initial calibration standard in batch SKK0205 (SKK0205-ICV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2-methylphenol, pentachlorophenol and benzoic acid in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs), and the concentration of benzoic acid in sample BH-SC-53-0to1 was J qualified as estimated.

The %Ds for benzoic acid (-97.7% and -99.3%) and pentachlorophenol (-79.0% and -82.9%) in the low level CCVs in batch SKK0288 (SKK0288-LCV1 and SKK0288-LCV2) were outside of

laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the MDLs, and the benzoic acid concentration in sample BH-SC-53-0to1 was J qualified as estimated.

The %D for pentachlorophenol (-29.5%) in a bracketing CCV in batch SKK0288 (SKK0288-ICV2) was outside of laboratory specified acceptance criteria with a low bias. Since the associated pentachlorophenol data were previously qualified and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Benzo(a)pyrene	135	D	135	J	9
BH-SC-53-1to2.4	Benzo(a)pyrene	34.6	NA	34.6	J	9
BH-SC-53-1to2.4-D	Benzo(a)pyrene	28.6	NA	28.6	J	9
BH-SC-53-2.4to4.4	Benzo(a)pyrene	21.4	NA	21.4	J	9
BH-SC-52-0to1.8	Benzo(a)pyrene	76.2	D	76.2	J	9
BH-SC-52-0to1.8-D	Benzo(a)pyrene	70.5	D	70.5	J	9
BH-SC-52-1.8to2.8	Benzo(a)pyrene	363	D	363	J	9
BH-SC-49-0to0.7	Benzo(a)pyrene	48.2	NA	48.2	J	9
BH-SC-49-0.7to2.8	Benzo(a)pyrene	196	D	196	J	9
BH-SC-49-0.7to2.8-D	Benzo(a)pyrene	124	D	124	J	9
BH-SC-53-0to1	Benzoic Acid	157	J	157	J	9
BH-SC-53-1to2.4	Benzoic Acid	39	U	39	UJ	9
BH-SC-53-1to2.4-D	Benzoic Acid	39	U	39	UJ	9
BH-SC-53-2.4to4.4	Benzoic Acid	39.1	U	39.1	UJ	9
BH-SC-52-0to1.8	Benzoic Acid	38.9	U	38.9	UJ	9
BH-SC-52-0to1.8-D	Benzoic Acid	39	U	39	UJ	9
BH-SC-52-1.8to2.8	Benzoic Acid	39	U	39	UJ	9
BH-SC-49-0to0.7	Benzoic Acid	39	U	39	UJ	9
BH-SC-49-0.7to2.8	Benzoic Acid	39	U	39	UJ	9
BH-SC-49-0.7to2.8-D	Benzoic Acid	13.5	U	13.5	UJ	9
BH-SC-53-0to1	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SC-53-1to2.4	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SC-53-1to2.4-D	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-53-2.4to4.4	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SC-52-0to1.8	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-52-0to1.8-D	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SC-52-1.8to2.8	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SC-49-0to0.7	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SC-49-0.7to2.8	2-Methylphenol	6.6	U	6.6	UJ	9
BH-SC-49-0.7to2.8-D	2-Methylphenol	2.3	U	2.3	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-53-1to2.4	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-53-1to2.4-D	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-53-2.4to4.4	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-SC-52-0to1.8	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-SC-52-0to1.8-D	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-52-1.8to2.8	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-49-0to0.7	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-49-0.7to2.8	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-49-0.7to2.8-D	Pentachlorophenol	10.8	U	10.8	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four method blanks were reported (batches BKJ0477, BKJ0651, BKJ0478 and BKJ0635). SVOCs and PAHs were not detected in the method blanks above the MDLs.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Two sample set specific MS/MSD pairs were reported, using samples BH-SC-53-1to2.4-D and BH-SC-53-1to2.4. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of N-nitrosodiphenylamine in the MS/MSD pair using sample BH-SC-53-1to2.4-D were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect result of N-nitrosodiphenylamine in sample BH-SC-53-1to2.4-D was UJ qualified as estimated less than the MDL.

One or both of the recoveries of dimethylphthalate, diethyl phthalate, pentachlorophenol, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate in the MS/MSD pair using sample BH-SC-53-1to2.4-D were high and outside of the laboratory specified acceptance criteria. Since these analytes were not detected in sample BH-SC-53-1to2.4-D, no qualifications were applied to the data.

The RPDs for 1,4-dichlorobenzene, 1,2-dichlorobenzene, benzyl alcohol, 2-methylphenol, 2,4-dimethylphenol, 1,2,4-trichlorobenzene, benzoic acid, hexachlorobutadiene, dimethylphthalate, dibenzofuran, diethyl phthalate, n-nitrosodiphenylamine, hexachlorobenzene, pentachlorophenol, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate in the MS/MSD pair using sample BH-SC-53-1to2.4-D were high and outside of the laboratory specified acceptance criteria. Since 1,4-dichlorobenzene, 1,2-dichlorobenzene, benzyl alcohol, 2-methylphenol, 2,4-dimethylphenol, 1,2,4-trichlorobenzene, benzoic acid, hexachlorobutadiene, dimethylphthalate, diethyl phthalate, n-nitrosodiphenylamine, hexachlorobenzene, pentachlorophenol, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate were not detected in sample BH-SC-53-1to2.4-D, no qualifications were applied to the 1,4-dichlorobenzene, 1,2-dichlorobenzene, benzyl alcohol, 2-methylphenol, 2,4-dimethylphenol, 1,2,4-trichlorobenzene, benzoic acid, hexachlorobutadiene, dimethylphthalate, diethyl phthalate, n-nitrosodiphenylamine, hexachlorobenzene, pentachlorophenol, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate data. However, the dibenzofuran concentration in sample BH-SC-53-1to2.4-D was J qualified as estimated.

The MSD recovery of 2-methylphenol in the MS/MSD pair using sample BH-SC-53-1to2.4-D was low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect 2-methylphenol result in sample BH-SC-53-1to2.4-D was UJ qualified as estimated less than the MDL.

The MSD recoveries of benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene in the MS/MSD pair using sample BH-SC-53-1to2.4 were low and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and total (b+k+j) benzofluoranthenes in sample BH-SC-53-1to2.4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-1to2.4	Benzo(b)fluoranthene	24.9	NA	24.9	J	4
BH-SC-53-1to2.4	Benzofluoranthenes, Total (b+k+j)	58.4	NA	58.4	J	4
BH-SC-53-1to2.4	Indeno(1,2,3-cd)pyrene	23.5	NA	23.5	J	4
BH-SC-53-1to2.4	Dibenzo(a,h)anthracene	6.84	NA	6.84	J	4
BH-SC-53-1to2.4-D	2-Methylphenol	6.6	U	6.6	UJ	4
BH-SC-53-1to2.4-D	Dibenzofuran	105	NA	105	J	4

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-1to2.4-D	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of N-nitrosodiphenylamine in the LCS/LCSD pair in batch BKJ0651 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of N-nitrosodiphenylamine in the associated samples were UJ qualified as estimated less than the MDLs.

The RPDs for 2,4-dimethylphenol, benzoic acid, diethyl phthalate, N-nitrosodiphenylamine, pentachlorophenol, di-n-butylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate in the LCS/LCSD pair in batch BKJ0651 were high and outside of the laboratory specified acceptance criteria. Since 2,4-dimethylphenol, N-nitrosodiphenylamine, pentachlorophenol and di-n-octylphthalate were not detected in the associated samples, no qualifications were applied to the 2,4-dimethylphenol, N-nitrosodiphenylamine, pentachlorophenol and di-n-octylphthalate data. However, the concentrations of benzoic acid, diethyl phthalate, di-n-butylphthalate and bis(2-ethylhexyl)phthalate in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Benzoic Acid	157	J	157	J	5
BH-SC-53-0to1	bis(2-ethylhexyl) Phthalate	45.4	J	45.4	J	5
BH-SC-53-1to2.4	bis(2-ethylhexyl) Phthalate	39.5	J	39.5	J	5
BH-SC-49-0to0.7	dibutyl phthalate	32.5	NA	32.5	J	5
BH-SC-53-2.4to4.4	Diethyl phthalate	33.8	J	33.8	J	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-52-0to1.8	Diethyl phthalate	21.9	J	21.9	J	5
BH-SC-52-0to1.8-D	Diethyl phthalate	29.5	J	29.5	J	5
BH-SC-52-1.8to2.8	Diethyl phthalate	26.3	J	26.3	J	5
BH-SC-49-0to0.7	Diethyl phthalate	36.0	J	36.0	J	5
BH-SC-49-0.7to2.8	Diethyl phthalate	22.3	J	22.3	J	5
BH-SC-49-0.7to2.8-D	Diethyl phthalate	14.2	J	14.2	J	5
BH-SC-53-0to1	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-53-1to2.4	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-53-1to2.4-D	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-53-2.4to4.4	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-52-0to1.8	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-52-0to1.8-D	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-52-1.8to2.8	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-49-0to0.7	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-49-0.7to2.8	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5
BH-SC-49-0.7to2.8-D	N-Nitrosodiphenylamine	1.8	U	1.8	UJ	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Three field duplicate samples, BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D and BH-SC-49-0.7to2.8-D, were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated

between the field duplicates and the original samples, BH-SC-53-1to2.4, BH-SC-52-0to1.8 and BH-SC-49-0.7to2.8, respectively, with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the MDL and less than the RL and a concentration greater than the RL, the RPDs were not calculable. Therefore, for these concentrations in the field duplicate pairs the concentrations were J qualified as estimated.

For analytes with both a concentration greater than the MDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-49-0.7to2.8	2-Methylnaphthalene	158	D	99	158	J	7
BH-SC-49-0.7to2.8-D	2-Methylnaphthalene	53.1	D		53.1	J	7
BH-SC-49-0.7to2.8	Acenaphthene	175	D	91	175	J	7
BH-SC-49-0.7to2.8-D	Acenaphthene	65.9	D		65.9	J	7
BH-SC-49-0.7to2.8	Acenaphthylene	122	D	107	122	J	7
BH-SC-49-0.7to2.8-D	Acenaphthylene	37.1	D		37.1	J	7
BH-SC-49-0.7to2.8	Anthracene	194	D	65	194	J	7
BH-SC-49-0.7to2.8-D	Anthracene	98.5	D		98.5	J	7
BH-SC-49-0.7to2.8	Benzo(j)fluoranthene	103	D	58	103	J	7
BH-SC-49-0.7to2.8-D	Benzo(j)fluoranthene	56.6	D		56.6	J	7
BH-SC-49-0.7to2.8	Benzo(k)fluoranthene	87.4	D	52	87.4	J	7
BH-SC-49-0.7to2.8-D	Benzo(k)fluoranthene	51.2	D		51.2	J	7
BH-SC-49-0.7to2.8	Benzofluoranthenes, Total (b+k+j)	323	D	50	323	J	7
BH-SC-49-0.7to2.8-D	Benzofluoranthenes, Total (b+k+j)	193	D		193	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-49-0.7to2.8	Chrysene	282	D	68	282	J	7
BH-SC-49-0.7to2.8-D	Chrysene	139	D		139	J	7
BH-SC-49-0.7to2.8	Dibenzofuran	33.8	NA	68	33.8	J	7
BH-SC-49-0.7to2.8-D	Dibenzofuran	16.7	NA		16.7	J	7
BH-SC-49-0.7to2.8	Fluoranthene	836	D	73	836	J	7
BH-SC-49-0.7to2.8-D	Fluoranthene	388	D		388	J	7
BH-SC-49-0.7to2.8	Fluorene	177	D	79	177	J	7
BH-SC-49-0.7to2.8-D	Fluorene	76.9	D		76.9	J	7
BH-SC-49-0.7to2.8	Naphthalene	1620	D	104	1620	J	7
BH-SC-49-0.7to2.8-D	Naphthalene	514	D		514	J	7
BH-SC-49-0.7to2.8	Phenanthrene	1130	D	104	1130	J	7
BH-SC-49-0.7to2.8-D	Phenanthrene	355	D		355	J	7
BH-SC-49-0.7to2.8	Phenol	17.2	J	NC	17.2	J	7
BH-SC-49-0.7to2.8-D	Phenol	7.9	NA		7.9	J	7
BH-SC-49-0.7to2.8	Pyrene	805	D	82	805	J	7
BH-SC-49-0.7to2.8-D	Pyrene	338	D		338	J	7
BH-SC-52-0to1.8	Acenaphthene	19.3	D	NC	19.3	J	7
BH-SC-52-0to1.8-D	Acenaphthene	13.6	J		13.6	J	7
BH-SC-52-0to1.8	Dibenzofuran	14.1	U	NC	14.1	UJ	7
BH-SC-52-0to1.8-D	Dibenzofuran	17.5	J		17.5	J	7
BH-SC-52-0to1.8	p-cresol	7.4	U	NC	7.4	UJ	7
BH-SC-52-0to1.8-D	p-cresol	43	NA		43	J	7
BH-SC-52-0to1.8	Phenol	4.4	U	NC	4.4	UJ	7
BH-SC-52-0to1.8-D	Phenol	20.8	NA		20.8	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-1to2.4	bis(2-ethylhexyl) Phthalate	39.5	J	NC	39.5	J	7
BH-SC-53-1to2.4-D	bis(2-ethylhexyl) Phthalate	5.4	U		5.4	UJ	7
BH-SC-53-1to2.4	Dibenzofuran	14.1	U	NC	14.1	UJ	7
BH-SC-53-1to2.4-D	Dibenzofuran	105	NA		105	J	7
BH-SC-53-1to2.4	Phenol	4.4	U	NC	4.4	UJ	7
BH-SC-53-1to2.4-D	Phenol	18.6	J		18.6	J	7
BH-SC-53-1to2.4	Acenaphthylene	3.45	J	NC	3.45	J	7
BH-SC-53-1to2.4-D	Acenaphthylene	7.6	NA		7.6	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
D-laboratory flag indicating the reported value is from a dilution
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-SC-221012, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs, with the following exceptions.

Diethyl phthalate, dibutyl phthalate and anthracene were detected in the equipment blank at estimated concentrations greater than the MDLs and less than the RLs. Since diethyl phthalate and dibutyl phthalate were detected in the associated samples at concentrations greater than the soil equivalent of the blank contamination and anthracene was not detected in the associated samples, no qualifications were applied to the data, based on professional and technical judgment.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The surrogate recoveries of base neutral extractable p-terphenyl-d14 in samples BH-SC-53-2.4to4.4, BH-SC-52-0to1.8 and BH-SC-49-0.7to2.8-D were high and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining three base neutral

extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

The surrogate recoveries of base neutral extractables nitrobenzene-d5, 2-fluorobiphenyl and p-terphenyl-d14 in sample BH-SC-49-0to0.7 were high and outside of the laboratory and QAPP specified acceptance criteria. Therefore, the dibenzofuran and dibutyl phthalate concentrations in sample BH-SC-49-0to0.7 were J+ qualified as estimated with high biases.

The surrogate recovery of acid extractable 2-fluorophenol in sample BH-SC-49-0to0.7 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining three acid extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-49-0to0.7	dibutyl phthalate	32.5	NA	32.5	J+	6
BH-SC-49-0to0.7	Dibenzofuran	21.2	NA	21.2	J+	6

µg/kg-microgram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B and 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
⊗ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met, with the following exception.

The r^2 for silver (0.9978) in the initial calibration was less than 0.998. Therefore, based on professional and technical judgment, the non-detect result of silver in the associated sample was UJ qualified as estimated less than the MDL, and the silver concentrations in the associated samples were J qualified as estimated.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Silver	0.12	J	0.12	J	9
BH-SC-53-1to2.4	Silver	0.14	J	0.14	J	9
BH-SC-53-1to2.4-D	Silver	0.11	J	0.11	J	9
BH-SC-53-2.4to4.4	Silver	0.11	J	0.11	J	9
BH-SC-52-0to1.8	Silver	0.15	J	0.15	J	9
BH-SC-52-0to1.8-D	Silver	0.14	J	0.14	J	9
BH-SC-52-1.8to2.8	Silver	0.17	J	0.17	J	9
BH-SC-49-0to0.7	Silver	0.07	J	0.07	J	9
BH-SC-49-0.7to2.8	Silver	0.08	J	0.08	J	9
BH-SC-49-0.7to2.8-D	Silver	0.08	J	0.08	J	9

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-SC-221012	Silver	0.022	U	0.022	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0628 and BKJ0712). Metals were not detected in the method blanks above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SC-53-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of silver in the MS/MSD pair using sample BH-SC-53-0to1 were low and outside of the laboratory specified acceptance criteria. Additionally, the RPD for silver was high and outside of the laboratory specified acceptance criteria. Therefore, the silver concentration in sample BH-SC-53-0to1 was J qualified as estimated.

The MSD recoveries of lead and zinc in the MS/MSD pair using sample BH-SC-53-0to1 were high and outside of the laboratory specified acceptance criteria. Therefore, the lead and zinc concentrations in sample BH-SC-53-0to1 were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Lead	62.0	NA	62.0	J+	4
BH-SC-53-0to1	Silver	0.12	J	0.12	J	4
BH-SC-53-0to1	Zinc	79.1	NA	79.1	J+	4

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

Three field duplicate samples, BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D and BH-SC-49-0.7to2.8-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SC-53-1to2.4, BH-SC-52-0to1.8 and BH-SC-49-0.7to2.8, respectively, with the following exceptions.

The RPDs for arsenic and lead in field duplicate pair BH-SC-53-1to2.4-D/BH-SC-53-1to2.4 were greater than 50%. Therefore, based on professional and technical judgement, the concentrations of

arsenic and lead in samples BH-SC-53-1to2.4-D and BH-SC-53-1to2.4 were J qualified as estimated.

Cadmium was detected in parent sample BH-SC-53-1to2.4 at a concentration greater than the RL and detected in field duplicate sample BH-SC-53-1to2.4-D at an estimated concentration greater than the MDL and less than the RL, resulting in a noncalculable RPD result. Therefore, the cadmium concentrations in samples BH-SC-53-1to2.4-D and BH-SC-53-1to2.4 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-1to2.4	Arsenic	10.3	NA	56	10.3	J	7
BH-SC-53-1to2.4-D	Arsenic	5.77	NA		5.77	J	7
BH-SC-53-1to2.4	Cadmium	0.18	NA	NC	0.18	J	7
BH-SC-53-1to2.4-D	Cadmium	0.10	J		0.10	J	7
BH-SC-53-1to2.4	Lead	85.7	NA	67	85.7	J	7
BH-SC-53-1to2.4-D	Lead	42.5	NA		42.5	J	7

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SC-53-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for arsenic, lead and zinc in the laboratory duplicate using sample BH-SC-53-0to1 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of arsenic, lead and zinc in sample BH-SC-53-0to1 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Arsenic	5.25	NA	5.25	J	12
BH-SC-53-0to1	Lead	62.0	NA	62.0	J	12
BH-SC-53-0to1	Zinc	79.1	NA	79.1	J	12

mg/kg-milligram per kilogram

NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.11 Rinsate Blank

One equipment blank, BH-EB-SC-221012, was collected during the sample event. Metals were not detected in the equipment blank above the MDLs, with the following exceptions.

Chromium and zinc were detected in the equipment blank at estimated concentrations greater than the MDLs and less than the RLs. Since chromium and zinc were detected in the associated samples at concentrations greater than the RLs and based on professional and technical judgment, no qualifications were applied to the data.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7471B and 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
⊗ Initial and Continuing Calibration Blanks
✓ Method Blank

⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the mercury analysis of a solid sample and water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exceptions.

The mercury results in the ICB and bracketing CCBs were more negative than the MDL and less than the RL. Therefore, based on professional and technical judgment, the non-detect mercury result in sample BH-EB-SC-221012 was UJ qualified as estimated less than the MDL.

Mercury was detected in the calibration blank in batch SKJ0375 (SKJ0375-CCB3) at an estimated concentration equal to the MDL. Therefore, based on professional and technical judgment, the mercury concentration in sample BH-SC-52-0to1.8 was J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-SC-221012	Mercury	0.0001	U	0.0001	UJ	3

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-52-0to1.8	Mercury	0.0521	NA	0.0521	J+	3

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0482 and BKJ0705). Mercury was not detected in the method blanks above the MDL.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, using samples BH-EB-SC-221012 and BH-SC-53-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries and RPD for mercury in the MS/MSD pair using sample BH-SC-53-0to1 were high and outside of the laboratory specified acceptance criteria. Additionally, the post spike recovery of mercury in the post spike using sample BH-SC-53-0to1 was within the laboratory specified acceptance criteria. Therefore, the mercury concentration in sample BH-SC-53-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Mercury	0.150	NA	0.150	J	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Three field duplicate samples, BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D and BH-SC-49-0.7to2.8-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SC-53-1to2.4, BH-SC-52-0to1.8 and BH-SC-49-0.7to2.8, respectively.

3.10 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported using samples BH-EB-SC-221012 and BH-SC-53-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for mercury in the laboratory duplicate using sample BH-SC-53-0to1 was high and outside of the laboratory specified acceptance criteria. Therefore, the mercury concentration in sample BH-SC-53-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-53-0to1	Mercury	0.150	NA	0.150	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

One equipment blank, BH-EB-SC-221012, was collected during the sample event. Mercury was not detected in the equipment blank above the MDL.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect

results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060 and TS by SM2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
TOC	US EPA Method 9060	14 days from collection to analysis in sediment samples 28 days from collection to analysis in preserved water samples

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0413). One method blank was reported for TOC (batch BKJ0388). The wet chemistry parameters were not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported for TOC. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Three field duplicate samples, BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D and BH-SC-49-0.7to2.8-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SC-53-1to2.4, BH-SC-52-0to1.8 and BH-SC-49-0.7to2.8, respectively, with the following exception.

The RPD for TOC in field duplicate pair BH-SC-52-0to1.8-D/ BH-SC-52-0to1.8 was greater than 50%. Therefore, based on professional and technical judgement, the TOC concentrations in samples BH-SC-52-0to1.8-D and BH-SC-52-0to1.8 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	RPD	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-52-0to1.8	TOC	2.34	NA	52	2.34	J	7
BH-SC-52-0to1.8-D	TOC	1.38	NA		1.38	J	7

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.10 Laboratory Duplicate

A laboratory duplicate was not reported with the sample set.

4.11 Rinsate Blank

One equipment blank, BH-EB-SC-221012, was collected during the sample event. The equipment blank was not analyzed for wet chemistry parameters.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by PSEP 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
✓ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

Three field duplicate samples, BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D and BH-SC-49-0.7to2.8-D, were collected with the sample sets. The field duplicates were not analyzed for grain size.

5.3 Laboratory Triplicate

Batch laboratory duplicates were reported. Since these were batch QC, the results do not affect the samples in this data set and qualifications were not applied to the data.

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0195**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of one sediment sample and one equipment blank, collected on 11-12 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E and 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E and 3520C/8270E using Selective Ion Monitoring (SIM)
- Simultaneously Extracted Metals (SEM) by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B and 7470A
- Total Organic Carbon (TOC) by US EPA Method 9060
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500-NH3 H-97
- Acid Volatile Sulfide (AVS) and Sulfide by SM 4500-S2 D-00
- Total Solids (TS) by SM2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22J0195-01	BH-SG-53-0to10
22J0195-02	BH-SG-53-0to10

Laboratory IDs	Client IDs
22J0195-03	BH-EB-SG-221012

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 0.3 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

There was time discrepancy between the relinquished by and received by times on the chain of custody (COC).

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
⊗ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the SVOC analysis of a water sample is seven days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The %Ds between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The percent difference or % drift (%D) for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with a high bias. Dibenzofuran was not reported as SIM-SVOC in the associated samples. However, the concentration of benzo(a)pyrene in the associated sample was J qualified as estimated.

The %Ds for benzoic acid (-97.7% and -99.3%) and pentachlorophenol (-79.0% and -82.9%) in the low level CCVs in batch SKK0288 (SKK0288-LCV1 and SKK0288-LCV2) were outside of laboratory specified acceptance criteria with a low bias. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated sample were UJ qualified as estimated less than the method detection limits (MDLs).

The %D for pentachlorophenol (-29.5%) in the low level CCV in batch SKK0288 (SKK0288-ICV2) was outside of laboratory specified acceptance criteria with a low bias. Since the associated

pentachlorophenol data were previously qualified and based on professional and technical judgment, no qualifications were applied to the data

The %Ds for 2-methylphenol (-20.9%), benzoic acid (-49.4%) and pentachlorophenol (-23.2%) in the secondary initial calibration standard in batch SKK0205 (SKK0205-ICV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2-methylphenol, pentachlorophenol and benzoic acid in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	Benzoic Acid	39	U	39	UJ	9
BH-SG-53-0to10	Benzo(a)pyrene	8.55	J	8.55	J	9
BH-SG-53-0to10	2-Methylphenol	6.7	U	6.7	UJ	9
BH-SG-53-0to10	Pentachlorophenol	31.2	U	31.2	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four method blanks were reported (batches BKJ0477, BKJ0651, BKJ0478 and BKJ0635). SVOCs and PAHs were not detected in the method blanks above the MDLs.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of N-nitrosodiphenylamine in the LCS/LCSD pair in batch BKJ0651 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect result of N-nitrosodiphenylamine in the associated sample was UJ qualified as estimated less than the MDL.

The RPDs for 2,4-dimethylphenol, benzoic acid, diethyl phthalate, N-nitrosodiphenylamine, pentachlorophenol, di-n-butylphthalate, bis(2-ethylhexyl)phthalate and di-n-octylphthalate in the LCS/LCSD pair in batch BKJ0651 were high and outside of the laboratory specified acceptance criteria. Since 2,4-dimethylphenol, benzoic acid, N-nitrosodiphenylamine, pentachlorophenol and di-n-octylphthalate were not detected in the associated samples, no qualifications were applied to the 2,4-dimethylphenol, benzoic acid, N-nitrosodiphenylamine, pentachlorophenol and di-n-octylphthalate data. However, the concentrations of diethyl phthalate, di-n-butylphthalate and bis(2-ethylhexyl)phthalate in the associated sample were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	bis(2-ethylhexyl) Phthalate	15.4	J	15.4	J	5
BH-SG-53-0to10	dibutyl phthalate	20.6	NA	20.6	J	5
BH-SG-53-0to10	Diethyl phthalate	35.2	J	35.2	J	5
BH-SG-53-0to10	N-Nitrosodiphenylamine	5.3	U	5.3	UJ	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

A field duplicate sample was not collected with the sample set.

1.11 Rinsate Blank

One equipment blank, BH-EB-SG-221012, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B and 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total

number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met, with the following exception.

The r^2 for silver (0.9978) in the initial calibration was less than 0.998. Therefore, based on professional and technical judgment, the non-detect result of silver in the associated sample was UJ qualified as estimated less than the MDL, and the silver concentrations in the associated samples were J qualified as estimated.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	Silver	0.11	J	0.11	J	9

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	Silver	0.008	U	0.008	UJ	9

µmol/g-micromole per gram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-SG-221012	Silver	0.022	U	0.022	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Cadmium was detected in the calibration blank in batch SKL0177 (SKL0177-CCBN) at an estimated concentration greater than the MDL and less than the RL. Since the calibration blanks and instrument blanks bracketing the cadmium data in the associated samples were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits, with the following exception.

The recovery of zinc in a CCV in batch SKL0245 (SKL0245-CCVR) was high and outside of the method specified acceptance criteria. Since the CCVs bracketing the associated samples were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches BKJ0628, BKJ0712 and BKJ0865). Metals were not detected in the method blanks above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported.

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

2.10 Laboratory Duplicate

Laboratory duplicates were not reported.

2.11 Rinsate Blank

One equipment blank, BH-EB-SG-221012, was collected during the sample event. Metals were not detected in the equipment blank above the MDLs, with the following exceptions.

Chromium, copper, lead and zinc were detected in the equipment blank at estimated concentrations greater than the MDLs and less than the RLs. Since chromium, copper, lead and zinc were detected in the associated sample at concentrations greater than the RLs and based on professional and technical judgment, no qualifications were applied to the data.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7471B and 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times

✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
⊗ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the mercury analysis of a solid and water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exceptions.

The mercury results in the ICB and bracketing CCBs were more negative than the MDL and less than the RL. Therefore, based on professional and technical judgment, the non-detect mercury result in sample BH-EB-SG-221012 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-SG-221012	Mercury	0.0001	U	0.0001	UJ	3

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0482 and BKJ0705). Mercury was not detected in the method blanks above the MDL, with the following exception.

Mercury was detected in the method blank in batch BKJ0705 at an estimated concentration greater than the MDL and less than the RL. Since mercury was detected in the associated sample at a concentration greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

3.10 Laboratory Duplicate

Laboratory duplicates were not reported.

3.11 Rinsate Blank

One equipment blank, BH-EB-SG-221012, was collected during the sample event. Mercury was not detected in the equipment blank above the MDL.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060, TS by SM2540G-97, AVS and sulfide by SM4500-S2-D00, TSS and VS by PSEP 1986 and ammonia as N by SM 4500-NH3.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to

the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
Sulfide	SM4500-S2-D00	7 days from collection to analysis
TSS and VS	PSEP 1986	7 days from collection to analysis
Ammonia as N	SM4500-NH3	7 days from collection to analysis
TOC	US EPA Method 9060	14 days from collection to analysis

The holding times were met for the sample analyses, with the following exception.

Sample BH-SG-53-0to10 was analyzed for VS outside of the holding time criteria. Therefore, the VS concentration in sample BH-SG-53-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	VS	4.83	H	4.83	J	2

%-percent
H-laboratory flag indicating hold time was exceeded
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0372).

One method blank was reported for TOC (batch BKJ0388). One method blank was reported for ammonia as N (batch BKJ04010). One method blank was reported for TSS (batch BKJ0409). Two method blanks were reported for sulfide (batches BKJ0462 and BKJ0672). One method blank was reported for TS/VS (batch BKJ0696). The wet chemistry parameters were not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for ammonia as N, using sample BH-SG-53-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported for TOC. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

4.10 Laboratory Duplicate

Sample set specific laboratory duplicates were reported for ammonia as N, TSS, TS/VS using sample BH-SG-53-0to10. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for VS in the laboratory duplicate using sample BH-SG-53-0to10 was high and outside of the laboratory specified acceptance criteria. Therefore, the VS concentration in sample BH-SG-53-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	VS	4.83	H	4.83	J	12

%-percent
H-laboratory flag indicating hold time was exceeded
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.11 Rinsate Blank

One equipment blank, BH-EB-SG-221012, was collected during the sample event. The equipment blank was not analyzed for wet chemistry parameters.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by PSEP 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

A field duplicate sample was not collected with the sample set.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-SG-53-0to10. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for Phi Scale -1 to 0, Phi Scale 0 to 1, Phi Scale 1 to 2, Phi Scale 2 to 3, Phi Scale 3 to 4, Phi Scale 4 to 5, Phi Scale 5 to 6, Sand and Silt in laboratory triplicate using sample BH-SG-53-0to10 were greater than 20%. Therefore, the results for these particle sizes in sample BH-SG-53-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-53-0to10	Particle/Grain Size, Phi Scale -1 to 0	0.50	NA	0.50	J	12
BH-SG-53-0to10	Particle/Grain Size, Phi Scale 0 to 1	0.10	NA	0.10	J	12
BH-SG-53-0to10	Particle/Grain Size, Phi Scale 1 to 2	0.30	NA	0.30	J	12
BH-SG-53-0to10	Particle/Grain Size, Phi Scale 2 to 3	0.20	NA	0.20	J	12
BH-SG-53-0to10	Particle/Grain Size, Phi Scale 3 to 4	0.10	NA	0.10	J	12
BH-SG-53-0to10	Particle/Grain Size, Phi Scale 4 to 5	0.70	NA	0.70	J	12
BH-SG-53-0to10	Particle/Grain Size, Phi Scale 5 to 6	0.80	NA	0.80	J	12
BH-SG-53-0to10	Particle/Grain Size, Sand	1.20	NA	1.20	J	12
BH-SG-53-0to10	Particle/Grain Size, Silt	1.50	NA	1.50	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0225**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of six sediment samples, collected on 12-13 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Simultaneously Extracted Metals (SEM) by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B
- Total Organic Carbon (TOC) by US EPA Method 9060
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500-NH3 H-97
- Acid Volatile Sulfide (AVS) and Sulfide by SM 4500-S2 D-00
- Total Sulfide Solids (TSS) and Volatile Solids (VS) by PSEP 1986
- Total Solids (TS) by SM2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following sample was analyzed in the data set.

Laboratory IDs	Client IDs
22J0225-01	BH-SG-49-0to10
22J0225-02	BH-SG-49-0to10
22J0225-03	BH-SG-46-0to10
22J0225-04	BH-SG-46-0to10
22J0225-05	BH-SG-47-0to10
22J0225-06	BH-SG-47-0to10

Laboratory IDs	Client IDs
22J0225-07	BH-SG-48-0to10
22J0225-08	BH-SG-48-0to10
22J0225-09	BH-SG-54-0to10
22J0225-10	BH-SG-54-0to10
22J0225-11	BH-SG-55-0to10
22J0225-12	BH-SG-55-0to10

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 2.8 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E and 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Dibenzofuran was not reported as SIM-SVOC in the associated samples. However, the concentrations of benzo(a)pyrene in the associated samples were J qualified as estimated.

The %Ds for benzoic acid (-97.6%) and pentachlorophenol (-91.7%) in the low level CCV in batch SKK0292 (SKK0292-LCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs), and the benzoic acid concentrations in samples BH-SG-46-0to10 and BH-SG-47-0to10 were J qualified as estimated.

The %Ds for 2-methylphenol (-20.9%), benzoic acid (-49.4%) and pentachlorophenol (-23.2%) in the secondary initial calibration standard in batch SKK0205 (SKK0205-ICV1) were outside of

laboratory specified acceptance criteria with low biases. Since the secondary initial calibration standard was reanalyzed in batch SKK0292 to bracket the associated samples and based on professional and technical judgment, no qualifications were applied to the data.

The %D for pentachlorophenol (-32.7%) in a CCV in batch SKK0292 (SKK0292-ICV1) was outside of laboratory specified acceptance criteria with low biases. Since the pentachlorophenol data in the associated samples were previously qualified for low level CCV exceedances, no additional qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-49-0to10	Benzo(a)pyrene	16.3	NA	16.3	J	9
BH-SG-46-0to10	Benzo(a)pyrene	573	NA	573	J	9
BH-SG-47-0to10	Benzo(a)pyrene	68.6	NA	68.6	J	9
BH-SG-48-0to10	Benzo(a)pyrene	102	NA	102	J	9
BH-SG-54-0to10	Benzo(a)pyrene	83.6	NA	83.6	J	9
BH-SG-55-0to10	Benzo(a)pyrene	130	NA	130	J	9
BH-SG-49-0to10	Benzoic Acid	39	U	39	UJ	9
BH-SG-46-0to10	Benzoic Acid	139	J	139	J	9
BH-SG-47-0to10	Benzoic Acid	39.7	J	39.7	J	9
BH-SG-48-0to10	Benzoic Acid	39	U	39	UJ	9
BH-SG-54-0to10	Benzoic Acid	39	U	39	UJ	9
BH-SG-55-0to10	Benzoic Acid	39	U	39	UJ	9
BH-SG-49-0to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SG-46-0to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SG-47-0to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SG-48-0to10	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SG-54-0to10	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-SG-55-0to10	Pentachlorophenol	31.3	U	31.3	UJ	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0664 and BKJ0665). SVOCs and PAHs were not detected in the method blanks above the MDLs, with the following exceptions.

Phenol and diethyl phthalate were detected in the method blank in batch BKJ0664 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of diethyl phthalate in the associated samples were U qualified as not detected at the RLs, and the phenol concentrations in samples BH-SG-54-0to10 and BH-SG-55-0to10 were J+ qualified as estimated with a high bias.

Naphthalene, 2-methylnaphthalene, acenaphthene and fluorene were detected in the method blank in batch BKJ0665 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of naphthalene, 2-methylnaphthalene, acenaphthene and fluorene in the associated samples were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-46-0to10	Diethyl phthalate	46.4	J	50	U	3
BH-SG-47-0to10	Diethyl phthalate	32.7	J	49.9	U	3
BH-SG-48-0to10	Diethyl phthalate	38.7	J	49.9	U	3
BH-SG-49-0to10	2-Methylnaphthalene	2.04	J	4.99	U	3
BH-SG-49-0to10	Acenaphthene	2.16	J	4.99	U	3
BH-SG-49-0to10	Diethyl phthalate	35.9	J	50	U	3
BH-SG-49-0to10	Fluorene	2.33	J	4.99	U	3
BH-SG-54-0to10	2-Methylnaphthalene	14.9	J,D	15	U	3
BH-SG-54-0to10	Diethyl phthalate	20.8	J	50	U	3
BH-SG-54-0to10	Phenol	27.8	NA	27.8	J+	3
BH-SG-55-0to10	2-Methylnaphthalene	8.69	J,D	15	U	3
BH-SG-55-0to10	Diethyl phthalate	29.8	J	50	U	3
BH-SG-55-0to10	Phenol	39.7	NA	39.7	J+	3

µg/kg-microgram per kilogram
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for benzoic acid in the LCS/LCSD pair in batch BKJ0664 was high and outside of the laboratory specified acceptance criteria. Therefore, the benzoic acid concentrations in the associated samples were J qualified as estimated.

One or both of the recoveries of naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene in the LCS/LCSD pair in batch BKJ0665 were low and outside of the laboratory specified acceptance criteria. Additionally, the RPDs for naphthalene, 2-methylnaphthalene and acenaphthylene were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and total(b+k+j) benzofluoranthenes in the associated samples were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-49-0to10	Acenaphthylene	2.39	J	2.39	J	5
BH-SG-49-0to10	Phenanthrene	16.5	NA	16.5	J	5
BH-SG-49-0to10	Anthracene	4.19	J	4.19	J	5
BH-SG-49-0to10	Pyrene	22.1	NA	22.1	J	5
BH-SG-49-0to10	Benzo(b)fluoranthene	10.0	NA	10.0	J	5
BH-SG-49-0to10	Benzofluoranthenes, Total (b+k+j)	23.3	NA	23.3	J	5
BH-SG-49-0to10	Benzo(a)pyrene	16.3	NA	16.3	J	5
BH-SG-49-0to10	Indeno(1,2,3-cd)pyrene	13.1	NA	13.1	J	5
BH-SG-49-0to10	Dibenzo(a,h)anthracene	3.73	J	3.73	J	5
BH-SG-49-0to10	2-Methylnaphthalene	2.04	J	2.04	J	5
BH-SG-49-0to10	Acenaphthene	2.16	J	2.16	J	5
BH-SG-49-0to10	Fluorene	2.33	J	2.33	J	5
BH-SG-49-0to10	Naphthalene	14.2	NA	14.2	J	5
BH-SG-46-0to10	Benzoic Acid	139	J	139	J	5
BH-SG-46-0to10	2-Methylnaphthalene	82.9	D	82.9	J	5
BH-SG-46-0to10	Acenaphthylene	192	D	192	J	5
BH-SG-46-0to10	Phenanthrene	430	D	430	J	5
BH-SG-46-0to10	Anthracene	109	D	109	J	5
BH-SG-46-0to10	Pyrene	476	D	476	J	5
BH-SG-46-0to10	Benzo(b)fluoranthene	297	D	297	J	5
BH-SG-46-0to10	Benzofluoranthenes, Total (b+k+j)	617	D	617	J	5
BH-SG-46-0to10	Benzo(a)pyrene	573	D	573	J	5
BH-SG-46-0to10	Indeno(1,2,3-cd)pyrene	441	D	441	J	5
BH-SG-46-0to10	Dibenzo(a,h)anthracene	100	D	100	J	5
BH-SG-46-0to10	Acenaphthene	47.8	D	47.8	J	5
BH-SG-46-0to10	Fluorene	67.2	D	67.2	J	5
BH-SG-46-0to10	Naphthalene	781	D	781	J	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-47-0to10	Benzoic Acid	39.7	J	39.7	J	5
BH-SG-47-0to10	2-Methylnaphthalene	27.1	D	27.1	J	5
BH-SG-47-0to10	Acenaphthylene	35.1	D	35.1	J	5
BH-SG-47-0to10	Acenaphthene	18.1	D	18.1	J	5
BH-SG-47-0to10	Phenanthrene	165	D	165	J	5
BH-SG-47-0to10	Anthracene	31.9	D	31.9	J	5
BH-SG-47-0to10	Pyrene	176	D	176	J	5
BH-SG-47-0to10	Benzo(b)fluoranthene	45.6	D	45.6	J	5
BH-SG-47-0to10	Benzofluoranthenes, Total (b+k+j)	106	D	106	J	5
BH-SG-47-0to10	Benzo(a)pyrene	68.6	D	68.6	J	5
BH-SG-47-0to10	Indeno(1,2,3-cd)pyrene	61.8	D	61.8	J	5
BH-SG-47-0to10	Dibenzo(a,h)anthracene	12.6	J,D	12.6	J	5
BH-SG-47-0to10	Fluorene	22.9	D	22.9	J	5
BH-SG-47-0to10	Naphthalene	300	D	300	J	5
BH-SG-48-0to10	2-Methylnaphthalene	57.5	D	57.5	J	5
BH-SG-48-0to10	Acenaphthene	42.7	D	42.7	J	5
BH-SG-48-0to10	Acenaphthylene	65.9	D	65.9	J	5
BH-SG-48-0to10	Phenanthrene	368	D	368	J	5
BH-SG-48-0to10	Anthracene	78.3	D	78.3	J	5
BH-SG-48-0to10	Pyrene	349	D	349	J	5
BH-SG-48-0to10	Benzo(b)fluoranthene	66.5	D	66.5	J	5
BH-SG-48-0to10	Benzofluoranthenes, Total (b+k+j)	160	D	160	J	5
BH-SG-48-0to10	Benzo(a)pyrene	102	D	102	J	5
BH-SG-48-0to10	Indeno(1,2,3-cd)pyrene	79.6	D	79.6	J	5
BH-SG-48-0to10	Dibenzo(a,h)anthracene	17.4	D	17.4	J	5
BH-SG-48-0to10	Fluorene	47.4	D	47.4	J	5
BH-SG-48-0to10	Naphthalene	581	D	581	J	5
BH-SG-54-0to10	Acenaphthene	16.3	D	16.3	J	5
BH-SG-54-0to10	2-Methylnaphthalene	14.9	J,D	14.9	J	5
BH-SG-54-0to10	Acenaphthylene	23.1	D	23.1	J	5
BH-SG-54-0to10	Phenanthrene	124	D	124	J	5
BH-SG-54-0to10	Anthracene	42.0	D	42.0	J	5
BH-SG-54-0to10	Pyrene	191	D	191	J	5
BH-SG-54-0to10	Benzo(b)fluoranthene	62.6	D	62.6	J	5
BH-SG-54-0to10	Benzofluoranthenes, Total (b+k+j)	140	D	140	J	5
BH-SG-54-0to10	Benzo(a)pyrene	83.6	D	83.6	J	5
BH-SG-54-0to10	Indeno(1,2,3-cd)pyrene	54.6	D	54.6	J	5
BH-SG-54-0to10	Dibenzo(a,h)anthracene	14.2	J,D	14.2	J	5
BH-SG-54-0to10	Fluorene	22.4	D	22.4	J	5
BH-SG-54-0to10	Naphthalene	60.6	D	60.6	J	5
BH-SG-55-0to10	Acenaphthene	16.5	D	16.5	J	5
BH-SG-55-0to10	2-Methylnaphthalene	8.69	J,D	8.69	J	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-55-0to10	Acenaphthylene	18.5	D	18.5	J	5
BH-SG-55-0to10	Phenanthrene	148	D	148	J	5
BH-SG-55-0to10	Anthracene	44.7	D	44.7	J	5
BH-SG-55-0to10	Pyrene	281	D	281	J	5
BH-SG-55-0to10	Benzo(b)fluoranthene	89.2	D	89.2	J	5
BH-SG-55-0to10	Benzofluoranthenes, Total (b+k+j)	203	D	203	J	5
BH-SG-55-0to10	Benzo(a)pyrene	130	D	130	J	5
BH-SG-55-0to10	Indeno(1,2,3-cd)pyrene	76.4	D	76.4	J	5
BH-SG-55-0to10	Dibenzo(a,h)anthracene	21.1	D	21.1	J	5
BH-SG-55-0to10	Fluorene	18.7	D	18.7	J	5
BH-SG-55-0to10	Naphthalene	27.2	D	27.2	J	5

µg/kg-microgram per kilogram
D-laboratory flag indicating the reported value is from a dilution
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

A field duplicate sample was not collected with the sample set.

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exception.

The surrogate recovery of base neutral extractable 2-methylnaphthalene-d10 in sample BH-SG-47-0to10 was low and outside of the laboratory and QAPP specified acceptance criteria. Since the recoveries of the remaining two base neutral extractable surrogates were within the laboratory specified acceptance criteria and based on professional and technical judgment, no qualifications were applied to the data.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total

number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exception.

Lead was detected in the instrument blank in batch SKK0136 (SKK0136-CCB8) at an estimated concentration greater than the MDL and less than the RL. Since lead was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0719 and BKJ0865). Metals were not detected in the method blanks above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SG-47-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The SEM recoveries of copper, zinc and lead in the MS/MSD pair using sample BH-SG-47-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of SEM copper, zinc and lead in sample BH-SG-47-0to10 were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-47-0to10	Copper	0.88	D	0.88	J+	4
BH-SG-47-0to10	Lead	16.6	D	16.6	J+	4
BH-SG-47-0to10	Zinc	5.6	D	5.6	J+	4

µmol/g-micromole per gram
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

2.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SG-47-0to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for SEM copper, lead, cadmium and zinc in the laboratory duplicate using sample BH-SG-47-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of copper, lead, cadmium and zinc in sample BH-SG-47-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-47-0to10	Copper	0.88	D	0.88	J	12
BH-SG-47-0to10	Cadmium	0.07	D	0.07	J	12
BH-SG-47-0to10	Lead	16.6	D	16.6	J	12
BH-SG-47-0to10	Zinc	5.6	D	5.6	J	12

µmol/g-micromole per gram
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.11 Rinsate Blank

An equipment blank was not collected during the sample event.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks

✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the mercury analysis of a solid sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKJ0705). Mercury was not detected in the method blank above the MDL.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

3.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

3.10 Laboratory Duplicate

Laboratory duplicates were not reported.

3.11 Rinsate Blank

An equipment blank was not collected during the sample event.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060, TS by SM2540G-97, AVS and sulfide by SM4500-S2-D00, TSS and VS by PSEP 1986 and ammonia as N by SM 4500-NH3.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
Sulfide	SM4500-S2-D00	7 days from collection to analysis
TSS and VS	PSEP 1986	7 days from collection to analysis
Ammonia as N	SM4500-NH3	7 days from collection to analysis
TOC	US EPA Method 9060	14 days from collection to analysis

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0372). One method blank was reported for TOC (batch BKJ0424). One method blank was reported for ammonia as N (batch BKJ0521). One method blank was reported for TSS (batch BKJ0501). Two method blanks were reported for sulfide (batches BKJ0462 and BKJ0672). One method blank was reported for TS/VS (batch BKJ0502). The wet chemistry parameters were not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for sulfide, using sample BH-SG-49-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). An LCS was reported for each analytical method. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

A field duplicate sample was not collected with the sample set.

4.10 Laboratory Duplicate

Sample set specific laboratory duplicates were reported for sulfide, TSS and ammonia as N, TS/VS using sample BH-SG-49-0to10. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for total sulfide in the laboratory duplicate using sample BH-SG-49-0to10 was high and outside of the laboratory specified acceptance criteria. Therefore, the total sulfide concentration in sample BH-SG-49-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-49-0to10	Sulfide	22.3	NA	22.3	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.11 Rinsate Blank

An equipment blank was not collected during the sample event.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by PSEP 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total

number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

Three field duplicate samples, BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D and BH-SC-49-0.7to2.8-D, were collected with the sample sets. The field duplicates were not analyzed for grain size.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-SG-46-0to10. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for Phi Scale -2.25 to -2, Phi Scale <-2.25, Phi Scale 3 to 4, Phi Scale 4 to 5, Phi Scale 5 to 6, Phi Scale 7 to 8, Phi Scale 9 to 10, Gravel and Silt in laboratory triplicate using sample BH-SG-46-0to10 were greater than 20%. Therefore, the results for these particle sizes in sample BH-SG-46-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier	Reason Code
BH-SG-46-0to10	Particle/Grain Size, Phi Scale -2.25 to -2	0.60	NA	0.60	J	12
BH-SG-46-0to10	Particle/Grain Size, Phi Scale <-2.25	3.50	NA	3.50	J	12
BH-SG-46-0to10	Particle/Grain Size, Phi Scale 3 to 4	16.1	NA	16.1	J	12
BH-SG-46-0to10	Particle/Grain Size, Phi Scale 4 to 5	10.1	NA	10.1	J	12
BH-SG-46-0to10	Particle/Grain Size, Phi Scale 5 to 6	2.30	NA	2.30	J	12
BH-SG-46-0to10	Particle/Grain Size, Phi Scale 7 to 8	3.00	NA	3.00	J	12
BH-SG-46-0to10	Particle/Grain Size, Phi Scale 9 to 10	1.60	NA	1.60	J	12
BH-SG-46-0to10	Particle/Grain Size, Gravel	5.80	NA	5.80	J	12
BH-SG-46-0to10	Particle/Grain Size, Silt	18.2	NA	18.2	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	24 May 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Julia Klens Caprio, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22J0226**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of five sediment samples, two field duplicate samples and one equipment blank, collected on 12 October 2022, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E and 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E and 3520C/8270E using Selective Ion Monitoring (SIM)
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B and 7470A
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Solids (TS) by SM2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives, with the following exception.

The non-detect result of benzoic acid in sample BH-SC-54-2.8to4 was R qualified as rejected due to less than 10% matrix spike duplicate (MSD) recovery.

The qualified data that were not rejected should be used within the limitations of the qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following sample was analyzed in the data set.

Laboratory IDs	Client IDs
22J0226-01	BH-SC-54-0to1
22J0226-02	BH-SC-54-1to2.8
22J0226-03	BH-SC-54-2.8to4
22J0226-04	BH-SC-54-4to6.6

Laboratory IDs	Client IDs
22J0226-05	BH-SC-54-4to6.6-D
22J0226-06	BH-SC-54-6.6to8.8
22J0226-07	BH-SC-54-6.6to8.8-D
22J0226-08	BH-EB-SC2-221012

The solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 0.6 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

It was noted that there were discrepancies between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by USEPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by USEPA Method 8270E.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E, 3510C/8270E, 3546/8270E SIM and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
⊗ Rinsate Blank
⊗ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives, with the following exception. The non-detect result of benzoic acid in sample BH-SC-54-2.8to4 was R qualified as rejected due to less than 10% MSD recovery. The analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 99.6%.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding time for the SVOC analysis of a water sample is seven days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for dibenzofuran (27.7%) and benzo(a)pyrene (26.5%) in the secondary initial calibration standard in batch SKD0159 (SKD0159-SCV1) were outside of validation specified acceptance criteria with high biases. Dibenzofuran was not reported as SIM-SVOC in the associated samples. However, the concentrations of benzo(a)pyrene in the associated samples were J qualified as estimated.

The %Ds for benzoic acid (-97.6%) and pentachlorophenol (-91.7%) in the low level CCV in batch SKK0292 (SKK0292-LCV1) were outside of laboratory specified acceptance criteria with low

biases. Therefore, the non-detect results of benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the MDLs.

The %Ds for 2-methylphenol (-20.9%), benzoic acid (-49.4%) and pentachlorophenol (-23.2%) in the secondary initial calibration standard in batch SKK0205 (SKK0205-ICV1) were outside of laboratory specified acceptance criteria with low biases. Since the secondary initial calibration standard was reanalyzed in batch SKK0292 to bracket the associated samples and based on professional and technical judgment, no qualifications were applied to the data.

The %D for pentachlorophenol (-32.7%) in secondary initial calibration standard in batch SKK0292 (SKK0292-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the pentachlorophenol data in the associated samples were previously qualified for low level CCV exceedances, no additional qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Benzo(a)pyrene	109	D	109	J	9
BH-SC-54-1to2.8	Benzo(a)pyrene	4.89	J	4.89	J	9
BH-SC-54-0to1	Benzoic Acid	38.9	U	38.9	UJ	9
BH-SC-54-1to2.8	Benzoic Acid	38.9	U	38.9	UJ	9
BH-SC-54-2.8to4	Benzoic Acid	39	U	39	UJ	9
BH-SC-54-4to6.6	Benzoic Acid	39.1	U	39.1	UJ	9
BH-SC-54-4to6.6-D	Benzoic Acid	38.9	U	38.9	UJ	9
BH-SC-54-6.6to8.8	Benzoic Acid	39	U	39	UJ	9
BH-SC-54-6.6to8.8-D	Benzoic Acid	39	U	39	UJ	9
BH-SC-54-0to1	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-SC-54-1to2.8	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-54-2.8to4	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-SC-54-4to6.6	Pentachlorophenol	31.3	U	31.3	UJ	9
BH-SC-54-4to6.6-D	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-54-6.6to8.8	Pentachlorophenol	31.2	U	31.2	UJ	9
BH-SC-54-6.6to8.8-D	Pentachlorophenol	31.2	U	31.2	UJ	9

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four method blanks were reported (batches BKJ0477,

BKJ0664, BKJ0478 and BKJ0665). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs), with the following exceptions.

Phenol and diethyl phthalate were detected in the method blank in batch BKJ0664 at estimated concentrations greater than the MDLs and less than the reporting limits (RLs). Therefore, the estimated concentrations of diethyl phthalate and phenol in the associated samples were U qualified as not detected at the RLs, and the phenol concentration in sample BH-SC-54-0to1 was J+ qualified as estimated with a high bias.

Naphthalene, 2-methylnaphthalene, acenaphthene and fluorene were detected in the method blank in batch BKJ0665 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of naphthalene, 2-methylnaphthalene, acenaphthene and fluorene in the associated samples were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Phenol	20.5	NA	20.5	J+	3
BH-SC-54-0to1	2-Methylnaphthalene	13.4	J,D	15	U	3
BH-SC-54-0to1	Acenaphthene	13.4	J,D	15	U	3
BH-SC-54-0to1	Diethyl phthalate	47.1	J	49.8	U	3
BH-SC-54-1to2.8	Naphthalene	1.43	J	4.98	U	3
BH-SC-54-1to2.8	Acenaphthene	1.96	J	4.98	U	3
BH-SC-54-1to2.8	Fluorene	1.86	J	4.98	U	3
BH-SC-54-2.8to4	Phenol	6	J	20	U	3
BH-SC-54-4to6.6	Phenol	5.3	J	20	U	3
BH-SC-54-4to6.6-D	Phenol	8.2	J	19.9	U	3
BH-SC-54-6.6to8.8	Diethyl phthalate	34.3	J	50	U	3
BH-SC-54-6.6to8.8-D	Phenol	5.3	J	20	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike (MS)/Matrix Spike Duplicate

Two sample set specific MS/MSD pairs were reported, using samples BH-SC-54-2.8to4 and BH-SC-54-4to6.6-D. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The MSD recovery of benzoic acid in the MS/MSD pair using sample BH-SC-54-2.8to4 was low, less than 10% and outside of the laboratory specified acceptance criteria. Additionally, the RPD for benzoic acid in the MS/MSD pair was high and outside of the laboratory specified acceptance criteria. Therefore, the non-detect result of benzoic acid in sample BH-SC-54-2.8to4 was R qualified as rejected.

The RPD for 2,4-dimethylphenol in the MS/MSD pair using sample BH-SC-54-2.8to4 was high and outside of the laboratory specified acceptance criteria. Since 2,4-dimethylphenol was not detected in sample BH-SC-54-2.8to4, no qualifications were applied to the data.

One or both of the recoveries of 2-methylnaphthalene, acenaphthene, acenaphthylene, fluoranthene, benz[a]anthracene, chrysene, total (b+k+j)benzofluoranthenes, anthracene, benzo(ghi)perylene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene in the MS/MSD pair using sample BH-SC-54-4to6.6-D were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of these analytes in sample BH-SC-54-4to6.6-D were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-2.8to4	Benzoic Acid	39	U	39	R	4
BH-SC-54-4to6.6-D	2-Methylnaphthalene	1.1	U	1.1	UJ	4
BH-SC-54-4to6.6-D	Acenaphthene	0.57	U	0.57	UJ	4
BH-SC-54-4to6.6-D	Acenaphthylene	1.08	U	1.08	UJ	4
BH-SC-54-4to6.6-D	Benzofluoranthenes, Total (b+k+j)	3.01	U	3.01	UJ	4
BH-SC-54-4to6.6-D	Anthracene	0.87	U	0.87	UJ	4
BH-SC-54-4to6.6-D	Benzo(a)pyrene	0.61	U	0.61	UJ	4
BH-SC-54-4to6.6-D	Benzo(b)fluoranthene	1.37	U	1.37	UJ	4
BH-SC-54-4to6.6-D	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	4
BH-SC-54-4to6.6-D	Fluorene	0.63	U	0.63	UJ	4
BH-SC-54-4to6.6-D	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	4
BH-SC-54-4to6.6-D	Naphthalene	1.28	U	1.28	UJ	4
BH-SC-54-4to6.6-D	Phenanthrene	0.72	U	0.72	UJ	4
BH-SC-54-4to6.6-D	Pyrene	0.63	U	0.63	UJ	4
BH-SC-54-4to6.6-D	Fluoranthene	0.47	U	0.47	UJ	4
BH-SC-54-4to6.6-D	Benz[a]anthracene	0.82	U	0.82	UJ	4
BH-SC-54-4to6.6-D	Chrysene	1.05	U	1.05	UJ	4
BH-SC-54-4to6.6-D	Benzo(ghi)perylene	1.07	U	1.07	UJ	4

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Four LCS/LCSD pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPD for benzoic acid in the LCS/LCSD pair in batch BKJ0664 was high and outside of the laboratory specified acceptance criteria. Since benzoic acid was not detected in the associated samples, no qualifications were applied to the data.

One or both of the recoveries of naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene in the LCS/LCSD pair in batch BKJ0665 were low and outside of the laboratory specified acceptance criteria. Additionally, the RPDs for naphthalene, 2-methylnaphthalene and acenaphthylene were high and outside of the laboratory specified acceptance criteria. Therefore, the estimated concentrations of naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and total(b+k+j) benzofluoranthenes in the associated samples were J qualified as estimated, the concentrations of naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and total(b+k+j) benzofluoranthenes that were greater than the RL in the associated samples were J- qualified as estimated with low biases, and the non-detect results of naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, pyrene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene and total(b+k+j) benzofluoranthenes in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Naphthalene	51.4	D	51.4	J	5
BH-SC-54-0to1	Acenaphthylene	20.9	D	20.9	J	5
BH-SC-54-0to1	Fluorene	20.7	D	20.7	J-	5
BH-SC-54-0to1	2-Methylnaphthalene	13.4	J	13.4	J	5
BH-SC-54-0to1	Acenaphthene	13.4	J	13.4	J	5
BH-SC-54-0to1	Phenanthrene	122	D	122	J-	5
BH-SC-54-0to1	Anthracene	50.4	D	50.4	J-	5
BH-SC-54-0to1	Pyrene	201	D	201	J-	5
BH-SC-54-0to1	Benzo(b)fluoranthene	89.6	D	89.6	J-	5
BH-SC-54-0to1	Benzofluoranthenes, Total (b+k+j)	94.3	D	94.3	J-	5
BH-SC-54-0to1	Benzo(a)pyrene	109	D	109	J	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Indeno(1,2,3-cd)pyrene	62.3	D	62.3	J-	5
BH-SC-54-0to1	Dibenzo(a,h)anthracene	16.8	D	16.8	J-	5
BH-SC-54-1to2.8	2-Methylnaphthalene	1.1	U	1.1	UJ	5
BH-SC-54-1to2.8	Acenaphthylene	1.20	J	1.20	J	5
BH-SC-54-1to2.8	Naphthalene	1.43	J	1.43	J	5
BH-SC-54-1to2.8	Acenaphthene	1.96	J	1.96	J	5
BH-SC-54-1to2.8	Fluorene	1.86	J	1.86	J	5
BH-SC-54-1to2.8	Phenanthrene	12.7	NA	12.7	J-	5
BH-SC-54-1to2.8	Anthracene	2.55	J	2.55	J	5
BH-SC-54-1to2.8	Pyrene	12.7	NA	12.7	J-	5
BH-SC-54-1to2.8	Benzo(b)fluoranthene	3.56	J	3.56	J	5
BH-SC-54-1to2.8	Benzofluoranthenes, Total (b+k+j)	8.84	J	8.84	J	5
BH-SC-54-1to2.8	Benzo(a)pyrene	4.89	J	4.89	J	5
BH-SC-54-1to2.8	Indeno(1,2,3-cd)pyrene	3.28	J	3.28	J	5
BH-SC-54-1to2.8	Dibenzo(a,h)anthracene	1.04	J	1.04	J	5
BH-SC-54-2.8to4	2-Methylnaphthalene	1.1	U	1.1	UJ	5
BH-SC-54-4to6.6	2-Methylnaphthalene	1.1	U	1.1	UJ	5
BH-SC-54-4to6.6-D	2-Methylnaphthalene	1.1	U	1.1	UJ	5
BH-SC-54-6.6to8.8	2-Methylnaphthalene	1.1	U	1.1	UJ	5
BH-SC-54-6.6to8.8-D	2-Methylnaphthalene	1.1	U	1.1	UJ	5
BH-SC-54-2.8to4	Benzofluoranthenes, Total (b+k+j)	3	U	3	UJ	5
BH-SC-54-2.8to4	Acenaphthene	0.57	U	0.57	UJ	5
BH-SC-54-4to6.6	Acenaphthene	0.57	U	0.57	UJ	5
BH-SC-54-4to6.6-D	Acenaphthene	0.57	U	0.57	UJ	5
BH-SC-54-6.6to8.8	Acenaphthene	0.57	U	0.57	UJ	5
BH-SC-54-6.6to8.8-D	Acenaphthene	0.57	U	0.57	UJ	5
BH-SC-54-4to6.6	Benzofluoranthenes, Total (b+k+j)	3	U	3	UJ	5
BH-SC-54-2.8to4	Acenaphthylene	1.08	U	1.08	UJ	5
BH-SC-54-4to6.6	Acenaphthylene	1.08	U	1.08	UJ	5
BH-SC-54-4to6.6-D	Acenaphthylene	1.08	U	1.08	UJ	5
BH-SC-54-6.6to8.8	Acenaphthylene	1.08	U	1.08	UJ	5
BH-SC-54-6.6to8.8-D	Acenaphthylene	1.08	U	1.08	UJ	5
BH-SC-54-2.8to4	Anthracene	0.87	U	0.87	UJ	5
BH-SC-54-4to6.6	Anthracene	0.87	U	0.87	UJ	5
BH-SC-54-4to6.6-D	Benzofluoranthenes, Total (b+k+j)	3.01	U	3.01	UJ	5
BH-SC-54-4to6.6-D	Anthracene	0.87	U	0.87	UJ	5
BH-SC-54-6.6to8.8	Anthracene	0.87	U	0.87	UJ	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-6.6to8.8-D	Anthracene	0.87	U	0.87	UJ	5
BH-SC-54-2.8to4	Benzo(a)pyrene	0.61	U	0.61	UJ	5
BH-SC-54-4to6.6	Benzo(a)pyrene	0.61	U	0.61	UJ	5
BH-SC-54-4to6.6-D	Benzo(a)pyrene	0.61	U	0.61	UJ	5
BH-SC-54-6.6to8.8	Benzo(a)pyrene	0.61	U	0.61	UJ	5
BH-SC-54-6.6to8.8	Benzofluoranthenes, Total (b+k+j)	3	U	3	UJ	5
BH-SC-54-6.6to8.8-D	Benzo(a)pyrene	0.61	U	0.61	UJ	5
BH-SC-54-2.8to4	Benzo(b)fluoranthene	1.37	U	1.37	UJ	5
BH-SC-54-4to6.6	Benzo(b)fluoranthene	1.37	U	1.37	UJ	5
BH-SC-54-4to6.6-D	Benzo(b)fluoranthene	1.37	U	1.37	UJ	5
BH-SC-54-6.6to8.8	Benzo(b)fluoranthene	1.37	U	1.37	UJ	5
BH-SC-54-6.6to8.8-D	Benzo(b)fluoranthene	1.37	U	1.37	UJ	5
BH-SC-54-6.6to8.8-D	Benzofluoranthenes, Total (b+k+j)	3.01	U	3.01	UJ	5
BH-SC-54-2.8to4	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	5
BH-SC-54-4to6.6	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	5
BH-SC-54-4to6.6-D	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	5
BH-SC-54-6.6to8.8	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	5
BH-SC-54-6.6to8.8-D	Dibenzo(a,h)anthracene	0.89	U	0.89	UJ	5
BH-SC-54-2.8to4	Fluorene	0.63	U	0.63	UJ	5
BH-SC-54-4to6.6	Fluorene	0.63	U	0.63	UJ	5
BH-SC-54-4to6.6-D	Fluorene	0.63	U	0.63	UJ	5
BH-SC-54-6.6to8.8	Fluorene	0.63	U	0.63	UJ	5
BH-SC-54-6.6to8.8-D	Fluorene	0.63	U	0.63	UJ	5
BH-SC-54-2.8to4	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	5
BH-SC-54-4to6.6	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	5
BH-SC-54-4to6.6-D	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	5
BH-SC-54-6.6to8.8	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	5
BH-SC-54-6.6to8.8-D	Indeno(1,2,3-cd)pyrene	1.05	U	1.05	UJ	5
BH-SC-54-2.8to4	Naphthalene	1.27	U	1.27	UJ	5
BH-SC-54-4to6.6	Naphthalene	1.27	U	1.27	UJ	5
BH-SC-54-4to6.6-D	Naphthalene	1.28	U	1.28	UJ	5
BH-SC-54-6.6to8.8	Naphthalene	1.27	U	1.27	UJ	5
BH-SC-54-6.6to8.8-D	Naphthalene	1.27	U	1.27	UJ	5
BH-SC-54-2.8to4	Phenanthrene	0.72	U	0.72	UJ	5
BH-SC-54-4to6.6	Phenanthrene	0.72	U	0.72	UJ	5
BH-SC-54-4to6.6-D	Phenanthrene	0.72	U	0.72	UJ	5

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-6.6to8.8	Phenanthrene	0.72	U	0.72	UJ	5
BH-SC-54-6.6to8.8-D	Phenanthrene	0.72	U	0.72	UJ	5
BH-SC-54-2.8to4	Pyrene	0.63	U	0.63	UJ	5
BH-SC-54-4to6.6	Pyrene	0.62	U	0.62	UJ	5
BH-SC-54-4to6.6-D	Pyrene	0.63	U	0.63	UJ	5
BH-SC-54-6.6to8.8	Pyrene	0.62	U	0.62	UJ	5
BH-SC-54-6.6to8.8-D	Pyrene	0.63	U	0.63	UJ	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Two field duplicate samples, BH-SC-54-4to6.6-D and BH-SC-54-6.6to8.8-D, were collected with the sample sets. Acceptable precision (RPD $\leq$ 50%) was demonstrated between the field duplicates and the original samples, BH-SC-54-4to6.6 and BH-SC-54-6.6to8.8, respectively, with the following exceptions.

Diethyl phthalate was detected in parent sample BH-SC-54-6.6to8.8 at an estimated concentration greater than the MDL and less than the RL and detected in field duplicate sample BH-SC-54-6.6to8.8-D at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the diethyl phthalate concentrations in samples BH-SC-54-6.6to8.8-D and BH-SC-54-6.6to8.8 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-6.6to8.8	Diethyl phthalate	34.3	J	NC	34.3	J	7
BH-SC-54-6.6to8.8-D	Diethyl phthalate	128	NA		128	J	7

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable

NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-SC2-221012, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs, with the following exceptions.

Butyl benzyl phthalate was detected in the equipment blank at a concentration greater than the RL. Since butyl benzyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

Bis(2-ethylhexyl) phthalate was detected in the equipment blank at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of bis(2-ethylhexyl) phthalate in the associated samples were U qualified as not detected at the RLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	bis(2-ethylhexyl) Phthalate	16.4	J	49.8	U	3
BH-SC-54-1to2.8	bis(2-ethylhexyl) Phthalate	6.0	J	49.9	U	3
BH-SC-54-4to6.6	bis(2-ethylhexyl) Phthalate	7.7	J	50.1	U	3
BH-SC-54-4to6.6-D	bis(2-ethylhexyl) Phthalate	5.8	J	49.8	U	3
BH-SC-54-6.6to8.8-D	bis(2-ethylhexyl) Phthalate	6.9	J	50	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exception.

The surrogate recovery of acid extractable 2,4,6-tribromophenol in sample BH-SC-54-2.8to4 was less than 10% and outside of the laboratory and QAPP specified acceptance criteria. Therefore, the non-detect results of acid extractable SVOCs in sample BH-SC-54-2.8to4 were UJ qualified as estimated less than the MDLs, and the phenol concentration in sample BH-SC-54-2.8to4 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-2.8to4	Phenol	20	J	20	J	6
BH-SC-54-2.8to4	2-Methylphenol	6.7	U	6.7	UJ	6
BH-SC-54-2.8to4	4-Methylphenol	7.4	U	7.4	UJ	6
BH-SC-54-2.8to4	2,4-Dimethylphenol	3.8	U	3.8	UJ	6
BH-SC-54-2.8to4	Pentachlorophenol	31.3	U	31.3	UJ	6

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B and 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
⊗ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate

✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment, soil, and preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met, with the following exception.

The r^2 for silver (0.9978) in the initial calibration were less 0.998. Therefore, based on professional and technical judgment, the non-detect result of silver in the associated samples were UJ qualified as estimated less than the MDLs, and the silver concentrations in the associated samples were J qualified as estimated.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Silver	0.21	J	0.21	J	9
BH-SC-54-1to2.8	Silver	0.07	J	0.07	J	9
BH-SC-54-2.8to4	Silver	0.09	J	0.09	J	9
BH-SC-54-6.6to8.8	Silver	0.10	J	0.10	J	9
BH-SC-54-6.6to8.8-D	Silver	0.06	J	0.06	J	9

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-4to6.6	Silver	0.08	J	0.08	J	9
BH-SC-54-4to6.6-D	Silver	0.08	J	0.08	J	9

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-SC2-221012	Silver	0.022	U	0.022	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Lead was detected in the instrument blank in batch SKK0136 (SKK0136-CCB8) at an estimated concentration greater than the MDL and less than the RL. Since lead was detected in the associated samples at concentrations greater than the RL and greater than ten times the soil equivalent blank contamination, no qualifications were applied to the data.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0628 and BKJ0719). Metals were not detected in the method blanks above the MDLs.

2.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SC-54-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of silver in the MS/MSD pair using sample BH-SC-54-0to1 were low and outside of the laboratory specified acceptance criteria. Therefore, the estimated silver concentration in sample BH-SC-54-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Silver	0.21	J	0.21	J	4

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

Two field duplicate samples, BH-SC-54-4to6.6-D and BH-SC-54-6.6to8.8-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SC-54-4to6.6 and BH-SC-54-6.6to8.8, respectively.

2.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SC-54-0to1. The RPD results were within the laboratory specified acceptance criteria.

2.11 Rinsate Blank

One equipment blank, BH-EB-SC2-221012, was collected during the sample event. Metals were not detected in the equipment blank above the MDLs, with the following exceptions.

Chromium (0.02905 mg/kg) and copper (0.04655 mg/kg) were detected in the equipment blank at concentrations greater than the RLs. Since chromium and copper were detected in the associated samples at concentrations greater than ten times the blank contamination, no qualifications were applied to the data.

Lead was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since lead was detected in the associated samples at concentrations greater than

the RL and based on professional and technical judgment, no qualifications were applied to the data.

2.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. The non-detect data were reported to the MDLs in the laboratory report and the final EDD. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for mercury by USEPA Methods 7471B and 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
⊗ Initial and Continuing Calibration Blanks
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the mercury analysis of a solid and water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exception.

The mercury results in the ICB and bracketing CCBs were more negative than the MDL and less than the RL. Therefore, based on professional and technical judgment, the non-detect mercury result in sample BH-EB-SC2-221012 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-SC2-221012	Mercury	0.0001	U	0.0001	UJ	3

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKJ0482 and BKJ0721). Mercury was not detected in the method blanks above the MDL, with the following exception.

Mercury was detected in the method blank in batch BKJ0721 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated concentrations of mercury in the associated samples were U qualified as not detected at the RLs, and the mercury concentrations in samples BH-SC-54-1to2.8 and BH-SC-54-4to6.6-D were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-1to2.8	Mercury	0.0307	NA	0.0307	J+	3
BH-SC-54-2.8to4	Mercury	0.0186	J	0.0226	U	3
BH-SC-54-4to6.6	Mercury	0.0223	J	0.0285	U	3
BH-SC-54-4to6.6-D	Mercury	0.0251	NA	0.0251	J+	3
BH-SC-54-6.6to8.8	Mercury	0.0232	J	0.0262	U	3
BH-SC-54-6.6to8.8-D	Mercury	0.0226	J	0.0244	U	3

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-SC-54-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Two field duplicate samples, BH-SC-54-4to6.6-D and BH-SC-54-6.6to8.8-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SC-54-4to6.6 and BH-SC-54-6.6to8.8, respectively.

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SC-54-0to1. The RPD for mercury in the laboratory duplicate using sample BH-SC-54-0to1 was high and outside of the laboratory specified acceptance criteria. Therefore, the mercury concentration in sample BH-SC-54-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	Mercury	0.247	NA	0.247	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

One equipment blank, BH-EB-SC2-221012, was collected during the sample event. Mercury was not detected in the equipment blank above the MDL.

3.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC by US EPA method 9060 and TS by SM2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
TS	SM2540G-97	7 days from collection to analysis
TOC	US EPA Method 9060	14 days from collection to analysis

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TS (batch BKJ0541). One method blank was reported for TOC (batch BKJ0697). The wet chemistry parameters were not detected in the method blanks above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for TOC, using sample BH-SC-54-0to1. The RPD result was within the laboratory specified acceptance criteria. However, the recoveries of TOC in the MS/MSD pair using sample BH-SC-54-0to1 were low and outside of the laboratory specified acceptance criteria. Therefore, the TOC concentration in sample BH-SC-54-0to1 was J-qualified as estimated with a low bias.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	TOC	2.17	NA	2.17	J-	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS and one standard reference material (SRM) were reported for TOC. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Two field duplicate samples, BH-SC-54-4to6.6-D and BH-SC-54-6.6to8.8-D, were collected with the sample sets. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-SC-54-4to6.6 and BH-SC-54-6.6to8.8, respectively, with the following exception.

The RPD for TOC in field duplicate pair BH-SC-54-6.6to8.8-D/BH-SC-54-6.6to8.8 was greater than 50%. Therefore, based on professional and technical judgement, the TOC concentrations in samples BH-SC-54-6.6to8.8-D and BH-SC-54-6.6to8.8 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	RPD	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-54-6.6to8.8	TOC	0.14	NA	55	0.14	J	7
BH-SC-54-6.6to8.8-D	TOC	0.08	NA		0.08	J	7

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.10 Laboratory Duplicate

Sample set specific laboratory duplicates were reported for TOC and TS using sample BH-SC-54-0to1. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for TOC in the laboratory duplicate using sample BH-SC-54-0to1 was high and outside of the laboratory specified acceptance criteria. Therefore, the TOC concentration in sample BH-SC-54-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SC-54-0to1	TOC	2.17	NA	2.17	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.11 Rinsate Blank

One equipment blank, BH-EB-SC2-221012, was collected during the sample event. The equipment blank was not analyzed for wet chemistry parameters.

4.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 GRAIN SIZE

The samples were analyzed for grain size by PSEP 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The grain size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

Two field duplicate samples, BH-SC-54-4to6.6-D and BH-SC-54-6.6to8.8-D, were collected with the sample sets. The field duplicates were not analyzed for grain size.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-SC-54-1to2.8. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for Phi Scale -1 to 0, Phi Scale -2.25 to -2, Phi Scale -2 to -1, Phi Scale 0 to 1, Phi Scale 1 to 2, Phi Scale 2 to 3, Phi Scale 3 to 4, Phi Scale 4 to 5, Phi Scale 5 to 6, Phi Scale 6 to 7, Phi Scale 7 to 8, Phi Scale 9 to 10 and Sand in laboratory triplicate using sample BH-SC-54-1to2.8 were greater than 20%. Therefore, the results for these particle sizes in sample BH-SC-54-1to2.8 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale -1 to 0	5.30	NA	5.30	J	12

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale -2.25 to -2	3.50	NA	3.50	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale -2 to -1	8.70	NA	8.70	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 0 to 1	2.00	NA	2.00	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 1 to 2	2.10	NA	2.10	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 2 to 3	4.30	NA	4.30	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 3 to 4	4.80	NA	4.80	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 4 to 5	2.80	NA	2.80	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 5 to 6	1.20	NA	1.20	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 6 to 7	1.00	NA	1.00	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 7 to 8	0.70	NA	0.70	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Phi Scale 9 to 10	0.90	NA	0.90	J	12
BH-SC-54-1to2.8	Particle/Grain Size, Sand	18.5	NA	18.5	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	29 October 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Kristoffer Henderson, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 22B0254**

Matrices: **Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of twelve sediment samples and one field duplicate sample, collected on 13 – 15 September 2021, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Metals by US EPA Methods 3050B/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
22B0254-01	BH-SB-23-6to7
22B0254-02	BH-SB-23-7to10
22B0254-06	BH-SB-22-10to12
22B0254-07	BH-SB-17-6to10
22B0254-08	BH-SB-17-6to10-D (duplicate)
22B0254-09	BH-SB-17-10to12
22B0254-10	BH-SB-18-6to9

Laboratory IDs	Client IDs
22B0254-11	BH-SB-18-9to11
22B0254-13	BH-SB-19-6to8
22B0254-14	BH-SB-19-8to10
22B0254-16	BH-SB-20-5to9
22B0254-18	BH-SB-21-6to10
22B0254-19	BH-SB-21-10to12

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 2.1 – 2.5 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3546/8270E and 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration

⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.1.2 Analysis Anomaly

Two sets of sample results were reported for sample BH-SB-22-10to12 for PAHs per USEPA Methods 3546/8270E SIM; one set from a 1:1 dilution and the second from a 1:5 dilution. The concentrations of benz[a]anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene and pyrene in the 1:1 dilution analysis of sample BH-SB-22-10to12 were E-flagged by the laboratory to indicate the results exceeded the calibration range. Therefore, the 1:5 dilution analysis for benz[a]anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene and pyrene in sample BH-SB-22-10to12 were the results considered for validation. The data to use were also indicated in the Reportable column of the EDD with qualifiers added file.

1.2 Holding Times

The holding time for the SVOC analysis of a frozen sediment sample is 1 year from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for 2,4-dinitrophenol (-59.1%), 4,6-dinitro-2-methylphenol (-24.1%) and pentachlorophenol (-34.7%) in the ICV in batch SJL0295 (SJL0295-SCV1) were outside of laboratory specified acceptance criteria with low biases. Since the %Ds for 4,6-dinitro-2-methylphenol and pentachlorophenol were within the validation specified acceptance criteria, no qualifications were applied to the 4,6-dinitro-2-methylphenol and pentachlorophenol data. However, the non-detect result of 2,4-dinitrophenol in sample BH-SB-21-10to12 was UJ qualified as estimated less than the method detection limits (MDLs).

The %Ds for 2,4-dimethylphenol (-20.3%), 2,4-dinitrophenol (-77.5%), 4,6-dinitro-2-methylphenol (-46.3%) and pentachlorophenol (-34.7%) in the ICV in batch SKB0252 (SKB0252-SCV1) were outside of laboratory specified acceptance criteria with low biases. Since the %Ds for 2,4-dimethylphenol and pentachlorophenol were within the validation specified acceptance criteria, no qualifications were applied to the 2,4-dimethylphenol and pentachlorophenol data.

However, the non-detect results of 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol in the associated samples were UJ qualified as estimated less than the MDLs.

The %Ds for pentachlorophenol (-51.1%) and 2,4-dinitrophenol (-81.9%) in the low concentration calibration standard in batch SKC0002 (SKC0002-LCV1) were outside of validation specified acceptance criteria with a low bias. Therefore, the non-detect results of pentachlorophenol and 2,4-dinitrophenol in the associated samples were UJ qualified as estimated less than the MDLs.

The %D for butylbenzylphthalate (144%) in the low concentration calibration standard in batch SKC0002 (SKC0002-LCV1) was outside of validation specified acceptance criteria with a high bias. Since butylbenzylphthalate was not detected in the associated samples, no qualifications were applied to the data.

The %D for butylbenzylphthalate (146% and 90.2%) in the low concentration calibration standard in batch SKC0029 (SKC0029-LCV1 and SKC0029-LCV2) was outside of validation specified acceptance criteria with a high bias. Since butylbenzylphthalate was not detected in the associated sample, no qualifications were applied to the data.

The %Ds for 2,4-dinitrophenol (-77.9% and -99.2%), 4,6-dinitro-2-methylphenol (-71.7%) and 2,4,6-tribromophenol (-54.1%) in the low concentration calibration standards in batch SKC0029 (SKC0029-LCV1 and SKC0029-LCV2) were outside of validation specified acceptance criteria with a low biases. Since the surrogate recoveries were evaluated in the respective associated samples, no qualifications were applied to the 2,4,6-tribromophenol data. However, the non-detect results of 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol in sample BH-SB-21-6to10 were UJ qualified as estimated less than the MDLs.

The %Ds for 2,4-dinitrophenol (-95.9% and -68.5%), pentachlorophenol (-92.6%), 4-chloro-3-methylphenol (-67.2%), 2,4,5-trichlorophenol (-50.7%) and 4,6-dinitro-2-methylphenol (-71.1% and -92.8%) in the low concentration calibration standard in batch SKC0062 (SKC0062-LCV1 and SKC0062-LCV2) were outside of validation specified acceptance criteria with low biases. Therefore, the non-detect results of 2,4-dinitrophenol, pentachlorophenol, 4-chloro-3-methylphenol, 2,4,5-trichlorophenol and 4,6-dinitro-2-methylphenol in sample BH-SB-21-10to12 were UJ qualified as estimated less than the MDLs.

The %D for pentachlorophenol (-25.5%) in the ICV standard in batch SKC0002 (SKC0002-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the %D for pentachlorophenol was within the validation specified acceptance criteria, no qualifications were applied to the data.

The %Ds for butylbenzylphthalate (39.6%) and bis(2-ethylhexyl)phthalate (36.5%) in the ICV standard in batch SKC0002 (SKC0002-ICV1) were outside of laboratory specified acceptance criteria with high biases. Since butylbenzylphthalate was not detected in the associated samples,

no qualifications were applied to the butylbenzylphthalate data. However, the bis(2-ethylhexyl)phthalate concentrations in the associated samples were J qualified as estimated.

The %Ds for 4-chloro-3-methylphenol (24.2%), 2,4-dinitrophenol (25.2%), 4,6-dinitro-2-methylphenol (21.4%), butylbenzylphthalate (90.2%), bis(2-ethylhexyl)phthalate (49.4%), penol-d5 (24.1%), nitrobenzene-d5 (26.8%) and p-terphenyl-d14 (22.6%) in the ICV standard in batch SKC0029 (SKC0029-ICV1) were outside of laboratory specified acceptance criteria with high biases. Since 4-chloro-3-methylphenol, 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, butylbenzylphthalate and bis(2-ethylhexyl)phthalate were not detected in sample BH-SB-21-6to10 and the surrogate recoveries were evaluated in the respective associated samples, no qualifications were applied to the data.

The %Ds for 2,4-dinitrophenol (-44.1%), 4,6-dinitro-2-methylphenol (-27.9%) and pentachlorophenol (-44.6%) in the ICV standard in batch SKC0062 (SKC0062-ICV1) were outside of laboratory specified acceptance criteria with high biases. Since the %Ds for 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol were within the validation specified acceptance criteria, no qualifications were applied to the 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data. However, the non-detect result of pentachlorophenol in sample BH-SB-21-10to12 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-23-6to7	2,4-Dinitrophenol	200	U	200	UJ	9
BH-SB-23-6to7	bis(2-ethylhexyl) Phthalate	9.4	J	9.4	J	9
BH-SB-23-6to7	Pentachlorophenol	100	U	100	UJ	9
BH-SB-23-6to7	4,6-Dinitro-2-Methylphenol	200	U	200	UJ	9
BH-SB-23-7to10	2,4-Dinitrophenol	200	U	200	UJ	9
BH-SB-23-7to10	bis(2-ethylhexyl) Phthalate	25.1	J	25.1	J	9
BH-SB-23-7to10	Pentachlorophenol	99.8	U	99.8	UJ	9
BH-SB-23-7to10	4,6-Dinitro-2-Methylphenol	200	U	200	UJ	9
BH-SB-22-10to12	2,4-Dinitrophenol	199	U	199	UJ	9
BH-SB-22-10to12	bis(2-ethylhexyl) Phthalate	14.0	J	14.0	J	9
BH-SB-22-10to12	Pentachlorophenol	99.7	U	99.7	UJ	9
BH-SB-22-10to12	4,6-Dinitro-2-Methylphenol	199	U	199	UJ	9
BH-SB-17-6to10	2,4-Dinitrophenol	403	U	403	UJ	9
BH-SB-17-6to10	Pentachlorophenol	201	U	201	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-17-6to10	4,6-Dinitro-2-Methylphenol	403	U	403	UJ	9
BH-SB-17-6to10-D (duplicate)	2,4-Dinitrophenol	379	U	379	UJ	9
BH-SB-17-6to10-D (duplicate)	Pentachlorophenol	190	U	190	UJ	9
BH-SB-17-6to10-D (duplicate)	4,6-Dinitro-2-Methylphenol	379	U	379	UJ	9
BH-SB-17-10to12	2,4-Dinitrophenol	378	U	378	UJ	9
BH-SB-17-10to12	bis(2-ethylhexyl) Phthalate	17.9	J	17.9	J	9
BH-SB-17-10to12	Pentachlorophenol	189	U	189	UJ	9
BH-SB-17-10to12	4,6-Dinitro-2-Methylphenol	378	U	378	UJ	9
BH-SB-18-6to9	2,4-Dinitrophenol	199	U	199	UJ	9
BH-SB-18-6to9	bis(2-ethylhexyl) Phthalate	12.9	J	12.9	J	9
BH-SB-18-6to9	Pentachlorophenol	99.7	U	99.7	UJ	9
BH-SB-18-6to9	4,6-Dinitro-2-Methylphenol	199	U	199	UJ	9
BH-SB-18-9to11	2,4-Dinitrophenol	200	U	200	UJ	9
BH-SB-18-9to11	bis(2-ethylhexyl) Phthalate	11.9	J	11.9	J	9
BH-SB-18-9to11	Pentachlorophenol	99.8	U	99.8	UJ	9
BH-SB-18-9to11	4,6-Dinitro-2-Methylphenol	200	U	200	UJ	9
BH-SB-19-6to8	2,4-Dinitrophenol	598	U	598	UJ	9
BH-SB-19-6to8	bis(2-ethylhexyl) Phthalate	29.1	J	29.1	J	9
BH-SB-19-6to8	Pentachlorophenol	299	U	299	UJ	9
BH-SB-19-6to8	4,6-Dinitro-2-Methylphenol	598	U	598	UJ	9
BH-SB-19-8to10	2,4-Dinitrophenol	199	U	199	UJ	9
BH-SB-19-8to10	bis(2-ethylhexyl) Phthalate	9.1	J	9.1	J	9
BH-SB-19-8to10	Pentachlorophenol	99.6	U	99.6	UJ	9
BH-SB-19-8to10	4,6-Dinitro-2-Methylphenol	199	U	199	UJ	9
BH-SB-20-5to9	2,4-Dinitrophenol	199	U	199	UJ	9
BH-SB-20-5to9	bis(2-ethylhexyl) Phthalate	7.3	J	7.3	J	9
BH-SB-20-5to9	Pentachlorophenol	99.6	U	99.6	UJ	9
BH-SB-20-5to9	4,6-Dinitro-2-Methylphenol	199	U	199	UJ	9
BH-SB-21-6to10	2,4-Dinitrophenol	200	U	200	UJ	9
BH-SB-21-6to10	4,6-Dinitro-2-Methylphenol	200	U	200	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-21-10to12	2,4,5-Trichlorophenol	99.7	U	99.7	UJ	9
BH-SB-21-10to12	2,4-Dinitrophenol	199	U	199	UJ	9
BH-SB-21-10to12	4,6-Dinitro-2-Methylphenol	199	U	199	UJ	9
BH-SB-21-10to12	4-Chloro-3-Methylphenol	99.7	U	99.7	UJ	9
BH-SB-21-10to12	Pentachlorophenol	99.7	U	99.7	UJ	9

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BKB0468 and BKB0471). SVOCs and PAHs were not detected in the method blanks above the MDLs, with the following exception.

1-Methylnaphthalene was detected in the method blank in batch BKB0471 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated 1-methylnaphthalene concentrations in samples BH-SB-23-6to7, BH-SB-23-7to10, BH-SB-18-9to11, BH-SB-19-6to8, BH-SB-20-5to9 and BH-SB-21-10to12 were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-SB-23-6to7	1-Methylnaphthalene	0.43	J	5.09	U	3
BH-SB-23-7to10	1-Methylnaphthalene	0.88	J	5.00	U	3
BH-SB-18-9to11	1-Methylnaphthalene	1.15	J	5.12	U	3
BH-SB-19-6to8	1-Methylnaphthalene	1.40	J	14.8	U	3
BH-SB-20-5to9	1-Methylnaphthalene	4.20	J	4.91	U	3
BH-SB-21-10to12	1-Methylnaphthalene	1.07	J	4.96	U	3

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two sample set specific MS/MSD pairs were reported, both using sample BH-SB-20-5to9. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of 4-chloro-3-methylphenol, 2,4-dinitrophenol, diethyl phthalate, 4,6-dinitro-2-methylphenol, butylbenzylphthalate and bis(2-ethylhexyl)phthalate in the MS/MSD pair using sample BH-SB-20-5to9 were high and outside of the laboratory specified acceptance criteria. Since 4-chloro-3-methylphenol, 2,4-dinitrophenol, diethyl phthalate, 4,6-dinitro-2-methylphenol and butylbenzylphthalate were not detected in the associated samples, no qualifications were applied to the 4-chloro-3-methylphenol, 2,4-dinitrophenol, diethyl phthalate, 4,6-dinitro-2-methylphenol and butylbenzylphthalate data. However, the bis(2-ethylhexyl)phthalate concentration in sample BH-SB-20-5to9 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-20-5to9	bis(2-ethylhexyl) Phthalate	7.3	J	7.3	J	4

µg/kg-microgram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The LCSD recoveries of 4-chloro-3-methylphenol and butylbenzylphthalate and the RPD for 2,4-dinitrophenol in the LCS/LCSD pair in batch BKB0468 were high and outside of the laboratory specified acceptance criteria. Since 2,4-dinitrophenol, 4-chloro-3-methylphenol and butylbenzylphthalate were not detected in the associated samples, no qualifications were applied to the data.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-SB-17-6to10-D (duplicate), was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-SB-17-6to10, with the following exceptions.

The RPDs for benzo(a)pyrene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene in the field duplicate pair were greater than 30%. Therefore, the concentrations of benzo(a)pyrene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene in samples BH-SB-17-6to10-D (duplicate) and BH-SB-17-6to10 were J qualified as estimated.

Dibenzofuran was detected in the parent sample BH-SB-17-6to10 at an estimated concentration greater than the MDL and less than the RL and detected at a concentration greater than the RL in the field duplicate sample BH-SB-17-6to10-D (duplicate), resulting in a noncalculable RPD. Therefore, the dibenzofuran concentrations in samples BH-SB-17-6to10-D (duplicate) and BH-SB-17-6to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-17-6to10	Benzo(a)pyrene	48.1	NA	50	48.1	J	7
BH-SB-17-6to10-D (duplicate)	Benzo(a)pyrene	80.2	NA		80.2	J	7
BH-SB-17-6to10	Benzo(b)fluoranthene	40.9	NA	56	40.9	J	7
BH-SB-17-6to10-D (duplicate)	Benzo(b)fluoranthene	73.1	NA		73.1	J	7
BH-SB-17-6to10	Benzo(j)fluoranthene	23	NA	57	23	J	7
BH-SB-17-6to10-D (duplicate)	Benzo(j)fluoranthene	41.2	NA		41.2	J	7
BH-SB-17-6to10	Benzo(k)fluoranthene	24	NA	43	24	J	7
BH-SB-17-6to10-D (duplicate)	Benzo(k)fluoranthene	37	NA		37	J	7
BH-SB-17-6to10	Benzofluoranthenes, Total (b+k+j)	85.9	NA	54	85.9	J	7
BH-SB-17-6to10-D (duplicate)	Benzofluoranthenes, Total (b+k+j)	150	NA		150	J	7

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SB-17-6to10	Dibenzo(a,h)anthracene	16.1	NA	62	16.1	J	7
BH-SB-17-6to10-D (duplicate)	Dibenzo(a,h)anthracene	30.5	NA		30.5	J	7
BH-SB-17-6to10	Dibenzofuran	37.3	J	NC	37.3	J	7
BH-SB-17-6to10-D (duplicate)	Dibenzofuran	47	NA		47	J	7
BH-SB-17-6to10	Indeno(1,2,3-cd)pyrene	132	NA	36	132	J	7
BH-SB-17-6to10-D (duplicate)	Indeno(1,2,3-cd)pyrene	189	NA		189	J	7

µg/kg-microgram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

An equipment blank was not collected during the sample event.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The surrogate recoveries of nitrobenzene-d5 in the LCS/LCSD pair in batch BKB0468 were high and outside of the laboratory specified acceptance criteria. Since the LCS recoveries of the target analytes were acceptable and the surrogate recoveries were evaluated in the respective associated samples, no qualifications were applied to the data.

One or both of the surrogate recoveries of phenol-d5, nitrobenzene-d5 and p-terphenyl-d14 in the MS/MSD pair using sample BH-SB-20-5to9 were high and outside of the laboratory specified acceptance criteria. Since the surrogate recoveries were evaluated in sample BH-SB-20-5to9 and based on professional and technical judgment, no qualifications were applied to the data.

The recovery of base neutral extractable surrogate terphenyl-d14 in sample BH-SB-17-6to10 was high and outside the laboratory specified acceptance criteria. Since the recoveries of the remaining

base neutral extractable surrogates, 2-fluorobiphenyl and nitrobenzene-d5, in sample BH-SB-17-6to10 were acceptable, no qualifications were applied to the data.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per USEPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of

valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a frozen sediment sample is 2 years from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

The cadmium result in the instrument blank in batch SKC0018 (SKC0018-IBLB) was more negative than the MDL and less negative than the RL. Therefore, the estimated cadmium concentration in sample BH-SB-17-10to12 was J qualified as estimated, the cadmium concentration in sample BH-SB-22-10to12 was J- qualified as estimated with a low bias, and the non-detect cadmium results in samples BH-SB-23-6to7 and BH-SB-23-7to10 were UJ qualified as estimated less than the MDL.

Chromium and lead were detected in the instrument blank in batch SKC0018 (SKC0018-IBL2) at estimated concentrations greater than the MDL and less than the RL. Since the chromium and lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-SB-23-6to7	Cadmium	0.16	U	0.16	UJ	3
BH-SB-23-7to10	Cadmium	0.21	U	0.21	UJ	3
BH-SB-22-10to12	Cadmium	0.51	NA	0.51	J-	3

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-SB-17-10to12	Cadmium	0.27	J	0.27	J	3

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BKB0539). Total and dissolved metals were not detected in the method blank above the MDLs, with the following exception.

Cadmium was detected in the method blank in batch BKB0539 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated cadmium concentrations in the samples BH-SB-17-10to12, BH-SB-18-6to9, BH-SB-20-5to9 and BH-SB-21-10to12 were U qualified as not detected at the RL, and the cadmium concentration in sample BH-SB-18-9to11 was J+ qualified, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-18-9to11	Cadmium	0.14	NA	0.14	J+	3
BH-SB-17-10to12	Cadmium	0.27	J	0.36	U	3
BH-SB-18-6to9	Cadmium	0.10	J	0.13	U	3
BH-SB-20-5to9	Cadmium	0.05	J	0.13	U	3
BH-SB-21-10to12	Cadmium	0.07	J	0.11	U	3

mg/kg-milligram per kilogram
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-SB-20-5to9. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of copper in the MS/MSD pair using sample BH-SB-20-5to9 were low and outside of the laboratory specified acceptance criteria. Therefore, the copper concentration in sample BH-SB-20-5to9 was J- qualified as estimated with a low bias.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-20-5to9	Copper	87.4	NA	87.4	J-	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

2.9 Field Duplicate

One field duplicate sample, BH-SB-17-6to10-D (duplicate), was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-SB-17-6to10.

2.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SB-20-5to9. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exception.

The RPD for zinc in the laboratory duplicate using sample BH-SB-20-5to9 was greater than 20% and the concentrations in the laboratory duplicate and sample result were greater than five times the RL. Therefore, the zinc concentration in sample BH-SB-20-5to9 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SB-20-5to9	Zinc	87.6	NA	87.6	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.11 Rinsate Blank

An equipment blank was not collected during the sample event.

2.12 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The ground water and sediment RLs listed in Tables 9b and 9c of the QAPP were not met for total zinc. However, the screening levels were met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	7 October 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Kristoffer Henderson, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverables – Analytical Resources, Incorporated Work Order 23B0020**

Matrices: **Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of four groundwater samples, one field duplicate sample and one equipment blank, including dissolved groundwater, field duplicate and equipment blank samples, collected on 31 January – 1 February 2023, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3520C/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3510C/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3010A/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7470A
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500NH_3H
- Sulfide by SM4500S^2D
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Suspended Solids (TSS) by SM2540D

- Total Dissolved Solids (TDS) by SM2540C
- Total Solids (TS) by SM2540B
- Total Volatile Solids (TVS) by SM2540E

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
23B0020-01	BH-GW-24-230131
23B0020-02	BH-GW-24-230131 (dissolved)
23B0020-03	BH-GW-26-230131
23B0020-04	BH-GW-26-230131 (dissolved)
23B0020-05	BH-GW-29-230201
23B0020-06	BH-GW-29-230201 (dissolved)

Laboratory IDs	Client IDs
23B0020-07	BH-GW-29-D-230201
23B0020-08	BH-GW-29-D-230201 (dissolved)
23B0020-09	BH-GW-27-230131
23B0020-10	BH-GW-27-230131 (dissolved)
23B0020-11	BH-EB-GW-230201
23B0020-12	BH-EB-GW-230201 (dissolved)

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 3.6 – 5.6 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3510C/8270E and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %D for 2,4-dinitrophenol (177%) in the low concentration calibration standard in batch SLB0009 (SLB0009-LCV1) was outside of validation specified acceptance criteria with a high bias. Since 2,4-dinitrophenol was not detected in the associated samples, no qualifications were applied to the data.

The %Ds for nitrobenzene-d5 (-20.4%) and pentachlorophenol (-57.6%) in the low concentration calibration standard in batch SLB0009-LCV1 (SLB0009-LCV1) was outside of laboratory specified acceptance criteria with a low bias. Since the surrogate recoveries were evaluated in the respective associated samples, no qualifications were applied to the nitrobenzene-d5 data. However, the non-detect pentachlorophenol results in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs).

The %D for 2,4,6-tribromophenol (21.0%) in the ICV standard in batch SLB0009 (SLB0009-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the surrogate

recoveries were evaluated in the respective associated samples, no qualifications were applied to the data.

The %Ds for 4,6-dinitro-2-methylphenol (20.5%) and 2,4,6-tribromophenol (20.4%) in the ICV standard in batch SLB0032 (SLB0032-ICV1) were outside of laboratory specified acceptance criteria with a low bias. Since the %D for 4,6-dinitro-2-methylphenol was within the validation specified acceptance criteria and the surrogate recoveries were evaluated in the respective associated samples, no qualifications were applied to the data.

The %D for 2,4-dinitrophenol (-62.0%) in the CCV standard in batch SLB0032 (SLB0032-CCV1) was outside of laboratory specified acceptance criteria with a low bias. Therefore, the non-detect 2,4-dinitrophenol results in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-230131	Pentachlorophenol	1.2	U	1.2	UJ	9
BH-GW-26-230131	Pentachlorophenol	1.2	U	1.2	UJ	9
BH-GW-29-230201	Pentachlorophenol	1.2	U	1.2	UJ	9
BH-GW-29-D-230201	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-GW-27-230131	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-EB-GW-230201	2,4-Dinitrophenol	1.7	U	1.7	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLB0050 and BLB0054). SVOCs and PAHs were not detected in the method blanks above the MDLs.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported for this analysis.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-GW-29-D-230201, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230201.

1.11 Rinsate Blank

One equipment blank, BH-EB-GW-230201, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The surrogate recovery of dibenzo[a,h]anthracene-d14 in the LCS in batch BLB0054 was high and outside of the laboratory specified acceptance criteria. Since the LCS recoveries of the target analytes were acceptable and the surrogate recoveries were evaluated in the respective associated samples, no qualifications were applied to the data.

The surrogate recovery of dibenzo[a,h]anthracene-d14 in samples BH-GW-24-230131, BH-GW-26-230131, BH-GW-29-230201, BH-GW-29-D-230201, BH-GW-27-230131 and BH-EB-GW-230201 were high and outside of the laboratory specified acceptance criteria. Since the recoveries of the remaining surrogates were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the reporting limit (RL). Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3510C/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLB0053). DRO and MRO were not detected in the method blank above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BLB0053. Based professional and technical judgment, the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-230131	MRO	0.056	U	0.056	UJ	5
BH-GW-26-230131	MRO	0.056	U	0.056	UJ	5
BH-GW-29-230201	MRO	0.056	U	0.056	UJ	5
BH-GW-29-D-230201	MRO	0.056	U	0.056	UJ	5
BH-GW-27-230131	MRO	0.056	U	0.056	UJ	5
BH-EB-GW-230201	MRO	0.056	U	0.056	UJ	5

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-GW-29-D-230201, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230201.

2.9 Rinsate Blank

One equipment blank, BH-EB-GW-230201, was collected during the sample event. DRO and MRO were not detected in the equipment blank above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for total and dissolved metals per USEPA Methods 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Blank

✓ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
⊗ Rinsate Blank
✓ Assessment of Total Metals vs. Dissolved Metals
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a preserved water sample is 6 months from collection to analysis. The holding time for the dissolved metal analysis of a preserved water sample is 15 minutes from collection to filtration and 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Chromium was detected in the instrument and calibration blanks in batch SLB0211 (SLB0211-IBL4, SLB0211-IBL5, SLB0211-IBL6, SLB0211-IBL7, SLB0211-IBL8 and SLB0211-CCB3) at

estimated concentrations greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blanks in batch SLB0211 (SLB0211-IBLJ and SLB0211-IBLM) at estimated concentrations greater than the MDL and less than the RL. Therefore, the estimated chromium concentrations in the associated samples were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-26-230131	Chromium	7.08	J	10.0	U	3
BH-GW-24-230131	Chromium	9.72	J	10.0	U	3
BH-GW-24-230131	Dissolved Chromium	9.76	J	10.0	U	3
BH-GW-27-230131	Chromium	6.52	J	10.0	U	3

µg/L-microgram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLB0350 and BLB0385). Total and dissolved metals were not detected in the method blanks above the MDLs, with the following exception.

Copper was detected in the method blank in batch BLB0350 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated copper concentrations in samples BH-GW-29-230201 and BH-GW-29-D-230201 were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-230201	Copper	9.26	J,B	10.0	U	3

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-D-230201	Copper	8.88	J,B	10.0	U	3

µg/L-microgram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
B-laboratory flag indicating this analyte was detected in the method blank.
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total metals, using sample BH-GW-24-230131. One sample set specific MS/MSD pair was reported for dissolved metals, using sample BH-GW-24-230131. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230201, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230201, with the following exceptions.

The RPD for dissolved copper in the field duplicate pair was greater than 30%. Since the estimated dissolved copper concentrations were U qualified as not detected at the RL due to blank contamination and based on professional and technical judgment, no qualifications were applied to the data.

The RPD for total chromium in the field duplicate pair was greater than 30%. Therefore, the concentrations of total chromium in samples BH-GW-29-D-230201 and BH-GW-29-230201 were J qualified as estimated.

Dissolved arsenic was detected in the field duplicate sample BH-GW-29-D-230201 at an estimated concentration greater than the MDL and less than the RL and not detected in the parent sample BH-GW-29-230201, resulting in a noncalculable RPD. Therefore, the non-detect result of

dissolved arsenic in sample BH-GW-29-230201 was UJ qualified as estimated less than the MDL, and the arsenic concentration in sample BH-GW-29-D-230201 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier	Reason Code
BH-GW-29-D-230201	Arsenic	0.9	J,D	NC	0.9	J	7
BH-GW-29-230201	Arsenic	0.746	U		0.746	UJ	7
BH-GW-29-230201	Chromium	62.7	NA	37	62.7	J	7
BH-GW-29-D-230201	Chromium	43.1	NA		43.1	J	7

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total metals using sample BH-GW-24-230131. One sample set specific laboratory duplicate was reported for dissolved metals using sample BH-GW-24-230131. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

One equipment blank, BH-EB-GW-230201, was collected during the sample event. Total and dissolved metals were not detected in the equipment blanks above the MDLs, with the following exceptions.

Dissolved copper was detected in the equipment blank, BH-EB-GW-230201, at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated concentrations of dissolved copper in the associated samples were U qualified as not detected at the RL.

µg/L-microgram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.12 Assessment of Total Metals vs. Dissolved Metals

The samples were analyzed for total and dissolved metals. The concentrations of total metals were greater than or equal to the concentrations of dissolved metals in the samples.

For samples with estimated concentrations of total metals less than the estimated concentrations of dissolved metals, no qualifications were applied to the data.

3.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The ground water and sediment RLs listed in Tables 9b and 9c of the QAPP were not met for total zinc. However, the screening levels were met

3.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
⊗ Rinsate Blank

✓ Assessment of Total Mercury vs. Dissolved Mercury
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total mercury analysis of a preserved water sample is 28 days from collection to analysis. The holding time for the dissolved mercury analysis of a preserved water sample is 15 minutes from collection to filtration and 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLB0263 and BLB0262). Total mercury was not detected in the method blanks above the MDL.

However, dissolved mercury was detected in the method blank in batch BLB0262 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated mercury concentrations in samples BH-GW-24-230131, BH-GW-26-230131, BH-GW-29-230201, BH-

GW-29-D-230201, BH-GW-27-230131 and BH-EB-GW-230201 were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-24-230131	Dissolved Mercury	0.000013	J	0.000100	U	3
BH-GW-26-230131	Dissolved Mercury	0.000020	J	0.000100	U	3
BH-GW-29-230201	Dissolved Mercury	0.000019	J	0.000100	U	3
BH-GW-29-D-230201	Dissolved Mercury	0.000019	J	0.000100	U	3
BH-GW-27-230131	Dissolved Mercury	0.000015	J	0.000100	U	3
BH-EB-GW-230201	Dissolved Mercury	0.000014	J	0.000100	U	3

mg/L-milligram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
B-laboratory flag indicating this analyte was detected in the method blank.
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total mercury, using sample BH-GW-24-230131. One sample set specific MS/MSD pair was reported for dissolved mercury, using sample BH-GW-24-230131. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230201, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230201.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total mercury using sample BH-GW-24-230131. One sample set specific laboratory duplicate was reported for dissolved mercury using sample BH-GW-24-230131. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less

than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

One equipment blank, BH-EB-GW-230201, was collected during the sample event. Total and dissolved mercury were detected in the equipment blank at estimated concentrations greater than the MDL and less than the RL. Since the estimated concentrations of dissolved mercury in the associated samples were U qualified as not detected at the RL due to method blank contamination and based on professional and technical judgment, no additional qualifications were applied to the dissolved mercury data. However, the estimated concentrations of total mercury in the associated samples were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-26-230131	Mercury	0.000016	J	0.000100	U	3
BH-GW-29-230201	Mercury	0.000024	J	0.000100	U	3
BH-GW-29-D-230201	Mercury	0.000024	J	0.000100	U	3
BH-GW-27-230131	Mercury	0.000016	J	0.000100	U	3

mg/L-milligram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.12 Assessment of Total Mercury vs. Dissolved Mercury

The samples were analyzed for total and dissolved mercury. The concentrations of total mercury were greater than or equal to the concentrations of dissolved mercury in the samples.

4.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 WET CHEMISTRY

The samples were analyzed for ammonia as N by SM 4500 NH_3H, TOC by US EPA method 9060, sulfide by SM4500S^2D, TDS by SM2540C, TS by SM2540B, TVS by SM2540E and TSS by SM2540D.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
Sulfide	SM4500S^2D	7 days from collection to analysis
Ammonia as N	SM 4500NH_3H	28 days from collection to analysis
TS	SM2540B	7 days from collection to analysis

Analyte	Method	Holding Time
TVS	SM2540E	7 days from collection to analysis
TDS	SM 2540C	7 days from collection to analysis
TSS	SM 2540D	7 days from collection to analysis
TOC	US EPA Method 9060	28 days from collection to analysis

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exception.

TOC (0.57 mg/L and 0.79 mg/L) was detected in the calibration blanks in batch SLB0307 (SLB0307-CCB1 and SLB0307-CCB3) at concentrations greater than the RLs. Since TOC was detected in the associated samples at concentrations greater than ten times the contamination and based on professional and technical judgment, no qualifications were applied to the data.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TSS (batch BLB0106). One method blank was reported for TDS (batches BLB0109). One method blank was reported for TS and TVS (batch BLB0133). One method blank was reported for ammonia (batch BLB0355). One method blank was reported for sulfide (batch BLB0130). One method blank was reported for TOC (batch BLB0327). The wet chemistry parameters were not detected in the method blanks above the MDLs, with the following exception.

TOC was detected in the method blank in batch BLB0327 at an estimated concentration greater than the MDL and less than the RL. Since TOC was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

5.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS was reported for sulfide, using sample BH-GW-24-230131. The recovery result was within the laboratory specified acceptance criteria.

One sample set specific MS/MSD pair was reported for TOC, using sample BH-GW-26-230131. The recovery and RPD results were within the laboratory specified acceptance criteria.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). LCSs were reported for each analytical method. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230201, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230201, with the following exception.

The RPD for TSS in the field duplicate pair was greater than 30%. Therefore, the TOC concentrations in samples BH-GW-29-D-230201 and BH-GW-29-230201 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	RPD	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-230201	TSS	10.0	NA	86	10.0	J	7
BH-GW-29-D-230201	TSS	4.00	NA		4.00	J	7

mg/L-milligram per liter
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for TSS, using sample BH-GW-27-230131. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for sulfide, using sample BH-GW-24-230131. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TOC, using sample BH-GW-26-230131. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TS and TVS, using sample BH-GW-24-230131. The RPD results were within the laboratory specified acceptance criteria.

In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

One equipment blank, BH-EB-GW-230201, was collected during the sample event. The wet chemistry parameters were not detected in the equipment blank above the MDLs.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	7 October 2023
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Kristoffer Henderson, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 23D0598**

Matrices: **Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of four groundwater samples, one field duplicate sample and one equipment blank, including dissolved groundwater, field duplicate and equipment blank samples, collected on 24 April 2023, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3520C/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3510C/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3010A/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7470A
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500NH_3H
- Sulfide by SM4500S^2D
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Suspended Solids (TSS) by SM2540D

- Total Dissolved Solids (TDS) by SM2540C
- Total Volatile Solids (TVS) by SM2540E

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
23D0598-01	BH-GW-27-230424
23D0598-02	BH-GW-27-230424 (dissolved)
23D0598-03	BH-GW-26-230424
23D0598-04	BH-GW-26-230424 (dissolved)
23D0598-05	BH-GW-24-230424
23D0598-06	BH-GW-24-230424 (dissolved)

Laboratory IDs	Client IDs
23D0598-07	BH-GW-29-230424
23D0598-08	BH-GW-29-230424 (dissolved)
23D0598-09	BH-GW-29-D-230424
23D0598-10	BH-GW-29-D-230424 (dissolved)
23D0598-11	BH-EB-GW-230424
23D0598-12	BH-EB-GW-230424 (dissolved)

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 2.9– 4.5 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3510C/8270E and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
⊗ Surrogates
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %D for 2,4,6-tribromophenol (29.6%) in the ICV standard in batch SLE0115 (SLE0115-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the surrogate recoveries were evaluated in their respective samples, no qualifications were applied to the data.

The %D for 2,4-dinitrophenol (165%) in the low concentration calibration standard in batch SLE0115 (SLE0115-LCV1) was outside of validation specified acceptance criteria with a high bias. Since 2,4-dinitrophenol was not detected in the associated samples, no qualifications were applied to the data.

The %D for 2,4,6-tribromophenol (26.9%) in the ICV standard in batch SLE0184 (SLE0184-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Since the surrogate recoveries were evaluated in their respective samples, no qualifications were applied to the data.

The %D for 2,4-dinitrophenol (279%) in the low concentration calibration standard in batch SLE0184 (SLE0184-LCV1) was outside of validation specified acceptance criteria with a high

bias. Since 2,4-dinitrophenol was not detected in the associated samples, no qualifications were applied to the data.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLD0735 and BLD0740). SVOCs and PAHs were not detected in the method blanks above the method detection limits (MDLs).

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported for this analysis.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS and one LCS/ LCS duplicate (LCSD) pairs were reported. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria, with the following exception.

The LCSD recovery of 2,4-dimethylphenol in the LCS/LCSD pair in batch BLD0735 was low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect 2,4-dimethylphenol results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230424	2,4-Dimethylphenol	1.0	U	1.0	UJ	5
BH-GW-26-230424	2,4-Dimethylphenol	1.0	U	1.0	UJ	5
BH-GW-24-230424	2,4-Dimethylphenol	1.0	U	1.0	UJ	5
BH-GW-29-230424	2,4-Dimethylphenol	3.0	U	3.0	UJ	5
BH-GW-29-D-230424	2,4-Dimethylphenol	1.0	U	1.0	UJ	5
BH-EB-GW-230424	2,4-Dimethylphenol	1.0	U	1.0	UJ	5

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-GW-29-D-230424, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230424.

1.11 Rinsate Blank

One equipment blank, BH-EB-GW-230424, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs, with the following exception.

Dibutyl phthalate was detected in the equipment blank at an estimated concentration greater than the MDL and less than the reporting limit (RL). Since dibutyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exception.

The surrogate recoveries of 2,4,6-tribromophenol in the ICV standard in batches SLE0115 (SLE0115-LCV1) and SLE0184 (SLE0184-ICV1) were high and outside of the laboratory specified acceptance criteria. Since the surrogate recoveries were evaluated in their respective associated samples and based on professional and technical judgment, no qualifications were applied to the data.

The surrogate recovery of dibenzo[a,h]anthracene-d14 in samples BH-GW-27-230424, BH-GW-26-230424, BH-GW-29-230424 and BH-GW-29-D-230424 were high and outside of the laboratory specified acceptance criteria. Since the recoveries of the remaining surrogates were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

The surrogate of 2-methylnaphthalene-d10 in sample BH-EB-GW-230424 was reported as not detected, resulting in 0% recovery. Therefore, the non-detect results of PAHs in sample BH-EB-GW-230424 was UJ qualified as estimated less than the MDLs.

The surrogate recovery of dibenzo[a,h]anthracene-d14 in sample BH-GW-24-230424 was high, and the surrogate recovery of 2-methylnaphthalene-d10 in sample BH-GW-24-230424 was low. Both recoveries were outside of the laboratory specified acceptance criteria. Based on professional and technical judgment, no qualifications were applied to the data .

The surrogate recoveries of dibenzo[a,h]anthracene-d14 in the method blank and LCS in batch BLD0740, THE ICV standard in batches SLE0115 (SLE0115-LCV1) and SLE0184 (SLE0184-

ICV1) were high and outside of the laboratory specified acceptance criteria. Since the surrogate recoveries were evaluated in their respective associated samples and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-230424	Naphthalene	0.020	U	0.020	UJ	6
BH-EB-GW-230424	1-Methylnaphthalene	0.020	U	0.020	UJ	6
BH-EB-GW-230424	Acenaphthene	0.020	U	0.020	UJ	6
BH-EB-GW-230424	Fluorene	0.020	U	0.020	UJ	6
BH-EB-GW-230424	Anthracene	0.020	U	0.020	UJ	6
BH-EB-GW-230424	Fluoranthene	0.020	U	0.020	UJ	6
BH-EB-GW-230424	Pyrene	0.030	U	0.030	UJ	6
BH-EB-GW-230424	Benz[a]anthracene	0.050	U	0.050	UJ	6
BH-EB-GW-230424	Chrysene	0.060	U	0.060	UJ	6
BH-EB-GW-230424	Benzo(b)fluoranthene	0.090	U	0.090	UJ	6
BH-EB-GW-230424	Benzo(k)fluoranthene	0.090	U	0.090	UJ	6
BH-EB-GW-230424	Benzo(j)fluoranthene	0.030	U	0.030	UJ	6
BH-EB-GW-230424	Benzofluoranthenes, Total (b+k+j)	0.190	U	0.190	UJ	6
BH-EB-GW-230424	Benzo(a)pyrene	0.060	U	0.060	UJ	6
BH-EB-GW-230424	Indeno(1,2,3-cd)pyrene	0.080	U	0.080	UJ	6
BH-EB-GW-230424	Dibenzo(a,h)anthracene	0.090	U	0.090	UJ	6

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3510C/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLD0737). DRO and MRO were not detected in the method blank above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analysis.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BLD0737. Based professional and technical judgment, the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL, and the MRO concentration in sample BH-GW-26-230424 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230424	MRO	0.056	U	0.056	UJ	5
BH-GW-26-230424	MRO	0.251	NA	0.251	J	5
BH-GW-24-230424	MRO	0.056	U	0.056	UJ	5
BH-GW-29-230424	MRO	0.056	U	0.056	UJ	5
BH-GW-29-D-230424	MRO	0.056	U	0.056	UJ	5

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-230424	MRO	0.056	U	0.056	UJ	5

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-GW-29-D-230424, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230424.

2.9 Rinsate Blank

One equipment blank, BH-EB-GW-230424, was collected during the sample event. DRO and MRO were not detected in the equipment blank above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for total and dissolved metals per USEPA Methods 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
⊗ Rinsate Blank
⊗ Assessment of Total Metals vs. Dissolved Metals
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a preserved water sample is 6 months from collection to analysis. The holding time for the dissolved metal analysis of a preserved water sample is 15 minutes from collection to filtration and 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Chromium was detected in the instrument and calibration blanks in batch SLE0209 (SLE0209-IBLP, SLE0209-CCBM, SLE0209-CCBN) at estimated concentrations greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blank in batch SLE0248 (SLE0248-IBL3) at an estimated concentration greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blank in batch SLE0265 (SLE0265-IBLE) at an estimated concentration greater than the MDL and less than the RL. Since chromium was detected in the associated sample at a concentration greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blanks in batch SLE0330 (SLE0330-IBL5 and SLE0330-IBL9) at estimated concentrations greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium (0.552 µg/L and 0.737 µg/L) was detected in the instrument blank in batch SLE0330 (SLE0330-IBL8) at an estimated concentration greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic was detected in the instrument blank in batch SLE0163 (SLE0163-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the arsenic data in the associated samples were bracketed by acceptable calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the calibration blank in batch SLE0163 (SLE0163-CCB4) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the instrument blank in batch SLE0209 (SLE0209-IBL2 and SLE0209-IBLD) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Copper was detected in the instrument blank in batch SLE0209 (SLE0209-IBLF) at an estimated concentration greater than the MDL and less than the RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the calibration blank in batch SLE0330 (SLE0330-CCB1) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLE0256 and BLE0119). Total and dissolved metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total metals, using sample BH-GW-27-230424. One sample set specific MS/MSD pair was reported for dissolved metals, using sample BH-GW-27-230424. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230424, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230424, with the following exceptions.

The RPDs for total arsenic, total chromium, total copper and total lead in the field duplicate pair was greater than 30%. Therefore, the concentrations of total arsenic, total chromium, total copper and total lead in samples BH-GW-29-D-230424 and BH-GW-29-230424 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-230424	Arsenic	2.66	D	56	2.66	J	7
BH-GW-29-D-230424	Arsenic	1.49	D		1.49	J	7
BH-GW-29-230424	Chromium	10.8	D	68	10.8	J	7
BH-GW-29-D-230424	Chromium	5.33	D		5.33	J	7
BH-GW-29-230424	Copper	16.1	D	40	16.1	J	7
BH-GW-29-D-230424	Copper	10.7	D		10.7	J	7
BH-GW-29-230424	Lead	0.538	D	38	0.538	J	7
BH-GW-29-D-230424	Lead	0.368	D		0.368	J	7

µg/L-microgram per liter
NA-not applicable
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total metals using sample BH-GW-27-230424. One sample set specific laboratory duplicate was reported for dissolved metals using sample BH-GW-27-230424. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

One equipment blank, BH-EB-GW-230424, was collected during the sample event. Total and dissolved metals were not detected in the equipment blanks above the MDLs, with the following exceptions.

Dissolved copper (0.532 µg/L) was detected in the equipment blank, BH-EB-GW-230424, at a concentration greater than the RL. Therefore, the concentrations of dissolved copper in samples BH-GW-29-230424 and BH-GW-29-D-230424 were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-29-230424	Dissolved Copper	3.27	NA	3.27	J+	3
BH-GW-29-D-230424	Dissolved Copper	3.49	NA	3.49	J+	3

µg/L-microgram per liter
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.12 Assessment of Total Metals vs. Dissolved Metals

The samples were analyzed for total and dissolved metals. The concentrations of total metals were greater than or equal to the concentrations of dissolved metals in the samples, with the following exceptions.

Dissolved arsenic was detected in sample BH-GW-29-D-230424 at a concentration greater than total arsenic. Since the RPD between the results were less than 30%, no qualifications were applied to the data.

Dissolved copper was detected in sample BH-EB-GW-230424 at an estimated concentration greater than the MDL and less than the RL, and total copper was not detected in sample BH-EB-GW-230424, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the dissolved copper concentration in sample BH-EB-GW-230424 was J qualified as estimated, and the non-detect result of total copper in sample BH-EB-GW-230424 was UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-230424	Copper	0.532	NA	NC	0.532	J	13

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-GW-230424	Copper	0.173	U		0.173	UJ	13

µg/L-microgram per liter
NA-not applicable
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

For samples with estimated concentrations of total metals less than the estimated concentrations of dissolved metals, no qualifications were applied to the data.

3.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported . Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The ground water and sediment RLs listed in Tables 9b and 9c of the QAPP were not met for total zinc. However, the screening levels were met.

3.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank

✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
✓ Assessment of Total Mercury vs. Dissolved Mercury
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total mercury analysis of a preserved water sample is 28 days from collection to analysis. The holding time for the dissolved mercury analysis of a preserved water sample is 15 minutes from collection to filtration and 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs did not meet the method acceptance criteria. Mercury was detected in the ICBs and CCBs in batch SLE0086 at estimated concentrations more negative than the MDL and less negative than the RL. Therefore, the non-detect mercury results in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230424	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-27-230424	Dissolved Mercury	0.000013	U	0.000013	UJ	3
BH-GW-26-230424	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-26-230424	Dissolved Mercury	0.000013	U	0.000013	UJ	3
BH-GW-24-230424	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-24-230424	Dissolved Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-230424	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-230424	Dissolved Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-D-230424	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-D-230424	Dissolved Mercury	0.000013	U	0.000013	UJ	3
BH-EB-GW-230424	Mercury	0.000013	U	0.000013	UJ	3
BH-EB-GW-230424	Dissolved Mercury	0.000013	U	0.000013	UJ	3

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLE0055 and BLE0036). Total and dissolved mercury were not detected in the method blanks above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total mercury, using sample BH-GW-27-230424. One sample set specific MS/MSD pair was reported for dissolved mercury, using sample BH-GW-27-230424. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230424, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230424.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total mercury using sample BH-GW-27-230424. One sample set specific laboratory duplicate was reported for dissolved mercury using sample BH-GW-27-230424. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

One equipment blank, BH-EB-GW-230424, was collected during the sample event. Total and dissolved mercury were not detected in the equipment blank above the MDL.

4.12 Assessment of Total Mercury vs. Dissolved Mercury

The samples were analyzed for total and dissolved mercury. The concentrations of total mercury were greater than or equal to the concentrations of dissolved mercury in the samples.

4.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met.

4.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 WET CHEMISTRY

The samples were analyzed for ammonia as N by SM 4500 NH_3H, TOC by US EPA method 9060, sulfide by SM4500S^2D, TDS by SM2540C, TVS by SM2540E and TSS by SM2540D.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
⊗ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses, with the following exception.

Analyte	Method	Holding Time
Sulfide	SM4500S^2D	7 days from collection to analysis
Ammonia as N	SM 4500NH_3H	28 days from collection to analysis
TS	SM2540B	7 days from collection to analysis
TVS	SM2540E	7 days from collection to analysis
TDS	SM 2540C	7 days from collection to analysis
TSS	SM 2540D	7 days from collection to analysis
TOC	US EPA Method 9060	28 days from collection to analysis

Sample BH-GW-26-230424 was analyzed for TOC outside of the holding time requirements. Therefore, the TOC concentration in sample BH-GW-26-230424 was J- qualified as estimated with low bias.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-26-230424	TOC	2.34	H	2.34	J-	2

mg/L-milligram per liter
H-laboratory flag indicating hold time violation
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exception.

TOC (0.71 mg/L) was detected in the instrument blank in batch SLE0075 (SLE0075-ICB1) at a concentration greater than the RL. Therefore, the TOC concentrations in the associated samples were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230424	TOC	3.55	D	3.55	J+	3
BH-GW-26-230424	TOC	2.34	H	2.34	J+	3
BH-GW-24-230424	TOC	3.22	NA	3.22	J+	3
BH-GW-29-230424	TOC	6.67	NA	6.67	J+	3
BH-GW-29-D-230424	TOC	6.45	NA	6.45	J+	3
BH-EB-GW-230424	TOC	0.62	NA	0.62	J+	3

mg/L-milligram per liter
D-laboratory flag indicating the reported value is from a dilution
H-laboratory flag indicating hold time violation
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TSS (batch BLD0706). One method blank was reported for TDS (batches BLD0797). One method blank was reported for TVS (batch BLD0794). One method blank was reported for ammonia (batch BLE0058). One method blank was reported for sulfide (batch BLE0038). One method blank was reported for TOC (batch BLE0460). The wet chemistry parameters were not detected in the method blanks above the MDLs.

5.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for sulfide, using sample BH-GW-27-230424. The recovery and RPD results were within the laboratory specified acceptance criteria.

One sample set specific MS/MSD pair was reported for ammonia, using sample BH-GW-27-230424. The recovery and RPD results were within the laboratory specified acceptance criteria.

One sample set specific MS/MSD pair was reported for TOC, using sample BH-GW-27-230424. The recovery and RPD results were within the laboratory specified acceptance criteria.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). LCSs were reported for each analytical method. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230424, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230424, with the following exceptions.

Ammonia as N was detected in the parent sample BH-GW-29-230424 at a concentration greater than the RL and not detected in the field duplicate sample BH-GW-29-D-230424, resulting in a noncalculable RPD. Therefore, the non-detect result of ammonia as N in sample BH-GW-29-D-230424 was UJ qualified as estimated less than the MDL, and the ammonia as N concentration in sample BH-GW-29-230424 was J qualified as estimated.

The RPDs for TDS and TSS in the field duplicate pair was greater than 30%. Therefore, the concentrations of TDS and TSS in samples BH-GW-29-D-230424 and BH-GW-29-230424 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	RPD	Validation Result (g/L)	Validation Qualifier*	Reason Code**
BH-GW-29-230424	Ammonia as N	0.067	NA	NC	0.067	J	7
BH-GW-29-D-230424	Ammonia as N	0.040	U		0.040	UJ	7
BH-GW-29-230424	TDS	529	NA	31	529	J	7
BH-GW-29-D-230424	TDS	388	NA		388	J	7
BH-GW-29-230424	TSS	5	NA	67	5	J	7
BH-GW-29-D-230424	TSS	10	NA		10	J	7

mg/L-milligram per liter
NC-noncalculable
NA-not applicable
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for TDS, using sample BH-GW-29-230424. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for sulfide, using sample BH-GW-27-230424. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TOC, using BH-GW-27-230424. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for ammonia, using BH-GW-27-230424. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TVS, using sample BH-GW-29-230424. The RPD results were within the laboratory specified acceptance criteria.

In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

One equipment blank, BH-EB-GW-230424, was collected during the sample event. The wet chemistry parameters were not detected in the equipment blank above the MDLs, with the following exception.

TOC (0.62 µg/L) was detected in the equipment blank, BH-EB-GW-230424, at a concentration greater than the RL. Therefore, the TOC concentrations in samples BH-GW-27-230424 and BH-GW-24-230424 were J+ qualified as estimated with a high bias, and the estimated TOC concentration in sample BH-GW-26-230424 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230424	TOC	3.55	NA	3.55	J+	3
BH-GW-26-230424	TOC	2.34	J	2.34	J	3
BH-GW-24-230424	TOC	3.22	NA	3.22	J+	3

mg/L-milligram per liter
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

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ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date: 7 October 2023

To: Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900

From: Matthew Richardson, Geosyntec

CC: Kristoffer Henderson, Geosyntec

Subject: **Blakely Harbor Park Site Stage 4 Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 23H0049**

Matrices: **Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of four groundwater samples, one field duplicate sample and one equipment blank, including dissolved groundwater, field duplicate and equipment blank samples, collected on 1 August 2023, as part of the Blakely Harbor Park sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Seattle, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (USEPA) Methods 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3520C/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3510C/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3010A/6020B Universal Cell Technology (UCT)-Kinetic Energy Discrimination (KED)
- Mercury by US EPA Method 7470A
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500NH_3H
- Sulfide by SM4500S^2D
- Total Organic Carbon (TOC) by US EPA Method 9060
- Total Suspended Solids (TSS) by SM2540D

- Total Dissolved Solids (TDS) by SM2540C
- Total Solids (TS) by SM2540B
- Total Volatile Solids (TVS) by SM2540E

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 540-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
23H0049-01	BH-GW-27-230801
23H0049-02	BH-GW-27-230801 (dissolved)
23H0049-03	BH-GW-26-230801
23H0049-04	BH-GW-26-230801 (dissolved)
23H0049-05	BH-GW-24-230801
23H0049-06	BH-GW-24-230801 (dissolved)

Laboratory IDs	Client IDs
23H0049-07	BH-GW-29-230801
23H0049-08	BH-GW-29-230801 (dissolved)
23H0049-09	BH-GW-29-D-230801
23H0049-10	BH-GW-29-D-230801 (dissolved)
23H0049-11	BH-EB-GW-230801
23H0049-12	BH-EB-GW-230801 (dissolved)

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 1.1 – 6.0 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

1.0 SEMI-VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per USEPA Methods 3510C/8270E and 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
⊗ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria, with the following exceptions.

The r^2 for 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol in the initial calibration GG00059 was less than 0.990. Therefore, the non-detect results of 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs).

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230801	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-GW-26-230801	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-GW-24-230801	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-GW-29-230801	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-GW-29-D-230801	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-EB-GW-230801	2,4-Dinitrophenol	1.7	U	1.7	UJ	9
BH-GW-27-230801	4,6-Dinitro-2-Methylphenol	2.4	U	2.4	UJ	9
BH-GW-26-230801	4,6-Dinitro-2-Methylphenol	2.4	U	2.4	UJ	9
BH-GW-24-230801	4,6-Dinitro-2-Methylphenol	2.4	U	2.4	UJ	9
BH-GW-29-230801	4,6-Dinitro-2-Methylphenol	2.4	U	2.4	UJ	9
BH-GW-29-D-230801	4,6-Dinitro-2-Methylphenol	2.4	U	2.4	UJ	9
BH-EB-GW-230801	4,6-Dinitro-2-Methylphenol	2.4	U	2.4	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for 2,4-dinitrophenol (57.7%) and 4,6-dinitro-2-methylphenol (24.2%) in the ICV standard in batch SLH0173 (SLH0173-ICV1) were outside of laboratory specified acceptance criteria with a high bias. Since 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol were not detected in the associated samples, no qualifications were applied to the data.

The %D for 2,4-dinitrophenol (71.5%) in the CCV standard in batch SLH0173 (SLH0173-CCV1) was outside of laboratory specified acceptance criteria with a high bias. Since 2,4-dinitrophenol was not detected in the associated samples, no qualifications were applied to the data.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLH0135 and BLH0134). SVOCs and PAHs were not detected in the method blanks above the MDLs.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Two sample set specific MS/MSD pairs were reported, using samples BH-EB-GW-230801 and BH-GW-24-230801. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of dibenzofuran, di-n-butylphthalate and bis(2-ethylhexyl)phthalate in the LCS in batch BLH0135 were low outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of dibenzofuran, di-n-butylphthalate and bis(2-ethylhexyl)phthalate in the associated samples were UJ qualified as estimated less than the MDLs, and the estimated concentration of di-n-butylphthalate in sample BH-EB-GW-230801 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier	Reason Code
BH-GW-27-230801	bis(2-ethylhexyl) Phthalate	0.30	U	0.30	UJ	5
BH-GW-27-230801	Dibenzofuran	0.20	U	0.20	UJ	5
BH-GW-27-230801	dibutyl phthalate	0.30	U	0.30	UJ	5
BH-GW-26-230801	bis(2-ethylhexyl) Phthalate	0.30	U	0.30	UJ	5
BH-GW-26-230801	Dibenzofuran	0.20	U	0.20	UJ	5
BH-GW-26-230801	dibutyl phthalate	0.30	U	0.30	UJ	5
BH-GW-24-230801	bis(2-ethylhexyl) Phthalate	0.30	U	0.30	UJ	5
BH-GW-24-230801	Dibenzofuran	0.20	U	0.20	UJ	5
BH-GW-24-230801	dibutyl phthalate	0.30	U	0.30	UJ	5
BH-GW-29-230801	bis(2-ethylhexyl) Phthalate	0.30	U	0.30	UJ	5
BH-GW-29-230801	Dibenzofuran	0.20	U	0.20	UJ	5
BH-GW-29-230801	dibutyl phthalate	0.30	U	0.30	UJ	5
BH-GW-29-D-230801	bis(2-ethylhexyl) Phthalate	0.30	U	0.30	UJ	5
BH-GW-29-D-230801	Dibenzofuran	0.20	U	0.20	UJ	5
BH-GW-29-D-230801	dibutyl phthalate	0.30	U	0.30	UJ	5
BH-EB-GW-230801	bis(2-ethylhexyl) Phthalate	0.30	U	0.30	UJ	5
BH-EB-GW-230801	Dibenzofuran	0.20	U	0.20	UJ	5
BH-EB-GW-230801	dibutyl phthalate	0.40	J	0.40	J	5

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
B-laboratory flag indicating this analyte was detected in the method blank.
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-GW-29-D-230801, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230801.

1.11 Rinsate Blank

One equipment blank, BH-EB-GW-230801, was collected during the sample event. SVOCs and PAHs were not detected in the equipment blank above the MDLs, with the following exception.

Dibutyl phthalate was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since dibutyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of base neutral extractable surrogate 1,2-dichlorobenzene-d4 in samples BH-GW-26-230801 and BH-GW-29-230801 were low and outside the laboratory specified acceptance criteria. Since the recoveries of the remaining base neutral extractable surrogates were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

The recoveries of base neutral extractable surrogate 2-fluorobiphenyl in sample BH-GW-29-D-230801 was low and outside the laboratory specified acceptance criteria. Since the recoveries of the remaining base neutral extractable surrogates were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

1.13 Sensitivity

The samples were reported as not detected at a concentration greater than or equal to the RL. Additionally, estimated concentrations less than the RL were reported. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO, and MRO) per Methods 3510C/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues

were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Verification
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ⊗ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Rinsate Blank
- ✓ Surrogates
- ✓ Sensitivity
- ⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the %RSD of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLH0074). DRO and MRO were not detected in the method blank above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-EB-GW-230801. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/laboratory control sample duplicate (LCSD) pair was reported. The recovery and RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BLH0074. Based professional and technical judgment, the non-detect MRO results in the associated samples were UJ qualified as estimated less than the MDL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230801	MRO	0.056	U	0.056	UJ	5
BH-GW-26-230801	MRO	0.056	U	0.056	UJ	5
BH-GW-24-230801	MRO	0.056	U	0.056	UJ	5
BH-GW-29-230801	MRO	0.056	U	0.056	UJ	5
BH-GW-29-D-230801	MRO	0.056	U	0.056	UJ	5
BH-EB-GW-230801	MRO	0.056	U	0.056	UJ	5

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

One field duplicate sample, BH-GW-29-D-230801, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230801.

2.9 Rinsate Blank

One equipment blank, BH-EB-GW-230801, was collected during the sample event. DRO and MRO were not detected in the equipment blank above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were reported to the RLs in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDLs in the EDD. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for total and dissolved metals per USEPA Methods 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank

✓ Assessment of Total Metals vs. Dissolved Metals
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a preserved water sample is 6 months from collection to analysis. The holding time for the dissolved metal analysis of a preserved water sample is 15 minutes from collection to filtration and 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Chromium (2.85 µg/L, 951 µg/L was detected in the instrument blanks in batch SLH0226 (SLH0226-IBL2, SLH0226-IBL3) at concentrations greater than RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blanks in batch SLH0226 (SLH0226-IBL5, SLH0226-IBL6, SLH0226-IBLB) at estimated concentrations greater than the MDL and less than the RL. Therefore, the estimated concentrations of dissolved in the associated samples were U qualified as not detected at the RL.

Lead (309 µg/L) was detected in the instrument blank in batch SLH0226 (SLH0226-IBL3) at a concentration greater than RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blanks in batch SLH0255 (SLH0255-IBL3, SLH0255-IBL4, SLH0255-IBL5, SLH0255-IBL6, SLH0255-IBL7, SLH0255-IBL8, SLH0255-IBL9, SLH0255-IBLA, SLH0255-IBLB, SLH0255-IBLI and SLH0255-IBLJ) at estimated concentrations greater than the MDL and less than the RL. Since total chromium was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

Lead (101 µg/L) was detected in the instrument blank in batch SLH0255 (SLH0255-IBL3) at a concentration greater than RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic (87.3 µg/L) was detected in the instrument blank in batch SLH0226 (SLH0226-IBL3) at a concentration greater than RL. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium (-153 µg/L) was detected in the instrument blank in batch SLH0226 (SLH0226-IBL3) at a concentration more negative than RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Copper (31.0 µg/L) was detected in the instrument blank in batch SLH0226 (SLH0226-IBL3) at a concentration greater than RL. Since the copper data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Zinc (243 µg/L) was detected in the instrument blank in batch SLH0226 (SLH0226-IBL3) at a concentration greater than RL. Since the zinc data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic (29.0 µg/L) was detected in the instrument blank in batch SLH0255 (SLH0255-IBL3) at a concentration greater than RL. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium (26.3 µg/L) was detected in the instrument blank in batch SLH0255 (SLH0255-IBL3) at a concentration greater than RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Copper (28.0 µg/L) was detected in the instrument blank in batch SLH0255 (SLH0255-IBL3) at a concentration greater than RL. Since the copper data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Zinc (147 µg/L) was detected in the instrument blank in batch SLH0255 (SLH0255-IBL3) at a concentration greater than RL. Since the zinc data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230801	Chromium	9.54	J	10.0	U	3
BH-GW-24-230801	Chromium	4.91	J	5.00	U	3
BH-GW-29-230801	Chromium	3.72	J	5.00	U	3
BH-GW-29-D-230801	Chromium	3.53	J	5.00	U	3

µg/L-microgram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLH0441 and BLH0365). Total and dissolved metals were not detected in the method blanks above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total metals, using sample BH-GW-27-230801. One sample set specific MS/MSD pair was

reported for dissolved metals, using sample BH-GW-27-230801. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230801, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230801, with the following exceptions.

Total arsenic was detected in the parent sample BH-GW-29-230801 at an estimated concentration greater than the MDL and less than the RL and not detected in the field duplicate sample BH-GW-29-D-230801, resulting in a noncalculable RPD. Therefore, the non-detect result of total arsenic in sample BH-GW-29-D-230801 was UJ qualified as estimated less than the MDL, and the total arsenic concentration in sample BH-GW-29-230801 was J qualified as estimated.

Total zinc was detected in the field duplicate sample BH-GW-29-D-230801 at an estimated concentration greater than the RL and not detected in the parent sample BH-GW-29-230801, resulting in a noncalculable RPD. Therefore, the non-detect result of total zinc in sample BH-GW-29-230801 was UJ qualified as estimated less than the MDL, and the total zinc concentration in sample BH-GW-29-D-230801 was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	RPD	Validation Result (µg/L)	Validation Qualifier	Reason Code
BH-GW-29-230801	Arsenic	0.42	J, D	NC	0.42	J	7
BH-GW-29-D-230801	Arsenic	0.373	U		0.373	UJ	7
BH-GW-29-230801	Zinc	92.1	D	NC	92.1	J	7
BH-GW-29-D-230801	Zinc	29.2	U		29.2	UJ	7

µg/L-microgram per liter
NC-noncalculable
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
D-laboratory flag indicating the reported value is from a dilution
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total metals using sample BH-GW-27-230801. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

One equipment blank, BH-EB-GW-230801, was collected during the sample event. Total and dissolved metals were not detected in the equipment blanks above the MDLs.

3.12 Assessment of Total Metals vs. Dissolved Metals

The samples were analyzed for total and dissolved metals. The concentrations of total metals were greater than or equal to the concentrations of dissolved metals in the samples, with the following exception.

Dissolved arsenic was detected in sample BH-GW-24-230801 at a concentration greater than total arsenic. Since the RPD between the results were less than 30%, no qualifications were applied to the data.

For samples with estimated concentrations of total metals less than the estimated concentrations of dissolved metals, no qualifications were applied to the data.

3.13 Sensitivity

The samples were reported to the MDLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The ground water and sediment RLs listed in Tables 9b and 9c of the QAPP were not met for total zinc. However, the screening levels were met

3.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for total and dissolved mercury by USEPA Methods 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
✓ Assessment of Total Mercury vs. Dissolved Mercury
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The total and dissolved mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the total mercury analysis of a preserved water sample is 28 days from collection to analysis. The holding time for the dissolved mercury analysis of a preserved water sample is 15 minutes from collection to filtration and 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs did not meet the method acceptance criteria. Mercury was detected in the ICBs and CCBs in batches SLH0112 and SLH0268 at estimated concentrations more negative than the MDL and less negative than the RL. Therefore, the non-detect mercury results in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-27-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-26-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-26-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-24-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-24-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-D-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-GW-29-D-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-EB-GW-230801	Mercury	0.000013	U	0.000013	UJ	3
BH-EB-GW-230801	Mercury	0.000013	U	0.000013	UJ	3

mg/L-milligram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLH0370 and BLH0188). Total and dissolved mercury were not detected in the method blanks above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported for total mercury, using sample BH-GW-27-230801. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230801, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230801.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for total mercury using sample BH-GW-27-230801. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

One equipment blank, BH-EB-GW-230801, was collected during the sample event. Total and dissolved mercury were not detected in the equipment blank above the MDL.

4.12 Assessment of Total Mercury vs. Dissolved Mercury

The samples were analyzed for total and dissolved mercury. The concentrations of total mercury were greater than or equal to the concentrations of dissolved mercury in the samples.

4.13 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9a, 9b, and 9c of the QAPP. However, the screening level for soils was not met

4.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 WET CHEMISTRY

The samples were analyzed for ammonia as N by SM 4500 NH_3H, TOC by US EPA method 9060, sulfide by SM4500S^2D, TDS by SM2540C, TS by SM2540B, TVS by SM2540E and TSS by SM2540D.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
Sulfide	SM4500S^2D	7 days from collection to analysis
Ammonia as N	SM 4500NH_3H	28 days from collection to analysis
TS	SM2540B	7 days from collection to analysis

Analyte	Method	Holding Time
TVS	SM2540E	7 days from collection to analysis
TDS	SM 2540C	7 days from collection to analysis
TSS	SM 2540D	7 days from collection to analysis
TOC	US EPA Method 9060	28 days from collection to analysis

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for TSS (batch BLH0209). One method blank was reported for TDS (batches BLH0212). One method blank was reported for TS and TVS (batch BLH0211). One method blank was reported for ammonia (batch BLH0459). One method blank was reported for sulfide (batch BLH0216). One method blank was reported for TOC (batch BLH0431). The wet chemistry parameters were not detected in the method blanks above the MDLs.

5.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS was reported for sulfide, using sample BH-GW-27-230801. The recovery result was within the laboratory specified acceptance criteria.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). LCSs were reported for each analytical method. The recovery results were within the laboratory specified acceptance criteria, with the following exception.

The LCS recovery of TS in batch BLH0211 was low and outside of the laboratory specified acceptance criteria. Therefore, the TS and TVS concentrations in the associated samples were J-

qualified as estimated with a low bias, and the non-detect TVS result in sample BH-EB-GW-230801 was UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier*	Reason Code**
BH-GW-27-230801	TS	30900	NA	30900	J-	5
BH-GW-27-230801	TVS	6400	NA	6400	J-	5
BH-GW-26-230801	TS	36000	NA	36000	J-	5
BH-GW-26-230801	TVS	7560	NA	7560	J-	5
BH-GW-24-230801	TS	26100	NA	26100	J-	5
BH-GW-24-230801	TVS	5340	NA	5340	J-	5
BH-GW-29-230801	TS	25200	NA	25200	J-	5
BH-GW-29-230801	TVS	6560	NA	6560	J-	5
BH-GW-29-D-230801	TS	25500	NA	25500	J-	5
BH-GW-29-D-230801	TVS	7300	NA	7300	J-	5
BH-EB-GW-230801	TS	5	NA	5	J-	5
BH-EB-GW-230801	TVS	5	U	5	UJ	5

mg/L-milligram per liter
NA-not applicable
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.9 Field Duplicate

One field duplicate sample, BH-GW-29-D-230801, was collected with the sample set. Acceptable precision (RPD < 30%) was demonstrated between the field duplicate and the original sample, BH-GW-29-230801.

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for sulfide, using sample BH-GW-27-230801. The RPD result was within the laboratory specified acceptance criteria.

One sample set specific laboratory duplicate was reported for TS and TVS, using sample BH-GW-27-230801. The RPD results were within the laboratory specified acceptance criteria.

In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

One equipment blank, BH-EB-GW-230801, was collected during the sample event. The wet chemistry parameters were not detected in the equipment blank above the MDLs, with the following exception.

TS (5 µg/L) was detected in the equipment blank, BH-EB-GW-230801, at a concentration greater than the RL. Since TS was detected in the associated samples at concentrations greater than the ten times the contamination and based on professional and technical judgment, no qualifications were applied to the data.

5.12 Sensitivity

The samples were reported to the MDLs in the laboratory report. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	8 March 2024
To:	Cindy Bartlett
From:	Quyen Le
CC:	Kristoffer Henderson
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGS North America Inc. Data Package Identifications B8937, B8939 and B8940**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of seventeen soil samples, two sediment samples, two soil field duplicate samples, one sediment field duplicate sample, one soil equipment blank and one sediment equipment blank, collected on 13-14 December 2023, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS North America Inc., Wilmington, North Carolina and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent method referenced by the laboratory reports, professional and technical judgment, and the following documents:

- Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, November 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);

- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
B8937_001	BH-HA-52-0to1
B8937_002	BH-HA-52-1to2
B8937_003	BH-HA-44-0to1
B8937_004	BH-HA-44-0to1-D
B8937_005	BH-HA-44-1to2
B8937_006	BH-HA-47-0to1
B8937_007	BH-HA-47-1to2
B8937_008	BH-HA-51-0to1
B8937_009	BH-HA-51-0to1-D
B8937_010	BH-HA-51-1to1.6
B8937_011	BH-HA-45-0to1
B8937_012	BH-HA-45-1to2

Laboratory ID	Client ID
B8937_013	BH-HA-50b-0to1
B8937_014	BH-HA-50b-1to1.6
B8937_015	BH-HA-49-0to1
B8937_016	BH-HA-49-1to2
B8937_017	BH-HA-46-0to1
B8937_018	BH-HA-46-1to1.8
B8937_019	BH-HA-37-2to2.9
B8939_001	BH-SG-56-0to10
B8939_002	BH-SG-56-0to10-D
B8939_003	BH-SG-57-0to10
B8940_001	BH-EB-SG-231214
B8940_002	BH-EB-HA-231213

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

Per the client's request, the laboratory revised the sample identification (ID) for BH-SG-D-0to10 as listed on the COC to BH-SG-56-0to10-D.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA Method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF

Analyte	Acronyms
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF
Total Dibenzo-p-dioxins/furans	Total PCDD/Fs

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Instrument Performance Check
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Verifications
- ✓ Method Blank

⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Equipment Blank
⊗ Field Duplicate
⊗ Isotope Dilution Standards
⊗ Target Compound Identifications
✓ Target Compound Quantitations
⊗ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

1.2 Holding Times

The holding times for the dioxin and furans analysis of groundwater samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches 20774, 20793 and 20789). Dioxins and furans were not detected in the method blanks at or above the detection limits (DLs).

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were analyzed and reported at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples) for batches 20774 and 20793, using samples BH-HA-52-0to1 and BH-SG-57-0to10, respectively. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria, with the following exceptions.

The OCDD recovery for the MSD using sample BH-HA-52-0to1 was below the QAPP-specified acceptance criteria. In addition, the OCDD RPD for the MS/MSD pair was above the QAPP-specified acceptance criteria. Therefore, the OCDD concentration in sample BH-HA-52-0to1 was J qualified as estimated.

The OCDD recovery for the MS and the RPD using sample BH-SG-57-0to10 were above the QAPP-specified acceptance criteria. Therefore, the OCDD concentration in sample BH-HA-52-0to1 was J qualified as estimated.

A MS/MSD pair was not reported for batch 20789. An ongoing precision and recovery standard (OPR) was used to access accuracy. A laboratory measure of precision was not reported.

Qualifications are in Attachment 3 at the end of this report.

1.8 Laboratory Control Sample (LCS)

OPRs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three OPRs were reported. The recovery results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

The QAPP requirement of one equipment blank per sampling event and/or type of sampling equipment was met. Two equipment blanks, BH-EB-SG-231214 and BH-EB-HA-231213, were submitted with the sample set. Dioxins and furans were not detected in the equipment blanks at or above the DLs, with the following exceptions.

1,2,3,4,7,8-HxCDD was detected in BH-EB-SG-231214 at an estimated concentration greater than the DL and less than the reporting limit (RL). Therefore, the estimated concentrations of 1,2,3,4,7,8-HxCDD in the associated samples were U qualified as not detected at the RLs.

Qualifications are in Attachment 4 at the end of this report.

1.10 Field Duplicate

The QAPP requirement of one field duplicate per every twenty primary samples of each matrix was met. Three field duplicate samples were submitted with the sample set, BH-HA-44-0to1-D, BH-HA-51-0to1-D and BH-SG-56-0to10-D. Acceptable precisions (RPD<50%) were demonstrated between the field duplicates and original samples BH-GW-29-230201, BH-GW-29-230424 and BH-GW-29-230801, respectively, with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the DL and less than the RL and a concentration greater than the RL, the RPDs were not calculable. Therefore, the concentrations in the field duplicate pairs the concentrations were J qualified as estimated, based on professional and technical judgment.

For analytes with both a concentration greater than the DL and a non-detect result, the RPDs were not calculable. Therefore, the concentrations in the field duplicate pairs were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the DLs, based on professional and technical judgment. However, if the concentration was U qualified due to blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Qualifications are in Attachment 5 at the end of this report.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

Some recoveries for equipment blank BH-EB-SG-231214 were above the laboratory specified acceptance criteria. The 1,2,3,4,7,8-HxCDD concentration in the equipment blank was qualified J+ as estimated with high bias. Since the remaining associated analytes were not detected in the equipment blank, no qualifications were applied to the data.

Qualifications are in Attachment 6 at the end of this report.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged EST by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, the concentrations were J qualified as estimated with the following exception.

For concentrations that were U qualified due to blank contamination, no additional qualifications were applied to the data based on professional and technical judgment.

Qualifications are in Attachment 7 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the DLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for soils, Table 9b for groundwaters and Table 9c for sediments. The screening levels were met, with the following exception.

The soil DLs reported for 2,3,7,8-TCDD did not meet the screening level of 0.0013 pg/g listed in the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. The RLs included in the EDD were not listed on the level IV reports. The percent solids and isotope dilution standards data listed on the level IV reports were not included in the EDD. No other discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

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ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	MS/MSD recovery or RPD outside limits
5	LCS/LCSD recovery outside limits or RPD outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate

ATTACHMENT 3
QUALIFICATION FOR MS/MSD

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-52-0to1	OCDD	268	NA	268	J	4
BH-SG-57-0to10	OCDD	337	NA	337	J	4

pg/g-picograms per gram
NA-not applicable

ATTACHMENT 4
QUALIFICATION FOR EQUIPMENT BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SG-56-0to10	123478-HxCDD	0.679	J EST	2.46	U	3
BH-SG-56-0to10-D	123478-HxCDD	0.868	J EST	2.45	U	3
BH-SG-57-0to10	123478-HxCDD	0.752	J EST	2.45	U	3

pg/g-picograms per gram
J-estimated concentration greater than the DL but less than the RL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

ATTACHMENT 5
QUALIFICATION FOR FIELD DUPLICATE

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-44-0to1	2378-TCDD	0.565	NA	63	0.565	J	7
BH-HA-44-0to1-D	2378-TCDD	1.09	EST		1.09	J	7
BH-HA-44-0to1	123678-HxCDD	1.01	J EST	NC	1.01	J	7
BH-HA-44-0to1-D	123678-HxCDD	2.59	N		2.59	J	7
BH-HA-44-0to1	2378-TCDF	2.54	NA	74	2.54	J	7
BH-HA-44-0to1-D	2378-TCDF	5.52	NA		5.52	J	7
BH-HA-44-0to1	12378-PeCDF	1.43	J	NC	1.43	J	7
BH-HA-44-0to1-D	12378-PeCDF	2.99	NA		2.99	J	7
BH-HA-44-0to1	23478-PeCDF	1.24	J	NC	1.24	J	7
BH-HA-44-0to1-D	23478-PeCDF	2.86	NA		2.86	J	7
BH-HA-44-0to1	1234789-HpCDF	0.142	U	NC	0.142	UJ	7
BH-HA-44-0to1-D	1234789-HpCDF	0.335	J		0.335	J	7
BH-HA-44-0to1	Total HpCDF	0.126	U	NC	0.126	UJ	7
BH-HA-44-0to1-D	Total HpCDF	5.35	EST		5.35	J	7
BH-HA-44-0to1	Total PCDD/Fs	284	NA	54	284	J	7
BH-HA-44-0to1-D	Total PCDD/Fs	494	NA		494	J	7
BH-HA-51-0to1	1234789-HpCDF	0.106	U	NC	0.106	UJ	7
BH-HA-51-0to1-D	1234789-HpCDF	0.41	J		0.41	J	7
BH-SG-56-0to10	123678-HxCDD	4.96	NA	NC	4.96	J	7
BH-SG-56-0to10-D	123678-HxCDD	1.95	J		1.95	J	7
BH-SG-56-0to10	1234678-HpCDD	244	NA	147	244	J	7
BH-SG-56-0to10-D	1234678-HpCDD	37.2	NA		37.2	J	7
BH-SG-56-0to10	OCDD	2850	NA	160	2850	J	7
BH-SG-56-0to10-D	OCDD	318	NA		318	J	7
BH-SG-56-0to10	12378-PeCDF	0.414	U	NC	0.414	UJ	7
BH-SG-56-0to10-D	12378-PeCDF	0.771	J EST		0.771	J	7
BH-SG-56-0to10	1234678-HpCDF	14.3	NA	71	14.3	J	7
BH-SG-56-0to10-D	1234678-HpCDF	6.84	NA		6.84	J	7
BH-SG-56-0to10	OCDF	70.3	NA	150	70.3	J	7
BH-SG-56-0to10-D	OCDF	10	NA		10	J	7
BH-SG-56-0to10	Total HpCDD	414	NA	96	414	J	7
BH-SG-56-0to10-D	Total HpCDD	145	NA		145	J	7
BH-SG-56-0to10	Total HpCDF	52.8	EST	NC	52.8	J	7
BH-SG-56-0to10-D	Total HpCDF	16.2	NA		16.2	J	7
BH-SG-56-0to10	Total PCDD/Fs	3450	NA	144	3450	J	7

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SG-56-0to10-D	Total PCDD/Fs	565	NA		565	J	7

pg/g-picograms per gram
J-estimated concentration greater than the DL but less than the RL
U-not detected at or above the DL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable
NC-not calculable

ATTACHMENT 6
QUALIFICATION FOR ISOTOPE DILUTION STANDARDS

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-EB-SG-231214	123478-HxCDD	1.78	J EST	1.78	J+	6

pg/L-picograms per liter
J-estimated concentration greater than the DL but less than the RL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

ATTACHMENT 7
QUALIFICATION FOR TARGET COMPOUND IDENTIFICATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-52-0to1	123478-HxCDD	0.664	J EST	0.664	J	13
BH-HA-52-0to1	12378-PeCDF	1.7	J EST	1.7	J	13
BH-HA-52-0to1	123678-HxCDF	0.873	J EST	0.873	J	13
BH-HA-52-0to1	Total TCDD	30.1	EST	30.1	J	13
BH-HA-52-0to1	Total PeCDD	24.9	EST	24.9	J	13
BH-HA-52-0to1	Total HxCDD	35.6	EST	35.6	J	13
BH-HA-52-0to1	Total TCDF	46.4	EST	46.4	J	13
BH-HA-52-0to1	Total PeCDF	19.7	EST	19.7	J	13
BH-HA-52-0to1	Total HxCDF	9.96	EST	9.96	J	13
BH-HA-52-0to1	Total HpCDF	7.7	EST	7.7	J	13
BH-HA-52-1to2	2378-TCDD	0.502	EST	0.502	J	13
BH-HA-52-1to2	12378-PeCDD	0.825	J EST	0.825	J	13
BH-HA-52-1to2	12378-PeCDF	1.65	J EST	1.65	J	13
BH-HA-52-1to2	234678-HxCDF	0.436	J EST	0.436	J	13
BH-HA-52-1to2	1234789-HpCDF	0.254	J EST	0.254	J	13
BH-HA-52-1to2	Total TCDD	32.8	EST	32.8	J	13
BH-HA-52-1to2	Total PeCDD	25.3	EST	25.3	J	13
BH-HA-52-1to2	Total TCDF	55.2	EST	55.2	J	13
BH-HA-52-1to2	Total PeCDF	19.5	EST	19.5	J	13
BH-HA-52-1to2	Total HxCDF	8.1	EST	8.1	J	13
BH-HA-52-1to2	Total HpCDF	5.98	EST	5.98	J	13
BH-HA-44-0to1	123678-HxCDD	1.01	J EST	1.01	J	13
BH-HA-44-0to1	123789-HxCDD	1.02	J EST	1.02	J	13
BH-HA-44-0to1	234678-HxCDF	0.498	J EST	0.498	J	13
BH-HA-44-0to1	1234678-HpCDF	0.893	J EST	0.893	J	13
BH-HA-44-0to1	OCDF	1.26	J EST	1.26	J	13
BH-HA-44-0to1	Total TCDD	33.5	EST	33.5	J	13
BH-HA-44-0to1	Total PeCDD	26.8	EST	26.8	J	13
BH-HA-44-0to1	Total HxCDD	24.8	EST	24.8	J	13
BH-HA-44-0to1	Total TCDF	42.5	EST	42.5	J	13
BH-HA-44-0to1	Total PeCDF	12.8	EST	12.8	J	13
BH-HA-44-0to1	Total HxCDF	4.35	EST	4.35	J	13
BH-HA-44-0to1-D	2378-TCDD	1.09	EST	1.09	J	13
BH-HA-44-0to1-D	12378-PeCDD	2.16	J EST	2.16	J	13
BH-HA-44-0to1-D	123789-HxCDD	1.82	J EST	1.82	J	13
BH-HA-44-0to1-D	123478-HxCDF	0.919	J EST	0.919	J	13
BH-HA-44-0to1-D	234678-HxCDF	0.863	J EST	0.863	J	13
BH-HA-44-0to1-D	1234678-HpCDF	2.57	EST	2.57	J	13
BH-HA-44-0to1-D	Total TCDD	70.7	EST	70.7	J	13
BH-HA-44-0to1-D	Total PeCDD	58.6	EST	58.6	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-44-0to1-D	Total HxCDD	49.2	EST	49.2	J	13
BH-HA-44-0to1-D	Total TCDF	92.5	EST	92.5	J	13
BH-HA-44-0to1-D	Total PeCDF	31.3	EST	31.3	J	13
BH-HA-44-0to1-D	Total HxCDF	8.53	EST	8.53	J	13
BH-HA-44-0to1-D	Total HpCDF	5.35	EST	5.35	J	13
BH-HA-44-1to2	12378-PeCDD	0.209	J EST	0.209	J	13
BH-HA-44-1to2	123478-HxCDD	0.373	J EST	0.373	J	13
BH-HA-44-1to2	2378-TCDF	0.461	J EST	0.461	J	13
BH-HA-44-1to2	Total TCDD	22	EST	22	J	13
BH-HA-44-1to2	Total PeCDD	8.47	EST	8.47	J	13
BH-HA-44-1to2	Total HxCDD	19.7	EST	19.7	J	13
BH-HA-44-1to2	Total TCDF	8.76	EST	8.76	J	13
BH-HA-47-0to1	12378-PeCDD	1.05	J EST	1.05	J	13
BH-HA-47-0to1	2378-TCDF	1.31	EST	1.31	J	13
BH-HA-47-0to1	23478-PeCDF	0.946	J EST	0.946	J	13
BH-HA-47-0to1	123478-HxCDF	0.573	J EST	0.573	J	13
BH-HA-47-0to1	123678-HxCDF	0.695	J EST	0.695	J	13
BH-HA-47-0to1	1234678-HpCDF	1.33	J EST	1.33	J	13
BH-HA-47-0to1	1234789-HpCDF	0.188	J EST	0.188	J	13
BH-HA-47-0to1	Total TCDD	63.3	EST	63.3	J	13
BH-HA-47-0to1	Total PeCDD	33.9	EST	33.9	J	13
BH-HA-47-0to1	Total TCDF	28.6	EST	28.6	J	13
BH-HA-47-0to1	Total PeCDF	12	EST	12	J	13
BH-HA-47-0to1	Total HxCDF	4.79	EST	4.79	J	13
BH-HA-47-0to1	Total HpCDF	2.58	EST	2.58	J	13
BH-HA-47-1to2	2378-TCDD	0.173	J EST	0.173	J	13
BH-HA-47-1to2	12378-PeCDD	0.318	J EST	0.318	J	13
BH-HA-47-1to2	123478-HxCDD	1.52	J EST	1.52	J	13
BH-HA-47-1to2	123789-HxCDD	3.04	EST	3.04	J	13
BH-HA-47-1to2	12378-PeCDF	0.203	J EST	0.203	J	13
BH-HA-47-1to2	1234678-HpCDF	0.226	J EST	0.226	J	13
BH-HA-47-1to2	Total TCDD	42.1	EST	42.1	J	13
BH-HA-47-1to2	Total PeCDD	15	EST	15	J	13
BH-HA-47-1to2	Total HxCDD	62.7	EST	62.7	J	13
BH-HA-47-1to2	Total PeCDF	1.43	EST	1.43	J	13
BH-HA-51-0to1	2378-TCDD	0.618	EST	0.618	J	13
BH-HA-51-0to1	2378-TCDF	1.4	EST	1.4	J	13
BH-HA-51-0to1	12378-PeCDF	1.02	J EST	1.02	J	13
BH-HA-51-0to1	123478-HxCDF	0.506	J EST	0.506	J	13
BH-HA-51-0to1	123678-HxCDF	0.872	J EST	0.872	J	13
BH-HA-51-0to1	234678-HxCDF	0.661	J EST	0.661	J	13
BH-HA-51-0to1	Total TCDD	36.7	EST	36.7	J	13
BH-HA-51-0to1	Total PeCDD	23.5	EST	23.5	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-51-0to1	Total TCDF	18.7	EST	18.7	J	13
BH-HA-51-0to1	Total PeCDF	14	EST	14	J	13
BH-HA-51-0to1	Total HxCDF	8.67	EST	8.67	J	13
BH-HA-51-0to1-D	2378-TCDD	0.987	EST	0.987	J	13
BH-HA-51-0to1-D	12378-PeCDD	1.57	J EST	1.57	J	13
BH-HA-51-0to1-D	23478-PeCDF	1.33	J EST	1.33	J	13
BH-HA-51-0to1-D	123678-HxCDF	0.647	J EST	0.647	J	13
BH-HA-51-0to1-D	234678-HxCDF	0.605	J EST	0.605	J	13
BH-HA-51-0to1-D	Total TCDD	31.9	EST	31.9	J	13
BH-HA-51-0to1-D	Total PeCDD	25.1	EST	25.1	J	13
BH-HA-51-0to1-D	Total HxCDD	79	EST	79	J	13
BH-HA-51-0to1-D	Total TCDF	24.4	EST	24.4	J	13
BH-HA-51-0to1-D	Total PeCDF	19.4	EST	19.4	J	13
BH-HA-51-0to1-D	Total HxCDF	12.3	EST	12.3	J	13
BH-HA-51-0to1-D	Total HpCDF	15.5	EST	15.5	J	13
BH-HA-51-1to1.6	2378-TCDD	0.172	J EST	0.172	J	13
BH-HA-51-1to1.6	123478-HxCDD	0.908	J EST	0.908	J	13
BH-HA-51-1to1.6	123678-HxCDD	1.99	J EST	1.99	J	13
BH-HA-51-1to1.6	2378-TCDF	1.7	EST	1.7	J	13
BH-HA-51-1to1.6	1234678-HpCDF	0.673	J EST	0.673	J	13
BH-HA-51-1to1.6	OCDF	1.15	J EST	1.15	J	13
BH-HA-51-1to1.6	Total TCDD	24.5	EST	24.5	J	13
BH-HA-51-1to1.6	Total PeCDD	14.5	EST	14.5	J	13
BH-HA-51-1to1.6	Total HxCDD	40	EST	40	J	13
BH-HA-51-1to1.6	Total TCDF	24.5	EST	24.5	J	13
BH-HA-51-1to1.6	Total PeCDF	6.84	EST	6.84	J	13
BH-HA-51-1to1.6	Total HxCDF	1.77	EST	1.77	J	13
BH-HA-51-1to1.6	Total HpCDF	1.49	EST	1.49	J	13
BH-HA-45-0to1	12378-PeCDD	1.52	J EST	1.52	J	13
BH-HA-45-0to1	123789-HxCDD	2.22	J EST	2.22	J	13
BH-HA-45-0to1	Total TCDD	46.5	EST	46.5	J	13
BH-HA-45-0to1	Total PeCDD	32.6	EST	32.6	J	13
BH-HA-45-0to1	Total HxCDD	35.3	EST	35.3	J	13
BH-HA-45-0to1	Total TCDF	266	EST	266	J	13
BH-HA-45-0to1	Total PeCDF	119	EST	119	J	13
BH-HA-45-0to1	Total HxCDF	42.7	EST	42.7	J	13
BH-HA-45-1to2	2378-TCDD	0.202	J EST	0.202	J	13
BH-HA-45-1to2	123789-HxCDD	0.819	J EST	0.819	J	13
BH-HA-45-1to2	234678-HxCDF	1.06	J EST	1.06	J	13
BH-HA-45-1to2	1234789-HpCDF	0.308	J EST	0.308	J	13
BH-HA-45-1to2	OCDF	2.81	J EST	2.81	J	13
BH-HA-45-1to2	Total TCDD	24.7	EST	24.7	J	13
BH-HA-45-1to2	Total PeCDD	13	EST	13	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-45-1to2	Total HxCDD	18.1	EST	18.1	J	13
BH-HA-45-1to2	Total TCDF	79	EST	79	J	13
BH-HA-45-1to2	Total PeCDF	32.9	EST	32.9	J	13
BH-HA-45-1to2	Total HxCDF	9.91	EST	9.91	J	13
BH-HA-45-1to2	Total HpCDF	4.72	EST	4.72	J	13
BH-HA-50b-0to1	123478-HxCDD	0.334	J EST	0.334	J	13
BH-HA-50b-0to1	123678-HxCDD	0.469	J EST	0.469	J	13
BH-HA-50b-0to1	234678-HxCDF	0.178	J EST	0.178	J	13
BH-HA-50b-0to1	OCDF	4.84	J EST	4.84	J	13
BH-HA-50b-0to1	Total HxCDD	7.27	EST	7.27	J	13
BH-HA-50b-0to1	Total HxCDF	1.88	EST	1.88	J	13
BH-HA-50b-0to1	Total HpCDF	4.12	EST	4.12	J	13
BH-HA-50b-1to1.6	123478-HxCDD	0.542	J EST	0.542	J	13
BH-HA-50b-1to1.6	123789-HxCDD	0.706	J EST	0.706	J	13
BH-HA-50b-1to1.6	Total PeCDD	1.5	EST	1.5	J	13
BH-HA-50b-1to1.6	Total HxCDD	9.9	EST	9.9	J	13
BH-HA-50b-1to1.6	Total HpCDF	2.88	EST	2.88	J	13
BH-HA-49-0to1	123678-HxCDF	5.39	EST	5.39	J	13
BH-HA-49-0to1	Total TCDD	178	EST	178	J	13
BH-HA-49-0to1	Total TCDF	303	EST	303	J	13
BH-HA-49-0to1	Total PeCDF	133	EST	133	J	13
BH-HA-49-0to1	Total HxCDF	52.5	EST	52.5	J	13
BH-HA-49-1to2	Total TCDD	87.3	EST	87.3	J	13
BH-HA-49-1to2	Total PeCDD	78.1	EST	78.1	J	13
BH-HA-49-1to2	Total TCDF	174	EST	174	J	13
BH-HA-49-1to2	Total PeCDF	83.8	EST	83.8	J	13
BH-HA-49-1to2	Total HxCDF	35.6	EST	35.6	J	13
BH-HA-46-0to1	2378-TCDF	1.38	EST	1.38	J	13
BH-HA-46-0to1	23478-PeCDF	1.18	J EST	1.18	J	13
BH-HA-46-0to1	123678-HxCDF	0.398	J EST	0.398	J	13
BH-HA-46-0to1	1234678-HpCDF	1.32	J EST	1.32	J	13
BH-HA-46-0to1	OCDF	2.26	J EST	2.26	J	13
BH-HA-46-0to1	Total TCDD	575	EST	575	J	13
BH-HA-46-0to1	Total PeCDD	95.1	EST	95.1	J	13
BH-HA-46-0to1	Total TCDF	17.8	EST	17.8	J	13
BH-HA-46-0to1	Total PeCDF	11.8	EST	11.8	J	13
BH-HA-46-0to1	Total HxCDF	5.87	EST	5.87	J	13
BH-HA-46-0to1	Total HpCDF	3.29	EST	3.29	J	13
BH-HA-46-1to1.8	2378-TCDD	0.656	EST	0.656	J	13
BH-HA-46-1to1.8	12378-PeCDD	0.836	J EST	0.836	J	13
BH-HA-46-1to1.8	2378-TCDF	0.768	EST	0.768	J	13
BH-HA-46-1to1.8	23478-PeCDF	0.539	J EST	0.539	J	13
BH-HA-46-1to1.8	234678-HxCDF	0.197	J EST	0.197	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-46-1to1.8	1234678-HpCDF	0.396	J EST	0.396	J	13
BH-HA-46-1to1.8	Total TCDD	155	EST	155	J	13
BH-HA-46-1to1.8	Total PeCDD	35.8	EST	35.8	J	13
BH-HA-46-1to1.8	Total TCDF	13.6	EST	13.6	J	13
BH-HA-46-1to1.8	Total PeCDF	4.73	EST	4.73	J	13
BH-HA-46-1to1.8	Total HxCDF	1.37	EST	1.37	J	13
BH-HA-46-1to1.8	Total HpCDF	1.04	EST	1.04	J	13
BH-HA-37-2to2.9	Total TCDD	289	EST	289	J	13
BH-HA-37-2to2.9	Total PeCDD	83.3	EST	83.3	J	13
BH-HA-37-2to2.9	Total HxCDD	210	EST	210	J	13
BH-HA-37-2to2.9	Total TCDF	304	EST	304	J	13
BH-HA-37-2to2.9	Total PeCDF	122	EST	122	J	13
BH-HA-37-2to2.9	Total HxCDF	45.9	EST	45.9	J	13
BH-SG-56-0to10	12378-PeCDD	0.564	J EST	0.564	J	13
BH-SG-56-0to10	123678-HxCDF	0.336	J EST	0.336	J	13
BH-SG-56-0to10	1234789-HpCDF	0.88	J EST	0.88	J	13
BH-SG-56-0to10	Total TCDD	9.55	EST	9.55	J	13
BH-SG-56-0to10	Total PeCDD	7.19	EST	7.19	J	13
BH-SG-56-0to10	Total HxCDD	32.5	EST	32.5	J	13
BH-SG-56-0to10	Total TCDF	13.7	EST	13.7	J	13
BH-SG-56-0to10	Total PeCDF	7.38	EST	7.38	J	13
BH-SG-56-0to10	Total HxCDF	12.4	EST	12.4	J	13
BH-SG-56-0to10	Total HpCDF	52.8	EST	52.8	J	13
BH-SG-56-0to10-D	12378-PeCDD	0.564	J EST	0.564	J	13
BH-SG-56-0to10-D	2378-TCDF	0.739	EST	0.739	J	13
BH-SG-56-0to10-D	12378-PeCDF	0.771	J EST	0.771	J	13
BH-SG-56-0to10-D	234678-HxCDF	1.42	J EST	1.42	J	13
BH-SG-56-0to10-D	Total PeCDD	8.6	EST	8.6	J	13
BH-SG-56-0to10-D	Total HxCDD	27.7	EST	27.7	J	13
BH-SG-56-0to10-D	Total TCDF	19.4	EST	19.4	J	13
BH-SG-56-0to10-D	Total PeCDF	17.5	EST	17.5	J	13
BH-SG-56-0to10-D	Total HxCDF	16.4	EST	16.4	J	13
BH-SG-57-0to10	123789-HxCDD	0.886	J EST	0.886	J	13
BH-SG-57-0to10	23478-PeCDF	0.422	J EST	0.422	J	13
BH-SG-57-0to10	123678-HxCDF	0.369	J EST	0.369	J	13
BH-SG-57-0to10	Total PeCDD	9.87	EST	9.87	J	13
BH-SG-57-0to10	Total HxCDD	28.1	EST	28.1	J	13
BH-SG-57-0to10	Total TCDF	8.67	EST	8.67	J	13
BH-SG-57-0to10	Total PeCDF	6.45	EST	6.45	J	13
BH-SG-57-0to10	Total HxCDF	7.52	EST	7.52	J	13

pg/g-picograms per gram
J-estimated concentration greater than the DL but less than the RL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-EB-SG-231214	123478-HxCDD	1.78	J EST	1.78	J	13

pg/L-picograms per liter
J-estimated concentration greater than the DL but less than the RL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	3 November 2023
To:	Cindy Bartlett
From:	Quyen Le
CC:	Kristoffer Henderson
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGX AXYS Analytical Services Data Package Identifications DPWG85402, DPWG85506 and DPWG85511**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of twenty-nine soil samples, eleven sediment samples and two soil field duplicate samples, collected on 15, 28 and 29 September and 5 October 2022, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, June 18, 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);

- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L38011-16	BH-HA-41-0to1
L38011-17	BH-HA-41-1to2
L38011-18	BH-HA-40-0to1
L38011-19	BH-HA-40-1to2
L38011-20	BH-HA-39-0to1
L38011-22	BH-HA-38-0to1
L38011-24	BH-HA-38-1to2
L38164-38	BH-SB-28-0to2
L38164-39	BH-SB-28-2to4
L38164-40	BH-SB-28-4to6
L38164-41	BH-SB-28-6to8
L38164-42	BH-SB-28-8to10
L38164-43	BH-SB-28-8to10-D
L38164-44	BH-SB-28-10to12
L38164-45	BH-SB-28-12to14
L38164-46	BH-SB-29-2to4
L38164-47	BH-SB-29-4to6
L38164-48	BH-SB-29-8to10
L38164-49	BH-SB-25-0to2
L38164-50	BH-SB-25-2to4
L38164-51	BH-SB-25-2to4-D

Laboratory ID	Client ID
L38164-52	BH-SB-25-4to6
L38164-53	BH-SB-25-8to10
L38164-54	BH-SB-25-10to12
L38164-55	BH-SB-25-12to14
L38164-56	BH-SB-25-14to15
L38164-57	BH-SB-26-0to2
L38164-58	BH-SB-26-2to4
L38164-59	BH-SB-26-4to6
L38164-60	BH-SB-26-7to9
L38164-61	BH-SB-26-9to10
L38164-62	BH-SC-11-2to4
L38164-63	BH-SC-11-4to6
L38164-64	BH-SC-11-6to8
L38164-65	BH-SC-11-8to10
L38164-66	BH-SC-10-2to4
L38164-67	BH-SC-10-4to6
L38164-68	BH-SC-10-6to8
L38164-69	BH-SC-10-8to10
L38164-70	BH-SC-17-0to2
L38164-71	BH-SC-17-2to3
L38164-72	BH-SC-17-9to10

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

DPWG85511: An incorrect error correction was observed on the COCs, instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

DPWG85506/DPWG85511: Some sample IDs on the containers used a "-" instead of a "to". The laboratory logged the IDs per the COCs.

Sample BH-SB-25-14to15 was received broken and the sample was transferred to a new container.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF

Analyte	Acronyms
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Equipment Blank
✓ Field Duplicate
⊗ Isotope Dilution Standards
⊗ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

The samples were analyzed using gas chromatography (GC) column DB-5. Per the laboratory SOP detections of 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD on GC column DB-5 are confirmed and quantitated by analysis using GC column DB-225. Therefore, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results were considered from the confirmation analysis when analyzed. However, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results that were not detected in the original analysis did not require confirmation and were considered from the original analysis. The results not considered for validation were R qualified as rejected in the EDDs.

The initial instrumental analysis results of samples BH-HA-41-0to1 and BH-HA-41-1to2 did not meet all the method specifications for the DB-225 column analyses. These sample extracts were instrumentally re-analyzed, and method specifications were met. Sample concentrations were reported from the re-injection (indicated by suffix 'i' on the SGS AXYS IDs).

Sample BH-HA-38-0to1 was given additional cleanup using acid/base silica column and Alumina columns to minimize interferences. The sample was reported from the analysis of the re-columned extract (indicated by the suffix 'L' on the SGS AXYS ID).

The method blank (batch WG84352) was given additional cleanup using carbon celite and Alumina columns to minimize interferences. The method blank was reported from the analysis of the re-columned extract (indicated by the suffix 'L' on the SGS AXYS ID).

The initial instrumental analysis results of the ongoing precision and recovery standard (OPR) (batch WG84352) did not meet the method specifications. The OPR extract was instrumentally re-analyzed, and method specifications were met. The concentrations were reported from the re-injection (indicated by suffix 'i' on the SGS AXYS ID).

Sample BH-SB-26-2to4 was instrumentally re-analyzed on the DB-5 column to confirm possible instrumental carry-over. The re-analysis data showed that the original analysis data was affected by the carry-over and the re-analysis data were reported (indicated by suffix 'i' on the SGS AXYS ID).

Samples BH-SC-17-0to2 and BH-SC-17-2to3 were diluted and instrumentally re-analyzed on the DB-225 column to minimize matrix interferences affecting 1,2,3,7,8,9-HxCDD. Matrix interference was also found in the dilution, and the results were reported from the original instrumental analysis.

DPWG85506: The resolution of the mass spectrometer is routinely monitored at the beginning and end of a twelve-hour analysis sequence. The monitored results of the ending resolution for analysis bracket Data File DX3M_025-E was acquired ten minutes over the method requirement of twelve hours. Given that no adjustments were made to the instrument during the analysis sequence and historical data has shown the instrument to remain stable, data were not considered affected by this variance.

The initial instrumental analysis results of the OPR (batch WG84351) did not meet the method specifications. The OPR extract was instrumentally re-analyzed, and method specifications were met. The concentrations were reported from the re-injection (indicated by suffix 'i' on the SGS AXYS ID).

Sample BH-SB-29-4to6 was instrumentally re-analyzed on the DB-5 column to confirm possible instrumental carry-over. The re-analysis data showed that carry-over did not occur, and the sample was reported from the original instrumental analysis.

Sample BH-SB-25-8to10 was instrumentally re-analyzed on the DB-225 column to ensure all method specifications were met. Sample concentrations were reported from the reinjection (indicated by suffix 'i' on the SGS AXYS ID).

Samples BH-SB-25-0to2, BH-SB-25-2to4 and BH-SB-25-2to4-D were diluted and instrumentally re-analyzed on the DB-225 column to minimize matrix interferences affecting 1,2,3,7,8,9-HxCDD. Matrix interference was also found in the dilution, and the sample results were reported from the original instrumental analysis.

1.2 Holding Times

The holding times for the dioxin and furans analysis of soil and sediment samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches WG84351, WG84352 and WG84930). Dioxins and furans were not detected in the method blanks at or above the minimum reporting levels (MRLs), with the following exceptions.

DPWG85511: 1,2,3,4,6,7,8-HPCDD and OCDD were detected in the method blank in batch WG84351 at estimated concentrations greater than the MRLs and less than the limit of quantitations (LOQs). Since OCDD was detected above the LOQ in the associated samples and based on professional and technical judgment, no qualifications were applied to the OCDD data. However, the estimated concentrations of 1,2,3,4,6,7,8-HPCDD in the associated samples were U qualified as not detected at the LOQs. TOTAL HEPTA-DIOXINS (0.100 pg/g) was detected in the method blank in batch WG84351 at a concentration greater than the LOQ. Since TOTAL HEPTA-DIOXINS was detected at concentrations greater than ten times the method blank concentration in the associated samples and based on professional and technical judgment, no qualifications were applied to the data.

DPWG85506: 1,2,3,7,8-PECDD, 1,2,3,6,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF and OCDF were detected in the method blank in batch WG84352 at estimated concentrations greater than the MRLs/sample detection limits (SDLs) and less than the LOQs. Therefore, the estimated concentrations of these analytes in the associated samples were U qualified as not detected at the LOQs. 2,3,7,8-TCDF was detected in the method blank in batch WG84352 on GC column DB-5 at an estimated concentration greater than the MRL and less than the LOQ. Since the 2,3,7,8-TCDF concentrations in the associated samples were reported from GC column DB-225 and based on professional and technical judgment, no qualifications were applied to the data. TOTAL PENTA-DIOXINS (0.0976 pg/g), TOTAL HEPTA-DIOXINS (0.179 pg/g), TOTAL TETRA-FURANS (0.143 pg/g), and TOTAL HEXA-FURANS (0.0852 pg/g) were detected in the method blank in batch WG84352 at concentrations greater than the LOQs. Since the TOTAL PENTA-DIOXINS concentrations in the associated samples were greater than ten times the blank concentrations, no qualifications were applied to the data. However, the TOTAL HEPTA-DIOXINS concentration in sample BH-SB-26-2to4, TOTAL TETRA-FURANS concentrations in samples BH-SB-26-7to9 and BH-SB-26-9to10 and TOTAL HEXA-FURANS concentrations in samples BH-SB-26-4to6 and BH-SB-26-9to10 were J+ qualified as estimated with high bias.

DPWG85402: 1,2,3,4,6,7,8-HPCDD and OCDD were detected in the method blank in batch WG84930 at estimated concentrations greater than the MRLs and less than the LOQs. Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the data. TOTAL

TETRA-DIOXINS (0.0751 pg/g) and TOTAL HEPTA-DIOXINS (0.147 pg/g) were detected in the method blank in batch WG84930 at concentrations greater than the LOQs. Since the TOTAL TETRA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentrations, no qualifications were applied to the data.

Qualifications are in Attachment 3 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met. OPR/OPR duplicate pairs were used to access precision and accuracy.

1.8 Laboratory Control Sample (LCS)

OPRs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three OPR/OPR duplicate pairs were reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Equipment blanks were not submitted with the sample set.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Two field duplicate samples were submitted and analyzed with the sample set; BH-SB-28-8to10-D and BH-SB-25-2to4-D. Acceptable precision (RPD $\leq$50%) was demonstrated between the field duplicates and original samples, BH-SB-28-8to10 and BH-SB-25-2to4, respectively.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of 13C-2,3,7,8-TCDD, 13C-1,2,3,4,7,8-HXCDD, 13C-1,2,3,6,7,8-HXCDD, 13C-2,3,7,8-TCDF, 13C-1,2,3,7,8-PECDF, 13C-1,2,3,7,8,9-HXCDF, 13C-2,3,4,6,7,8-HXCDF, 13C-1,2,3,4,6,7,8-HPCDF, and 13C-1,2,3,4,7,8,9-HPCDF in sample BH-HA-39-0to1 were below the laboratory specified acceptance criteria. Therefore, the 1,2,3,7,8,9-HXCDD, 2,3,7,8-TCDF, 2,3,7,8-TCDD, 1,2,3,4,7,8-HXCDD, 1,2,3,6,7,8-HXCDD, 1,2,3,7,8-PECDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, and 1,2,3,4,7,8,9-HPCDF concentrations in sample BH-HA-39-0to1 were J qualified as estimated.

The recoveries of 13C-OCDD and 13C-1,2,3,4,7,8,9-HPCDF in sample BH-SB-28-12to14 were below the laboratory specified acceptance criteria. Therefore, the OCDD and 1,2,3,4,7,8,9-HPCDF concentrations in sample BH-SB-28-12to14 were J qualified as estimated.

Qualifications are in Attachment 4 at the end of this report.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged NJ by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions; for the concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Qualifications are in Attachment 5 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the MRLs/SDLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for soils and QAPP Table 9c for sediments. The screening levels were met, with the following exception.

The MRL for soils for 2,3,7,8-TCDD of 0.050 pg/g did not meet the screening level of 0.0013 pg/g listed in the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. The LOQs included in the EDD were not listed on the level IV reports. No discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-28-10to12	1,2,3,4,6,7,8-HPCDD	2.38	J	2.47	U	3
BH-SB-28-8to10	1,2,3,4,6,7,8-HPCDD	1.3	J	2.28	U	3
BH-SB-28-8to10-D	1,2,3,4,6,7,8-HPCDD	1.1	J	2.61	U	3
BH-SB-26-0to2	2,3,4,7,8-PECDF	1.59	J	2.12	U	3
BH-SB-26-0to2	1,2,3,6,7,8-HXCDF	0.982	J	2.12	U	3
BH-SB-26-0to2	1,2,3,7,8,9-HXCDF	0.0764	B J	2.12	U	3
BH-SB-26-0to2	1,2,3,4,7,8,9-HPCDF	0.221	J	2.12	U	3
BH-SB-26-0to2	OCDF	1.15	J	4.24	U	3
BH-SB-26-2to4	1,2,3,7,8-PECDD	0.113	NJ J	2.78	U	3
BH-SB-26-2to4	1,2,3,6,7,8-HXCDD	0.0863	NJ J	2.78	U	3
BH-SB-26-2to4	1,2,3,4,6,7,8-HPCDD	0.659	B J	2.78	U	3
BH-SB-26-2to4	OCDD	4.31	J	5.57	U	3
BH-SB-26-2to4	1,2,3,7,8-PECDF	0.13	NJ J	2.78	U	3
BH-SB-26-2to4	2,3,4,7,8-PECDF	0.0817	J	2.78	U	3
BH-SB-26-2to4	1,2,3,4,7,8-HXCDF	0.0705	NJ J	2.78	U	3
BH-SB-26-2to4	1,2,3,4,6,7,8-HPCDF	0.0997	J	2.78	U	3
BH-SB-26-2to4	TOTAL HEPTA-DIOXINS	1.27	NA	1.27	J+	3
BH-SB-26-4to6	1,2,3,7,8-PECDD	0.161	J	2.28	U	3
BH-SB-26-4to6	1,2,3,6,7,8-HXCDD	0.356	J	2.28	U	3
BH-SB-26-4to6	1,2,3,7,8-PECDF	0.103	NJ J	2.28	U	3
BH-SB-26-4to6	2,3,4,7,8-PECDF	0.076	NJ J	2.28	U	3
BH-SB-26-4to6	1,2,3,4,7,8-HXCDF	0.0782	J	2.28	U	3
BH-SB-26-4to6	1,2,3,4,6,7,8-HPCDF	0.152	J	2.28	U	3
BH-SB-26-4to6	OCDF	0.0797	NJ J	4.56	U	3
BH-SB-26-4to6	TOTAL HEXA-FURANS	0.206	B	0.206	J+	3
BH-SB-26-7to9	1,2,3,7,8-PECDD	0.161	J	2.34	U	3
BH-SB-26-7to9	1,2,3,6,7,8-HXCDD	0.363	J	2.34	U	3
BH-SB-26-7to9	1,2,3,7,8-PECDF	0.0588	J	2.34	U	3
BH-SB-26-7to9	1,2,3,4,7,8-HXCDF	0.0503	NJ J	2.34	U	3
BH-SB-26-7to9	1,2,3,4,6,7,8-HPCDF	0.164	J	2.34	U	3
BH-SB-26-7to9	OCDF	0.0747	NJ J	4.68	U	3
BH-SB-26-7to9	TOTAL TETRA-FURANS	0.45	B	0.45	J+	3
BH-SB-26-9to10	1,2,3,7,8-PECDD	0.225	J	2.31	U	3
BH-SB-26-9to10	1,2,3,6,7,8-HXCDD	0.475	J	2.31	U	3
BH-SB-26-9to10	1,2,3,7,8-PECDF	0.0469	NJ J	2.31	U	3
BH-SB-26-9to10	1,2,3,4,6,7,8-HPCDF	0.074	NJ J	2.31	U	3
BH-SB-26-9to10	TOTAL TETRA-FURANS	0.298	B	0.298	J+	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-26-9to10	TOTAL HEXA-FURANS	0.0509	B	0.0509	J+	3
BH-SC-10-2to4	1,2,3,7,8,9-HXCDF	1.13	J	2.43	U	3
BH-SC-10-4to6	1,2,3,7,8,9-HXCDF	0.618	J	2.53	U	3
BH-SC-10-6to8	1,2,3,7,8,9-HXCDF	0.307	B J	2.21	U	3
BH-SC-10-6to8	1,2,3,4,7,8,9-HPCDF	1.97	J	2.21	U	3
BH-SC-10-8to10	1,2,3,7,8-PECDD	0.504	J	2.44	U	3
BH-SC-10-8to10	1,2,3,6,7,8-HXCDD	0.995	J	2.44	U	3
BH-SC-10-8to10	1,2,3,7,8-PECDF	0.47	J	2.44	U	3
BH-SC-10-8to10	2,3,4,7,8-PECDF	0.369	J	2.44	U	3
BH-SC-10-8to10	1,2,3,4,7,8-HXCDF	0.679	J	2.44	U	3
BH-SC-10-8to10	1,2,3,6,7,8-HXCDF	0.313	J	2.44	U	3
BH-SC-10-8to10	1,2,3,4,6,7,8-HPCDF	1.85	J	2.44	U	3
BH-SC-10-8to10	1,2,3,4,7,8,9-HPCDF	0.0994	J	2.44	U	3
BH-SC-10-8to10	OCDF	1.17	J	4.87	U	3
BH-SC-11-2to4	1,2,3,7,8,9-HXCDF	0.525	J	2.25	U	3
BH-SC-11-4to6	1,2,3,7,8,9-HXCDF	0.321	B J	2.35	U	3
BH-SC-11-4to6	1,2,3,4,7,8,9-HPCDF	1.12	J	2.35	U	3
BH-SC-11-6to8	2,3,4,7,8-PECDF	2.32	J	2.34	U	3
BH-SC-11-6to8	1,2,3,6,7,8-HXCDF	1.99	J	2.34	U	3
BH-SC-11-6to8	1,2,3,7,8,9-HXCDF	0.142	B J	2.34	U	3
BH-SC-11-6to8	1,2,3,4,7,8,9-HPCDF	0.555	J	2.34	U	3
BH-SC-11-8to10	1,2,3,7,8-PECDD	0.423	J	2.98	U	3
BH-SC-11-8to10	1,2,3,6,7,8-HXCDD	0.583	J	2.98	U	3
BH-SC-11-8to10	1,2,3,7,8-PECDF	0.647	J	2.98	U	3
BH-SC-11-8to10	2,3,4,7,8-PECDF	0.321	J	2.98	U	3
BH-SC-11-8to10	1,2,3,4,7,8-HXCDF	1.02	J	2.98	U	3
BH-SC-11-8to10	1,2,3,6,7,8-HXCDF	0.347	J	2.98	U	3
BH-SC-11-8to10	1,2,3,4,6,7,8-HPCDF	1.49	J	2.98	U	3
BH-SC-11-8to10	1,2,3,4,7,8,9-HPCDF	0.112	J	2.98	U	3
BH-SC-11-8to10	OCDF	0.599	J	5.96	U	3
BH-SC-17-0to2	1,2,3,7,8-PECDD	1.76	J	2.4	U	3
BH-SC-17-0to2	1,2,3,6,7,8-HXCDD	2.05	J	2.4	U	3
BH-SC-17-0to2	1,2,3,6,7,8-HXCDF	2.03	J	2.4	U	3
BH-SC-17-0to2	1,2,3,7,8,9-HXCDF	0.154	B J	2.4	U	3
BH-SC-17-0to2	1,2,3,4,7,8,9-HPCDF	0.695	J	2.4	U	3
BH-SC-17-2to3	1,2,3,7,8-PECDD	1.42	J	2.59	U	3
BH-SC-17-2to3	1,2,3,6,7,8-HXCDD	1.63	J	2.59	U	3
BH-SC-17-2to3	1,2,3,7,8-PECDF	1.84	J	2.59	U	3
BH-SC-17-2to3	2,3,4,7,8-PECDF	1.99	J	2.59	U	3
BH-SC-17-2to3	1,2,3,4,7,8-HXCDF	1.98	J	2.59	U	3
BH-SC-17-2to3	1,2,3,6,7,8-HXCDF	1.61	J	2.59	U	3
BH-SC-17-2to3	1,2,3,7,8,9-HXCDF	0.429	B J	2.59	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-17-2to3	1,2,3,4,7,8,9-HPCDF	0.712	J	2.59	U	3
BH-SC-17-2to3	OCDF	1.94	J	5.17	U	3
BH-SC-17-9to10	1,2,3,7,8-PECDD	1.67	J	2.11	U	3
BH-SC-17-9to10	2,3,4,7,8-PECDF	1.71	J	2.11	U	3
BH-SC-17-9to10	1,2,3,7,8,9-HXCDF	0.14	B J	2.11	U	3
BH-SC-17-9to10	1,2,3,4,7,8,9-HPCDF	0.468	J	2.11	U	3

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

ATTACHMENT 4
QUALIFICATION FOR ISOTOPE DILUTION STANDARDS

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-28-12to14	OCDD	579	NA	579	J	6,11
BH-SB-28-12to14	1,2,3,4,7,8,9-HPCDF	0.196	J	0.196	J	6,11
BH-SB-28-12to14	OCDF	0.607	NJ J	0.607	J	6,11
BH-HA-39-0to1	1,2,3,7,8,9-HXCDD	6.9	NJ	6.9	J	6,11
BH-HA-39-0to1	2,3,7,8-TCDF	0.412	J	0.412	J	6,11
BH-HA-39-0to1	2,3,7,8-TCDD	0.216	J	0.216	J	6,11
BH-HA-39-0to1	1,2,3,4,7,8-HXCDD	2.21	J	2.21	J	6,11
BH-HA-39-0to1	1,2,3,6,7,8-HXCDD	4.92	NA	4.92	J	6,11
BH-HA-39-0to1	1,2,3,7,8-PECDF	0.202	NJ J	0.202	J	6,11
BH-HA-39-0to1	1,2,3,7,8,9-HXCDF	0.0583	J	0.0583	J	6,11
BH-HA-39-0to1	2,3,4,6,7,8-HXCDF	0.0847	J	0.0847	J	6,11
BH-HA-39-0to1	1,2,3,4,6,7,8-HPCDF	0.233	J	0.233	J	6,11
BH-HA-39-0to1	1,2,3,4,7,8,9-HPCDF	0.0606	NJ J	0.0606	J	6,11

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

ATTACHMENT 5
QUALIFICATION FOR TARGET COMPOUND IDENTIFICATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-25-0to2	1,2,3,7,8,9-HXCDD	50.9	NJ	50.9	J	13
BH-SB-25-10to12	1,2,3,7,8,9-HXCDD	0.965	NJ J	0.965	J	13
BH-SB-25-10to12	2,3,7,8-TCDD	0.198	NJ J	0.198	J	13
BH-SB-25-10to12	1,2,3,7,8-PECDD	0.869	NJ J	0.869	J	13
BH-SB-25-12to14	1,2,3,7,8,9-HXCDD	0.413	NJ J	0.413	J	13
BH-SB-25-12to14	2,3,7,8-TCDD	0.0881	NJ J	0.0881	J	13
BH-SB-25-12to14	1,2,3,4,7,8-HXCDD	0.187	NJ J	0.187	J	13
BH-SB-25-14to15	1,2,3,7,8,9-HXCDD	0.532	NJ J	0.532	J	13
BH-SB-25-14to15	1,2,3,4,7,8-HXCDF	0.0463	NJ J	0.0463	J	13
BH-SB-25-2to4	1,2,3,7,8,9-HXCDD	10.5	NJ	10.5	J	13
BH-SB-25-2to4-D	1,2,3,7,8,9-HXCDD	9.81	NJ	9.81	J	13
BH-SB-25-4to6	1,2,3,7,8,9-HXCDD	1.38	NJ J	1.38	J	13
BH-SB-25-8to10	2,3,7,8-TCDD	0.0929	NJ J	0.0929	J	13
BH-SB-25-8to10	2,3,4,7,8-PECDF	0.0942	NJ J	0.0942	J	13
BH-SB-25-8to10	OCDF	0.215	NJ J	0.215	J	13
BH-SB-28-10to12	2,3,7,8-TCDD	0.169	NJ J	0.169	J	13
BH-SB-28-10to12	1,2,3,4,7,8-HXCDD	0.206	NJ J	0.206	J	13
BH-SB-28-10to12	1,2,3,6,7,8-HXCDD	0.466	NJ J	0.466	J	13
BH-SB-28-12to14	1,2,3,7,8,9-HXCDF	0.0877	NJ J	0.0877	J	13
BH-SB-28-12to14	OCDF	0.607	NJ J	0.607	J	13
BH-SB-28-4to6	1,2,3,7,8,9-HXCDD	0.522	NJ J	0.522	J	13
BH-SB-28-4to6	1,2,3,4,7,8,9-HPCDF	0.051	NJ J	0.051	J	13
BH-SB-28-6to8	1,2,3,7,8,9-HXCDD	0.255	NJ J	0.255	J	13
BH-SB-28-6to8	1,2,3,4,7,8,9-HPCDF	0.0837	NJ J	0.0837	J	13
BH-SB-28-8to10	1,2,3,7,8,9-HXCDD	0.128	NJ J	0.128	J	13
BH-SB-28-8to10	1,2,3,4,7,8-HXCDD	0.168	NJ J	0.168	J	13
BH-SB-28-8to10	1,2,3,6,7,8-HXCDF	0.207	NJ J	0.207	J	13
BH-SB-28-8to10-D	1,2,3,7,8,9-HXCDD	0.077	NJ J	0.077	J	13
BH-SB-28-8to10-D	2,3,4,7,8-PECDF	0.245	NJ J	0.245	J	13
BH-SB-28-8to10-D	2,3,4,6,7,8-HXCDF	0.109	NJ J	0.109	J	13
BH-SB-29-2to4	1,2,3,7,8,9-HXCDD	1.29	NJ J	1.29	J	13
BH-SB-29-4to6	1,2,3,7,8,9-HXCDD	1.18	NJ J	1.18	J	13
BH-SB-29-4to6	1,2,3,4,7,8-HXCDD	0.338	NJ J	0.338	J	13
BH-SB-29-4to6	1,2,3,7,8-PECDF	0.119	NJ J	0.119	J	13
BH-SB-29-4to6	OCDF	0.186	NJ J	0.186	J	13
BH-SB-29-8to10	1,2,3,6,7,8-HXCDF	0.0563	NJ J	0.0563	J	13
BH-SB-29-8to10	1,2,3,4,6,7,8-HPCDF	0.191	NJ J	0.191	J	13
BH-SB-26-0to2	1,2,3,7,8,9-HXCDD	6.34	NJ	6.34	J	13
BH-SB-26-4to6	1,2,3,7,8,9-HXCDD	0.621	NJ J	0.621	J	13
BH-SB-26-7to9	1,2,3,7,8,9-HXCDD	0.86	NJ J	0.86	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-26-9to10	1,2,3,7,8,9-HXCDD	0.982	NJ J	0.982	J	13
BH-SC-10-8to10	1,2,3,7,8,9-HXCDD	1.73	NJ J	1.73	J	13
BH-SC-11-4to6	1,2,3,7,8,9-HXCDD	9	NJ	9	J	13
BH-SC-11-6to8	1,2,3,7,8,9-HXCDD	4.02	NJ	4.02	J	13
BH-SC-11-8to10	1,2,3,7,8,9-HXCDD	0.979	NJ J	0.979	J	13
BH-SC-11-8to10	2,3,4,6,7,8-HXCDF	0.217	NJ J	0.217	J	13
BH-SC-17-0to2	1,2,3,7,8,9-HXCDD	2.58	NJ	2.58	J	13
BH-SC-17-2to3	1,2,3,7,8,9-HXCDD	1.93	NJ J	1.93	J	13
BH-SC-17-9to10	1,2,3,7,8,9-HXCDD	3.46	NJ	3.46	J	13
BH-HA-38-1to2	1,2,3,7,8,9-HXCDD	0.681	NJ J	0.681	J	13
BH-HA-38-1to2	1,2,3,7,8,9-HXCDF	0.146	NJ J	0.146	J	13
BH-HA-39-0to1	1,2,3,7,8,9-HXCDD	6.9	NJ	6.9	J	13
BH-HA-39-0to1	1,2,3,7,8-PECDF	0.202	NJ J	0.202	J	13
BH-HA-39-0to1	1,2,3,6,7,8-HXCDF	0.0921	NJ J	0.0921	J	13
BH-HA-39-0to1	1,2,3,4,7,8,9-HPCDF	0.0606	NJ J	0.0606	J	13
BH-HA-40-0to1	1,2,3,7,8,9-HXCDD	2.59	NJ	2.59	J	13
BH-HA-40-1to2	1,2,3,7,8,9-HXCDD	0.599	NJ J	0.599	J	13
BH-HA-40-1to2	1,2,3,4,7,8,9-HPCDF	0.0542	NJ J	0.0542	J	13
BH-HA-41-0to1	1,2,3,7,8,9-HXCDD	4.17	NJ	4.17	J	13
BH-HA-41-1to2	1,2,3,7,8,9-HXCDD	1.44	NJ J	1.44	J	13

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	24 October 2023
To:	Cindy Bartlett
From:	Quyen Le
CC:	Kristoffer Henderson
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGS North America Data Package Identifications B7850, B7853 and B8229**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of twelve groundwater samples, three field duplicate samples and three equipment blanks, collected on 31 January, 1 February, 24 April, and 1 August 2023, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS North America, Wilmington, North Carolina and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, November 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);

- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
B7580_19855_DF_001	BH-GW-24-230131
B7580_19855_DF_002	BH-GW-26-230131
B7580_19855_DF_003	BH-GW-29-230201
B7580_19855_DF_004	BH-GW-29-D-230201
B7580_19855_DF_005	BH-GW-27-230131
B7580_19855_DF_006	BH-EB-GW-230201
B7853_20071_DF_001	BH-GW-24-230424
B7853_20071_DF_002	BH-GW-26-230424
B7853_20071_DF_003	BH-GW-27-230424

Laboratory ID	Client ID
B7853_20071_DF_004	BH-GW-29-230424
B7853_20071_DF_005	BH-GW-29-D-230424
B7853_20071_DF_006	BH-EB-GW-230424
B8229_20362_DF_001	BH-GW-27-230801
B8229_20362_DF_002	BH-GW-26-230801
B8229_20362_DF_003	BH-GW-24-230801
B8229_20362_DF_004	BH-GW-29-230801
B8229_20362_DF_005	BH-GW-29-D-230801
B8229_20362_DF_006	BH-EB-GW-230801

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

The laboratory updated the collection times for samples BH-GW-29-230201 and BH-GW-29-D-230201 from 24:26 and 24:50 as listed on the COC to 01:26 and 01:50, respectively, per the client's 2/6/2023 email.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF

Analyte	Acronyms
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Instrument Performance Check
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Verifications
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Equipment Blank
- ✓ Field Duplicate
- ✓ Isotope Dilution Standards

⊗ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

B7583: The laboratory narrated that the level of perfluorokerosene (PFK) was low for the ending resolution chromatograms (resplots) of the sequence. PFK was added and manual resplots were collected as soon as practical with no adjustments being made to the instrument's tune. All impacted resplots are included with the nearest bracketing resplots. The instrument ran continuously during the time between each set of resplots. There was no impact on the final results.

1.2 Holding Times

The holding times for the dioxin and furans analysis of groundwater samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria, with the following exception.

The ES OCDD percent deviation (%D) of -31% and the ES OCDF %D of -34% for CCV CS3_230824_DF_CB were above the method criteria. Based on professional and technical judgment, no qualifications were applied to the sample data since the analytes were within method criteria.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches 19855, 20362 and 20071). Dioxins and furans were not detected in the method blanks at or above the detection limits (DLs).

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met. Ongoing precision and recovery standards (OPRs) were used to access accuracy. Laboratory measures of precision were not reported.

1.8 Laboratory Control Sample (LCS)

OPRs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three OPRs were reported. The recovery results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Three equipment blanks, BH-EB-GW-230201 BH-EB-GW-230424 and BH-EB-GW-230801, were submitted with the sample set. Dioxins and furans were not detected in the equipment blank at or above the DLs.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every twenty primary samples. Three field duplicate samples were submitted and analyzed with the sample set, BH-GW-29-D-230201, BH-GW-29-D-230424 and BH-GW-29-D-230801. Acceptable precision (RPD $\leq$30%)

was demonstrated between the field duplicates and original samples BH-GW-29-230201, BH-GW-29-230424 and BH-GW-29-230801, respectively.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged EST by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment.

Qualifications are in Attachment 3 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the DLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9b for groundwaters. The screening levels were met, with the following exception.

The DL for groundwaters for 2,3,7,8-TCDD did not meet the screening level of 0.67 pg/L listed in the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV report at a minimum of 20%. The RLs included in the EDD were not listed on the level IV report. The OPR2_19855_DF and OPR1_19863_DF-RJ data included in the EDD were not on the level IV report since they were not associated with the samples. No other discrepancies were identified between the level IV report and the EDD.

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* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

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ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR TARGET COMPOUND IDENTIFICATION

Sample	Analyte	Laboratory Result (pg/L)	Laboratory Flag	Validation Result (pg/L)	Validation Qualifier	Reason Code
BH-GW-29-230201	1,2,3,4,6,7,8-HpCDD	2.86	J EST	2.86	J	13
BH-GW-29-230201	OCDD	25.7	J EST	25.7	J	13
BH-GW-29-D-230201	OCDD	21.5	J EST	21.5	J	13
BH-GW-29-230424	OCDD	30.9	J EST	30.9	J	13
BH-GW-29-D-230424	OCDD	37.2	J EST	37.2	J	13

pg/L-picograms per liter
J-estimated concentration greater than the DL but less than the RL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	18 October 2023
To:	Cindy Bartlett
From:	Quyen Le
CC:	Kristoffer Henderson
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGS North America Data Package Identification B8295**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of ten soil samples and one field duplicate sample, collected on 13, 22, and 28-30 September 2022, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS North America, Wilmington, North Carolina and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, November 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);

- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
B8295_20403_DF_001	BH-HA-42-0to1
B8295_20403_DF_002	BH-HA-42-1to2
B8295_20403_DF_003	BH-HA-43-0to1
B8295_20403_DF_004	BH-HA-43-1to2
B8295_20403_DF_005	BH-HA-43-1to2-D
B8295_20403_DF_006	BH-SB-27-16to18

Laboratory ID	Client ID
B8295_20403_DF_007	BH-SB-27-18to20
B8295_20403_DF_008	BH-SB-29-19to21
B8295_20403_DF_009	BH-SB-29-21to23
B8295_20429_DF_010	BH-SB-29-23to24
B8295_20403_DF_011	BH-SB-24-10to12

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B. The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF

Analyte	Acronyms
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Equipment Blank
⊗ Field Duplicate
✓ Isotope Dilution Standards
⊗ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

The laboratory narrated that sample BH-SB-29-23to24 went to dryness during the initial extraction process. The sample was re-extracted in a new batch. Lab QC for both extraction batches was included in the report. Sample results were reported from the re-extraction (indicated by suffix 'R1' on the SGS ID).

The laboratory noted that as is frequently seen in the summer with the elevated humidity, the lab encounters issues with de-activation of Florisil, used in the fractionation/clean-up columns. To mitigate the issue, a deviation from their standard operating procedure (SOP) was used: 56 mL of dichloromethane (DCM) was collected, immediately following the 85 mL hexane wash. The 3% x 20mL DCM/Hexane was not used.

1.2 Holding Times

The holding times for the dioxin and furans analysis of soil and sediment samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches 20403 and 20429). Dioxins and furans were not detected in the method blanks at or above the detection limits (DLs), with the following exceptions.

OCDD (1.79 pg/g) was detected in the method blank in batch 20403 at an estimated concentration greater than the DL and less than the reporting limit (RL). Since OCDD was detected above the RL in the associated samples and based on professional and technical judgment, no qualifications were applied to the data. 1,2,3,4,6,7,8-HpCDF (0.148 pg/g) was detected in the method blank in batch 20403 at an estimated maximum possible concentration (EMPC) greater than the DL and less than the RL. Based on professional and technical judgment, no qualifications were applied to the 1,2,3,4,6,7,8-HpCDF data where it was detected above the RL in the associated samples. However, the estimated concentrations of 1,2,3,4,6,7,8-HpCDF in the associated samples were U qualified as not detected at or above the RLs.

Qualifications are in Attachment 3 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One MS/MSD pair was reported, using sample BH-HA-42-0to1. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria, with the following exceptions.

The 1,2,3,4,6,7,8-HpCDD recovery in the MSD and the OCDD recoveries in the MS/MSD were below the QAPP-specified acceptance criteria. The 1,2,3,4,6,7,8-HpCDD RPD was above the QAPP-specified acceptance criteria. Based on professional and technical judgment, no qualifications were applied to the data due to the parent sample concentrations.

1.8 Laboratory Control Sample (LCS)

Ongoing Precision and Recovery (OPR) Standards were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two OPRs were reported. The recovery results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Equipment blanks were not submitted with the sample set.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every twenty primary samples. One field duplicate sample was submitted and analyzed with the sample set, BH-HA-43-1to2-D. Acceptable precision (RPD $\leq$50%) was demonstrated between the field duplicate and original sample BH-HA-43-1to2, with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

Qualifications are in Attachment 4 at the end of this report.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged EST by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions; for the concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Qualifications are in Attachment 5 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the DLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for soils. The screening levels were met, with the following exception.

The DL for soils for 2,3,7,8-TCDD did not meet the screening level of 0.0013 pg/g listed in the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV report at a minimum of 20%. The RLs included in the EDD were not listed on the level IV report. The percent solids data listed on the level IV report were not included in the EDD. No other discrepancies were identified between the level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-42-1to2	1,2,3,4,6,7,8-HpCDF	0.363	J B	2.49	U	3
BH-HA-43-1to2	1,2,3,4,6,7,8-HpCDF	0.778	J B	2.46	U	3
BH-HA-43-1to2-D	1,2,3,4,6,7,8-HpCDF	0.433	J B	2.44	U	3
BH-SB-27-16to18	1,2,3,4,6,7,8-HpCDF	0.202	J B EST	2.44	U	3
BH-SB-29-19to21	1,2,3,4,6,7,8-HpCDF	0.116	J B EST	2.48	U	3
BH-SB-29-21to23	1,2,3,4,6,7,8-HpCDF	0.217	J B	2.46	U	3

pg/g-picograms per gram
J-estimated concentration greater than the DL but less than the RL
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

ATTACHMENT 4
QUALIFICATION FOR FIELD DUPLICATE

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-43-1to2	Total TCDD	113	EST	53	113	J	7
BH-HA-43-1to2-D	Total TCDD	66	EST		66	J	7

pg/g-picograms per gram
EST-lab flag indicating EMPC

ATTACHMENT 5
QUALIFICATION FOR TARGET COMPOUND IDENTIFICATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-42-0to1	2,3,4,6,7,8-HxCDF	0.572	J EST	0.572	J	13
BH-HA-42-0to1	Total TCDD	52.5	EST	52.5	J	13
BH-HA-42-0to1	Total PeCDD	45.3	EST	45.3	J	13
BH-HA-42-0to1	Total HxCDD	155	EST	155	J	13
BH-HA-42-0to1	Total TCDF	38.6	EST	38.6	J	13
BH-HA-42-0to1	Total PeCDF	16.1	EST	16.1	J	13
BH-HA-42-0to1	Total HxCDF	6.15	EST	6.15	J	13
BH-HA-42-0to1	Total HpCDF	3.86	EST	3.86	J	13
BH-HA-42-1to2	Total TCDD	52.5	EST	52.5	J	13
BH-HA-42-1to2	Total PeCDD	29.3	EST	29.3	J	13
BH-HA-42-1to2	Total HpCDF	0.939	EST	0.939	J	13
BH-HA-43-0to1	2,3,7,8-TCDD	1.04	EST	1.04	J	13
BH-HA-43-0to1	1,2,3,7,8-PeCDF	1.23	J EST	1.23	J	13
BH-HA-43-0to1	2,3,4,6,7,8-HxCDF	0.758	J EST	0.758	J	13
BH-HA-43-0to1	Total TCDD	65.7	EST	65.7	J	13
BH-HA-43-0to1	Total PeCDD	65	EST	65	J	13
BH-HA-43-0to1	Total TCDF	34.8	EST	34.8	J	13
BH-HA-43-0to1	Total PeCDF	16	EST	16	J	13
BH-HA-43-0to1	Total HxCDF	5.6	EST	5.6	J	13
BH-HA-43-0to1	Total HpCDF	3.67	EST	3.67	J	13
BH-HA-43-1to2	2,3,7,8-TCDD	0.715	EST	0.715	J	13
BH-HA-43-1to2	2,3,7,8-TCDF	0.85	EST	0.85	J	13
BH-HA-43-1to2	1,2,3,7,8-PeCDF	0.309	J EST	0.309	J	13
BH-HA-43-1to2	2,3,4,7,8-PeCDF	0.419	J EST	0.419	J	13
BH-HA-43-1to2	OCDF	0.838	J EST	0.838	J	13
BH-HA-43-1to2	Total TCDD	113	EST	113	J	13
BH-HA-43-1to2	Total PeCDD	54.3	EST	54.3	J	13
BH-HA-43-1to2	Total TCDF	8.02	EST	8.02	J	13
BH-HA-43-1to2	Total PeCDF	2.67	EST	2.67	J	13
BH-HA-43-1to2	Total HpCDF	1.47	EST	1.47	J	13
BH-HA-43-1to2-D	2,3,7,8-TCDD	0.606	EST	0.606	J	13
BH-HA-43-1to2-D	1,2,3,7,8-PeCDF	0.372	J EST	0.372	J	13
BH-HA-43-1to2-D	2,3,4,7,8-PeCDF	0.399	J EST	0.399	J	13
BH-HA-43-1to2-D	Total TCDD	66	EST	66	J	13
BH-HA-43-1to2-D	Total PeCDD	43.8	EST	43.8	J	13
BH-HA-43-1to2-D	Total TCDF	7.4	EST	7.4	J	13
BH-HA-43-1to2-D	Total PeCDF	3.46	EST	3.46	J	13
BH-HA-43-1to2-D	Total HpCDF	1.04	EST	1.04	J	13
BH-SB-27-16to18	1,2,3,7,8-PeCDD	0.277	J EST	0.277	J	13
BH-SB-27-16to18	1,2,3,7,8,9-HxCDD	0.801	J EST	0.801	J	13

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-27-16to18	Total PeCDD	3.23	EST	3.23	J	13
BH-SB-27-16to18	Total HxCDD	10.6	EST	10.6	J	13
BH-SB-27-18to20	1,2,3,4,7,8-HxCDD	0.481	J EST	0.481	J	13
BH-SB-27-18to20	Total TCDD	10.6	EST	10.6	J	13
BH-SB-27-18to20	Total PeCDD	3.76	EST	3.76	J	13
BH-SB-27-18to20	Total HxCDD	21	EST	21	J	13
BH-SB-29-19to21	1,2,3,4,7,8-HxCDD	0.344	J EST	0.344	J	13
BH-SB-29-19to21	Total PeCDD	2.75	EST	2.75	J	13
BH-SB-29-19to21	Total HxCDD	8.19	EST	8.19	J	13
BH-SB-29-21to23	1,2,3,7,8,9-HxCDD	0.827	J EST	0.827	J	13
BH-SB-29-21to23	Total TCDD	14.9	EST	14.9	J	13
BH-SB-29-21to23	Total PeCDD	3.86	EST	3.86	J	13
BH-SB-29-21to23	Total HxCDD	10.5	EST	10.5	J	13
BH-SB-29-23to24	1,2,3,7,8-PeCDD	0.24	J EST	0.24	J	13
BH-SB-29-23to24	1,2,3,4,7,8-HxCDD	0.355	J EST	0.355	J	13
BH-SB-29-23to24	Total TCDD	32.8	EST	32.8	J	13
BH-SB-29-23to24	Total PeCDD	9.11	EST	9.11	J	13
BH-SB-29-23to24	Total HxCDD	30.5	EST	30.5	J	13
BH-SB-24-10to12	1,2,3,4,7,8,9-HpCDF	0.578	J EST	0.578	J	13
BH-SB-24-10to12	Total TCDD	48.1	EST	48.1	J	13
BH-SB-24-10to12	Total PeCDD	48.5	EST	48.5	J	13
BH-SB-24-10to12	Total HxCDD	40.2	EST	40.2	J	13
BH-SB-24-10to12	Total TCDF	52.9	EST	52.9	J	13
BH-SB-24-10to12	Total PeCDF	33.3	EST	33.3	J	13
BH-SB-24-10to12	Total HpCDF	17.9	EST	17.9	J	13

pg/g-picograms per gram
J-estimated concentration greater than the DL but less than the RL
EST-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	3 November 2023
To:	Cindy Bartlett
From:	Quyen Le
CC:	Kristoffer Henderson
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGS AXYS Analytical Services Data Package Identifications DPWG80813, DPWG80837 and DPWG81471**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of twenty-eight soil samples, one sediment sample, and four soil field duplicate samples, collected on 19, 20, 23, and 24 August and 13-15 September 2021, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, November 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);

- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L35487-2	HA-01-12to24
L35487-5	HA-06-12to24
L35487-7	HA-05-12to24
L35487-9	HA-03-12to24
L35487-11	HA-02-12to24
L35487-13	HA-04-12to24
L35487-15	HA-16-12to24
L35487-17	HA-12-12to24
L35487-18	HA-12-12to24-D
L35487-20	HA-11-12to24
L35487-22	HA-15-12to24
L35487-24	HA-13-12to24
L35487-26	HA-14-12to24
L35487-28	HA-10-12to24
L35487-29	HA-10-12to24-D
L35487-31	HA-09-12to24
L35487-33	HA-08-12to24

Laboratory ID	Client ID
L35624-1	BH-SB-21-6to10
L35624-2	BH-SB-21-10to12
L35624-3	BH-SB-20-5to9
L35624-6	BH-SB-18-6to9
L35624-7	BH-SB-18-9to11
L35624-8	BH-SB-19-6to8
L35624-9	BH-SB-19-8to10
L35700-13	BH-SB-23-6to7
L35700-14	BH-SB-23-7to10
L35700-19	BH-SB-22-6to10
L35700-20	BH-SB-22-6to10-D
L35700-21	BH-SB-22-10to12
L35700-26	BH-SB-17-6to10
L35700-27	BH-SB-17-6to10-D
L35700-28	BH-SB-17-10to12
L35623-20	BH-SC-24-5.9to7.7

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

DPWG80837: Incorrect error corrections were observed on the COCs, instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections. One COC did not document the Report To and the Invoice To information.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B (Modified). The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Instrument Performance Check
- ✓ Initial Calibration

✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Equipment Blank
⊗ Field Duplicate
⊗ Isotope Dilution Standards
⊗ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

The samples were analyzed using gas chromatography (GC) column DB-5. Per the laboratory SOP detections of 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD on GC column DB-5 are confirmed and quantitated by analysis using GC column DB-225. Therefore, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results were considered from the confirmation analysis when analyzed. However, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results that were not detected in the original analysis did not require confirmation and were considered from the original analysis. The results not considered for validation were R qualified as rejected in the EDDs.

DPWG80813 (DB-5 analysis): Samples HA-13-12to24 and HA-10-12to24 were given a second cleanup using an AgNO3 column. Given that the surrogate recoveries met the method criteria, sample data were not considered affected.

DPWG80813 (DB-5 analysis): The method blank, ongoing precision and recovery standard (OPR) and samples HA-05-12to24, HA-11-12to24, HA-15-12to24, HA-13-12to24, and HA-14-12to24 were instrumentally re-analyzed due to instrument interferences. The re-analyses data showed improvement and data were reported from the instrumental re-analyses (as indicated by suffix ‘i’ on the SGS AXYS IDs).

DPWG80813 (DB-5 analysis): Samples HA-03-12to24, HA-16-12to24, HA-12-12to24, and HA-08-12to24) were instrumentally re-analyzed multiple times due to instrument interference, calibration verification failure and/or potential sample carry-over. The last re-analyses data

showed improvement and data were reported from the instrumental re-analyses (as indicated by suffix ‘i2, i3 or i4’ on the SGS AXYS IDs).

DPWG80813 (DB-5 analysis): Sample HA-10-12to24-D was given additional cleanup procedures to minimize the instrument interferences followed by instrumental re-analysis twice. The second instrumental re-analysis was successful, and the data were reported (as indicated by suffix ‘Li’ on the SGS AXYS ID).

DPWG80813 (DB-5 analysis): Lock mass interference was observed under the retention time corresponding to 2,3,7,8-TCDF and its labeled surrogate for calibration verifications (data filenames: DX2M_031 S: 35, DX2M_036C S: 15 and S: 21). Given that the surrogate recovery and the analyte recovery were within the method criteria, sample data were not considered affected.

DPWG80813 (DB-5 analysis): Lock mass interference was observed under the retention time corresponding to 2,3,7,8-TCDF and its labeled surrogate for samples HA-01-12to24, HA-04-12to24, HA-16-12to24, HA-12-12to24, and HA-11-12to24, as indicated by laboratory ‘G’ flag. Given that the surrogate recovery was within the method criteria, sample data were not considered affected.

DPWG80813 (DB-225 analysis): Sample HA-10-12to24-D was given additional cleanup procedures to minimize the instrument interferences followed by instrumental re-analysis twice. The second instrumental re-analysis was successful, and the data were reported (as indicated by suffix ‘Li’ on the SGS AXYS ID).

DPWG80837: The analyst noted on the laboratory worksheet that the extract for sample BH-SB-19-6to8 was initially loaded onto an acid/base silica column that did not contain silver nitrate. The extract was eluted through the proper 44% A/B AgNO3 silica prior to further extract cleanup. Given that the recovery values of the labeled standards were within the method control limits, sample data were determined to not be affected by this variance.

DPWG80837 (DB-5 analysis): The initial instrumental analysis results of samples BH-SB-21-6to10, BH-SB-18-9to11, BH-SB-19-6to8, BH-SB-22-10to12, BH-SB-17-6to10, BH-SB-17-6to10-D, and BH-SB-17-10to12, the method blank, and the OPR did not meet the method specifications. The extracts were instrumentally re-analyzed, and the method specifications were met. Concentrations were reported from the re-injections (as indicated by suffix ‘i,’ ‘i2’, ‘i3’ or ‘i5’ on the SGS AXYS IDs).

DPWG80837 (DB-225 analysis): The initial instrumental analysis results of samples BH-SB-21-6to10, BH-SB-21-10to12, BH-SB-20-5to9, BH-SB-18-6to9, BH-SB-18-9to11, BH-SB-19-6to8, BH-SB-19-8to10, BH-SB-23-6to7, and BH-SB-17-6to10-D did not meet the method specifications. The sample extracts were instrumentally re-analyzed, and the method specifications

were met. Sample concentrations were reported from the re-injections (as indicated by suffix 'I' on the SGS AXYS IDs).

DPWG81471: Sample BH-SC-24-5.9to7.7 was originally extracted in batch (WG80629). The results were not reportable, and so the sample was reanalyzed, starting from a fresh subsample. Sample results from the repeat analysis were reported (as indicated by suffix 'i' on the SGS AXYS ID).

1.2 Holding Times

The holding times for the dioxin and furans analysis of soil and sediment samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches WG80205, WG80206 and WG81060). Dioxins and furans were not detected in the method blanks at or above the minimum reporting levels (MRLs)/sample detection limits (SDLs), with the following exceptions.

DPWG80813: 1,2,3,4,6,7,8-HPCDD, OCDD and 1,2,3,4,6,7,8-HPCDF were detected in the method blank in batch WG80205 at estimated concentrations greater than the MRLs and less than the limit of quantitations (LOQs). Based on professional and technical judgment, no qualifications were applied to the data for these analytes where they were detected at or above the LOQ in the associated samples. However, the estimated concentrations of these analytes in the associated samples were U qualified as not detected at or above the LOQ. TOTAL HEPTA-DIOXINS (0.0597 pg/g) and TOTAL HEPTA-FURANS (0.0650 pg/g) were detected in the method blank in batch WG80205 at concentrations greater than the LOQs. Since these analytes were detected in the associated samples at concentrations greater than ten times the method blank concentration and based on professional and technical judgment, the concentrations for these analytes in the associated samples were not qualified.

DPWG80837: 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 1,2,3,4,6,7,8-HPCDF, and OCDF were detected in the method blank in batch WG80206 at estimated concentrations greater than the MRLs and less than the LOQs. Based on professional and technical judgment, no qualifications were applied to the data for these analytes where they were detected at or above the LOQ in the associated samples. However, the estimated concentrations of these analytes in the associated samples were U qualified as not detected at or above the LOQ. TOTAL HEPTA-DIOXINS (0.144 pg/g), TOTAL PENTA-FURANS (0.148 pg/g) and TOTAL HEXA-FURANS (0.0774 pg/g) were detected in the method blank in batch WG80206 at concentrations greater than the LOQs. Based on professional and technical judgment, the concentrations for these analytes in the associated samples greater than ten times the method blank concentrations were not qualified. However, the TOTAL HEPTA-DIOXINS concentration in sample BH-SB-23-7to10, the TOTAL HEXA-FURANS concentration in sample BH-SB-19-8to10 and the TOTAL PENTA-FURANS concentrations in samples BH-SB-21-10to12, BH-SB-23-6to7 and BH-SB-23-7to10 were J+ qualified as estimated with high bias.

DPWG81471: 1,2,3,4,7,8-HXCDD, 1,2,3,6,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PECDF, 2,3,4,7,8-PECDF, 1,2,3,4,7,8-HXCDF, 1,2,3,6,7,8-HXCDF, 1,2,3,7,8,9-HXCDF, 2,3,4,6,7,8-HXCDF, 1,2,3,4,6,7,8-HPCDF, 1,2,3,4,7,8,9-HPCDF, and OCDF were detected in the method blank in batch WG81060 at estimated concentrations greater than the MRLs and less than the LOQs. Based on professional and technical judgment, no qualifications were applied to the data for these analytes where they were detected above the LOQ in the associated sample. However, the estimated concentrations of these analytes in the associated sample were U qualified as not detected at or above the LOQ. TOTAL HEXA-DIOXINS (0.0597 pg/g), TOTAL HEPTA-DIOXINS (0.0562 pg/g) and TOTAL PENTA-FURANS (0.0219 pg/g) were detected in the method blank in batch WG81060 at concentrations greater than the LOQs. Since the concentrations for these analytes in the associated sample were greater than ten times the method blank concentrations, no qualifications were applied to the data.

Qualifications are in Attachment 3 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met. OPR/OPR duplicate pairs were used to access precision and accuracy for batches WG80205 and WG80206. An OPR was used to access accuracy for batch WG81060. A laboratory measure of precision was not reported for batch WG81060.

1.8 Laboratory Control Sample (LCS)

OPRs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two OPR/OPR duplicate pairs and one OPR were reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Equipment blanks were not submitted with the sample set.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Six field duplicate samples were submitted and analyzed with the sample set; HA-12-12to24-D, HA-10-12to24-D, BH-SB-22-6to10-D, and BH-SB-17-6to10-D. Acceptable precision (RPD $\leq$50%) was demonstrated between the field duplicates and original samples, HA-12-12to24, HA-10-12to24, BH-SB-22-6to10, and BH-SB-17-6to10, respectively, with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the SDL and less than the LOQ and a concentration greater than the LOQ, the RPDs were not calculable. Therefore, for these concentrations in the field duplicate pairs the concentrations were J qualified as estimated.

For analytes with both a concentration greater than the SDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the SDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Qualifications are in Attachment 4 at the end of this report.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The recovery of 13C-OCDD in sample HA-14-12to24 was below the laboratory specified acceptance criteria. Therefore, the concentrations of OCDD and OCDF in the sample HA-14-12to24 were J qualified as estimated.

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
HA-14-12to24	OCDD	533	NA	533	J	11
HA-14-12to24	OCDF	13.6	NA	13.6	J	11

pg/g-picograms per gram
NA-not applicable

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged NJ by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions; for the concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Qualifications are in Attachment 5 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the MRLs/SDLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for soils and QAPP Table 9c for sediments. The screening levels were met, with the following exception.

The MRL for soils for 2,3,7,8-TCDD of 0.050 pg/g did not meet the screening level of 0.0013 pg/g listed in the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. The LOQs included in the EDD were not listed on the level IV reports. No other discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-10to12	1,2,3,4,6,7,8-HPCDF	0.0869	J	2.67	U	3
BH-SB-17-10to12	1,2,3,7,8,9-HXCDF	0.0869	NJ B J	2.67	U	3
BH-SB-17-10to12	1,2,3,4,7,8-HXCDF	0.811	J	2.67	U	3
BH-SB-17-10to12	1,2,3,7,8-PECDF	0.853	J	2.67	U	3
BH-SB-17-10to12	OCDF	0.487	J	5.34	U	3
BH-SB-17-6to10	1,2,3,7,8,9-HXCDF	0.110	B J	2.73	U	3
BH-SB-17-6to10	1,2,3,4,6,7,8-HPCDF	1.59	J	2.73	U	3
BH-SB-17-6to10	1,2,3,4,7,8-HXCDF	0.999	J	2.73	U	3
BH-SB-17-6to10	1,2,3,7,8-PECDF	1.02	J	2.73	U	3
BH-SB-17-6to10	OCDF	0.546	J	5.46	U	3
BH-SB-17-6to10-D	1,2,3,4,6,7,8-HPCDF	1.17	J	2.45	U	3
BH-SB-17-6to10-D	1,2,3,7,8,9-HXCDF	0.102	B J	2.45	U	3
BH-SB-17-6to10-D	1,2,3,4,7,8-HXCDF	0.680	J	2.45	U	3
BH-SB-17-6to10-D	1,2,3,7,8-PECDF	0.932	J	2.45	U	3
BH-SB-17-6to10-D	OCDF	0.582	J	4.91	U	3
BH-SB-18-6to9	1,2,3,7,8,9-HXCDF	0.682	J	2.42	U	3
BH-SB-18-9to11	1,2,3,7,8,9-HXCDF	1.39	J	2.41	U	3
BH-SB-18-9to11	OCDF	3.18	J	4.82	U	3
BH-SB-19-6to8	1,2,3,4,6,7,8-HPCDD	0.842	J	2.91	U	3
BH-SB-19-6to8	1,2,3,4,6,7,8-HPCDF	0.378	J	2.91	U	3
BH-SB-19-6to8	1,2,3,4,7,8-HXCDF	0.301	NJ J	2.91	U	3
BH-SB-19-6to8	1,2,3,7,8,9-HXCDF	0.134	NJ B J	2.91	U	3
BH-SB-19-6to8	1,2,3,7,8-PECDF	0.200	B J	2.91	U	3
BH-SB-19-6to8	OCDD	4.20	J	5.82	U	3
BH-SB-19-6to8	OCDF	0.228	J	5.82	U	3
BH-SB-19-8to10	1,2,3,4,6,7,8-HPCDF	0.106	J	2.41	U	3
BH-SB-19-8to10	1,2,3,7,8,9-HXCDF	0.0606	B J	2.41	U	3
BH-SB-19-8to10	TOTAL HEXA-FURANS	0.123	B	0.123	J+	3
BH-SB-20-5to9	1,2,3,4,6,7,8-HPCDF	1.03	J	2.38	U	3
BH-SB-20-5to9	1,2,3,4,7,8-HXCDF	0.287	J	2.38	U	3
BH-SB-20-5to9	1,2,3,7,8,9-HXCDF	0.0753	B J	2.38	U	3
BH-SB-20-5to9	1,2,3,7,8-PECDF	0.235	NJ B J	2.38	U	3
BH-SB-20-5to9	OCDF	0.569	J	0.569	U	3
BH-SB-21-10to12	1,2,3,4,6,7,8-HPCDF	0.167	J	2.41	U	3
BH-SB-21-10to12	1,2,3,4,7,8-HXCDF	0.0734	NJ J	2.41	U	3
BH-SB-21-10to12	1,2,3,7,8-PECDF	0.0764	NJ B J	2.41	U	3

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-21-10to12	OCDF	0.054	J	0.054	U	3
BH-SB-21-10to12	TOTAL PENTA-FURANS	0.0756	B	0.0756	U	3
BH-SB-21-6to10	1,2,3,7,8-PECDF	1.68	J	3.4	U	3
BH-SB-21-6to10	1,2,3,7,8,9-HXCDF	0.133	NJ B J	3.41	U	3
BH-SB-21-6to10	OCDF	1.27	J	6.8	U	3
BH-SB-22-6to10	1,2,3,7,8,9-HXCDF	0.775	J	2.48	U	3
BH-SB-22-6to10-D	1,2,3,7,8,9-HXCDF	0.943	J	2.26	U	3
BH-SB-23-6to7	1,2,3,4,6,7,8-HPCDD	1.76	J	2.39	U	3
BH-SB-23-6to7	OCDD	3.61	J	4.77	U	3
BH-SB-23-6to7	1,2,3,4,6,7,8-HPCDF	0.555	J	2.39	U	3
BH-SB-23-6to7	1,2,3,4,7,8-HXCDF	0.320	J	2.39	U	3
BH-SB-23-6to7	1,2,3,7,8,9-HXCDF	0.0559	NJ B J	2.39	U	3
BH-SB-23-6to7	1,2,3,7,8-PECDF	0.250	NJ B J	2.39	U	3
BH-SB-23-6to7	OCDF	0.157	J	0.157	U	3
BH-SB-23-6to7	TOTAL PENTA-FURANS	0.862	J	0.862	J+	3
BH-SB-23-7to10	1,2,3,4,6,7,8-HPCDD	0.637	J	2.41	U	3
BH-SB-23-7to10	1,2,3,4,6,7,8-HPCDF	0.119	NJ J	2.41	U	3
BH-SB-23-7to10	1,2,3,4,7,8-HXCDF	0.0712	NJ J	2.41	U	3
BH-SB-23-7to10	1,2,3,7,8-PECDF	0.0929	B J	2.41	U	3
BH-SB-23-7to10	OCDF	0.0766	J	0.0766	U	3
BH-SB-23-7to10	TOTAL HEPTA-DIOXINS	1.41	NA	1.41	J+	3
BH-SB-23-7to10	TOTAL PENTA-FURANS	0.199	B	0.199	J+	3
BH-SC-24-5.9to7.7	1,2,3,4,7,8,9-HPCDF	0.0395	J	1.25	U	3
BH-SC-24-5.9to7.7	1,2,3,4,7,8-HXCDD	0.0821	B J	1.25	U	3
BH-SC-24-5.9to7.7	1,2,3,4,7,8-HXCDF	0.157	J	1.25	U	3
BH-SC-24-5.9to7.7	1,2,3,6,7,8-HXCDD	0.183	J	1.25	U	3
BH-SC-24-5.9to7.7	1,2,3,6,7,8-HXCDF	0.0946	J	1.25	U	3
BH-SC-24-5.9to7.7	1,2,3,7,8,9-HXCDF	0.0309	J	1.25	U	3
BH-SC-24-5.9to7.7	1,2,3,7,8-PECDF	0.11	J	1.25	U	3
BH-SC-24-5.9to7.7	2,3,4,6,7,8-HXCDF	0.076	J	1.25	U	3
BH-SC-24-5.9to7.7	2,3,4,7,8-PECDF	0.103	J	1.25	U	3
BH-SC-24-5.9to7.7	OCDF	0.162	NJ J	2.5	U	3
HA-09-12to24	1,2,3,4,6,7,8-HPCDF	1.24	J	2.41	U	3
HA-11-12to24	1,2,3,4,6,7,8-HPCDF	0.503	J	2.44	U	3

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

ATTACHMENT 4
QUALIFICATION FOR FIELD DUPLICATE

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
HA-12-12to24	1,2,3,4,7,8,9-HPCDF	10	NA	62	10	J	7
HA-12-12to24-D	1,2,3,4,7,8,9-HPCDF	18.9	NA		18.9	J	7
HA-12-12to24	2,3,7,8-TCDD	0.69	J	NC	0.69	J	7
HA-12-12to24	2,3,7,8-TCDD	0.82	NA		0.82	J	7
BH-SB-22-6to10	1,2,3,4,6,7,8-HPCDF	58.6	NA	59	58.6	J	7
BH-SB-22-6to10-D	1,2,3,4,6,7,8-HPCDF	108	NA		108	J	7
BH-SB-22-6to10	OCDF	22.4	NA	55	22.4	J	7
BH-SB-22-6to10	OCDF	39.5	NA		39.5	J	7

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NA-not applicable
NC-not calculable

ATTACHMENT 5
QUALIFICATION FOR TARGET COMPOUND IDENTIFICATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SB-17-10to12	1,2,3,4,7,8,9-HPCDF	0.0765	NJ J	0.0765	J	13
BH-SB-17-10to12	1,2,3,6,7,8-HXCDF	0.396	NJ J	0.396	J	13
BH-SB-17-6to10	1,2,3,4,7,8-HXCDD	0.56	NJ J	0.56	J	13
BH-SB-17-6to10	1,2,3,7,8,9-HXCDD	2.02	NJ J	2.02	J	13
BH-SB-17-6to10-D	1,2,3,6,7,8-HXCDF	0.35	NJ J	0.35	J	13
BH-SB-17-6to10-D	1,2,3,7,8,9-HXCDD	1.05	NJ J	1.05	J	13
BH-SB-17-6to10-D	1,2,3,7,8-PECDD	0.87	NJ J	0.87	J	13
BH-SB-18-6to9	2,3,7,8-TCDD	0.805	NJ	0.805	J	13
BH-SB-18-9to11	2,3,7,8-TCDD	0.481	NJ J	0.481	J	13
BH-SB-19-6to8	1,2,3,4,7,8,9-HPCDF	0.114	NJ J	0.114	J	13
BH-SB-19-6to8	1,2,3,4,7,8-HXCDD	0.0792	NJ J	0.0792	J	13
BH-SB-19-6to8	1,2,3,6,7,8-HXCDD	0.137	NJ J	0.137	J	13
BH-SB-19-6to8	1,2,3,7,8,9-HXCDD	0.0692	NJ J	0.0692	J	13
BH-SB-19-6to8	1,2,3,7,8-PECDD	0.107	NJ J	0.107	J	13
BH-SB-19-6to8	2,3,4,7,8-PECDF	0.109	NJ J	0.109	J	13
BH-SB-19-6to8	2,3,7,8-TCDF_C	0.123	NJ J	0.123	J	13
BH-SB-19-8to10	1,2,3,4,7,8-HXCDD	0.151	NJ J	0.151	J	13
BH-SB-19-8to10	1,2,3,6,7,8-HXCDD	0.318	NJ J	0.318	J	13
BH-SB-19-8to10	1,2,3,7,8-PECDD	0.149	NJ J	0.149	J	13
BH-SB-19-8to10	2,3,7,8-TCDD	0.0635	NJ J	0.0635	J	13
BH-SB-20-5to9	1,2,3,4,7,8,9-HPCDF	0.0882	NJ J	0.0882	J	13
BH-SB-20-5to9	2,3,7,8-TCDD	0.205	NJ J	0.205	J	13
BH-SB-21-10to12	2,3,7,8-TCDD	0.0876	NJ J	0.0876	J	13
BH-SB-21-6to10	1,2,3,4,7,8-HXCDD	0.431	NJ J	0.431	J	13
BH-SB-21-6to10	1,2,3,7,8,9-HXCDD	0.803	NJ J	0.803	J	13
BH-SB-21-6to10	1,2,3,7,8,9-HXCDD	0.691	NJ J	0.691	J	13
BH-SB-21-6to10	2,3,7,8-TCDD	0.163	NJ J	0.163	J	13
BH-SB-22-6to10-D	1,2,3,4,7,8,9-HPCDF	3.63	NJ	3.63	J	13
BH-SB-23-6to7	2,3,4,7,8-PECDF	0.159	NJ J	0.159	J	13
BH-SB-23-6to7	2,3,7,8-TCDD	0.211	NJ J	0.211	J	13
BH-SB-23-7to10	1,2,3,7,8,9-HXCDD	0.139	NJ J	0.139	J	13
BH-SB-23-7to10	2,3,4,7,8-PECDF	0.0718	NJ J	0.0718	J	13
BH-SB-23-7to10	2,3,7,8-TCDD	0.103	NJ J	0.103	J	13
HA-03-12to24	2,3,7,8-TCDD	0.177	NJ J	0.177	J	13
HA-06-12to24	1,2,3,7,8,9-HXCDF	0.138	NJ J	0.138	J	13

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date:	27 October 2023
To:	Cindy Bartlett
From:	Quyen Le
CC:	Kristoffer Henderson
Subject:	**Blakely Harbor - Stage 4 Data Validation - Level IV Data Deliverables – SGS AXYS Analytical Services Data Package Identifications DPWG85531, DPWG85766 and DPWG86484**

SITE: Blakely Harbor

INTRODUCTION

This report summarizes the findings of the Stage 4 data validation of twenty-four sediment samples, one soil sample, five sediment field duplicate samples, and one soil field duplicate sample, collected on 15 September and 10-13 October 2022, as part of the Remedial Investigation and Feasibility Study (RI/FS) for the Blakely Harbor Park Site, located in Bainbridge Island, Washington. The samples were submitted to SGS AXYS, Sidney, British Columbia, Canada and analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method 1613 Revision B (Modified) – Dioxins and Furans

EXECUTIVE SUMMARY

Overall, based on this Stage 4 data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. Qualified data should be used within the limitation of the qualification. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The data were reviewed based on the pertinent method referenced by the laboratory report, professional and technical judgment, and the following documents:

- Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington, November 2021;
- US EPA National Functional Guidelines for High Resolutions Superfund Methods Data Review, November 2020 (EPA-542-R-20-007);

- USEPA Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, November 2002; and
- USEPA Draft Region 9 Superfund Data Evaluation/Validation Guidance, R9QA/006.1, December 2001.

The following samples were analyzed and validated at a Stage 4 level:

Laboratory ID	Client ID
L38295-1	BH-SC-51-0to2
L38295-2	BH-SC-51-2to4
L38295-3	BH-SC-51-4to5.2
L38295-4	BH-SC-51-5.2to7.2
L38295-5	BH-SC-51-7.2to9.4
L38295-6	BH-SG-53-0to10
L38295-7	BH-SC-53-0to1
L38295-8	BH-SC-53-1to2.4
L38295-9	BH-SC-53-1to2.4-D
L38295-10	BH-SC-53-2.4to4.4
L38295-11	BH-SC-52-0to1.8
L38295-12	BH-SC-52-0to1.8-D
L38295-13	BH-SC-52-1.8to2.8
L38295-14	BH-SC-49-0to0.7
L38295-15	BH-SC-49-0.7to2.8
L38295-16	BH-SC-49-0.7to2.8-D

Laboratory ID	Client ID
L38011-21	BH-HA-39-1to2
L38011-23	BH-HA-38-0to1-D
L38247-8	BH-SG-49-0to10
L38247-1	BH-SC-54-0to1
L38247-2	BH-SC-54-1to2.8
L38247-3	BH-SC-54-2.8to4
L38247-4	BH-SC-54-4to6.6
L38247-5	BH-SC-54-4to6.6-D
L38247-6	BH-SC-54-6.6to8.8
L38247-7	BH-SC-54-6.6to8.8-D
L38247-9	BH-SG-46-0to10
L38247-10	BH-SG-47-0to10
L38247-11	BH-SG-48-0to10
L38247-12	BH-SG-54-0to10
L38247-13	BH-SG-55-0to10

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The samples were received within the QAPP-specified receipt temperature of <6 degrees Celsius (°C).

No sample preservation issues were noted by the laboratory.

The percent solids data, used to report the solid samples on dry weight bases, were not validated.

1.0 DIOXINS AND FURANS

The samples were analyzed for dioxins and furans based on USEPA method 1613 Revision B (Modified). The following compounds were reported:

Analyte	Acronyms
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2,3,7,8-TCDD
2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF

Analyte	Acronyms
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1,2,3,7,8-PeCDD
1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	1,2,3,7,8,9-HxCDD
1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF
Octachlorodibenzo-p-dioxin	OCDD
Octachlorodibenzofuran	OCDF
Total Tetra-Dioxins	Total TCDD
Total Tetra-Furans	Total TCDF
Total Penta-Dioxins	Total PeCDD
Total Penta-Furans	Total PeCDF
Total Hexa-Dioxins	Total HxCDD
Total Hexa-Furans	Total HxCDF
Total Hepta-Dioxins	Total HpCDD
Total Hepta-Furans	Total HpCDF

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
✓ Initial and Continuing Calibration Verifications
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate

✓ Laboratory Control Sample
✓ Equipment Blank
⊗ Field Duplicate
✓ Isotope Dilution Standards
⊗ Target Compound Identifications
✓ Target Compound Quantitations
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The dioxins and furans data reported in this laboratory report are considered to be usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this laboratory report is 100%.

The samples were analyzed using gas chromatography (GC) column DB-5. Per the laboratory SOP detections of 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD on GC column DB-5 are confirmed and quantitated by analysis using GC column DB-225. Therefore, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results were considered from the confirmation analysis when analyzed. However, 2,3,7,8-TCDF and 1,2,3,7,8,9-HXCDD results that were not detected in the original analysis did not require confirmation and were considered from the original analysis. The results not considered for validation were R qualified as rejected in the EDDs.

DPWG85531: The initial instrumental analysis results of the following samples and lab blank, ongoing precision and recovery standard (OPR), and OPR duplicate (SGS AXYS IDs: WG84353-101, -102 and -103, respectively) did not meet all method specifications for the DB-5 column analysis. These sample extracts were instrumentally re-analyzed and method specifications were met. Results are reported from the re-injection (indicated by suffix 'i' on the SGS AXYS IDs).

SGS AXYS ID	Client ID
L38295-1	BH-SC-51-0to2
L38295-2	BH-SC-51-2to4
L38295-3	BH-SC-51-4to5.2
L38295-4	BH-SC-51-5.2to7.2
L38295-5	BH-SC-51-7.2to9.4
L38295-6	BH-SG-53-0to10
L38295-7	BH-SC-53-0to1
L38295-8	BH-SC-53-1to2.4

DPWG85766: Samples BH-HA-39-1to2 and BH-HA-38-0to1-D (SGS AXYS IDs: L38011-21 and L38011-23, respectively) were originally analyzed in batch WG84930. Sample BH-SG-49-0to10 (SGS AXYS ID: L38247-8) was analyzed twice before, in batches WG84354 and WG85192. The results of the original analyses were unreportable because of surrogate losses. The three samples were successfully reanalyzed (starting from fresh subsamples) in batch WG85519. Sample results were reported from the repeated analyses (indicated by suffix "R" or "R2" on the AXYS IDs).

DPWG85766: The initial instrumental analysis results of sample BH-HA-39-1to2 (SGS AXYS ID: L38011-21) did not meet all method specifications for the DB-5 column analysis. The sample extract was instrumentally re-analyzed and method specifications were met. Sample results are reported from the re-injection (indicated by suffix 'R' on the SGS AXYS ID).

DPWG86484: The OPR required two additional instrumental runs (or "reinjections") because of instrumental disruptions. Results of the second reinjection were reported (indicated by suffix 'R2" on the AXYS ID).

DPWG86484: Sample BH-SG-49-0to10 (AXYS ID: L38247-8) was originally extracted in this batch (WG84354) but required reanalysis. Sample results were reported from analysis batch WG85519, in data package DPWG85766 as indicated above.

1.2 Holding Times

The holding times for the dioxin and furans analysis of soil and sediment samples are 1 year from sample collection to extraction and if frozen, 1 year from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

Instrument performance was checked at the required frequency and the method specified criteria were met.

1.4 Initial Calibration

Appropriate initial calibrations were performed for the analytes. The laboratory calculated the relative standard deviations (%RSD) of the relative response factors (RRFs). The average %RSDs for the RRFs were within the method criteria, 20% RSD criteria for the compounds calculated by isotope dilution and within 35% RSD for the labeled compounds.

The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the initial calibration.

1.5 Initial and Continuing Calibration Verifications (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the method criteria. The method specified resolution, isomer specificity, signal to noise ratios, ion abundance ratios and retention time criteria were also met for the ICVs and CCVs.

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches WG84353, WG84354 and WG85519). Dioxins and furans were not detected in the method blanks at or above the sample specific detection limit (SDL) or minimum reporting levels (MRLs), with the following exceptions.

DPWG85531: 1,2,3,4,6,7,8-HPCDD and OCDD were detected in the method blank in batch WG84353 at estimated concentrations greater than the MRLs and less than the limit of quantitations (LOQs). Since 1,2,3,4,6,7,8-HPCDD and OCDD were detected above the LOQs in the associated samples and based on professional and technical judgment, no qualifications were applied to the data. TOTAL TETRA-DIOXINS (0.0721 pg/g) and TOTAL HEPTA-DIOXINS (0.105 pg/g) were detected in the method blank in batch WG84353 at concentrations greater than the LOQs. Since the TOTAL TETRA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentrations, no qualifications were applied to the data.

DPWG85766: 1,2,3,6,7,8-HXCDD, 1,2,3,4,6,7,8-HPCDD, OCDD, 1,2,3,7,8-PECDF, 1,2,3,4,6,7,8-HPCDF, and OCDF were detected in the method blank in batch WG85519 at estimated concentrations greater than the MRLs and less than the LOQs. Based on professional and technical judgment, no qualifications were applied to the data for these analytes where they were detected above the LOQ in the associated samples. However, the estimated concentrations of these analytes in the associated samples were U qualified as not detected at or above the LOQ. TOTAL TETRA-DIOXINS (0.0908 pg/g), TOTAL HEXA-DIOXINS (0.0526 pg/g), TOTAL HEPTA-DIOXINS (0.110 pg/g), and TOTAL HEPTA-FURANS (0.0873 pg/g) were detected in the method blank in batch WG85519 at concentrations greater than the LOQs. Since the TOTAL TETRA-DIOXINS, TOTAL HEXA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentrations, no qualifications were applied to the data. However, based on professional and technical judgment, the TOTAL HEPTA-FURANS concentrations in the associated samples were J+ qualified as estimated with high bias.

DPWG86484: 1,2,3,4,6,7,8-HPCDD, OCDD, and OCDF were detected in the method blank in batch WG84354 at estimated concentrations greater than the MRLs and less than the LOQs. Based

on professional and technical judgment, no qualifications were applied to the data for these analytes where they were detected above the LOQ in the associated samples. However, the estimated concentrations of OCDF in the associated samples were U qualified as not detected at or above the LOQ. TOTAL TETRA-DIOXINS (0.0974 pg/g), TOTAL PENTA-DIOXINS (0.129 pg/g) and TOTAL HEPTA-DIOXINS (0.188 pg/g) were detected in the method blank in batch WG84354 at concentrations greater than the LOQs. Since the TOTAL TETRA-DIOXINS, TOTAL PENTA-DIOXINS and TOTAL HEPTA-DIOXINS concentrations in the associated samples were greater than ten times the method blank concentrations, no qualifications were applied to the data.

Qualifications are in Attachment 3 at the end of this report.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported; therefore, the QAPP specified criteria of one MS/MSD pair per 20 samples was not met. OPR/OPR duplicate pairs were used to access precision and accuracy.

1.8 Laboratory Control Sample (LCS)

OPRs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three OPR/OPR duplicate pairs were reported. The recovery and relative percent difference (RPD) results were within the QAPP-specified acceptance criteria.

1.9 Equipment Blank

Equipment blanks were not submitted with the sample set.

1.10 Field Duplicate

The QAPP specifies that one field duplicate should be collected for every ten primary samples. Six field duplicate samples were submitted and analyzed with the sample set; BH-SC-53-1to2.4-D, BH-SC-52-0to1.8-D, BH-SC-49-0.7to2.8-D, BH-HA-38-0to1-D, BH-SC-54-4to6.6-D, and BH-SC-54-6.6to8.8-D. Acceptable precision (RPD $\leq$50%) was demonstrated between the field duplicates and original samples, BH-SC-53-1to2.4, BH-SC-52-0to1.8, BH-SC-49-0.7to2.8, BH-HA-38-0to1, BH-SC-54-4to6.6, and BH-SC-54-6.6to8.8, respectively, with the following exceptions.

For RPDs greater than 50%, the concentrations in the field duplicate pairs were J qualified as estimated.

For analytes with both a concentration greater than the SDL and less than the LOQ and a concentration greater than the LOQ, the RPDs were not calculable. Therefore, for these concentrations in the field duplicate pairs the concentrations were J qualified as estimated.

For analytes with both a concentration greater than the SDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the SDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Qualifications are in Attachment 4 at the end of this report.

1.11 Isotope Dilution Standards

The isotope dilution standard recoveries were within the laboratory specified acceptance criteria.

1.12 Target Compound Identifications

The compound identifications were within the validation guidance, with the following exceptions.

Several concentrations were flagged NJ by the laboratory to indicate the peak of the analyte was detected; however, the qualitative identifications were not within criteria. Therefore, these concentrations were J qualified as estimated, based on professional and technical judgment with the following exceptions; for the concentrations that were U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

One concentration of 1,2,3,4,6,7,8-HPCDF was flagged G by the laboratory to indicate lock mass interference was present. Therefore, this concentration was J qualified as estimated, based on professional and technical judgment.

Qualifications are in Attachment 5 at the end of this report.

1.13 Target Compound Quantitations

The compound quantitations were within the validation guidance.

1.14 Sensitivity

The samples were reported to the SDLs/MRLs. No elevated non-detect results were reported. Screening levels were listed in QAPP Table 9a for soils and QAPP Table 9c for sediments. The screening levels were met, with the following exception.

The MRL for soils for 2,3,7,8-TCDD of 0.050 pg/g did not meet the screening level of 0.0013 pg/g listed in the QAPP.

1.15 Electronic Data Deliverable Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level IV reports at a minimum of 20%. The LOQs included in the EDD were not listed on the level IV reports. No other discrepancies were identified between the level IV reports and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected at or above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Extraction or analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits or RPD outside limits (LCS/LCSD)
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Lab flag removed or modified
15	Lab flag removed: result not considered for validation

LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample duplicate
RPD - Relative percent difference

ATTACHMENT 3
QUALIFICATION FOR METHOD BLANK CONTAMINATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-HA-39-1to2	TOTAL HEPTA-FURANS	0.196	B	0.196	J+	3
BH-HA-39-1to2	1,2,3,4,6,7,8-HPCDF	0.0764	B J	2.39	U	3
BH-HA-39-1to2	1,2,3,7,8-PECDF	0.0643	NJ J	2.39	U	3
BH-HA-39-1to2	OCDF	0.0757	NJ J	4.79	U	3
BH-HA-38-0to1-D	TOTAL HEPTA-FURANS	4.02	NA	4.02	J+	3
BH-HA-38-0to1-D	1,2,3,4,6,7,8-HPCDF	2.07	J	2.36	U	3
BH-HA-38-0to1-D	1,2,3,6,7,8-HXCDD	1.86	J	2.36	U	3
BH-HA-38-0to1-D	1,2,3,7,8-PECDF	1.48	J	2.36	U	3
BH-HA-38-0to1-D	OCDF	2.27	J	4.72	U	3
BH-SC-54-1to2.8	OCDF	0.347	J	4.55	U	3
BH-SC-54-6.6to8.8-D	OCDF	0.0517	B J	4.78	U	3
BH-SG-49-0to10	TOTAL HEPTA-FURANS	45.2	NA	45.2	J+	3

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable

ATTACHMENT 4
QUALIFICATION FOR FIELD DUPLICATE

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-53-1to2.4	2,3,7,8-TCDF	0.56	NA	NC	0.56	J	7
BH-SC-53-1to2.4-D	2,3,7,8-TCDF	0.375	J		0.375	J	7
BH-SC-53-1to2.4	1,2,3,7,8,9-HXCDF	0.0477	NJ J	NC	0.0477	J	7
BH-SC-53-1to2.4-D	1,2,3,7,8,9-HXCDF	0.0476	UJ		0.0476	UJ	7
BH-SC-53-1to2.4	TOTAL TETRA-FURANS	14.6	NA	70	14.6	J	7
BH-SC-53-1to2.4-D	TOTAL TETRA-FURANS	7.01	NA		7.01	J	7
BH-SC-53-1to2.4	TOTAL PENTA-FURANS	11.7	NA	70	11.7	J	7
BH-SC-53-1to2.4-D	TOTAL PENTA-FURANS	5.62	NA		5.62	J	7
BH-SC-52-0to1.8	2,3,7,8-TCDF	0.75	NA	NC	0.75	J	7
BH-SC-52-0to1.8-D	2,3,7,8-TCDF	0.493	J		0.493	J	7
BH-SC-52-0to1.8	OCDD	294	NA	58	294	J	7
BH-SC-52-0to1.8-D	OCDD	162	NA		162	J	7
BH-SC-52-0to1.8	2,3,4,7,8-PECDF	0.586	J	61	0.586	J	7
BH-SC-52-0to1.8-D	2,3,4,7,8-PECDF	0.312	J		0.312	J	7
BH-SC-52-0to1.8	OCDF	6.98	NA	NC	6.98	J	7
BH-SC-52-0to1.8-D	OCDF	4.49	J		4.49	J	7
BH-SC-49-0.7to2.8	1,2,3,7,8,9-HXCDF	0.0497	UJ	NC	0.0497	UJ	7
BH-SC-49-0.7to2.8-D	1,2,3,7,8,9-HXCDF	0.0684	J		0.0684	J	7
BH-SC-54-4to6.6	TOTAL TETRA-FURANS	0.111	NA	NC	0.111	J	7
BH-SC-54-4to6.6-D	TOTAL TETRA-FURANS	0.048	UJ		0.048	UJ	7
BH-SC-54-4to6.6	TOTAL HEPTA-FURANS	0.0482	UJ	NC	0.0482	UJ	7
BH-SC-54-4to6.6-D	TOTAL HEPTA-FURANS	0.0515	NA		0.0515	J	7
BH-SC-54-6.6to8.8	1,2,3,4,6,7,8-HPCDF	0.0492	UJ	NC	0.0492	UJ	7
BH-SC-54-6.6to8.8-D	1,2,3,4,6,7,8-HPCDF	0.0678	NJ J		0.0678	J	7
BH-SC-54-6.6to8.8	OCDF	0.0492	UJ	NC*	NA	NA	NA
BH-SC-54-6.6to8.8-D	OCDF	0.0517	B J		NA	NA	NA
BH-SC-54-6.6to8.8	TOTAL HEXA-DIOXINS	51.9	NA	51	51.9	J	7
BH-SC-54-6.6to8.8-D	TOTAL HEXA-DIOXINS	30.9	NA		30.9	J	7
BH-SC-54-6.6to8.8	TOTAL TETRA-FURANS	0.284	NA	NC	0.284	J	7

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	RPD	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-54-6.6to8.8D	TOTAL TETRA-FURANS	0.0478	UJ		0.0478	UJ	7
BH-SC-54-6.6to8.8	TOTAL PENTA-FURANS	0.0586	NA	NC	0.0586	J	7
BH-SC-54-6.6to8.8-D	TOTAL PENTA-FURANS	0.0478	UJ		0.0478	UJ	7

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
UJ-not detected at or above the SDL or MRL
B-laboratory flag indicating analyte was detected in both the method blank and the sample concentration was less than 5 times the blank concentration
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
NA-not applicable
NC-not calculable
*no qualification, see explanation above

ATTACHMENT 5
QUALIFICATION FOR TARGET COMPOUND IDENTIFICATION

Sample	Analyte	Laboratory Result (pg/g)	Laboratory Flag	Validation Result (pg/g)	Validation Qualifier	Reason Code
BH-SC-51-5.2to7.2	1,2,3,4,6,7,8-HPCDF	0.0771	NJ J	0.0771	J	13
BH-SC-51-7.2to9.4	2,3,7,8-TCDD	0.165	NJ J	0.165	J	13
BH-SG-53-0to10	1,2,3,4,7,8-HXCDD	0.293	NJ J	0.293	J	13
BH-SG-53-0to10	2,3,4,7,8-PECDF	0.125	NJ J	0.125	J	13
BH-SC-53-1to2.4	1,2,3,7,8,9-HXCDD	1.62	NJ J	1.62	J	13
BH-SC-53-1to2.4	1,2,3,7,8,9-HXCDF	0.0477	NJ J	0.0477	J	13
BH-SC-53-1to2.4-D	1,2,3,7,8,9-HXCDD	1.64	NJ J	1.64	J	13
BH-SC-53-1to2.4-D	2,3,4,6,7,8-HXCDF	0.339	NJ J	0.339	J	13
BH-SC-53-1to2.4-D	2,3,7,8-TCDD	0.137	NJ J	0.137	J	13
BH-SC-53-2.4to4.4	1,2,3,4,7,8,9-HPCDF	0.127	NJ J	0.127	J	13
BH-SC-53-2.4to4.4	2,3,4,6,7,8-HXCDF	0.207	NJ J	0.207	J	13
BH-SC-52-0to1.8	1,2,3,7,8,9-HXCDD	0.91	NJ J	0.91	J	13
BH-SC-52-0to1.8	2,3,7,8-TCDD	0.153	NJ J	0.153	J	13
BH-SC-52-0to1.8-D	1,2,3,4,7,8,9-HPCDF	0.183	NJ J	0.183	J	13
BH-SC-52-0to1.8-D	1,2,3,7,8,9-HXCDD	0.839	NJ J	0.839	J	13
BH-SC-52-0to1.8-D	2,3,4,6,7,8-HXCDF	0.293	NJ J	0.293	J	13
BH-SC-52-0to1.8-D	2,3,7,8-TCDD	0.138	NJ J	0.138	J	13
BH-SC-49-0.7to2.8	1,2,3,4,7,8,9-HPCDF	0.129	NJ J	0.129	J	13
BH-SC-49-0.7to2.8-D	1,2,3,4,7,8-HXCDD	0.674	NJ J	0.674	J	13
BH-SC-49-0.7to2.8-D	2,3,4,7,8-PECDF	0.711	NJ J	0.711	J	13
BH-SC-54-1to2.8	1,2,3,4,7,8-HXCDD	0.256	NJ J	0.256	J	13
BH-SC-54-2.8to4	2,3,7,8-TCDD	0.154	NJ J	0.154	J	13
BH-SC-54-4to6.6	1,2,3,4,6,7,8-HPCDF	0.0553	NJ J	0.0553	J	13
BH-SC-54-4to6.6	1,2,3,7,8,9-HXCDD	2.29	NJ J	2.29	J	13
BH-SC-54-4to6.6	2,3,7,8-TCDD	0.196	NJ J	0.196	J	13
BH-SC-54-4to6.6-D	1,2,3,7,8,9-HXCDD	1.81	NJ J	1.81	J	13
BH-SC-54-6.6to8.8	1,2,3,7,8,9-HXCDD	2.53	NJ	2.53	J	13
BH-SC-54-6.6to8.8	2,3,7,8-TCDD	0.191	NJ J	0.191	J	13
BH-SC-54-6.6to8.8-D	1,2,3,4,6,7,8-HPCDF	0.0678	NJ J	0.0678	J	13
BH-SC-54-6.6to8.8-D	1,2,3,7,8,9-HXCDD	1.69	NJ J	1.69	J	13
BH-SG-46-0to10	1,2,3,7,8,9-HXCDD	5.82	NJ	5.82	J	13
BH-SG-47-0to10	1,2,3,7,8,9-HXCDD	11.1	NJ	11.1	J	13
BH-SG-48-0to10	1,2,3,7,8,9-HXCDD	5.94	NJ	5.94	J	13
BH-SG-55-0to10	1,2,3,7,8,9-HXCDF	0.0594	NJ J	0.0594	J	13
BH-SC-53-1to2.4-D	1,2,3,4,6,7,8-HPCDF	3.81	G	3.81	J	13

pg/g-picograms per gram
J-estimated concentration greater than the SDL or MRL but less than the LOQ
NJ-laboratory flag indicating peak was detected; however, the method criteria for positive identification was not met
G-laboratory flag indicating lock mass interference was present

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	4 August 2024
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Quyen Le, Geosyntec
	Kristoffer Henderson, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 23L0430**

Matrices: **Sediment**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of two sediment samples and one field duplicate sample, collected on 14 December 2023, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Tukwila, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (US EPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500-NH3 H-97
- Total Organic Carbon (TOC) by US EPA Method 9060
- Sulfide by SM 4500-S2 D-00
- Total Solids (TS) by SM 2540G-97

The following analysis was performed at AmTest Laboratories, Inc. Kirkland, WA:

- Particle Size Distribution by Sieve Analysis by Puget Sound Estuary Protocol (PSEP) Method 1986

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 542-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
23L0430-01	BH-SG-56-0to10
23L0430-02	BH-SG-56-0to10 (dissolved)
23L0430-03	BH-SG-56-0to10-D

Laboratory IDs	Client IDs
23L0430-04	BH-SG-56-0to10-D (dissolved)
23L0430-05	BH-SG-57-0to10
23L0430-06	BH-SG-57-0to10 (dissolved)

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC).

The total solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory at 2.8 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

Incorrect error corrections were observed on the COC, instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

A discrepancy was observed on the COC. Sample BH-SG-56-0to10-D was identified as "BH-SG-56-0to10" on the COC and logged by the laboratory as BH-SG-56-0to10-D.

The relinquished by and received by year for the sample transfer was not documented on the COC.

It was noted that there was a discrepancy between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by US EPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by US EPA Method 8270E.

1.0 SEMIVOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per US EPA Methods 3546/8270E and PAHs per Methods 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.1.2 Analysis Anomaly

Sample BH-SG-56-0to10 was analyzed as 1:1 and 1:10 dilutions, and both analyses were reported. The concentrations of anthracene, benz[a]anthracene, benzo(a)pyrene, chrysene, fluoranthene, phenanthrene and pyrene were flagged with "E" in the 1:1 dilution to indicate the concentration was outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the concentrations of anthracene, benz[a]anthracene, benzo(a)pyrene, chrysene, fluoranthene, phenanthrene and pyrene in sample BH-SG-56-0to10 from the 1:10 dilution was considered for validation. The results for the remaining compounds were considered for validation from the 1:1 dilution analysis. The results not considered for validation were indicated as not reportable in the EDD.

Sample BH-SG-56-0to10-D was analyzed as 1:1 and 1:20 dilutions, and both analyses were reported. The concentrations of acenaphthylene, anthracene, benz[a]anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(j)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene and pyrene were flagged with "E" in the 1:1 dilution to indicate the concentration was outside of the laboratory calibration range. Therefore, based on professional and technical judgment, the concentrations of acenaphthylene, anthracene, benz[a]anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(j)fluoranthene, benzo(k)fluoranthene, total (b+k+j) benzofluoranthenes, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene and pyrene in sample BH-SG-56-0to10-D from the 1:20 dilution was considered for validation. The results for the remaining compounds were considered for validation from the 1:1 dilution analysis. The results not considered for validation were indicated as not reportable in the EDD.

1.2 Holding Times

The holding time for the SVOC analysis of a sediment sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for 2,4-dimethylphenol (-31.7%), benzoic acid (-42.8%) and pentachlorophenol (-33.4%) in the secondary initial calibration standard in batch SLK0002 (SLK0002-SCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2,4-dimethylphenol, benzoic acid and pentachlorophenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs), and the benzoic acid concentration in sample BH-SG-56-0to10 was J qualified as estimated.

The %Ds for benzoic acid (-58.9%) and pentachlorophenol (-59.2%) in the low concentration calibration standard in batch SMA0136 (SMA0136-LCV1) were outside of laboratory specified acceptance criteria with low biases. Since the benzoic acid and pentachlorophenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %Ds for benzoic acid (-78.3%) and pentachlorophenol (-71.1%) in the low concentration calibration standard in batch SMA0136 (SMA0136-LCV2) were outside of laboratory specified

acceptance criteria with low biases. Since the benzoic acid and pentachlorophenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %D for phenol (27.9%) in a secondary initial calibration verification standard in batch SMA0136 (SMA0136-ICV1) was outside of laboratory specified acceptance criteria with a high bias. Since the estimated phenol concentration in sample BH-SG-57-0to10 was U qualified as not detected at the RL due to rinsate blank contamination and based on professional and technical judgment, no additional qualifications were applied to the data. However, the phenol concentrations in the remaining associated samples were J qualified as estimated.

The %D for dimethylphthalate (-21.4%) in a secondary initial calibration verification standard in batch SMA0136 (SMA0136-ICV1) was outside of laboratory specified acceptance criteria with a low bias. Therefore, the non-detect results of dimethylphthalate in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	2,4-Dimethylphenol	8.9	U	8.9	UJ	9
BH-SG-56-0to10-D	2,4-Dimethylphenol	8.6	U	8.6	UJ	9
BH-SG-57-0to10	2,4-Dimethylphenol	8.9	U	8.9	UJ	9
BH-SG-56-0to10	Benzoic Acid	58.9	J	58.9	J	9
BH-SG-56-0to10-D	Benzoic Acid	37.7	U	37.7	UJ	9
BH-SG-57-0to10	Benzoic Acid	38.7	U	38.7	UJ	9
BH-SG-56-0to10	Dimethyl phthalate	4.4	U	4.4	UJ	9
BH-SG-56-0to10-D	Dimethyl phthalate	4.2	U	4.2	UJ	9
BH-SG-57-0to10	Dimethyl phthalate	4.4	U	4.4	UJ	9
BH-SG-56-0to10	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-SG-56-0to10-D	Pentachlorophenol	30.2	U	30.2	UJ	9
BH-SG-57-0to10	Pentachlorophenol	31.0	U	31.0	UJ	9
BH-SG-56-0to10	Phenol	32.7	J	32.7	J	9
BH-SG-56-0to10-D	Phenol	21.2	J	21.2	J	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLL0700 and

BLL0703). SVOCs and PAHs were not detected in the method blanks at or above the MDLs, with the following exceptions.

Phenol was detected in the method blank in batch BLL0700 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated phenol concentration in sample BH-SG-57-0to10 was U qualified as not detected at the RL, and the phenol concentrations in samples BH-SG-56-0to10 and BH-SG-56-0to10-D were J+ qualified as estimated with high biases, based on professional and technical judgment.

Acenaphthene and fluoranthene were detected in the method blank in batch BLL0703 at estimated concentrations greater than the MDLs and less than the RLs. Since acenaphthene and fluoranthene were detected in the associated samples at concentrations greater than the RLs and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Phenol	32.7	NA	32.7	J+	3
BH-SG-56-0to10-D	Phenol	21.2	NA	21.2	J+	3
BH-SG-57-0to10	Phenol	9.4	J	19.8	U	3

µg/kg-microgram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Two sample set specific MS/MSD pairs were reported, with both using sample BH-SG-57-0to10. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The LCSD recoveries of 1,4-dichlorobenzene, 1,2-dichlorobenzene, dimethylphthalate, dibenzofuran, di-n-butylphthalate and butylbenzylphthalate in the LCS/LCSD pair in batch BLL0700 were low and outside of the laboratory specified acceptance criteria. Therefore, the non-detect results of 1,4-dichlorobenzene, 1,2-dichlorobenzene, dimethylphthalate, dibenzofuran, di-n-butylphthalate and butylbenzylphthalate in the associated samples were UJ qualified as

estimated less than the MDLs, and the dibenzofuran concentrations in the associated samples were J qualified as estimated.

The RPD for benzoic acid in the LCS/LCSD pair in batch BLL0700 was high and outside of the laboratory specified acceptance criteria. Therefore, the benzoic acid concentration in the associated sample was J qualified as estimated.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	1,2-Dichlorobenzene	6.1	U	6.1	UJ	5
BH-SG-56-0to10-D	1,2-Dichlorobenzene	5.9	U	5.9	UJ	5
BH-SG-57-0to10	1,2-Dichlorobenzene	6.1	U	6.1	UJ	5
BH-SG-56-0to10	1,4-Dichlorobenzene	6.3	U	6.3	UJ	5
BH-SG-56-0to10-D	1,4-Dichlorobenzene	6.1	U	6.1	UJ	5
BH-SG-57-0to10	1,4-Dichlorobenzene	6.3	U	6.3	UJ	5
BH-SG-56-0to10	Benzoic Acid	58.9	J	58.9	J	5
BH-SG-56-0to10	Butyl benzyl phthalate	9.4	U	9.4	UJ	5
BH-SG-56-0to10-D	Butyl benzyl phthalate	9.1	U	9.1	UJ	5
BH-SG-57-0to10	Butyl benzyl phthalate	9.3	U	9.3	UJ	5
BH-SG-56-0to10	Dibenzofuran	36.8	NA	36.8	J	5
BH-SG-56-0to10-D	Dibenzofuran	60.9	NA	60.9	J	5
BH-SG-57-0to10	Dibenzofuran	14.0	U	14.0	UJ	5
BH-SG-56-0to10	dibutyl phthalate	5.6	U	5.6	UJ	5
BH-SG-56-0to10-D	dibutyl phthalate	5.4	U	5.4	UJ	5
BH-SG-57-0to10	dibutyl phthalate	5.6	U	5.6	UJ	5
BH-SG-56-0to10	Dimethyl phthalate	4.4	U	4.4	UJ	5
BH-SG-56-0to10-D	Dimethyl phthalate	4.2	U	4.2	UJ	5
BH-SG-57-0to10	Dimethyl phthalate	4.4	U	4.4	UJ	5

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

One field duplicate sample, BH-SG-56-0to10-D, was collected with the sample set. Acceptable precisions (RPDs ≤ 50%) were demonstrated between the field duplicate and the original sample, BH-SG-56-0to10, with the following exception.

For analytes with both a concentration greater than the MDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	RPD	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Benzoic Acid	58.9	J	NC	58.9	J	7
BH-SG-56-0to10-D	Benzoic Acid	37.7	U		37.7	UJ	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-SG-231214, was collected during the sample event and reported in SDG 23L0435. SVOCs and PAHs were not detected in the equipment blank at or above the MDLs, with the following exception.

Diethyl phthalate was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since diethyl phthalate was not detected in the associated samples, no qualifications were applied to the data.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 METALS

The samples were analyzed for metals per US EPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
⊗ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

2.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the total metal analysis of a sediment sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

2.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Arsenic was detected in the instrument blanks in batch SLL0403 (SLL0403-IBL1, SLL0403-IBL2 and SLL0403-IBL3) at estimated concentrations greater than the MDLs and less than the RLs. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the instrument blank in batch SLL0403 (SLL0403-IBLJ) at an estimated concentration greater than the MDL and less than the RL. Since cadmium was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

Copper was detected in the continuing calibration blank and instrument blank in batch SMA0068 (SMA0068-CCB3 and SMA0068-IBL7) at estimated concentrations greater than the MDLs and less than the RLs. Since the copper data in the associated samples were bracketed by acceptable continuing calibration blanks and instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the instrument blank in batch SMA0177 (SMA0177-IBL1) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Chromium was detected in the instrument blanks in batch SLL0403 (SLL0403-IBLB and SLL0403-IBLN) at estimated concentrations greater than the MDLs and less than the RLs. Since

the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Silver was detected in the instrument blank in batch SMA0177 (SMA0177-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the silver data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Lead was detected in the instrument blank in batch SMA0192 (SMA0192-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the lead data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data

Silver was detected in the instrument blank in batch SMA0192 (SMA0192-IBL2) at an estimated concentration greater than the MDL and less than the RL. Since the silver data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

2.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits, with the following exception.

The recovery of silver in the high concentration calibration verification in batch SMA0068 (SMA0068-HCV1) was high and outside of the laboratory specified acceptance criteria. Since the silver data in the associated samples were bracketed by acceptable high concentration calibration verification and based on professional and technical judgment, no qualifications were applied to the data.

2.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLL0692 and BMA0155). Metals were not detected in the method blanks at or above the MDLs, with the following exceptions.

Silver was detected in the method blank in batch BMA0155 at an estimated concentration greater than the MDL and less than the RL. Therefore, the estimated silver concentration in the associated sample was U qualified as not detected at the RL.

Lead (0.15 mg/kg/0. 0.000000723 µmol/g), isotope 66 zinc (22.3 mg/kg/ 0.000341 µmol/g) and isotope 67 zinc (19.6 mg/kg/ 0.0002998 µmol/g) were detected in the method blank in batch

BMA0155 at concentrations greater than the RLs. Since the µmol/g equivalent concentration was less than the MDLs and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-57-0to10	Silver	0.004	J	0.020	U	3

µmol/g-micromole per gram
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.7 Matrix Spike/Matrix Spike Duplicate

Two sample set specific MS/MSD pairs were reported, with one each for AVS/SEM metals and total metals using sample BH-SG-56-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The MS recovery of chromium and the MSD recoveries of lead and silver in the MS/MSD pair using sample BH-SG-56-0to10 were low and outside of the laboratory specified acceptance criteria. Since the lead concentration in sample BH-SG-56-0to10 was greater than four times the spike amount, no qualifications were applied to the lead data. However, the estimated silver concentration in sample BH-SG-56-0to10 was J qualified as estimated, and the chromium concentration in sample BH-SG-56-0to10 was J- qualified as estimated with a low bias.

The MS recovery and RPD for zinc in the MS/MSD pair using sample BH-SG-56-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the zinc concentration in sample BH-SG-56-0to10 was J qualified as estimated.

The MSD recoveries of lead and copper in the MS/MSD pair using sample BH-SG-56-0to10 were low and outside of the laboratory specified acceptance criteria. Since the concentrations of lead and copper in sample BH-SG-56-0to10 were greater than four times the spike amounts, no qualifications were applied to the data.

One or both of the recoveries of copper, cadmium and zinc in the MS/MSD pair using sample BH-SG-56-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of copper, cadmium and zinc in sample BH-SG-56-0to10 were J+ qualified as estimated with high biases.

The recoveries of lead in the MS/MSD pair using sample BH-SG-56-0to10 were low and outside of the laboratory specified acceptance criteria. Since the concentration of lead in sample BH-SG-56-0to10 was greater than four times the spike amount, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Cadmium	0.08	NA	0.08	J+	4
BH-SG-56-0to10	Copper	4.17	NA	4.17	J+	4
BH-SG-56-0to10	Zinc	9.9	B	9.9	J+	4

µmol/g-micromole per gram
B-laboratory flag indicating analyte was detected in blank and sample
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Chromium	19.6	NA	19.6	J-	4
BH-SG-56-0to10	Silver	0.23	J	0.23	J	4
BH-SG-56-0to10	Zinc	143	NA	143	J	4

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs and one standard reference material (SRM) were reported. The recovery results were within the laboratory specified acceptance criteria, with the following exceptions.

The LCS recoveries of zinc in batch BMA0155 were high and outside of the laboratory specified acceptance criteria. Therefore, the zinc concentrations in the associated samples were J+ qualified as estimated with a high bias.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Zinc	9.9	B	9.9	J+	5
BH-SG-56-0to10-D	Zinc	8.8	B	8.8	J+	5

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-57-0to10	Zinc	2.4	B	2.4	J+	5

µmol/g-micromole per gram
B-laboratory flag indicating analyte was detected in blank and sample
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.9 Field Duplicate

One field duplicate sample, BH-SG-56-0to10-D, was collected with the sample set. Acceptable precisions (RPDs < 50%) were demonstrated between the field duplicate and the original sample, BH-SG-56-0to10.

2.10 Laboratory Duplicate

Two sample set specific laboratory duplicates were reported, with one each for AVS/SEM metals and total metals using sample BH-SG-56-0to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for arsenic, chromium, lead and zinc in the laboratory duplicate using sample BH-SG-56-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of arsenic, chromium, lead and zinc in sample BH-SG-56-0to10 were J qualified as estimated.

The RPDs for lead, cadmium, copper and zinc in the laboratory duplicate using sample BH-SG-56-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of lead, cadmium, copper and zinc in sample BH-SG-56-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Cadmium	0.08	NA	0.08	J	12
BH-SG-56-0to10	Copper	4.17	NA	4.17	J	12
BH-SG-56-0to10	Lead	29.9	B	29.9	J	12
BH-SG-56-0to10	Zinc	9.9	B	9.9	J	12

µmol/g-micromole per gram
B-laboratory flag indicating analyte was detected in blank and sample
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Arsenic	9.75	NA	9.75	J	12
BH-SG-56-0to10	Chromium	19.6	NA	19.6	J	12
BH-SG-56-0to10	Lead	169	NA	169	J	12
BH-SG-56-0to10	Zinc	143	NA	143	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.11 Rinsate Blank

One equipment blank, BH-EB-SG-231214, was collected during the sample event and reported in SDG 23L0435. Metals were not detected in the equipment blank at or above the MDLs, with the following exception.

Chromium was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since chromium was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

2.12 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met.

2.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

3.0 MERCURY

The samples were analyzed for mercury per US EPA Method 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the mercury analysis of a sediment sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

3.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

3.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0494). Mercury was not detected in the method blank at or above the MDL.

3.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-SG-56-0to10. The MS recovery and RPD result were high, and the MSD recovery was less than 30%. Both the recoveries and RPD results were outside of the laboratory specified acceptance criteria. Additionally, the post digestion spike (PDS) recovery of mercury was acceptable. Therefore, the mercury concentration in sample BH-SG-56-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Mercury	0.616	NA	0.616	J	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

3.9 Field Duplicate

One field duplicate sample, BH-SG-56-0to10-D, was collected with the sample set. Acceptable precision (RPD < 50%) was not demonstrated between the field duplicate and the original sample, BH-SG-56-0to10. The RPD for mercury was greater than 50% in the field duplicate pair. Therefore, the mercury concentrations in samples BH-SG-56-0to10-D and BH-SG-56-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier	Reason Code
BH-SG-56-0to10	Mercury	0.616	NA	76	0.616	J	7
BH-SG-56-0to10-D	Mercury	0.276	NA		0.276	J	7

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-SG-56-0to10. The RPD result was outside of the laboratory specified acceptance criteria. Therefore, the mercury concentration in sample BH-SG-56-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Mercury	0.616	NA	0.616	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

One equipment blank, BH-EB-SG-231214, was collected during the sample event and reported in SDG 23L0435. Mercury was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since mercury was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

3.12 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9b and 9c of the QAPP. However, the screening level for soils was not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 WET CHEMISTRY

The samples were analyzed for TOC per US EPA Method 9060, ammonia as N by SM 4500-NH3 H-97, sulfide by SM 4500-S2 D-00 and TS by SM 2540G-97.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
⊗ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blanks
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
⊗ Laboratory Duplicate
✓ Rinsate Blank
✓ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses, with the following exceptions.

The samples BH-SG-56-0to10-D, BH-SG-56-0to10 and BH-SG-57-0to10 were analyzed for sulfide outside of the holding time requirement. Therefore, the estimated sulfide concentrations in samples BH-SG-56-0to10-D, BH-SG-56-0to10 and BH-SG-57-0to10 were J- qualified as estimated.

Analyte	Method	Holding Time
TS	SM 2540G-97	7 days from collection to analysis
Sulfide	SM 4500 S2 D 00	7 days from collection to analysis
Ammonia	SM 4500 NH3 H-97	7 days from collection to analysis in sediment samples
TOC	US EPA Method 9060	14 days from collection to analysis in sediment samples

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10-D	Sulfide	14.8	NA	14.8	J-	2
BH-SG-56-0to10	Sulfide	17.3	NA	17.3	J-	2
BH-SG-57-0to10	Sulfide	6.09	NA	6.09	J-	2

µmol/g-micromole per gram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.3 Initial Calibration

The initial calibration requirements were met.

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported for sulfide (batches BLL0483 and BMA0091). One method blank was reported for TOC (batch BMA0035). One method blank was reported for ammonia as N (batch BLL0635). One method blank was reported for TS/VS (batch BLL0576). One method blank was reported for TSS (batch BLL0657). The wet chemistry parameters were not detected in the method blanks at or above the MDLs.

4.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for TOC, using sample BH-SG-56-0to10. The RPD result was within the laboratory specified acceptance criteria. However, the recoveries of TOC in the MS/MSD pair were low and outside of the laboratory specified acceptance criteria.

Therefore, the TOC concentration in sample BH-SG-56-0to10 was J- qualified as estimated with a low bias.

One sample set specific MS was reported for ammonia as N, using sample BH-SG-56-0to10. The recovery result was within the laboratory specified acceptance criteria.

Two sample set specific MS/MSD pairs were reported for sulfide, with both using sample BH-SG-56-0to10. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The MS recovery of sulfide in the MS/MSD pair using sample BH-SG-56-0to10 was low and outside of the laboratory specified acceptance criteria. Therefore, the sulfide concentration in sample BH-SG-56-0to10 was J- qualified as estimated with a low bias.

The recoveries of AVS sulfide in the MS/MSD pair using sample BH-SG-56-0to10 were low, less than 30% and outside of the laboratory specified acceptance criteria. Therefore, the AVS sulfide concentration in sample BH-SG-56-0to10 was J- qualified as estimated with a low bias.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Total Organic Carbon	5.25	NA	5.25	J-	4

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (µmol/g)	Laboratory Flag	Validation Result (µmol/g)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Sulfide (AVS)	17.3	NA	17.3	J-	4

µmol/g-micromole per gram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Sulfide	560	NA	560	J-	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported for ammonia as N, TOC, and two LCSs were reported for sulfide. Additionally, one SRM was reported for TOC. The recovery results were within the laboratory specified acceptance criteria.

4.9 Field Duplicate

One field duplicate sample, BH-SG-56-0to10-D, was collected with the sample set. Acceptable precision (RPDs < 50%) was demonstrated between the field duplicate and the original sample, BH-SG-56-0to10, respectively.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for ammonia as N using sample BH-SG-56-0to10. Two sample set specific laboratory duplicates were reported for TOC, with both using sample BH-SG-56-0to10. Two sample set specific laboratory duplicates were reported for sulfide, with both using sample BH-SG-56-0to10. One sample set specific laboratory duplicate was reported for TSS using sample BH-SG-56-0to10. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for TOC in the laboratory duplicates using sample BH-SG-56-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the TOC concentration in sample BH-SG-56-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Total Organic Carbon	5.25	NA	5.25	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

The RPDs for sulfide in the laboratory duplicates using sample BH-SG-56-0to10 were high and outside of the laboratory specified acceptance criteria. Therefore, the sulfide concentration in sample BH-SG-56-0to10 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Sulfide	17.3	NA	17.3	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.11 Rinsate Blank

One equipment blank, BH-EB-SG-231214, was collected during the sample event and reported in SDG 23L0435. TOC (0.55 mg/L soil equivalent concentration 0.000055%) was detected in the equipment blank at a concentration greater than the RL. Since TOC was detected in the associated samples at concentrations greater than ten times the blank contamination, no qualifications were applied to the data.

4.12 Sensitivity

The samples were reported to the MDLs. No elevated non-detect results were reported.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 PARTICLE SIZE

The samples were analyzed for particle size by PSEP Method 1986.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
⊗ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The particle size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

One field duplicate sample, BH-SG-56-0to10-D, was collected with the sample set. The field duplicate was not analyzed for grain size.

5.3 Laboratory Triplicate

Two sample set specific laboratory triplicates were reported, with both using sample BH-SG-56-0to10. The relative standard deviation (RSD) was less than 20%, with the following exceptions.

The RSDs for Phi Scale <-2.25, Phi Scale -2.25 to -2, Phi Scale 2 to 3, Phi Scale 3 to 4, Phi Scale 6 to 7, Phi Scale 7 to 8, Phi Scale 8 to 9 and Phi Scale 9 to 10 in laboratory triplicate using sample BH-SG-56-0to10 were greater than 20%. Therefore, the results for these particle sizes in sample BH-SG-56-0to10 were J qualified as estimated.

Sample	Analyte	Laboratory Result (%)	Laboratory Flag	Validation Result (%)	Validation Qualifier*	Reason Code**
BH-SG-56-0to10	Particle/Grain Size, Phi Scale <-2.25	9.1	NA	9.1	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale 2 to 3	15.5	NA	15.5	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale -2.25 to -2	1.7	NA	1.7	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale 3 to 4	12.7	NA	12.7	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale 6 to 7	1.5	NA	1.5	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale 7 to 8	1.9	NA	1.9	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale 8 to 9	1.6	NA	1.6	J	12
BH-SG-56-0to10	Particle/Grain Size, Phi Scale 9 to 10	0.9	NA	0.9	J	12

%-percent
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	4 August 2024
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Quyen Le, Geosyntec
	Kristoffer Henderson, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 23L0435**

Matrices: **Water**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of two equipment blanks, collected on 13-14 December 2023, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Tukwila, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (US EPA) Methods 3510C/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3520C/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3510C/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3010A/6020B
- Mercury by US EPA Method 7470A
- Ammonia as Nitrogen (N) by Standard Methods (SM) 4500-NH3 H-97
- Total Organic Carbon (TOC) by SM 5310 B-00
- Sulfide by SM 4500 S2 D-00

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 542-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
23L0435-01	BH-EB-SG-231214
23L0435-02	BH-EB-HA-231213

Laboratory IDs	Client IDs
23L0435-03	BH-EB-HA-231214

The laboratory reported results for the analytical method(s) requested for each sample on the chain of custody (COC), with the following exception. Sample BH-EB-HA-231214 (logged under lab ID 23L0435-03) was not analyzed.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 5.2 – 5.8 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory. It was noted that there was a discrepancy between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by US EPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by US EPA Method 8270E.

1.0 SEMIVOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per US EPA Methods 3510C/8270E and PAHs per Methods 3520C/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Times

The holding time for the SVOC analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %D for 2,4-dimethylphenol (-23.7%) in the secondary initial calibration standard in batch SLJ0300 (SLJ0300-SCV1) was outside of laboratory specified acceptance criteria with a low bias. Therefore, the non-detect results of 2,4-dimethylphenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs).

The %D for fluorene (20.6%) in the secondary initial calibration standard in batch SLL0016 (SLL0016-SCV1) was outside of validation specified acceptance criteria with a high bias. Therefore, the non-detect results of fluorene in the associated samples were UJ qualified as estimated less than the MDLs.

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-SG-231214	2,4-Dimethylphenol	1.0	U	1.0	UJ	9
BH-EB-SG-231214	Fluorene	0.02	U	0.02	UJ	9
BH-EB-HA-231213	2,4-Dimethylphenol	1.0	U	1.0	UJ	9

Sample	Analyte	Laboratory Result (µg/L)	Laboratory Flag	Validation Result (µg/L)	Validation Qualifier*	Reason Code**
BH-EB-HA-231213	Fluorene	0.02	U	0.02	UJ	9

µg/L-microgram per liter
U-not detected at a concentration greater than or equal to the MDL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLL0510 and BLL0560). SVOCs and PAHs were not detected in the method blanks at or above the MDLs.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported for this analytical method.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCSs were reported. The recovery results were within the laboratory specified acceptance criteria.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Field duplicate samples were not collected with the sample set.

1.11 Rinsate Blank

Two equipment blanks, BH-EB-SG-231214 and BH-EB-HA-231213, were collected during the sample event and analyzed for SVOCs and PAHs. SVOCs and PAHs were not detected in the equipment blanks at or above the MDLs, with the following exception.

Diethyl phthalate was detected in the equipment blank BH-EB-SG-231214 at an estimated concentration greater than the MDL and less than the RL. Since only equipment blanks were reported in this SDG and based on professional and technical judgment, no qualifications were applied to the data.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.13 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the reporting limits (RLs) in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for DRO and MRO per Methods 3510C/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
✓ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a water sample is 7 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the percent relative standard deviation (%RSD) of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0514). DRO and MRO were not detected in the method blank at or above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

MS/MSD pairs were not reported for this analytical method.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCS duplicate (LCSD) pair was reported. The recovery and the relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BLL0514. Based on professional and technical judgment, the non-detect MRO result in the associated sample was UJ qualified as estimated less than MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier	Reason Code
BH-EB-HA-231213	MRO	0.056	U	0.056	UJ	5

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
MRO-motor oil range organics
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

Field duplicate samples were not collected with the sample set.

2.9 Rinsate Blank

One equipment blank, BH-EB-HA-231213, was analyzed for petroleum hydrocarbons. DRO and MRO were not detected in the equipment blank at or above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDL. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per US EPA Methods 3010A/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a preserved water sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria.

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0583). Metals were not detected in the method blank at or above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-EB-SG-231214. The recovery and RPD results were within the laboratory specified acceptance criteria.

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Field duplicate samples were not collected with the sample set.

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported, using sample BH-EB-SG-231214. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

3.11 Rinsate Blank

Two equipment blanks, BH-EB-SG-231214 and BH-EB-HA-231213, were collected during the sample event and analyzed for metals. Metals were not detected in the equipment blanks at or above the MDLs, with the following exceptions.

Chromium was detected in the equipment blank BH-EB-SG-231214 at an estimated concentration greater than the MDL and less than the RL. Since only equipment blanks were reported in this SDG and based on professional and technical judgment, no qualifications were applied to the data.

Copper was detected in the equipment blank BH-EB-HA-231213 at an estimated concentration greater than the MDL and less than the RL. Since only equipment blanks were reported in this SDG and based on professional and technical judgment, no qualifications were applied to the data.

3.12 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soil RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for mercury by US EPA Method 7470A.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank

⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the mercury analysis of a water sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria, with the following exceptions.

Mercury was detected in the continuing calibration blanks in batch SLL0372 (SLL0372-CCB4 and SLL0372-CCB5) at estimated concentrations greater than the MDLs and less than the RLs. Since the mercury data in the associated samples were bracketed by acceptable continuing calibration blanks and based on professional and technical judgment, no qualifications were applied to the data.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0591). Mercury was detected in the method blank at an estimated concentration greater than the MDL

and less than the RL. Therefore, the estimated mercury concentrations in the associated samples were U qualified as not detected at the RL.

Sample	Analyte	Laboratory Result (mg/L)	Laboratory Flag	Validation Result (mg/L)	Validation Qualifier	Reason Code
BH-EB-SG-231214	Mercury	0.000016	J	0.000100	U	3
BH-EB-HA-231213	Mercury	0.000018	J	0.000100	U	3

mg/L-milligram per liter
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-EB-SG-231214. The recovery and RPD results were within the laboratory specified acceptance criteria.

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Field duplicate samples were not collected with the sample set.

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-EB-SG-231214. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD result was within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

Two equipment blanks, BH-EB-SG-231214 and BH-EB-HA-231213, were collected during the sample event and analyzed for mercury. Mercury was detected in the equipment blanks at estimated concentrations greater than the MDLs and less than the RLs. The estimated concentrations of mercury in the equipment blanks were U qualified as not detected at the RL due to method blank contamination.

4.12 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9b and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 WET CHEMISTRY

The samples were analyzed for TOC by SM 5310 B-00, ammonia as N by SM 4500-NH3 H-97 and sulfide by SM 4500 S2 D-00.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Overall Assessment
- ✓ Holding Times
- ✓ Initial Calibration
- ✓ Initial and Continuing Calibration Blanks
- ✓ Initial and Continuing Calibration Verification
- ✓ Method Blank
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Control Sample
- ✓ Field Duplicate
- ✓ Laboratory Duplicate
- ✓ Rinsate Blank
- ✓ Sensitivity
- ✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The wet chemistry data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to

the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Holding Times

The holding times for the wet chemistry parameters are listed below. The holding times were met for the sample analyses.

Analyte	Method	Holding Time
Sulfide	SM 4500 S2 D-00	7 days from collection to analysis
Ammonia as N	SM 4500-NH3 H-97	28 days from collection to analysis
TOC	SM 5310 B-00	28 days from collection to analysis

5.3 Initial Calibration

The initial calibration requirements were met.

5.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

5.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

5.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported for sulfide (batch BLL0495). One method blank was reported for TOC (batch BMA0070). One method blank was reported for ammonia as N (batch BLL0757). The wet chemistry parameters were not detected in the method blanks at or above the MDLs.

5.7 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported for TOC, using sample BH-EB-SG-231214. The recovery and RPD results were within the laboratory specified acceptance criteria .

One sample set specific post digestion spike (PDS) was reported for sulfide, using sample BH-EB-SG-231214. The recovery result was within the laboratory specified acceptance criteria.

5.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported each for sulfide and TOC and two LCSs were reported for ammonia as N. The recovery results were within the laboratory specified acceptance criteria.

5.9 Field Duplicate

Field duplicate samples were not collected with the sample set.

5.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported for TOC using sample BH-EB-SG-231214. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria.

5.11 Rinsate Blank

One equipment blank, BH-EB-SG-231214, was collected during the sample event and analyzed for the wet chemistry parameters. The wet chemistry parameters were not detected in the equipment blank at or above the MDLs.

5.12 Sensitivity

The samples were reported to the MDLs. No elevated non-detect results were reported.

5.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

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DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

180A Market Place Blvd
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Data Validation Report

Date:	4 August 2024
To:	Cindy Bartlett and Anne Fitzpatrick, Geosyntec PNG0900
From:	Matthew Richardson, Geosyntec
CC:	Quyen Le, Geosyntec
	Kristoffer Henderson, Geosyntec
Subject:	**Blakely Harbor Park Site Stage 2B Data Validation - Level IV Data Deliverable – Analytical Resources, Incorporated Work Order 23L0493**

Matrices: **Soil**

Site: **Blakely Harbor Park, PNG0900**

INTRODUCTION

This report summarizes the findings of the Stage 2B data validation of seventeen soil samples and two field duplicate samples, collected on 13-14 December 2023, as part of the Blakely Harbor sampling event. The data validation was completed by Geosyntec chemists out of the Knoxville office.

Analytical Resources, Inc. (ARI) Tukwila, WA, analyzed the samples for the following analytical tests:

- Semivolatile Organic Compounds (SVOCs) by United States Environmental Protection Agency (US EPA) Methods 3546/8270E
- Polycyclic Aromatic Hydrocarbons (PAHs) by US EPA Methods 3546/8270E using Selective Ion Monitoring (SIM)
- Diesel Range Organics (DRO) and Motor Oil Range Organics (MRO) by Methods 3546/Northwest Petroleum Hydrocarbon (NWTPH)-Dx
- Metals by US EPA Methods 3050B/6020B
- Mercury by US EPA Method 7471B

The following analysis was performed at Materials Testing & Consulting, Inc. Burlington, WA:

- Particle Size Distribution by Sieve Analysis by American Society for Testing and Materials (ASTM)-2487

EXECUTIVE SUMMARY

Overall, based on this Stage 2B data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications. If there are results with two or more different qualifications due to multiple QC failures, the final qualification is reconciled in the electronic data deliverable (EDD) with qualifications.

The completeness goal of > 90% was met and data quality for completeness was not significantly impacted.

The data were reviewed based on the pertinent methods referenced in the data package, professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Organic Superfund Methods Data Review, November 2020 (EPA 540-R-20-005)
- US EPA National Functional Guidelines for Inorganic Superfund Methods Data Review, November 2020 (EPA 542-R-20-006)
- Draft Final Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), Blakely Harbor Park Site, Bainbridge Island, Washington Project PNG0900, June 2021.

The following samples were analyzed in the data set.

Laboratory IDs	Client IDs
23L0493-01	BH-HA-52-0to1
23L0493-02	BH-HA-52-1to2
23L0493-03	BH-HA-44-0to1
23L0493-04	BH-HA-44-0to1-D
23L0493-05	BH-HA-44-1to2
23L0493-06	BH-HA-47-0to1
23L0493-07	BH-HA-47-1to2
23L0493-08	BH-HA-51-0to1
23L0493-09	BH-HA-51-0to1-D
23L0493-10	BH-HA-51-1to1.6

Laboratory IDs	Client IDs
23L0493-11	BH-HA-45-0to1
23L0493-12	BH-HA-45-1to2
23L0493-14	BH-HA-50b-0to1
23L0493-15	BH-HA-50b-1to1.6
23L0493-16	BH-HA-49-0to1
23L0493-17	BH-HA-49-1to2
23L0493-18	BH-HA-46-0to1
23L0493-19	BH-HA-46-1to1.8
23L0493-20	BH-HA-37-2to2.9

The laboratory reported results for the analytical method(s) requested for each sample on the chains of custody (COCs).

The total solids data used to report the samples on a dry weight basis were not validated.

Validation qualifiers and validation reason codes are listed in Attachments 1 and 2, respectively.

The samples were received at the laboratory between 5.2 – 5.8 degrees Celsius (ºC) within the criteria of 0-6.0 ºC. No sample preservation issues were noted by the laboratory.

Sample BH-HA-50-0to0.7 (logged under lab ID 23L0493-13) was placed on hold per the COC.

Incorrect error corrections were observed on the COCs, instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

It was noted that there was a discrepancy between the analytical methods performed by the laboratory and the analytical methods listed in the QAPP:

- ARI Laboratories analyzed 2-methylnaphthalene by US EPA Method 8270E SIM, however, the QAPP lists 2-methylnaphthalene to be analyzed by US EPA Method 8270E.

1.0 SEMIVOLATILE ORGANIC COMPOUNDS

The samples were analyzed for SVOCs per US EPA Methods 3546/8270E and PAHs per Method 3546/8270E SIM.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Instrument Performance Check
✓ Initial Calibration
⊗ Initial and Continuing Calibration Verification
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Internal Standard
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

1.1.1 Completeness

The SVOC and PAH data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.1.2 Analysis Anomaly

Sample BH-HA-46-0to1 was analyzed as 1:1 and 1:3 dilutions, and both analyses were reported. The pyrene concentration was flagged "E" in the 1:1 dilution to indicate the concentration was outside of the laboratory calibration range. Therefore, based on professional and technical judgment the pyrene concentration in sample BH-HA-46-0to1 from the 1:3 dilution was considered for validation. The results for the remaining compounds were considered for validation from the 1:1 dilution analysis. The results not considered for validation were indicated as not reportable in the EDD.

1.2 Holding Times

The holding time for the SVOC analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

1.3 Instrument Performance Check

An instrument performance check sample (tune standard) was analyzed before the initial calibration was performed. The ion abundance criteria were met for decafluorotriphenylphosphine (DFTPP).

1.4 Initial Calibration

An appropriate initial calibration was performed. The laboratory used a linear curve fit. The coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibration. The target analyte relative response factors (RRFs) were above the method and validation minimum RRF criteria.

The method recommends the recalculation of the low initial calibration standard when linear curve fits are used to verify the viability of detections at the low end of the calibration curve; the recalculated concentration of the low calibration point should be within ± 30% of the standard's true concentration. The criteria were met.

1.5 Initial and Continuing Calibration Verification (ICV and CCV)

The ICVs and CCVs were performed at the required frequency. The ICV and CCV RRFs met the validation criteria and the method criteria.

The percent differences or % drifts (%Ds) between the RRFs in the ICVs and CCVs for the target analytes were within the validation criteria, laboratory specified acceptance criteria, and the method criteria, with the following exceptions.

The %Ds for 2,4-dimethylphenol (-31.7%), 2,4-dinitrophenol (-65.8%), 4,6-dinitro-2-methylphenol (-32.2%) and pentachlorophenol (-33.4%) in the secondary initial calibration standard in batch SLK0002 (SLK0002-SCV1) were outside of laboratory specified acceptance criteria with low biases. Therefore, the non-detect results of 2,4-dimethylphenol, 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol and pentachlorophenol in the associated samples were UJ qualified as estimated less than the method detection limits (MDLs).

The %D for 2,4-dinitrophenol (-68.8%) in the low concentration calibration standard in batch SLL0383 (SLL0383-LCV1) was outside of laboratory specified acceptance criteria with a low bias. Since the 2,4-dinitrophenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %Ds for 2,4-dinitrophenol (-93.5%), 4,6-dinitro-2-methylphenol (-68.4%) and pentachlorophenol (-62.7%) in the low concentration calibration standard in batch SLL0383 (SLL0383-LCV2) were outside of validation specified acceptance criteria with low biases. Since the 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol and pentachlorophenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %D for 2,4-dinitrophenol (-64.4%) in the low concentration calibration standard in batch SMA0032 (SMA0032-LCV1) was outside of laboratory specified acceptance criteria with a low bias. Since the 2,4-dinitrophenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %D for 2,4-dinitrophenol (-80.1%), 4,6-dinitro-2-methylphenol (-50.7%) and pentachlorophenol (-55.4%) in the low concentration calibration standard in batch SMA0032 (SMA0032-LCV2) were outside of laboratory specified acceptance criteria with a low bias. Since the 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %D for phenol (37.2%) in a secondary initial calibration verification standard in batch SLL0383 (SLL0383-ICV1) was outside of laboratory specified acceptance criteria with a high bias. Therefore, the phenol concentrations in the associated samples were J qualified as estimated.

The %Ds for phenol (34.0%), 2,4-dichlorophenol (24.2%) and 4,6-dinitro-2-methylphenol (22.2%) in a secondary initial calibration verification standard in batch SMA0032 (SMA0032-ICV1) were outside of laboratory specified acceptance criteria with high biases. Since the 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data. However, the phenol concentration in the associated sample was J qualified as estimated.

The %D for 2,4-dinitrophenol (-50.2%) in the CCV standard in batch SLL0383 (SLL0383-CCV1) was outside of laboratory specified acceptance criteria with a low bias. Since the 2,4-dinitrophenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

The %Ds for 2,4-dinitrophenol (-81.4%) and 4,6-dinitro-2-methylphenol (-65.8%) in the CCV standard in batch SMA0032 (SMA0032-CCV1) were outside of laboratory specified acceptance criteria with low biases. Since the 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol data in the associated samples were previously qualified for secondary initial calibration standard exceedances, no additional qualifications were applied to the data.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-52-0to1	2,4-Dimethylphenol	8.2	U	8.2	UJ	9
BH-HA-52-1to2	2,4-Dimethylphenol	8.0	U	8.0	UJ	9
BH-HA-44-0to1	2,4-Dimethylphenol	8.2	U	8.2	UJ	9
BH-HA-44-0to1-D	2,4-Dimethylphenol	8.6	U	8.6	UJ	9
BH-HA-44-1to2	2,4-Dimethylphenol	8.7	U	8.7	UJ	9
BH-HA-47-0to1	2,4-Dimethylphenol	8.9	U	8.9	UJ	9
BH-HA-47-1to2	2,4-Dimethylphenol	8.8	U	8.8	UJ	9
BH-HA-51-0to1	2,4-Dimethylphenol	8.5	U	8.5	UJ	9
BH-HA-51-0to1-D	2,4-Dimethylphenol	8.7	U	8.7	UJ	9
BH-HA-51-1to1.6	2,4-Dimethylphenol	8.5	U	8.5	UJ	9
BH-HA-45-0to1	2,4-Dimethylphenol	8.4	U	8.4	UJ	9
BH-HA-45-1to2	2,4-Dimethylphenol	8.2	U	8.2	UJ	9
BH-HA-50b-0to1	2,4-Dimethylphenol	8.6	U	8.6	UJ	9
BH-HA-50b-1to1.6	2,4-Dimethylphenol	7.6	U	7.6	UJ	9
BH-HA-49-0to1	2,4-Dimethylphenol	8.5	U	8.5	UJ	9
BH-HA-49-1to2	2,4-Dimethylphenol	8.2	U	8.2	UJ	9
BH-HA-46-0to1	2,4-Dimethylphenol	7.9	U	7.9	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-46-1to1.8	2,4-Dimethylphenol	8.5	U	8.5	UJ	9
BH-HA-37-2to2.9	2,4-Dimethylphenol	8.9	U	8.9	UJ	9
BH-HA-52-0to1	2,4-Dinitrophenol	31.1	U	31.1	UJ	9
BH-HA-52-1to2	2,4-Dinitrophenol	30.2	U	30.2	UJ	9
BH-HA-44-0to1	2,4-Dinitrophenol	31.0	U	31.0	UJ	9
BH-HA-44-0to1-D	2,4-Dinitrophenol	32.7	U	32.7	UJ	9
BH-HA-44-1to2	2,4-Dinitrophenol	33.1	U	33.1	UJ	9
BH-HA-47-0to1	2,4-Dinitrophenol	33.7	U	33.7	UJ	9
BH-HA-47-1to2	2,4-Dinitrophenol	33.5	U	33.5	UJ	9
BH-HA-51-0to1	2,4-Dinitrophenol	32.3	U	32.3	UJ	9
BH-HA-51-0to1-D	2,4-Dinitrophenol	32.9	U	32.9	UJ	9
BH-HA-51-1to1.6	2,4-Dinitrophenol	32.4	U	32.4	UJ	9
BH-HA-45-0to1	2,4-Dinitrophenol	32.0	U	32.0	UJ	9
BH-HA-45-1to2	2,4-Dinitrophenol	30.9	U	30.9	UJ	9
BH-HA-50b-0to1	2,4-Dinitrophenol	32.6	U	32.6	UJ	9
BH-HA-50b-1to1.6	2,4-Dinitrophenol	28.9	U	28.9	UJ	9
BH-HA-49-0to1	2,4-Dinitrophenol	32.4	U	32.4	UJ	9
BH-HA-49-1to2	2,4-Dinitrophenol	31.0	U	31.0	UJ	9
BH-HA-46-0to1	2,4-Dinitrophenol	30.0	U	30.0	UJ	9
BH-HA-46-1to1.8	2,4-Dinitrophenol	32.4	U	32.4	UJ	9
BH-HA-37-2to2.9	2,4-Dinitrophenol	33.6	U	33.6	UJ	9
BH-HA-52-0to1	4,6-Dinitro-2-Methylphenol	34.9	U	34.9	UJ	9
BH-HA-52-1to2	4,6-Dinitro-2-Methylphenol	33.9	U	33.9	UJ	9
BH-HA-44-0to1	4,6-Dinitro-2-Methylphenol	34.8	U	34.8	UJ	9
BH-HA-44-0to1-D	4,6-Dinitro-2-Methylphenol	36.8	U	36.8	UJ	9
BH-HA-44-1to2	4,6-Dinitro-2-Methylphenol	37.2	U	37.2	UJ	9
BH-HA-47-0to1	4,6-Dinitro-2-Methylphenol	37.8	U	37.8	UJ	9
BH-HA-47-1to2	4,6-Dinitro-2-Methylphenol	37.7	U	37.7	UJ	9
BH-HA-51-0to1	4,6-Dinitro-2-Methylphenol	36.3	U	36.3	UJ	9
BH-HA-51-0to1-D	4,6-Dinitro-2-Methylphenol	37.0	U	37.0	UJ	9
BH-HA-51-1to1.6	4,6-Dinitro-2-Methylphenol	36.4	U	36.4	UJ	9
BH-HA-45-0to1	4,6-Dinitro-2-Methylphenol	35.9	U	35.9	UJ	9
BH-HA-45-1to2	4,6-Dinitro-2-Methylphenol	34.7	U	34.7	UJ	9

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-50b-0to1	4,6-Dinitro-2-Methylphenol	36.7	U	36.7	UJ	9
BH-HA-50b-1to1.6	4,6-Dinitro-2-Methylphenol	32.4	U	32.4	UJ	9
BH-HA-49-0to1	4,6-Dinitro-2-Methylphenol	36.4	U	36.4	UJ	9
BH-HA-49-1to2	4,6-Dinitro-2-Methylphenol	34.9	U	34.9	UJ	9
BH-HA-46-0to1	4,6-Dinitro-2-Methylphenol	33.7	U	33.7	UJ	9
BH-HA-46-1to1.8	4,6-Dinitro-2-Methylphenol	36.4	U	36.4	UJ	9
BH-HA-37-2to2.9	4,6-Dinitro-2-Methylphenol	37.8	U	37.8	UJ	9
BH-HA-52-0to1	Pentachlorophenol	28.7	U	28.7	UJ	9
BH-HA-52-1to2	Pentachlorophenol	27.9	U	27.9	UJ	9
BH-HA-44-0to1	Pentachlorophenol	28.6	U	28.6	UJ	9
BH-HA-44-0to1-D	Pentachlorophenol	30.3	U	30.3	UJ	9
BH-HA-44-1to2	Pentachlorophenol	30.6	U	30.6	UJ	9
BH-HA-47-0to1	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-HA-47-1to2	Pentachlorophenol	31.0	U	31.0	UJ	9
BH-HA-51-0to1	Pentachlorophenol	29.9	U	29.9	UJ	9
BH-HA-51-0to1-D	Pentachlorophenol	30.4	U	30.4	UJ	9
BH-HA-51-1to1.6	Pentachlorophenol	29.9	U	29.9	UJ	9
BH-HA-45-0to1	Pentachlorophenol	29.5	U	29.5	UJ	9
BH-HA-45-1to2	Pentachlorophenol	28.6	U	28.6	UJ	9
BH-HA-50b-0to1	Pentachlorophenol	30.2	U	30.2	UJ	9
BH-HA-50b-1to1.6	Pentachlorophenol	26.7	U	26.7	UJ	9
BH-HA-49-0to1	Pentachlorophenol	29.9	U	29.9	UJ	9
BH-HA-49-1to2	Pentachlorophenol	28.7	U	28.7	UJ	9
BH-HA-46-0to1	Pentachlorophenol	27.8	U	27.8	UJ	9
BH-HA-46-1to1.8	Pentachlorophenol	29.9	U	29.9	UJ	9
BH-HA-37-2to2.9	Pentachlorophenol	31.1	U	31.1	UJ	9
BH-HA-44-0to1	Phenol	10.5	J	10.5	J	9
BH-HA-47-0to1	Phenol	15.5	J	15.5	J	9
BH-HA-50b-1to1.6	Phenol	55.4	NA	55.4	J	9

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the reporting limit (RL)
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two method blanks were reported (batches BLL0683 and BLL0663). SVOCs and PAHs were not detected in the method blanks at or above the MDLs, with the following exceptions.

Naphthalene and 1-methylnaphthalene were detected in the method blank in batch BLL0663 at estimated concentrations greater than the MDLs and less than the RLs. Therefore, the estimated concentrations of naphthalene and 1-methylnaphthalene in the associated samples were U qualified as not detected at the RLs, and the 1-methylnaphthalene concentration in sample BH-HA-49-0to1 and naphthalene concentrations in samples BH-HA-47-0to1, BH-HA-46-1to1.8, BH-HA-45-0to1, BH-HA-44-0to1, BH-HA-44-0to1-D, BH-HA-49-0to1 and BH-HA-49-1to2 were J+ qualified as estimated with a high bias, based on professional and technical judgment.

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-52-0to1	1-Methylnaphthalene	0.97	J	4.96	U	3
BH-HA-52-1to2	1-Methylnaphthalene	0.56	J	4.99	U	3
BH-HA-44-0to1	1-Methylnaphthalene	2.18	J	4.99	U	3
BH-HA-44-0to1-D	1-Methylnaphthalene	1.29	J	4.91	U	3
BH-HA-47-0to1	1-Methylnaphthalene	1.3	J	4.95	U	3
BH-HA-51-0to1	1-Methylnaphthalene	1.07	J	4.93	U	3
BH-HA-51-0to1-D	1-Methylnaphthalene	0.60	J	4.87	U	3
BH-HA-51-1to1.6	1-Methylnaphthalene	0.49	J	5.00	U	3
BH-HA-45-0to1	1-Methylnaphthalene	1.56	J	4.97	U	3
BH-HA-45-1to2	1-Methylnaphthalene	0.81	J	4.99	U	3
BH-HA-50b-0to1	1-Methylnaphthalene	0.89	J	4.93	U	3
BH-HA-49-0to1	1-Methylnaphthalene	7.62	NA	7.62	J+	3
BH-HA-49-1to2	1-Methylnaphthalene	3.41	J	5.00	U	3
BH-HA-46-1to1.8	1-Methylnaphthalene	2.77	J	4.97	U	3
BH-HA-37-2to2.9	1-Methylnaphthalene	2.48	J	14.8	U	3
BH-HA-52-0to1	Naphthalene	3.46	J	4.96	U	3
BH-HA-52-1to2	Naphthalene	3.80	J	4.99	U	3
BH-HA-44-0to1	Naphthalene	7.72	NA	7.72	J+	3
BH-HA-44-0to1-D	Naphthalene	6.62	NA	6.62	J+	3
BH-HA-47-0to1	Naphthalene	8.26	NA	8.26	J+	3
BH-HA-47-1to2	Naphthalene	2.08	J	4.92	U	3
BH-HA-51-0to1	Naphthalene	2.05	J	4.93	U	3
BH-HA-51-0to1-D	Naphthalene	1.62	J	4.87	U	3
BH-HA-51-1to1.6	Naphthalene	2.13	J	5.00	U	3

Sample	Analyte	Laboratory Result (µg/kg)	Laboratory Flag	Validation Result (µg/kg)	Validation Qualifier*	Reason Code**
BH-HA-45-0to1	Naphthalene	12.3	NA	12.3	J+	3
BH-HA-45-1to2	Naphthalene	2.27	J	4.99	U	3
BH-HA-50b-0to1	Naphthalene	1.53	J	4.93	U	3
BH-HA-49-0to1	Naphthalene	30.8	NA	30.8	J+	3
BH-HA-49-1to2	Naphthalene	9.92	NA	9.92	J+	3
BH-HA-46-1to1.8	Naphthalene	6.53	NA	6.53	J+	3
BH-HA-37-2to2.9	Naphthalene	12.4	J	14.8	U	3

µg/kg-microgram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Two sample set specific MS/MSD pairs were reported, using samples BH-HA-52-1to2 and BH-HA-44-0to1. The recovery and relative percent difference (RPD) results were within the laboratory specified acceptance criteria.

1.8 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Two LCS/LCS duplicate (LCSD) pairs were reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

1.9 Internal Standard

The internal standard areas and retention times were within method limits.

1.10 Field Duplicate

Two field duplicate samples, BH-HA-44-0to1-D and BH-HA-51-0to1-D, were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-HA-44-0to1 and BH-HA-51-0to1, respectively, with the following exceptions.

For analytes with both a concentration greater than the MDL and less than the RL and a concentration greater than the RL, the RPDs were not calculable. Therefore, for these concentrations in the field duplicate pairs the concentrations were J qualified as estimated.

For analytes with both a concentration greater than the MDL and a non-detect result, the RPDs were not calculable. Therefore, for these results in the field duplicate pairs the concentrations were

J qualified as estimated and the non-detect results were UJ qualified as estimated less than the MDLs, based on professional and technical judgment. However, if the concentration was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

Sample	**Analyte**	**Laboratory Result (µg/kg)**	**Laboratory Flag**	**RPD**	**Validation Result (µg/kg)**	**Validation Qualifier***	**Reason Code****
BH-HA-51-0to1	Acenaphthene	2.02	J	NC	2.02	J	7
BH-HA-51-0to1-D	Acenaphthene	0.56	U		0.56	UJ	7
BH-HA-51-0to1	Benz[a]anthracene	8.74	NA	NC	8.74	J	7
BH-HA-51-0to1-D	Benz[a]anthracene	3.26	J		3.26	J	7
BH-HA-51-0to1	Benz[a]anthracene	5.7	U	NC	5.7	UJ	7
BH-HA-51-0to1-D	Benz[a]anthracene	12.2	J		12.2	J	7
BH-HA-51-0to1	Benzo(a)pyrene	10.1	NA	NC	10.1	J	7
BH-HA-51-0to1-D	Benzo(a)pyrene	3.92	J		3.92	J	7
BH-HA-51-0to1	Benzo(a)pyrene	4.0	U	NC	4.0	UJ	7
BH-HA-51-0to1-D	Benzo(a)pyrene	15.1	J		15.1	J	7
BH-HA-51-0to1	Benzo(b)fluoranthene	7.26	NA	NC	7.26	J	7
BH-HA-51-0to1-D	Benzo(b)fluoranthene	3.24	J		3.24	J	7
BH-HA-51-0to1	Benzofluoranthenes, Total (b+k+j)	16.3	NA	NC	16.3	J	7
BH-HA-51-0to1-D	Benzofluoranthenes, Total (b+k+j)	7.47	J		7.47	J	7
BH-HA-51-0to1	Benzofluoranthenes, Total (b+k+j)	20.1	U	NC	20.1	UJ	7
BH-HA-51-0to1-D	Benzofluoranthenes, Total (b+k+j)	26	J		26	J	7
BH-HA-51-0to1	Chrysene	10.6	J	NC	10.6	J	7
BH-HA-51-0to1-D	Chrysene	20	NA		20	J	7
BH-HA-51-0to1	Fluoranthene	12.6	NA	NC	12.6	J	7
BH-HA-51-0to1-D	Fluoranthene	3.63	J		3.63	J	7
BH-HA-51-0to1	Fluoranthene	10	J	NC	10	J	7
BH-HA-51-0to1-D	Fluoranthene	28.4	NA		28.4	J	7
BH-HA-51-0to1	Fluorene	1.34	J	NC	1.34	J	7
BH-HA-51-0to1-D	Fluorene	0.61	U		0.61	UJ	7
BH-HA-51-0to1	Indeno(1,2,3-cd)pyrene	8.3	NA	NC	8.3	J	7
BH-HA-51-0to1-D	Indeno(1,2,3-cd)pyrene	4.16	J		4.16	J	7
BH-HA-51-0to1	Naphthalene	4.1	U	NC	4.1	UJ	7
BH-HA-51-0to1-D	Naphthalene	5.7	J		5.7	J	7
BH-HA-51-0to1	Pyrene	22.4	NA	98	22.4	J	7
BH-HA-51-0to1-D	Pyrene	7.71	NA		7.71	J	7
BH-HA-51-0to1	Pyrene	10.6	J	NC	10.6	J	7

Sample	**Analyte**	**Laboratory Result (µg/kg)**	**Laboratory Flag**	**RPD**	**Validation Result (µg/kg)**	**Validation Qualifier***	**Reason Code****
BH-HA-51-0to1-D	Pyrene	23.3	NA		23.3	J	7

µg/kg-microgram per kilogram
U-not detected at a concentration greater than or equal to the MDL
J-estimated concentration greater than or equal to the MDL and less than the RL
NA-not applicable
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

1.11 Rinsate Blank

One equipment blank, BH-EB-HA-231213, was collected during the sample event and reported in SDG 23L0435. SVOCs and PAHs were not detected in the equipment blank at or above the MDLs.

1.12 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria, with the following exceptions.

The recovery of acid extractable surrogate phenol-d5 in the ICV in batch SLL0383 was high and outside of the laboratory specified acceptance criteria. Since the recoveries of the remaining acid extractable surrogates were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

The recovery of acid extractable surrogate phenol-d5 in the ICV in batch SMA0032 was high and outside of the laboratory specified acceptance criteria. Since the recoveries of the remaining acid extractable surrogates were acceptable and based on professional and technical judgment, no qualifications were applied to the data.

1.13 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, 9c, and 9d of the QAPP.

1.14 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that 2-chloronaphthalene, 2-methylphenol, 4-methylphenol, and di-n-butyl phthalate were reported as pcn-002, o-cresol, p-

cresol, and dibutyl phthalate in the EDD, respectively. No other discrepancies were identified between the level IV report and the EDD.

2.0 PETROLEUM HYDROCARBONS

The samples were analyzed for petroleum hydrocarbons (DRO and MRO) per Methods 3546/NWTPH-Dx.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Laboratory Control Sample
⊗ Field Duplicate
✓ Rinsate Blank
✓ Surrogates
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The petroleum hydrocarbon data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Times

The holding time for the petroleum hydrocarbon analysis of a soil sample is 14 days from collection to extraction and 40 days from extraction to analysis. The holding times were met for the sample analyses.

2.3 Initial Calibration

An initial calibration was performed for petroleum hydrocarbons. The laboratory calculated the percent relative standard deviation (%RSD) of the response factors (RFs). The %RSDs were within the laboratory specified acceptance criteria.

2.4 Initial and Continuing Calibration Verification

ICV and CCVs were performed at the required frequency. The %Ds in the ICV and CCVs were within the laboratory specified acceptance criteria.

2.5 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0662). DRO and MRO were not detected in the method blank at or above the MDLs.

2.6 Matrix Spike/Matrix Spike Duplicate

One sample set specific MS/MSD pair was reported, using sample BH-HA-47-1to2. The recovery and RPD results were within the laboratory specified acceptance criteria.

2.7 Laboratory Control Sample

LCS/LCSD pairs were analyzed at the proper frequency for the number and types of samples analyzed (one pair per batch of 20 samples). One LCS/LCSD pair was reported. The recovery and the RPD results were within the laboratory specified acceptance criteria.

However, it was noted that MRO was not spiked into the LCS/LCSD pair in batch BLL0662. Based on professional and technical judgment, the MRO concentrations in the associated samples were J qualified as estimated, and the non-detect MRO results in the associated samples were UJ qualified as estimated less than MDL.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-52-0to1	MRO	22.1	NA	22.1	J	5
BH-HA-52-1to2	MRO	13.6	NA	13.6	J	5
BH-HA-44-0to1	MRO	105	NA	105	J	5
BH-HA-44-0to1-D	MRO	104	NA	104	J	5
BH-HA-44-1to2	MRO	3.49	U	3.49	UJ	5
BH-HA-47-0to1	MRO	55.0	NA	55.0	J	5
BH-HA-47-1to2	MRO	12.7	NA	12.7	J	5
BH-HA-51-0to1	MRO	209	NA	209	J	5

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-51-0to1-D	MRO	99.1	NA	99.1	J	5
BH-HA-51-1to1.6	MRO	28.0	NA	28.0	J	5
BH-HA-45-0to1	MRO	95.9	NA	95.9	J	5
BH-HA-45-1to2	MRO	34.1	NA	34.1	J	5
BH-HA-50b-0to1	MRO	71.1	NA	71.1	J	5
BH-HA-50b-1to1.6	MRO	40.3	NA	40.3	J	5
BH-HA-49-0to1	MRO	127	NA	127	J	5
BH-HA-49-1to2	MRO	60.7	NA	60.7	J	5
BH-HA-46-0to1	MRO	85.0	NA	85.0	J	5
BH-HA-46-1to1.8	MRO	21.9	NA	21.9	J	5
BH-HA-37-2to2.9	MRO	803	NA	803	J	5

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
MRO-motor oil range organics
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.8 Field Duplicate

Two field duplicate samples, BH-HA-44-0to1-D and BH-HA-51-0to1-D, were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-HA-44-0to1 and BH-HA-51-0to1, respectively, with the following exceptions.

The RPDs for DRO and MRO in the field duplicate pair BH-HA-51-0to1-D/BH-HA-51-0to1 were greater than 50%. Therefore, the DRO and MRO concentrations in samples BH-HA-51-0to1-D and BH-HA-51-0to1 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-51-0to1	DRO	21.2	NA	72	21.2	J	7
BH-HA-51-0to1-D	DRO	9.96	NA		9.96	J	7
BH-HA-51-0to1	MRO	209	NA	71	209	J	7
BH-HA-51-0to1-D	MRO	99.1	NA		99.1	J	7

mg/kg-milligram per kilogram
U-not detected at a concentration greater than or equal to the MDL
DRO-diesel range organics
MRO-motor oil range organics
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

2.9 Rinsate Blank

One equipment blank, BH-EB-HA-231213, was collected during the sample event and reported in SDG 23L0435. DRO and MRO were not detected in the equipment blank at or above the MDLs.

2.10 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.11 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. No elevated non-detect results were reported. The RLs met those listed in Tables 9a and 9b of the QAPP.

2.12 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. It was noted that the samples were reported as not detected at or above the RLs in the level IV report; both the RLs and the MDLs were listed in the EDD and laboratory report. The samples were reported as not detected at or above the MDL. Additionally, it was noted that MRO was reported as lube oil in the EDD. No other discrepancies were identified between the level IV report and the EDD.

3.0 METALS

The samples were analyzed for metals per US EPA Methods 3050B/6020B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
⊗ Initial and Continuing Calibration Blank
✓ Initial and Continuing Calibration Verification
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
⊗ Field Duplicate

⊗ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

3.1 Overall Assessment

The metals data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

3.2 Holding Times

The holding time for the total metal analysis of a soil sample is 6 months from collection to analysis. The holding times were met for the sample analyses.

3.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standards were within the laboratory control limits (50-150% recovery).

The interference check standards (ICSA and ICSAB) met the method acceptance criteria for the metals.

3.4 Initial and Continuing Calibration Blanks (ICB and CCB)

The ICBs and CCBs met the method specified acceptance criteria, with the following exceptions.

Chromium was detected in the instrument blank in batch SMA0025 (SMA0025-IBL6) at an estimated concentration greater than the MDL and less than the RL. Since the chromium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Arsenic was detected in the instrument blanks in batch SLL0403 (SLL0403-IBL1, SLL0403-IBL2 and SLL0403-IBL3) at estimated concentrations greater than the MDLs and less than the RLs. Since the arsenic data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

Cadmium was detected in the instrument blank in batch SLL0403 (SLL0403-IBLH) at an estimated concentration greater than the MDL and less than the RL. Since the cadmium data in the associated samples were bracketed by acceptable instrument blanks and based on professional and technical judgment, no qualifications were applied to the data.

The cadmium result in the instrument blank in batch SLL0403 (SLL0403-IBLM) was more negative than the MDL and less negative than the PQL. Therefore, the cadmium concentration in sample BH-HA-46-1to1.8 was J- qualified as estimated with a low bias, and the estimated cadmium concentration in sample BH-HA-37-2to2.9 was J qualified as estimated.

Nickel was detected in the continuing calibration blank in batch SLL0403 (SLL0403-CCBG) at an estimated concentration greater than the MDL and less than the RL. Since nickel was detected in the associated samples at concentrations greater than the RLs and based on professional and technical judgment, no qualifications were applied to the data.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-46-1to1.8	Cadmium	0.33	NA	0.33	J-	3
BH-HA-37-2to2.9	Cadmium	0.06	J	0.06	J	3

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.5 Initial and Continuing Calibration Verification

The percent recoveries in the ICVs and CCVs were within the method specified acceptance limits.

3.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0618). Metals were not detected in the method blank at or above the MDLs.

3.7 Matrix Spike/Matrix Spike Duplicate

Two sample set specific MS/MSD pairs were reported, with both using sample BH-HA-52-0to1. The recovery and RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

One or both of the recoveries of arsenic, nickel, copper, zinc and chromium in the MS/MSD pair using sample BH-HA-52-0to1 were low and outside of the laboratory specified acceptance criteria.

Additionally, the MSD recovery of nickel was less than 30%, and the RPD for copper was high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of arsenic, nickel, copper, zinc and chromium in sample BH-HA-52-0to1 were J- qualified as estimated with low biases.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-52-0to1	Arsenic	4.59	NA	4.59	J-	4
BH-HA-52-0to1	Copper	92.0	NA	92.0	J-	4
BH-HA-52-0to1	Nickel	68.6	NA	68.6	J-	4
BH-HA-52-0to1	Chromium	81.9	NA	81.9	J-	4
BH-HA-52-0to1	Zinc	102	NA	102	J-	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

3.9 Field Duplicate

Two field duplicate samples, BH-HA-44-0to1-D and BH-HA-51-0to1-D, were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-HA-44-0to1 and BH-HA-51-0to1, respectively, with the following exceptions.

The RPDs for arsenic and lead in the field duplicate pair BH-HA-51-0to1-D/BH-HA-51-0to1 were greater than 50%. Therefore, the arsenic and lead concentrations in samples BH-HA-51-0to1-D and BH-HA-51-0to1 were J qualified as estimated.

Cadmium was detected in parent sample BH-HA-51-0to1 at an estimated concentration greater than the MDL and less than the RL and detected in field duplicate sample BH-HA-51-0to1-D at a concentration greater than the RL, resulting in a noncalculable RPD. Therefore, based on professional and technical judgment, the cadmium concentrations in samples BH-HA-51-0to1 and BH-HA-51-0to1-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-51-0to1	Arsenic	2.59	NA	52	2.59	J	7
BH-HA-51-0to1-D	Arsenic	4.42	NA		4.42	J	7
BH-HA-51-0to1	Cadmium	0.08	J	NC	0.08	J	7
BH-HA-51-0to1-D	Cadmium	0.19	NA		0.19	J	7
BH-HA-51-0to1	Lead	7.86	NA	70	7.86	J	7
BH-HA-51-0to1-D	Lead	16.4	NA		16.4	J	7

mg/kg-milligram per kilogram
NA-not applicable
J-estimated concentration greater than or equal to the MDL and less than the RL
NC-noncalculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported, using sample BH-HA-52-0to1. In cases where results in the original sample and laboratory duplicate sample were less than five times the RL and the absolute difference between the results was less than the RL, no qualifications were applied to the data. The RPD results were within the laboratory specified acceptance criteria, with the following exceptions.

The RPDs for arsenic, lead and nickel in the laboratory duplicate using sample BH-HA-52-0to1 were high and outside of the laboratory specified acceptance criteria. Therefore, the concentrations of arsenic, lead and nickel in sample BH-HA-52-0to1 were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-52-0to1	Arsenic	4.59	NA	4.59	J	12
BH-HA-52-0to1	Lead	9.40	NA	9.40	J	12
BH-HA-52-0to1	Nickel	68.6	NA	68.6	J	12

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

3.11 Rinsate Blank

One equipment blank, BH-EB-HA-231213, was collected during the sample event and reported in SDG 23L0435. Metals were not detected in the equipment blank at or above the MDLs, with the following exception.

Copper was detected in the equipment blank BH-EB-HA-231213 at an estimated concentration greater than the MDL and less than the RL. Since copper was detected in the associated samples at concentrations greater than the RL and based on professional and technical judgment, no qualifications were applied to the data.

3.12 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. Elevated non-detect results were not reported. The RLs met those listed in Tables 9a, 9b, and 9c of the QAPP, with the following exceptions. The soils RLs and screening levels listed in Table 9a of the QAPP were not met for total zinc. The SEM RLs were not met.

3.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

4.0 MERCURY

The samples were analyzed for mercury by US EPA Method 7471B.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
✓ Initial Calibration
✓ Initial and Continuing Calibration Verification
✓ Initial and Continuing Calibration Blanks
✓ Method Blank
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Field Duplicate
✓ Laboratory Duplicate
✓ Rinsate Blank
⊗ Sensitivity
✓ Electronic Data Deliverable Review

4.1 Overall Assessment

The mercury data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

4.2 Holding Times

The holding time for the mercury analysis of a soil sample is 28 days from collection to analysis. The holding times were met for the sample analyses.

4.3 Initial Calibration

The initial calibration requirements were met.

The low-level calibration check standard was within the laboratory control limits (50-150% recovery).

4.4 Initial and Continuing Calibration Verification

The percent recoveries in the associated ICVs and CCVs were within the method acceptance limits.

4.5 Initial and Continuing Calibration Blank

The ICBs and CCBs met the method acceptance criteria.

4.6 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch BLL0619). Mercury was not detected in the method blank at or above the MDL.

4.7 Matrix Spike/Matrix Spike Duplicate

MS/MSDs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One sample set specific MS/MSD pair was reported, using sample BH-HA-52-0to1. The RPD result was high, and the MS/MSD recoveries were less than 30%. Both the recoveries and RPD results were outside of the laboratory specified acceptance criteria. Additionally, the post digestion spike (PDS) recovery of mercury was acceptable. Therefore, the mercury concentration in sample BH-HA-52-0to1 was J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-52-0to1	Mercury	0.0799	NA	0.0799	J	4

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.8 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery result was within the laboratory specified acceptance criteria.

4.9 Field Duplicate

Two field duplicate samples, BH-HA-44-0to1-D and BH-HA-51-0to1-D, were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-HA-44-0to1 and BH-HA-51-0to1, respectively, with the following exception. The RPD for mercury in the field duplicate pair BH-HA-51-0to1-D/BH-HA-51-0to1 was greater than 50%. Therefore, the mercury concentrations in samples BH-HA-51-0to1-D and BH-HA-51-0to1-D were J qualified as estimated.

Sample	Analyte	Laboratory Result (mg/kg)	Laboratory Flag	RPD	Validation Result (mg/kg)	Validation Qualifier*	Reason Code**
BH-HA-51-0to1	Mercury	0.0438	NA	73	0.0438	J	7
BH-HA-51-0to1-D	Mercury	0.0943	NA		0.0943	J	7

mg/kg-milligram per kilogram
NA-not applicable
* Validation qualifiers are defined in Attachment 1 at the end of this report
** Reason codes are defined in Attachment 2 at the end of this report

4.10 Laboratory Duplicate

One sample set specific laboratory duplicate was reported using sample BH-HA-52-0to1. The RPD result was within the laboratory specified acceptance criteria.

4.11 Rinsate Blank

One equipment blank, BH-EB-HA-231213, was collected during the sample event and reported in SDG 23L0435. Mercury was detected in the equipment blank at an estimated concentration greater than the MDL and less than the RL. Since the mercury concentration in the equipment blank was

U qualified as not detected at the RL due to method blank contamination, no additional qualifications were applied to the data.

4.12 Sensitivity

The samples were assessed to the MDLs, and non-detect results were reported as not detected at a concentration greater than or equal to the RLs in the laboratory report. No elevated non-detect results were reported. The MDLs and RLs met those listed in Tables 9b and 9c of the QAPP. However, the screening level for soils was not met.

4.13 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the level IV report and the EDD.

5.0 PARTICLE SIZE

The samples were analyzed for particle size by ASTM-2487.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Field Duplicate
✓ Laboratory Triplicate
✓ Electronic Data Deliverable Review

5.1 Overall Assessment

The particle size data reported in this data set are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

5.2 Field Duplicate

Two field duplicate samples, BH-HA-44-0to1-D and BH-HA-51-0to1-D, were collected with the sample set. Acceptable precision (RPD < 50%) was demonstrated between the field duplicates and the original samples, BH-HA-44-0to1 and BH-HA-51-0to1, respectively.

5.3 Laboratory Triplicate

One sample set specific laboratory triplicate was reported using sample BH-HA-52-0to1. The RSD was less than 20%.

5.4 Electronic Data Deliverable Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated Level IV report at a minimum of 20%. No discrepancies were identified between the Level IV report and the EDD.

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ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit.

UJ The analyte was not detected above the MDL or RL as applicable. The value reported is an estimate below the respective reporting limit. Additionally, the quantitation limit is uncertain and may not accurately represent the actual limit.

J The analyte was detected above the MDL but below the respective RL. The value reported is an estimate.

J- The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected negative or low bias.

J+ The analyte was detected above the MDL but below the respective RL. The value reported is an estimate. The estimated result has a suspected positive or high bias.

R The reported analyte concentration is rejected due to a serious deficiency with the associated QC result(s). The presence or absence of the analyte cannot be confirmed.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required
NV	Not validated

Geosyntec consultants

520 Pike Street., Ste 2600
Seattle, WA 98101
www.geosyntec.com

BIOASSAY TEST DATA REVIEW CHECKLIST - *NEANTHES ARENACEODENTATA*

Project:	Blakely Harbor	**Date:**	10/20/2021
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts, Inc.

Sample Identification:

Sample Identification	Sample Abbreviation
BH-SG-04-0to10	SG-04
BH-SG-05-0to10	SG-05
BH-SG-06-0to10	SG-06
BH-SG-15-0to10	SG-15
BH-SG-22-0to10	SG-22
BH-SG-27-0to10	SG-27
BH-SG-31-0to10	SG-31
BH-SG-33-0to10	SG-33
BH-SG-35-0to10	SG-35
BH-SG-36-0to10	SG-36
BH-SG-37-0to10	SG-37
BH-SG-39-0to10	SG-39
BH-SG-41-0to10	SG-41
BH-SG-42-0to10	SG-42

Test and Methods:

- 20-day *Neanthes arenaceodentata* survival and growth test
- Washington State Department of Ecology (Ecology), 2021. *Sediment Cleanup User's Manual II (SCUM II) Guidance* for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Third Revision. December.

- Puget Sound Estuary Program (PSEP), 1995. Puget Sound Protocols and Guidelines. Puget Sound Water Quality Action Team, Olympia, Washington.
- United States Environmental Protection Agency (USEPA), 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

Yes	No	N/A	
☐	☒	☐	Samples were received on ice and at the appropriate temperatures? Sample temperature upon receipt was 4±2°C
☒	☐	☐	Samples were stored in the dark at 4°C?
☒	☐	☐	Sample holding times were met?
☒	☐	☐	Requested tests completed?
☒	☐	☐	Test followed appropriate guidance documents?
☐	☐	☒	Requested or acceptable alternative species used?
☒	☐	☐	Test organisms acclimated to appropriate test conditions? Organisms were held in seawater at approximately 20°C prior to test initiation.
☒	☐	☐	Test organisms did not experience significant mortality prior to test initiation? Not stated; however, assumed to be low because controls show 0% mean mortality during the test.
☒	☐	☐	Test organisms met age/size class requirements at test initiation?
☒	☐	☐	Test chamber, exposure volume, and photoperiod met specified methods?
☒	☐	☐	Number of replicates per treatment met specified methods?
☒	☐	☐	Number of test organisms per replicate met specified methods?
☒	☐	☐	Test duration met specified methods?
☒	☐	☐	Test performed at specified temperature and salinity ranges? Test observed temperature ranged between 18.8-20.6°C which is within the recommended range (20±1°C). Test observed salinity ranged between 27-29 part per trillion (ppt) which is within the recommended range (28±2 ppt)
☒	☐	☐	Appropriate water quality parameters measured at the required frequencies? Prior to the test initiation, water quality measurements were taken in a surrogate chamber for each test treatment and included dissolved oxygen, temperature, salinity, and pH.

Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination. During the test, water quality was monitored daily in one surrogate replicate per treatment.

☒ ☐ ☐ Water quality measurements within protocol limits?
☒ ☐ ☐ Feeding performed at required frequencies? (if applicable)
☒ ☐ ☐ Water renewals performed at the required frequencies?
☒ ☐ ☐ Test chambers aerated?
☒ ☐ ☐ Test met control test acceptability criteria?
☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?

Ammonia concentrations observed were above the purging trigger in the overlying water of samples SG-33 and SG-39 on Day 20 (0.537 and 0.513 mg/L, compare to purging trigger of 0.46 mg/L), however they were both below the NOEC value derived from the concurrent ammonia reference-toxicant test (1.51 mg/L).

☐ ☒ ☐ Other potential confounding factors?
☒ ☐ ☐ Reference toxicant test performed?

Reference toxicant test performed with Ammonium Chloride

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?
☒ ☐ ☐ Reference toxicant test met control acceptability requirements?
☒ ☐ ☐ Reference toxicant test LC_{50} or $\underline{EC_{50}}$ fell within two standard deviations of the laboratory mean?
☐ ☒ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the methods accordingly to the guidance documents and met acceptability criteria. There were minor deviations, as listed above; however, these should not affect the overall results or data interpretation. No data qualifiers are recommended.

Geosyntec consultants

520 Pike Street., Ste 2600
Seattle, WA 98101
www.geosyntec.com

BIOASSAY TEST DATA REVIEW CHECKLIST - *EOHAUSTORIUS ESTUARIUS*

Project:	Blakely Harbor	**Date:**	10/20/2021
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts, Inc.

Sample Identification:

Sample Identification	Sample Abbreviation
BH-SG-04-0to10	SG-04
BH-SG-04-0to10	SG-04 Sieved[a]
BH-SG-05-0to10	SG-05
BH-SG-06-0to10	SG-06
BH-SG-15-0to10	SG-15
BH-SG-22-0to10	SG-22
BH-SG-22-0to10	SG-22 Sieved[a]
BH-SG-27-0to10	SG-27
BH-SG-31-0to10	SG-31
BH-SG-33-0to10	SG-33
BH-SG-35-0to10	SG-35
BH-SG-36-0to10	SG-36
BH-SG-37-0to10	SG-37
BH-SG-39-0to10	SG-39
BH-SG-41-0to10	SG-41
BH-SG-41-0to10	SG-41 Purged[b]
BH-SG-42-0to10	SG-42

Footnotes:

a. Sediment were sieved at 2.0mm to remove wood debris prior to test initiation

b. Sediment were purged to remove excess sulfide prior to test initiation

Test and Methods:

- 10-day *Eohaustorius estuarius* Acute Toxicity Test
- Washington State Department of Ecology (Ecology), 2021. *Sediment Cleanup User's Manual II (SCUM II) Guidance* for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Third Revision. December.
- Puget Sound Estuary Program (PSEP), 1995. Puget Sound Protocols and Guidelines. Puget Sound Water Quality Action Team, Olympia, Washington.
- United States Environmental Protection Agency (USEPA), 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

Yes No N/A

☒ ☐ ☐ Samples were received on ice and at the appropriate temperatures?

Sample temperature upon receipt was 4±2°C

☒ ☐ ☐ Samples were stored in the dark at 4°C?

☒ ☐ ☐ Sample holding times were met?

☒ ☐ ☐ Requested tests completed?

☒ ☐ ☐ Test followed appropriate guidance documents?

☐ ☐ ☒ Requested or acceptable alternative species used?

☒ ☐ ☐ Test organisms acclimated to appropriate test conditions?

Organisms were received and held at approximately 14±1°C prior to test initiation.

☒ ☐ ☐ Test organisms did not experience significant mortality prior to test initiation?

Not stated; however, assumed to be low because controls show minimal mortality during the test (4%).

☒ ☐ ☐ Test organisms met age/size class requirements at test initiation?

☒ ☐ ☐ Test chamber, exposure volume, and photoperiod met specified methods?

Assumed yes, however, the exposure volume required is at least 2cm of sediemtns and 800 mL of overlaying water. The test used 175 mL of sediemtns (~2 cm) and 775 mL of water considering natural sediemtn settling

☒ ☐ ☐ Number of replicates per treatment met specified methods?

☒ ☐ ☐ Number of test organisms per replicate met specified methods?

☒ ☐ ☐ Test duration met specified methods?

☒ ☐ ☐ Test performed at specified temperature and salinity ranges?

Test observed temperature ranged between 14.6-16.1°C which is within the recommended range (15±1°C). Test observed salinity ranged between 27-29 part per trillion (ppt) which is within the recommended range (28±2 ppt)

☒ ☐ ☐ Appropriate water quality parameters measured at the required frequencies?

Water quality parameters were measured daily in one surrogate replicate per treatment and included temperature, DO, pH, and salinity. Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination.

☒ ☐ ☐ Water quality measurements within protocol limits?

☐ ☐ ☒ Feeding performed at required frequencies? (if applicable)

☐ ☐ ☒ Water renewals performed at the required frequencies?

Water renewal was performed daily on treatments of sample SG-41 Purged and Control Purged.

☒ ☐ ☐ Test chambers aerated?

☒ ☐ ☐ Test met control test acceptability criteria?

☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?

☐ ☒ ☐ Other potential confounding factors?

☒ ☐ ☐ Reference toxicant test performed?

Reference toxicant test performed with Ammonium Chloride

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?

☒ ☐ ☐ Reference toxicant test met control acceptability requirements?

☒ ☐ ☐ Reference toxicant test LC_{50} or $\underline{EC_{50}}$ fell within two standard deviations of the laboratory mean?

☐ ☒ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the methods accordingly to the guidance documents and met acceptability criteria. There were minor deviations, as listed above; however, these should not affect the overall results or data interpretation. No data qualifiers are recommended.

Geosyntec consultants

520 Pike Street., Ste 2600
Seattle, WA 98101
www.geosyntec.com

BIOASSAY TEST DATA REVIEW CHECKLIST - *MYTILUS GALLOPROVINCIALIS*

Project:	Blakely Harbor	**Date:**	10/20/2021
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts, Inc.

Sample Identification:

Sample Identification	Sample Abbreviation
BH-SG-04-0to10	SG-04
BH-SG-04-0to10	SG-04 Sieved[a]
BH-SG-05-0to10	SG-05
BH-SG-06-0to10	SG-06
BH-SG-15-0to10	SG-15
BH-SG-22-0to10	SG-22
BH-SG-22-0to10	SG-22 Sieved[a]
BH-SG-27-0to10	SG-27
BH-SG-31-0to10	SG-31
BH-SG-33-0to10	SG-33
BH-SG-35-0to10	SG-35
BH-SG-36-0to10	SG-36
BH-SG-37-0to10	SG-37
BH-SG-39-0to10	SG-39
BH-SG-41-0to10	SG-41
BH-SG-41-0to10	SG-41 Purged[b]
BH-SG-42-0to10	SG-42

Footnotes:

c. Sediment were sieved at 2.0mm to remove wood debris prior to test initiation

d. Sediment were purged to remove excess sulfide prior to test initiation

Test and Methods:

- *Mytilus galloprovincialis* Bivalvae Larval Development Test
- Washington State Department of Ecology (Ecology), 2021. *Sediment Cleanup User's Manual II (SCUM II) Guidance* for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Third Revision. December.
- Puget Sound Estuary Program (PSEP), 1995. Puget Sound Protocols and Guidelines. Puget Sound Water Quality Action Team, Olympia, Washington.
- United States Environmental Protection Agency (USEPA), 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

Yes	No	N/A	
☒	☐	☐	Samples were received on ice and at the appropriate temperatures? Sample temperature upon receipt was 4±2°C
☒	☐	☐	Samples were stored in the dark at 4°C?
☒	☐	☐	Sample holding times were met?
☒	☐	☐	Requested tests completed?
☒	☐	☐	Test followed appropriate guidance documents?
☐	☐	☒	Requested or acceptable alternative species used?
☒	☐	☐	Test organisms acclimated to appropriate test conditions? Organisms were held under flowing seawater at about 15±2°C prior to spawning induction were fed during the holding period a marine algal suspension ad libitum.
☐	☐	☒	Test organisms did not experience significant mortality prior to test initiation?
☒	☐	☐	Test organisms met age/size class requirements at test initiation?
☒	☐	☐	Test chamber, exposure volume, and photoperiod met specified methods?
☒	☐	☐	Number of replicates per treatment met specified methods?
☒	☐	☐	Number of test organisms per replicate met specified methods?
☒	☐	☐	Test duration met specified methods?
☒	☐	☐	Test performed at specified temperature and salinity ranges?
☒	☐	☐	Appropriate water quality parameters measured at the required frequencies?

Water quality parameters were measured daily in the surrogate chamber per treatment and included temperature, DO, pH, and salinity. Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination.

☒ ☐ ☐ Water quality measurements within protocol limits?
☐ ☐ ☒ Feeding performed at required frequencies? (if applicable)
☐ ☐ ☒ Water renewals performed at the required frequencies?
☐ ☒ ☐ Test chambers aerated?

The larval test was performed without aeration unless dissolved oxygen levels fell below threshold levels for action. If required, trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface

☒ ☐ ☐ Test (survival) met control test acceptability criteria?
☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?
☐ ☒ ☐ Other potential confounding factors?
☒ ☐ ☐ Reference toxicant test performed?

Reference toxicant test performed with Ammona

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?
☒ ☐ ☐ Reference toxicant test met control acceptability requirements?
☒ ☐ ☐ Reference toxicant test LC_{50} or $\underline{EC_{50}}$ fell within two standard deviations of the laboratory mean?
☐ ☒ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the methods accordingly to the guidance documents and met acceptability criteria. No data qualifiers are recommended

Geosyntec consultants

16644 West Bernardo Dr., Ste 301
San Diego, CA 92127
PH 858.674.6559
www.geosyntec.com

TOXICITY TEST DATA REVIEW CHECKLIST

Project:	Blakely Harbor	**Date:**	2/8/2022
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts

Sample Identification:

SG-04-0to10	SG-31-0to10	SG-41-0to10
SG-05-0to10	SG-33-0to10	SG-42-0to10
SG-06-0to10	SG-35-0to10	
SG-15-0to10	SG-36-0to10	
SG-22-0to10	SG-37-0to10	
SG-27-0to10	SG-39-0to10	

Test and Methods:

PSEP (1995) with SMARM revisions, SCUM (2019)

- 10-day *Eohaustorius estuarius* amphipod survival test
    - Side by side tests including sieving of SG-04-0to10, SG-22-0to10, and purging of SG-22-0to10
- 20-day juvenile *Neanthes arenaceodentata* survival and growth test
- 48-hour *Mytilus* sp. larval development test with resuspension protocol
    - Side by side tests included sieving of SG-04-0to10, SG-22-0to10, and purging of SG-22-0to10

Yes No N/A

☒ ☐ ☐ Samples were received on ice and at the appropriate temperatures?

☒ ☐ ☐ Samples were stored in the dark at 4°C?

☐ ☐ ☐ Sample holding times were met?

☒ ☐ ☐ Requested tests completed?

☒ ☐ ☐ Test followed appropriate guidance documents?

☒ ☐ ☐ Requested or acceptable alternative species used?

☒ ☐ ☐ Test organisms acclimated to appropriate test conditions?

☒ ☐ ☐ Test organisms did not experience significant mortality prior to test initiation?

☒ ☐ ☐ Test organisms met age/size class requirements at test initiation?

☒ ☐ ☐ Test chamber, exposure volume, and photoperiod met specified methods?

☒ ☐ ☐ Number of replicates per treatment met specified methods?

☒ ☐ ☐ Number of test organisms per replicate met specified methods?

- Yes except potential contamination was found in 3 different test chambers from 3 different treatments and these 3 individual test chambers/results were excluded from analysis, leaving the number of replicates at 4 in the sand control, SG-36, SG-42 treatments.

☒ ☐ ☐ Test duration met specified methods?

☒ ☐ ☐ Test performed at specified temperature and salinity ranges?

☒ ☐ ☐ Appropriate water quality parameters measured at the required frequencies?

☒ ☐ ☐ Water quality measurements within protocol limits?

- With the exception of dissolved oxygen in the larval bivalve development test which decreased on day 1, but then was aerated; average water quality targets were met.

☒ ☐ ☐ Feeding performed at required frequencies?

- Yes, only applies to the *Neanthes arenaceodentata* survival and growth test.

☒ ☐ ☐ Water renewals performed at the required frequencies?

- Yes, only applies to the *Neanthes arenaceodentata* survival and growth test.

☒ ☐ ☐ Test chambers aerated?

- All tests aerated in accordance with the work plan

☒ ☐ ☐ Test met control test acceptability criteria?

☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?

☐ ☒ ☐ Other potential confounding factors?

- Ammonia, sulfide, and wood waste were not confounding

☒ ☐ ☐ Reference toxicant test performed?

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?

☒ ☐ ☐ Reference toxicant test met control acceptability requirements?

- Yes, for all three tests/species, separately.

☒ ☐ ☐ Reference toxicant test LC_{50} or EC_{50} fell within two standard deviations of the laboratory mean?

- Yes, for all three tests/species, separately.

☒ ☐ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the PSEP (1995) with SMARM revisions, SCUM (2019) methods and met acceptability criteria. There were minor deviations, as listed above; however, these should not affect the overall results or data interpretation. No data qualifiers are recommended.

It should be noted that the larval bivalve development test method does not require a direct count of embryo densities in the test chambers (i.e., counts are only done on the stock); therefore, the resulting density estimates have some uncertainty associated with them. The consequence of this uncertainty is more variability in the numbers of "normal" larvae counted at test end because of the starting density being lower or higher in some replicates than others. In this test, the stocking density measurements ranged from 209 to 329 larvae (per 10 mL).

References

Gardiner, W. 2010. Bioassay Testing Issues. Public Issue Paper presented by Mr. William Gardiner (Newfields, Inc.) at 2010 Sediment Management Annual Review Meeting, Federal Center South http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/2010_SMARM_Minutes_Final.pdf).

PSEP 1995. Puget Sound Protocols and Guidelines. Puget Sound Estuary Program. Puget Sound Water Quality Action Team, Olympia, Washington.

WDOE 2019. Sediment Cleanup User's Manual (SCUM). Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Toxics Cleanup Program. Washington State Department of Ecology. Olympia, Washington. Publication No. 12-09-057. Second Revision December 2019.

Geosyntec consultants

520 Pike Street., Ste 2600
Seattle, WA 98101
www.geosyntec.com

BIOASSAY TEST DATA REVIEW CHECKLIST - *NEANTHES ARENACEODENTATA*

Project:	Blakely Harbor	**Date:**	12/08/2022
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts, Inc.

Sample Identification:

Sample ID	Sample Abbreviation
BH-SG-10A-0to10	SG-10A
BH-SG-11A-0to10	SG-11A
BH-SG-46-0to10	SG-46
BH-SG-47-0to10	SG-47
BH-SG-48-0to10	SG-48
BH-SG-49-0to10	SG-49

Test and Methods:

- 20-day *Neanthes arenaceodentata* survival and growth test
- Washington State Department of Ecology (Ecology), 2021. *Sediment Cleanup User's Manual II (SCUM II) Guidance* for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Third Revision. December.
- Puget Sound Estuary Program (PSEP), 1995. Puget Sound Protocols and Guidelines. Puget Sound Water Quality Action Team, Olympia, Washington.
- United States Environmental Protection Agency (USEPA), 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

Yes No N/A

☐ ☒ ☐ Samples were received on ice and at the appropriate temperatures?

Samples SG-47 and SG-48 were received above 6°C (at 9.4°C), however they were

received at EcoAnalysts and stored cold within 5 hours of collection

☒ ☐ ☐ Samples were stored in the dark at 4°C?

☒ ☐ ☐ Sample holding times were met?

☒ ☐ ☐ Requested tests completed?

☒ ☐ ☐ Test followed appropriate guidance documents?

☐ ☐ ☒ Requested or acceptable alternative species used?

☒ ☐ ☐ Test organisms acclimated to appropriate test conditions?

Organisms were held in seawater at approximately 20°C prior to test initiation.

☒ ☐ ☐ Test organisms did not experience significant mortality prior to test initiation?

Not stated; however, assumed to be low because controls and tests did not show mortality during the test.

☒ ☐ ☐ Test organisms met age/size class requirements at test initiation?

☒ ☐ ☐ Test chamber, exposure volume, and photoperiod met specified methods?

☒ ☐ ☐ Number of replicates per treatment met specified methods?

☒ ☐ ☐ Number of test organisms per replicate met specified methods?

☒ ☐ ☐ Test duration met specified methods?

☒ ☐ ☐ Test performed at specified temperature and salinity ranges?

☒ ☐ ☐ Appropriate water quality parameters measured at the required frequencies?

Water quality parameters were measured daily and included temperature, DO, pH, and conductivity. Hardness and alkalinity were measured in the overlying water of a composite from all replicates within each treatment on test initiation and termination. Surrogate replicates for each sample were set up to obtain measurements of ammonia and sulfides within sample overlying water and interstitial porewater at test initiation and termination.

☒ ☐ ☐ Water quality measurements within protocol limits?

☒ ☐ ☐ Feeding performed at required frequencies? (if applicable)

☒ ☐ ☐ Water renewals performed at the required frequencies?

☒ ☐ ☐ Test chambers aerated?

☒ ☐ ☐ Test met control test acceptability criteria?

☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?

☐ ☒ ☐ Other potential confounding factors?

☒ ☐ ☐ Reference toxicant test performed?

Reference toxicant test performed with Ammonium Chloride

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?

☒ ☐ ☐ Reference toxicant test met control acceptability requirements?

☒ ☐ ☐ Reference toxicant test LC_{50} or $\underline{EC_{50}}$ fell within two standard deviations of the laboratory mean?

☐ ☒ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the methods accordingly to the guidance documents and met acceptability criteria. There were minor deviations, as listed above; however, these should not affect the overall results or data interpretation. No data qualifiers are recommended.

Geosyntec consultants

520 Pike Street., Ste 2600
Seattle, WA 98101
www.geosyntec.com

BIOASSAY TEST DATA REVIEW CHECKLIST - *EOHAUSTORIUS ESTUARIUS*

Project:	Blakely Harbor	**Date:**	12/08/2022
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts, Inc.

Sample Identification:

Sample ID	Sample Abbreviation
BH-SG-10A-0to10	SG-10A
BH-SG-11A-0to10	SG-11A
BH-SG-49-0to10	SG-49

Test and Methods:

- 10-day *Eohaustorius estuarius* Acute Toxicity Test
- Washington State Department of Ecology (Ecology), 2021. *Sediment Cleanup User's Manual II (SCUM II) Guidance* for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Third Revision. December.
- Puget Sound Estuary Program (PSEP), 1995. Puget Sound Protocols and Guidelines. Puget Sound Water Quality Action Team, Olympia, Washington.
- United States Environmental Protection Agency (USEPA), 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

Yes No N/A

☒ ☐ ☐ Samples were received on ice and at the appropriate temperatures?

☒ ☐ ☐ Samples were stored in the dark at 4°C?

☒ ☐ ☐ Sample holding times were met?

☒ ☐ ☐ Requested tests completed?

☒ ☐ ☐ Test followed appropriate guidance documents?

☐ ☐ ☒ Requested or acceptable alternative species used?

☒ ☐ ☐ Test organisms acclimated to appropriate test conditions?

Organisms were received and held at approximately 15°C prior to test initiation.

☒ ☐ ☐ Test organisms did not experience significant mortality prior to test initiation?

Not stated; however, assumed to be low because controls and tests show minimal mortality during the test (4%).

☒ ☐ ☐ Test organisms met age/size class requirements at test initiation?

☐ ☒ ☐ Test chamber, exposure volume, and photoperiod met specified methods?

The exposure volume required is at least 2cm of sediments and 800 mL of overlaying water. The test used 175 mL of sediments (~2 cm) and 775 mL of water considering natural sediment settling

☒ ☐ ☐ Number of replicates per treatment met specified methods?

☒ ☐ ☐ Number of test organisms per replicate met specified methods?

☒ ☐ ☐ Test duration met specified methods?

☒ ☐ ☐ Test performed at specified temperature and salinity ranges?

☒ ☐ ☐ Appropriate water quality parameters measured at the required frequencies?

Water quality parameters were measured daily in one surrogate replicate per treatment and included temperature, DO, pH, and salinity. Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination.

☒ ☐ ☐ Water quality measurements within protocol limits?

☐ ☐ ☒ Feeding performed at required frequencies? (if applicable)

☐ ☐ ☒ Water renewals performed at the required frequencies?

☒ ☐ ☐ Test chambers aerated?

☒ ☐ ☐ Test met control test acceptability criteria?

☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?

☐ ☒ ☐ Other potential confounding factors?

☒ ☐ ☐ Reference toxicant test performed?

Reference toxicant test performed with Ammonium Chloride

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?

☒ ☐ ☐ Reference toxicant test met control acceptability requirements?

☒ ☐ ☐ Reference toxicant test LC_{50} or $\underline{EC_{50}}$ fell within two standard deviations of the laboratory mean?

☐ ☒ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the methods accordingly to the guidance documents and met acceptability criteria. There were minor deviations, as listed above; however, these should not affect the overall results or data interpretation. No data qualifiers are recommended.

Geosyntec consultants

520 Pike Street., Ste 2600
Seattle, WA 98101
www.geosyntec.com

BIOASSAY TEST DATA REVIEW CHECKLIST - *MYTILUS GALLOPROVINCIALIS*

Project:	Blakely Harbor	**Date:**	12/08/2022
Project No.:	PNG0900	**Laboratory:**	EcoAnalysts, Inc.

Sample Identification:

Sample ID	Sample Abbreviation
BH-SG-10A-0to10	SG-10A
BH-SG-11A-0to10	SG-11A
BH-SG-49-0to10	SG-49

Test and Methods:

- *Mytilus galloprovincialis* Bivalvae Larval Development Test
- Washington State Department of Ecology (Ecology), 2021. *Sediment Cleanup User's Manual II (SCUM II) Guidance* for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC. Publication No. 12-09-057. Third Revision. December.
- Puget Sound Estuary Program (PSEP), 1995. Puget Sound Protocols and Guidelines. Puget Sound Water Quality Action Team, Olympia, Washington.
- United States Environmental Protection Agency (USEPA), 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

Yes	No	N/A	
☒	☐	☐	Samples were received on ice and at the appropriate temperatures?
☒	☐	☐	Samples were stored in the dark at 4°C?
☒	☐	☐	Sample holding times were met?
☒	☐	☐	Requested tests completed?
☒	☐	☐	Test followed appropriate guidance documents?
☐	☐	☒	Requested or acceptable alternative species used?
☒	☐	☐	Test organisms acclimated to appropriate test conditions?

Organisms were held under flowing seawater at about 12°C prior to spawning induction.

☐ ☐ ☒ Test organisms did not experience significant mortality prior to test initiation?

Not stated; however, assumed to be low because controls and tests did not show mortality during the test.

☒ ☐ ☐ Test organisms met age/size class requirements at test initiation?

☒ ☐ ☐ Test chamber, exposure volume, and photoperiod met specified methods?

☒ ☐ ☐ Number of replicates per treatment met specified methods?

☒ ☐ ☐ Number of test organisms per replicate met specified methods?

☒ ☐ ☐ Test duration met specified methods?

☒ ☐ ☐ Test performed at specified temperature and salinity ranges?

☒ ☐ ☐ Appropriate water quality parameters measured at the required frequencies?

Water quality parameters were measured daily in one surrogate replicate per treatment and included temperature, DO, pH, and salinity. Ammonia and sulfide concentrations were measured in both interstitial (porewater) and overlying water at initiation and termination.

☒ ☐ ☐ Water quality measurements within protocol limits?

☐ ☐ ☒ Feeding performed at required frequencies? (if applicable)

☐ ☐ ☒ Water renewals performed at the required frequencies?

☒ ☐ ☐ Test chambers aerated?

☒ ☐ ☐ Test (survival) met control test acceptability criteria?

☒ ☐ ☐ Test (growth) met control test acceptability criteria?

☐ ☒ ☐ Ammonia measured within test treatments at a level of concern?

☐ ☒ ☐ Other potential confounding factors?

☒ ☐ ☐ Reference toxicant test performed?

Reference toxicant test performed with Ammonium Chloride

☒ ☐ ☐ Reference toxicant test followed appropriate procedures?

☒ ☐ ☐ Reference toxicant test met control acceptability requirements?

☒ ☐ ☐ Reference toxicant test LC_{50} or $\underline{EC_{50}}$ fell within two standard deviations of the laboratory mean?

☐ ☒ ☐ Other deviations not listed above?

Overall Assessment and Recommended Data Qualifiers:

This test followed the methods accordingly to the guidance documents and met acceptability criteria. No data qualifiers are recommended

APPENDIX P
Data Handling

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APPENDIX P
DATA HANDLING

DRAFT REMEDIAL INVESTIGATION

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

August 2024

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ACRONYMS AND ABBREVIATIONS

%	percent
AO	Agreed Order
cPAH	total carcinogenic PAHs
DCAP	draft cleanup action plan
dw	dry weight
Ecology	Washington Department of Ecology
HPAH	high molecular weight PAHs
IDW	inverse distance weighting
LPAH	low molecular weight PAHs
MDL	method detection limit
mg/kg	milligrams per kilogram
OC	organic carbon
PAH	polycyclic aromatic hydrocarbons
Port Blakely	Port Blakely Tree Farms
QAPP	quality assurance project plan
QC	quality control
RI/FS	remedial investigation and feasibility study
SIM	selected ion monitoring
SL	screening level
SWAC	spatially weighted average concentration
TCDD	2,3,7,8-tetrachlorodibenzodioxin
TEQ	toxicity equivalent
TOC	total organic carbon
µg/kg	micrograms per kilogram

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) (AO No. DE 16944; Ecology and Port Blakely Tree Farms, 2020) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park Site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020).

This appendix of the Remedial Investigation Report summarizes the directives established by the Department of Ecology (Ecology) for data treatment and summing rules, applied when managing and updating the environmental database for the Blakely Harbor RI/FS.

1. DATA PRESENTATION

The following section outlines the number of significant figures presented within the data summary tables (Appendix M) and when rounding occurred for calculation of summation parameters and unit conversions.

1.1 Significant Figures and Rounding

The appropriate number of significant figures selected for presentation were generally based on the number of significant figures reported by the laboratory (in the database). In general, three significant figures were presented in order to facilitate unit conversion (e.g., conversion from mg/kg to µg/kg). However, some values were presented with one or two significant digits by the laboratory and were presented in the same manner in the RI report. Sample concentrations expressed in summary tables are generally three significant digits depending on whether the concentrations are less than 1, 10, 100, or greater than 100. For example, the unitless concentrations would be expressed as 0.288, 2.88, 28.8, 288, or 2880.

X/Y location coordinates were rounded to the nearest whole foot. Vertical elevations in either elevations or depths below ground surface/mudline surface were rounded to the nearest tenth of a foot.

Data treatment calculations were performed prior to rounding. For summed totals and conversion from dry weight (dw) to organic carbon (OC)-normalized, the number of significant figures was based on the individual parameter results included in the summation or converted. Generally, if individual parameters were detected, the number of significant figures was rounded to three, if not detected, the number of significant figures was the same as the selected ND value.

1.2 Locations

The original target or actual sample location is represented by X/Y coordinates. If multiple soil and/or sediment grabs were collected per station to collect enough sample volume, the original actual location was used for the coordinates. Additional grab samples, if needed, were located close to the original location and stepped out as indicated in the field notes (Appendix D). For piling scrape samples, the centroid of a piling scrape area was used (Appendix K).

1.3 Nondetect Results in the RI Figures

In general, the samples that did not have the analyte detected were handled as follows:

- For presentation of data in figures to understand the nature and extent of contamination, the method detection limit (MDL)/practical quantitation limit (PQL) was selected to represent the sample.
- For calculation of inverse-distance weighting (IDW) grids and spatially weighted average concentrations (SWACs), the MDL/PQL was selected to represent the sample.
- Summation parameters used one half the MDL/PQL for calculation, with exceptions noted in Section 3.2.

1.4 Collocated Samples

If a historical sample location was re-occupied during the RI to confirm a previous concentration, then the more recent result (either higher or lower) represented that location and/or depth for decision-making. Older concentrations were considered in the conceptual site model understanding. For seasonal groundwater sampling, all results are retained.

2. DATA TREATMENT

The following section discusses the treatment methods used for duplications, converting from dw to OC-normalized results for sediment samples and the methods/guidance used to develop summation parameters used in the RI.

2.1 Laboratory Replicates and Field Duplicates

Parent and duplicate samples collected for QC purposes are presented separately in the data summary tables (Appendix M), but a single value for the pair was selected for evaluation in the RI as follows:

- If the analyte was detected in both samples, the maximum detected value was selected to represent the sample.
- If the analyte was detected in one sample and not the other, the detected value was selected to represent the sample.
- If the analyte was not detected in either sample, the maximum MDL/PQL was selected to represent the sample.

2.2 TOC Normalization

The sediment management standards of marine sediments adopt OC-normalized concentrations based on total organic carbon (TOC) concentrations in samples for nonpolar organic compounds (PAHs, phthalates, phenols) to account for chemical bioavailability within normal TOC range of 0.5 to 5% TOC (Ecology, 2021). Other chemicals are expressed in dw normalized to account for the percent moisture present in lab samples.

Both the dw and OC normalized result are presented in the RI sediment data summary table (Appendix M) and compared to dw or OC-normalized screening levels as appropriate. Chemical concentrations originally in units of micrograms per kilogram (µg/kg) dw were converted to mg/kg OC using the following equation:

$$C_{\frac{mg}{kg}\,OC} = \frac{C\ \frac{\mu g}{kg}\ dw \times 0.001 \frac{mg}{\mu g}}{TOC}$$

Where:

C = the chemical concentration

TOC = the percent total organic carbon on a dry weight basis, expressed as a decimal (e.g., 1% = 0.01)]

Conversions occurred after calculation of summed totals. For example, a dw concentration of 5,200 ug/kg for total LPAHs is converted 260 mg/kg OC if the sample had 2% TOC.

2.3 Calculation of Summed Totals

Analyte sums were calculated for: low molecular weight PAHs (LPAHs), high molecular weight PAHs (HPAHs), total carcinogenic PAHs (cPAH) toxicity equivalent (TEQ) and dioxins/furans, as follows:

- LPAHs and HPAHs in sediment samples was calculated from the list of chemicals direct in Ecology guidance (2021). The concentrations for acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene were summed to represent LPAH for the sample and the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, pyrene, and total benzofluoranthenes were summed to represent HPAHs for the sample.

- Total cPAH TEQ was calculated for soil and sediment samples based on Implementation Memorandum #10 (Ecology, 2015). The concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were multiplied by their toxicity equivalency factors (TEFs) and summed to represent total cPAH TEQ in the sample.

- Total 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) TEQ was calculated for soil and sediment samples based on Implementation Memorandum #13 (Ecology 2016 The 17 dioxin and furan congeners (see section 2.4) were multiplied by their TEFs and summed to represent total TCDD TEQ in the sample.

For samples where some individual chemicals were not detected, a value of one half the MDL/PQL, whichever was selected during data validation, was selected to represent the concentration included in calculation. Total HPAHs and cPAHs were the sum of detected concentrations and non-detected concentrations at half the reporting limit. LPAH ND results were assumed to be zero based on Ecology guidance (2021).

For samples where none of the individual chemicals were detected, no summation was performed. The highest reporting limit among the individual chemicals was selected to represent the sample and qualified as “U” not detected. Indicating the lack of detected concentrations.

2.4 Calculating TEQs

There were two TEQs calculated at the Bakely Harbor Site that utilized TEFs, total cPAH TEQ and total TCDD TEQ. TEFs were used to normalize an individual chemicals toxicity to the toxicity of the reference chemical. The reference chemical for total cPAH TEQ is benzo(a)pyrene and the reference chemical for total TCDD TEQ is TCDD. The TEQ for a sample was calculated by multiplying the concentration of the individual chemical with the appropriate TEF, then summing the products to represent the TEQ for the sample.

The individual chemicals and TEFs used to calculate the total cPAH TEQ were reference from Ecology guidance (2015) and are presented in Table 1.

Table P-1. Carcinogenic PAH Toxicity Equivalency Factors

CAS Number	cPAH	TEF (unitless)
50-32-8	Benzo(a)pyrene	1
56-55-3	Benzo(a)anthracene	0.1
205-99-2	Benzo(b)fluoranthene	0.1
207-08-9	Benzo(k)fluoranthene	0.1
218-01-9	Chrysene	0.01
53-70-3	Dibenz(a,h)anthracene	0.1
193-39-5	Indeno(1,2,3-cd)pyrene	0.1

The individual chemicals and TEFs used to calculate the total TCDD TEQ were reference from Ecology guidance (2016) and are presented in Table 2. The selected TEFs for calculation of the TCDD TEQ were mammalian TEFs. The total TCDD TEQ based on mammalian TEFs was used by Ecology (2010) to derive the natural background concentration and for development of human health SLs (Ecology, 2024). The mammalian TCDD TEQ, focused on protection of mammalian receptors (i.e., terrestrial mammals and humans) was used for decisions for soil sample collection for the Site.

An analysis of the mammalian and avian based TCDD TEQs was performed to determine the protectiveness of mammalian TCDD TEQ versus avian TCDD TEQ. To develop avian based TCDD TEQs, TEFs for the 17 dioxin and furan congeners from Ecology guidance (Ecology, 2016) were used. Ecology has not currently developed an avian-based SL for TCDD TEQ; therefore, the value of 16 ng/kg from an authoritative source that is protective of avian receptors was used for comparison to the calculated avian TCDD TEQs (EPA, 2018). The results of the comparison indicated no instances in which an avian TCDD TEQ exceeded the avian screening level when the mammalian TCDD TEQ did not exceed the natural background soil value. From this analysis, it was determined that evaluation of TCDD TEQs focus on the mammalian TCDD TEQ due to also being protective of avian receptors.

Table P-2. Dioxin and Furan Toxicity Equivalency Factors

CAS Number	Dioxin Congeners	TEF (unitless)
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.1
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.1
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.1
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.01
3268-87-9	Octachlorodibenzo-p-dioxin	0.0003
CAS Number	**Furan Congeners**	**TEF (unitless)**
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	0.1
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	0.03
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	0.3
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	0.1
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	0.1
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	0.1
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	0.1
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01
39001-02-0	Octachlorodibenzofuran	0.0003

3. MULTIPLE RESULTS FOR SAMPLE ANALYTE PAIRS

Multiple analyses of a sample for a group of analytes occurred due to laboratory quality control (QC) procedures and resulted in multiple results for certain sample-analyte pairs. During data validation, a single value was selected to represent the sample-analyte pair as follows:

- If multiple results were reported with the same QC failures noted by the laboratory (i.e., internal standard failure), then the result from the lowest dilution was selected.
- If multiple results were reported with multiple QC failures noted by the laboratory, the "result considered for validation" was selected by the validator using the (i) pertinent methods referenced by the data packages, (ii) the guidance documents specified in the quality assurance project plan (QAPP), and (iii) professional and technical judgment.
- If results were reported with and without QC failures noted by the laboratory, then the result reported without QC failure(s) was selected.
- If multiple results were reported without QC failures noted by the laboratory, then the lowest MDL/PQL was selected.

For some samples, there were multiple results for a sample-analyte pair due to multiple analytical methods. The preferred method was identified in the QAPP and selected by the data validator unless a QC issue warranted selection of the results from an alternative method (Appendix O). For those instances where multiple results were present based on analysis by different methods, the selection of a representative result was as follows:

- The more sensitive method was selected. This occurred with analytes analyzed through a selected ion monitoring (SIM) method.
    - For example, if an analyte was measured through USEPA SW-846 Method 8270E and through USEPA SW-846 Method 8270E SIM, the SIM result was selected.
- If the more sensitive method result was R qualified (rejected), the less sensitive method was selected to represent the sample.

4. REFERENCES

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Washinton Department of Ecology (Ecology). 2010. *Technical Memorandum #8 Natural Background for Dioxins/Furans in WA Soils*. Toxics Cleanup Programs. Publication #10-09-053. August.

Ecology. 2015. *Implementation Memorandum #10: Evaluating the Human Health Toxicity of Carcinogenic PAHs (cPAHs) using Toxicity Equivalency Factors (TEFs)*. Toxics Cleanup Program. Publication # 15-09-049. April.

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Ecology. 2024. Cleanup Levels and Risk Calculation Tables. February update. Available at: https://ecology.wa.gov/regulations-permits/guidance-technical-assistance/contamination-clean-up-tools/clarc/data-tables.

APPENDIX Q

GIS Inverse Distance Weighting Interpolation Methodology and Calibration

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APPENDIX Q
GIS INVERSE DISTANCE WEIGHTING INTERPOLATION METHODOLOGY AND CALIBRATION

BLAKELY HARBOR PARK SITE
BAINBRIDGE ISLAND, WASHINGTON

Prepared for

Port Blakely Tree Farms
1501 Fourth Avenue, Suite 2150
Seattle, Washington 98101

Prepared by

Geosyntec Consultants, Inc.
520 Pike Street, Suite 2600
Seattle, Washington 98101

Project Number: PNG0900

February 2025

Geosyntec consultants

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Figure 6: IDW Interpolation of TCDD in Surface Soil and Sediment using Optimized Settings

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
bgs	below ground surface
cm	centimetern
COPCs	chemicals of potential concern
CV	cross-validated
DCAP	draft cleanup action plan
Ecology	Washington State Department of Ecology
FN	false negative
FP	false positive
FS	Feasibility Study
ft	foot/feet
Geosyntec	Geosyntec Consultants, Inc.
IDW	inverse distance weighting
Port Blakely	Port Blakely Tree Farms
RI	Remedial Investigation
RMSE	root mean square errors
SL	screening levels
TCDD	tetrachlorodibenzoparadioxin
TEQ	total equivalents
the Site	Blakely Harbor Park Site

1. INTRODUCTION AND PURPOSE

On June 24, 2020, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) with Port Blakely Tree Farms (Port Blakely) to conduct a remedial investigation and feasibility study (RI/FS) and prepare a draft cleanup action plan (DCAP) at the Blakely Harbor Park site (the Site) located on Bainbridge Island, Kitsap County, Washington (Ecology and Port Blakely, 2020). The Site is the former location of a large sawmill and is located within Blakely Harbor Park, a public park owned and managed by Bainbridge Island Parks and Recreation District.

Geosyntec Consultants, Inc. (Geosyntec) is conducting the remedial investigations on behalf of Port Blakely. This appendix documents the optimization of inverse distance weighting (IDW) interpolation methodology for GIS mapping applications. This methodology will help interpolate concentrations of chemicals of potential concern (COPCs) in soil and sediment to verify the extent of contamination at the Site and identify areas with concentrations that exceed preliminary screening levels (SL).

Inverse distance weighting is a deterministic method for spatial interpolation of datasets used to evaluate soil and sediment chemistry both area wide and site wide. When the IDW interpolation is conducted, values (e.g., concentrations) are assigned to a location by calculating a weighted average of the known values available at nearby locations. IDW has been used for interpolation of environmental data in previous studies conducted at the Site by Ecology (GeoEngineers, 2019; Leidos and NewFields, 2019).

This appendix documents the optimization of IDW methodology proposed to interpolate concentrations of COPCs in surface soil and sediment at the Blakely Harbor Park Site using a combined dataset, including Phase 1 RI data (2021) and historical data.[1]

The purpose of this appendix is to identify the IDW settings that minimize the modeling errors associated with the interpolation process. Ecology conducted environmental sampling at the Site in 2019 and adopted the IDW methodology to interpolate the collected data (Nakayama, 2020; personal communication). The set of parameters used during the 2019 study (Table 1) were considered for the purpose of this study. However, the environmental dataset collected more recently in the RI has a larger sample size and spatial coverage compared to previous investigations, and, therefore, re-calibration of IDW parameters was needed for interpolation.

The following sections describe the interpolation framework, including a description of the IDW settings (Section 2.1) and the dataset used (Section 2.2), the selection criteria used to evaluate the optimal IDW settings (Section 2.3), the optimization results (Section 3), and the final recommendations (Section 4).

[1] Phase 2 data collected for the RI in 2022 were not included in the evaluation. Validated data were not yet available at time of this model calibration. However, the Phase 2 was primarily to fill in data gaps and should not significantly alter the Phase 1 parameterization using the larger dataset.

2. IDW MODEL CALIBRATION

Settings of the IDW parameters influence the accuracy of the interpolation. Therefore, prior to applying the IDW methodology to the full RI dataset, we selected a range of IDW settings and evaluated multiple combinations of these settings. We considered the errors associated with the interpolation outputs and selected the best-fit IDW settings to minimize those errors. The following subsections describe details of this optimization process.

2.1 IDW Range-Finding Settings

Numerous IDW parameters can be optimized (power, radius, minimum and maximum neighbors, etc.), and thus the first step in the optimization process was to select the combination of settings to evaluate. Table 1 reports the settings used in a previous environmental study conducted at the Site (Nakayama, 2020).

The settings of IDW parameters considered for this memorandum included combinations of power, radius of influence, minimum neighbors, and maximum neighbors, as follows:

- Power—between 0 and 3 in increments of 0.1
- Radius—between 100 and 300 in increments of 50
- Minimum number of neighbors—between 2 and 10 in increments of 2
- Maximum number of neighbors—between 2 and 16 in increments of 2

In addition, data logarithmic transformation was also considered.

2.2 Dataset

The dataset used in this memorandum included surface soil and sediment samples collected during the 2019 environmental studies performed by Ecology (GeoEngineers, 2019; Leidos and NewFields, 2019) and the 2021 remedial investigation performed by Geosyntec on behalf of Port Blakely Tree Farms (Geosyntec, 2022a). Samples included:

- Sediment grabs, collected between 0 and 10 centimeters (cm) below sediment surface
- The surficial interval of sediment cores, collected at depths ranging between 0 to 1 foot (ft) and 0 to 2 ft
- Hand auger soil samples, collected between 0 and 1 ft below ground surface (bgs)
- The first interval of soil borings, collected between 0 and 2 ft bgs

Three COPCs were selected for exploratory analysis of the dataset, including a metal (copper), a polycyclic aromatic hydrocarbon (benzo(a)pyrene), and a dioxin (total equivalents [TEQ] of tetrachlorodibenzoparadioxin [TCDD]). These COPCs were selected to provide broad spatial coverage and concentration distribution across the Site. Table 2 provides a summary of the sample counts in the dataset used for analysis.

2.3 Metrics Considered to Optimize IDW Settings

The optimization process aims to minimize the errors associated with the IDW methodology and several metrics can be used as measure of errors in the calibration analysis (Goovaertes, 1997). The metrics reviewed in this memorandum included the root mean square errors (RMSE), the frequency of positive and false predictions associated with the interpolation process, and cross-validated metrics (CV-RMSE, CV false positive, and CV-false negative). A summary is presented in Table 3 and reported below.

2.3.1 Ordinary and Cross-Validated RMSE

The ordinary RMSE compares differences between each empirical data point and its underlying interpolated grid-cell value, and it can be interpreted as the average error in prediction at each sampling location.

The cross validated (CV)-RMSE compares the same metric but generates sequential interpolations (one for each data point) by removing that co-located data point prior to interpolation. CV consists of generating a "training dataset" by removing one data-point from the original dataset; this training dataset is used to build a model and predict concentrations at the location of the removed datapoint. Thus, CV excludes the empirical concentration from the interpolation dataset and then compares the empirical and interpolated concentrations. The differences between predictions and true values are then used to calculate CV metrics, and this process assesses modeling errors associated with parameter settings.

2.3.2 Ordinary and Cross-Validated Frequencies of False Predictions

Interpolation yields an ordinary "false" prediction when the interpolated sample concentration at a specific location falls within a higher (false positive, FP) or lower (false negative, FN) concentration range than the empirical data point. Cross-validated false negative (CV-FN) and positive (CV-FP) predictions were evaluated by using the "cross-validated dataset" generated by removing a data-point from the ordinary dataset and replacing it with the interpolated value.

The types and number of ordinary and CV false predictions were counted relative to concentration ranges for the COPC included in the dataset. The concentration ranges identified are based on preliminary SL selected (Geosyntec, 2022b) and are shown in Table 4. A CV false prediction would occur if the predicted value was not within the SL bracket where the observed value would fall.

2.4 Evaluation Process

The R programming language was used in conjunction with the R package phylin (Tarroso et al., 2015) to estimate the ordinary and cross-validated RMSE and false predictions for multiple combinations of each IDW setting considered. A total of 6,000 different parameter sets per each analyte were evaluated for each of the three analytes separately.

Table 5 reports combinations of IDW settings minimizing measured RMSE, CV-RMSE, ordinary and cross-validated false predictions. The Blakely Harbor dataset was interpolated using all combinations of the IDW parameters listed in Table 5; Figures 1 shows interpolated concentrations for copper, Figure 2 for benzo(a)pyrene, and Figure 3 for TCDD TEQ.

IDW interpolations were visualized to assess representativeness of the measured data, and based on this assessment (Figures 1 to 3), two selection criteria were identified for IDW optimization:

- The frequency of the ordinary false negative predictions, because minimizing this metric prioritizes accuracy and yields a more conservative interpolation output. Ultimately, minimizing false negative predictions limits the frequency of a predicted value not exceeding SL when the observed value does.
- The CV-RMSE, because selecting minimal CV-RMSE values limits discretization and modeling errors associated with the interpolation outputs. The IDW settings minimizing the ordinary false negative also showed minimal CV-RMSE (within a 10% range of the minimum CV-RMSE value).

3. IDW OPTIMIZATION RESULTS

This section describes results of the IDW optimization process for copper, benzo(a)pyrene, and TCDD TEQ. The optimal combinations of IDW settings minimize the frequency of false predictions to prioritize accuracy and yield a more conservative interpolation and CV error statistics to limit discretization and modeling errors associated with the interpolation outputs. Best-fit IDW settings are highlighted in Table 5 and correspond to the second map from the top to the left in Figures 1 through 3.

3.1 Least Error Best-fit Settings

A summary of the least error best-fit setting yielded by the optimization process is reported below per analyte:

- For copper, optimal IDW settings correspond to ordinary false negative predictions equal to zero and CV-RMSE of 109.4 (2% higher than the minimum possible value with the analyzed dataset, 107.4). The map depicting interpolated results (labeled “D” in Figure 1) shows consistency between data points and interpolated data. Data points different than surrounding interpolated data are noticeable in results shown in Figures 1-A, -C, and -E, which depict outputs for IDW settings minimizing only CV-RMSE, CV-FN, and CV-FP.
- For benzo(a)pyrene, optimal IDW settings correspond to ordinary false negative predictions equal to zero and CV-RMSE of 1877 (9% higher than the minimum possible value with the analyzed dataset, 1723.7). The map depicting interpolated results (labeled “D” in Figure 2) shows consistency between data points and interpolated data. Data points different than surrounding interpolated data are appreciable in results showed in Figures 1-A, -C, -E, and -F, which depict outputs for IDW settings minimizing only CV-RMSE, CV-FN, CV-FP, and FP.
- For TCDD TEQ, optimal IDW settings correspond to ordinary false negative predictions equal to zero and CV-RMSE of 28.2 (7% higher than the minimum possible value with the analyzed dataset, 26.5). The map depicting interpolated results (labeled “D” in Figure 3) shows consistency between data points and interpolated data. Data points different than surrounding interpolated data are noticeable in f in results shown in Figures 1-A, -C, -E,

and -F, which depict outputs for IDW settings minimizing only CV-RMSE, CV-FN, CV-FP, and FP.

3.2 Best-fit Interpolation Maps

IDW settings that minimize false negative predictions and CV-RMSE values (within 10% of the minimum CV-RMSE) varied for each tested analyte and are as follows:

- Copper: Logarithmic transformation | power of 5.2 | maximum/minimum nearest neighbors 10/16 | search radius 300
- Benzo(a)pyrene: Logarithmic transformation | power of 3.6 | maximum/minimum nearest neighbors 10/16 | search radius 250
- TCDD TEQ: No transformation | power of 2.4 | maximum/minimum nearest neighbors 2/12 | search radius 200

Table 5 shows IDW settings above minimum false negative predictions and CV-RMSE values with respect to IDW settings used in previous studies by Ecology (GeoEngineers, 2019; Leidos and NewFields. 2019). The map produced using the best-fit IDW settings are shown for each COPC in Figure 1, Figure 2, and Figure 3.

4. RECOMMENDATIONS

The recommended IDW settings for interpolating data from surface soil and sediment at the Blakely Harbor Park Site are shown in Table 6 and include the following:

- Data are logarithmic transformation
- Power of 3
- Maximum/minimum nearest neighbors 8/2
- Search radius of 200 ft

These IDW settings were selected because they represent the best fit for minimizing interpolation errors for the entire dataset. The map produced using the recommended IDW settings is shown for each COPC in Figure 4, Figure 5, and Figure 6. For comparison, Figures 4 through 6 includes non-transformed selected IDW settings and historical IDW settings reported in Table 1 (GeoEngineers, 2019; Leidos and NewFields, 2019). The selected IDW settings consolidated hot spot areas compared to the non-transformed and historical data and were considered more representative of the Site conditions.

5. REFERENCES

GeoEngineers. 2019. *Surface Soil and Sediment Data Report, Former Port Blakely Mill Site.* Bainbridge Island, Washington. August.

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TABLES

Geosyntec consultants

Table 1. Ecology IDW Interpolation Parameters

Parameter	Setting
Data Transformation	None
Power	2
Search Neighbors	Standard
Maximum Neighbors	5
Minimum Neighbors	3
Sector Type	Full
Major Semiaxis	200
Minor Semiaxis	200
Angle	0

References

Nakayama, J. 2020. Blakely Harbor Park IDW methods. Personal email communication from John Nakayama to John Evered of Ecology, and forwarded to Anne Fitzpatrick, Geosyntec. 17 December.

Table 2. Summary of the Dataset and Sample Counts

Characteristics	2019 (a)	2019 (b)	2021 (c)	Combined Dataset
Collection Timeframe	June 2019	July 2019	Aug-Sept 2021	2019-2021
Total Sample Size	11	40	69	120
Sample Size per Matrix				
Sediment Grabs (0-10 cm)	6	40	29	75
Sediment Cores (0-2 ft)	0	0	17	17
Surface Soil (0-1 ft)	5	0	16	21
Soil Borings (0-2 ft)	0	0	7	7
Sample Size per COPC				
Benzo(a)pyrene	11	40	69	120
Copper	6	40	69	115
TCDD TEQ	11	10	44	65

Acronyms

cm = centimeters
COPC = contaminant of potential concern
ft = feet
TCDD = tetrachloroparadioxin
TEQ = Toxic Equivalents

References

(a) GeoEngineers. 2019. Surface Soil and Sediment Data Report, Former Port Blakely Mill Site. Bainbridge Island, Washington. August.
(b) Leidos and NewFields. 2019. Blakely Harbor Park Sediment Investigation, Draft Data Report. Prepared for the Washington State Department of Ecology, Toxics Cleanup Program, Lacy, Washington. October.
(c) Geosyntec. 2022. Final Remedial Design Investigation/Feasibility Study Work Plan, Blakely Harbor Park Site. Prepared for Port Blakely Tree Farms. For submittal to Washington State Department of Ecology, Olympia Washington. January.

Table 3. Potential Selection Criteria to Identify Optimal IDW Parameters

Metric	Description
RMSE	Measure of the difference between predicted and observed values. This metrics is indicative of the discretization errors.
Ordinary FP	Frequency of false prediction resulting in a predicted value exceeding SL when observed value does not. This metrics indicates how many times errors introduced by discretizing result in predicting a value exceeding SL when observed value does not.
Ordinary FN	Frequency of false prediction resulting in a predicted value not exceeding SL when observed value does. This metrics indicates how many times errors introduced by discretizing result in predicting a value not exceeding SL when observed value does.
CV-RMSE	Measure of the difference between predicted and observed values in a cross-validated dataset obtained by removing a data-point from the ordinary dataset and replacing it with the interpolated value. This metrics is indicative of the discretization and modeling errors.
CV-FP	Frequency of false prediction resulting in a predicted value exceeding SL when observed value does not evaluated with a cross-validated dataset. This metric indicates how many times errors introduced by discretizing and modeling result in predicting a value exceeding SL when observed value does not.
CV-FN	Frequency of false prediction resulting in a predicted value not exceeding SL when observed value does evaluated with a cross-validated dataset. This metric indicates how many times errors introduced by discretizing and modeling result in predicting a value not exceeding SL when observed value does.

Acronyms

CV = cross-validated
FN = false negative
FP = false positive
RMSE = root mean square error
SL = screening levels

Table 4. Interpolation Bins

Concentration Range	Max Value	Basis of Screening Level
Copper in mg/kg		
--	0.069	Soil SL, protective of groundwater
> 36	36	Puget Sound 90% soil background
> 36 to 45	45	Sediment natural background
> 45 to 90	90	2x NB
> 90 to 180	180	4x NB
>180 to 390	390	Sediment cleanup objective
> 390		
Benzo(a)pyrene in µg/kg		
--	0.016	Protection of leaching to surface water
< 16	16	1000x Soil SL
> 16 to 160	160	1/10 SCO
>160 to 800	800	1/2 SCO
> 800 to 1600	1600	Sediment cleanup objective
> 1600 to 3200	3200	2x SCO
> 3200		
TCDD TEQ in ng/kg		
--	0.0013	Protection of leaching to surface water
>4	4	Sediment natural background
< 4 to 5.21	5.21	Soil natural background
> 5.21 to 15	15	3 x NB
> 15 to 45	45	9 x NB
> 45		

Acronyms

-- = Not considered
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
NB = Natural Background
ng/kg = nanograms per kilogram
SCO = Benthic Sediment Cleanup Objective
SL = Screening Level
TCDD = tetrachloroparadioxin
TEQ = Toxic Equivalents

References

Geosyntec. 2022. Final Remedial Design Investigation/Feasibility Study Work Plan, Blakely Harbor Park Site. Prepared for Port Blakely Tree Farms. For submittal to Washington State Department of Ecology, Olympia Washington. January.

Table 5. Best IDW Settings Minimizing Optimization Parameters

IDW Settings					*Evaluation Criteria*						
Transformation	**Power**	**Radius**	**Minimum Neighbors**	**Maximum Neighbors**	**Ordinary RMSE**	**Ordinary FP**	**Ordinary FN**	**CV-RMSE**	**CV-RMSE/ min CV-RMSE**	**CV-FP**	**CV-FN**
Copper											
None	1	250	10	14	21.37	1	12	118.17	10%	30	10
None	2	200	3	5	4.49	1	2	113.57	6%	31	17
None	6	100	4	8	1.42	0	0	122.54	14%	28	25
Logarithmic	0.4	200	2	6	79.01	21	10	118.85	11%	12	27
Logarithmic	3.6	300	3	16	1.93	0	1	107.38	0%	20	27
Logarithmic	3.6	300	10	16	1.93	0	1	107.38	0%	20	27
Logarithmic	**5.2**	**300**	**10**	**16**	**1.45**	**0**	**0**	**109.35**	**2%**	**21**	**26**
Logarithmic	**3**	**200**	**2**	**8**	**2.49**	**0**	**1**	**108.04**	**1%**	**17**	**28**
Benzo(a)pyrene											
None	0.6	300	8	16	864.61	7	49	1789.46	4%	52	12
None	1.4	300	8	16	226.37	0	13	1864.30	8%	50	13
None	2	200	3	5	159.11	1	5	2022.04	17%	39	20
None	6	100	2	6	26.50	2	0	2402.14	39%	36	27
Logarithmic	0.2	100	4	8	1534.39	26	17	1739.73	1%	22	27
Logarithmic	0.2	200	2	6	1557.65	29	22	1723.73	0%	32	28
Logarithmic	**3.6**	**250**	**10**	**16**	**107.80**	**2**	**0**	**1877.02**	**9%**	**26**	**30**
Logarithmic	**3**	**200**	**2**	**8**	**142.75**	**2**	**2**	**1840.33**	**7%**	**28**	**29**
TCDD TEQ											
None	0.2	100	8	12	22.98	8	39	29.68	12%	51	11
None	0.2	150	2	6	17.08	7	22	26.50	0%	39	18
None	2	200	3	5	0.32	0	1	28.57	8%	40	17
None	1.2	150	2	8	2.45	0	5	27.13	2%	35	21
None	**2.4**	**200**	**2**	**12**	**0.13**	**0**	**0**	**28.22**	**7%**	**39**	**20**
Logarithmic	1.6	150	2	6	1.54	0	1	30.69	16%	28	31
Logarithmic	6	100	2	6	0.00	0	0	36.06	36%	30	32
Logarithmic	**3**	**200**	**2**	**8**	**0.04**	**0**	**0**	**31.42**	**19%**	**30**	**29**

Acronyms
CV = cross-validated
FN = false negative
FP = false positive
RMSE = root mean square error
TCDD = tetrachloroparadioxin
TEQ = toxic equivalents

Bold = best fit minimizing Ordinary FN and CV-RMSE
Bold = selected for RIFS dataset
red font = previously used by Ecology

Table 6. Recommended IDW Interpolation Parameters for the RI/FS

IDW Parameter	RI/FS Setting
Data Transformation	logarithmic
Power	3
Search Neighbors	Standard
Maximum Neighbors	8
Minimum Neighbors	2
Sector Type	Full
Major Semiaxis	200
Minor Semiaxis	200
Angle	0

red font = previously used by Ecology

FIGURES

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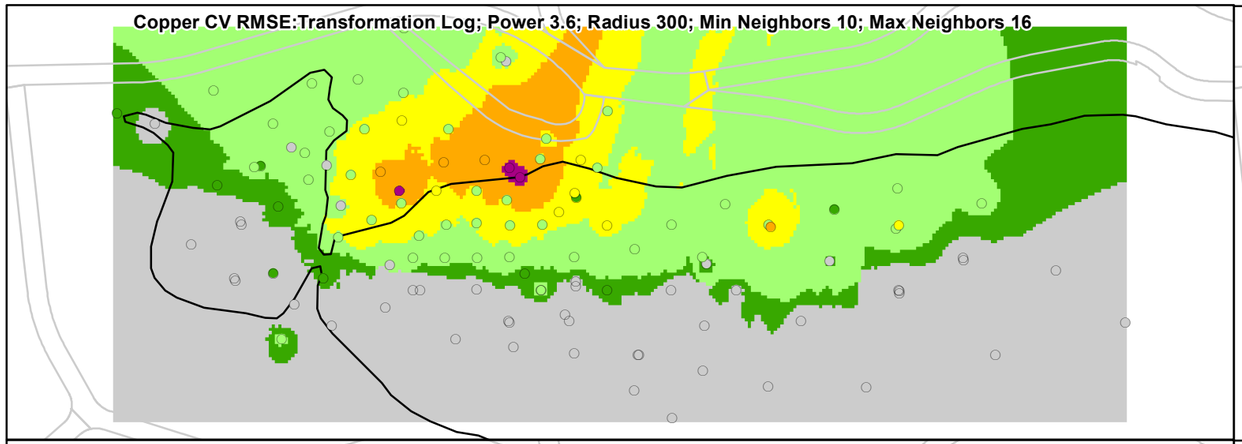
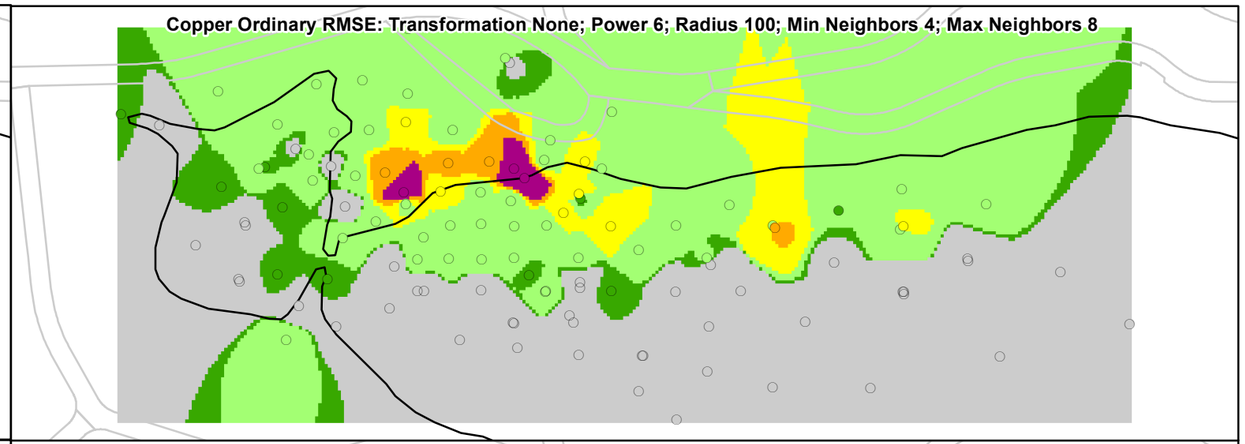
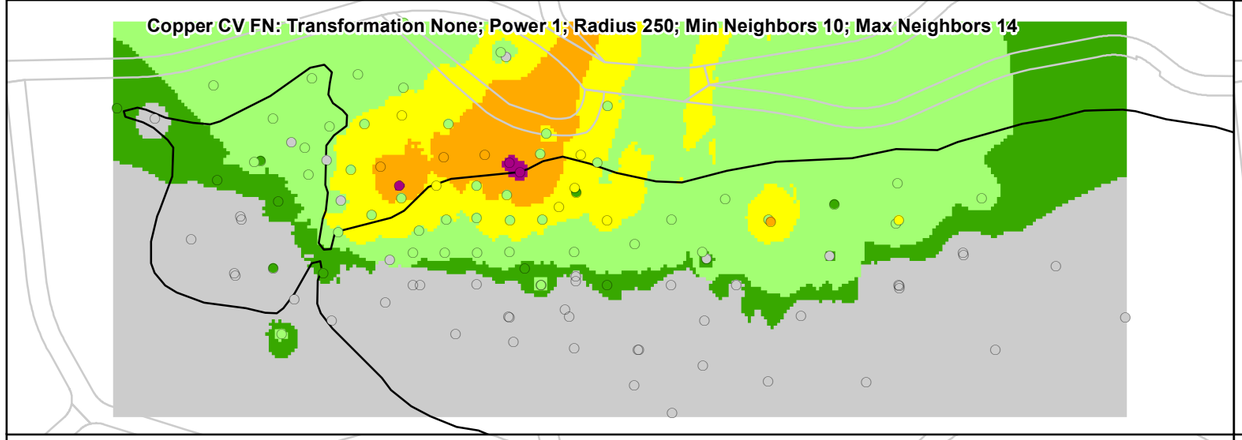
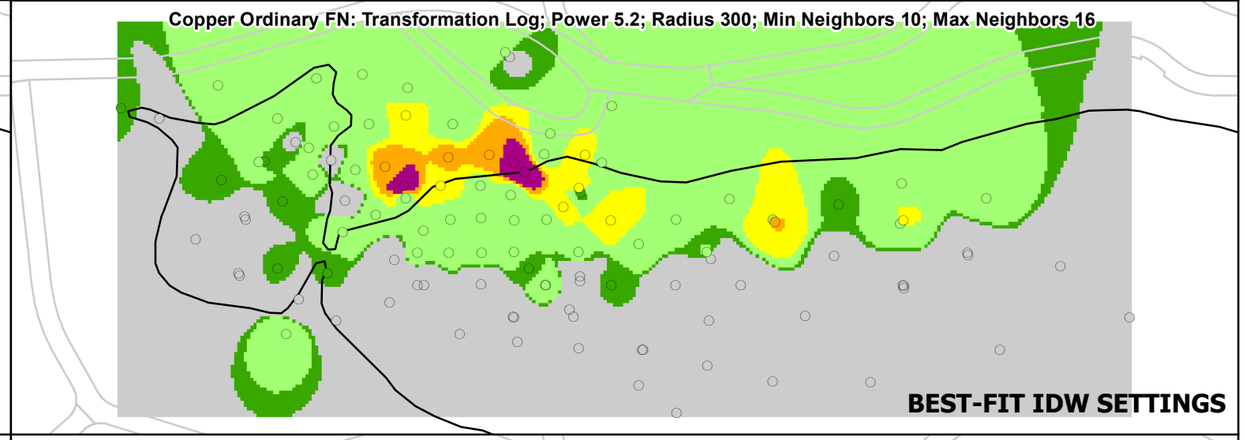
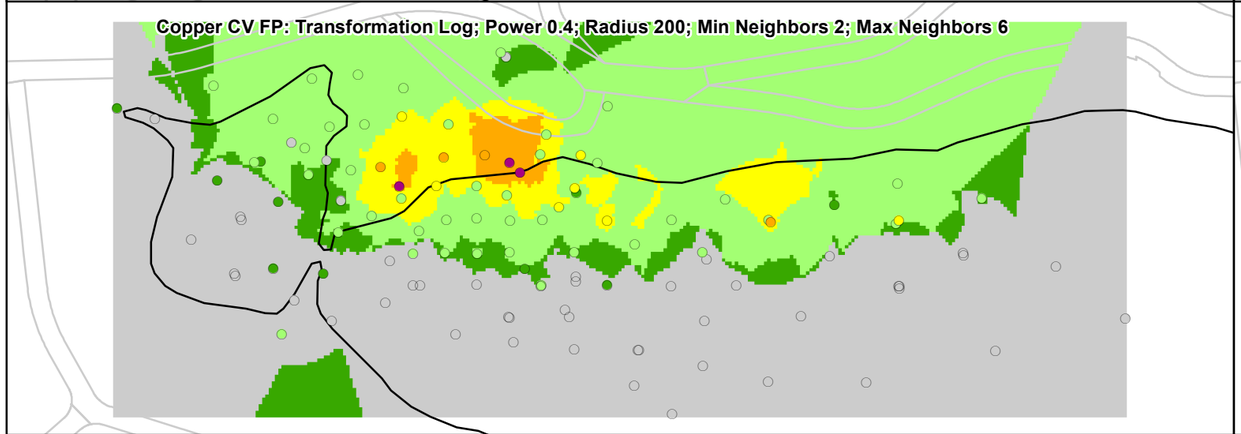


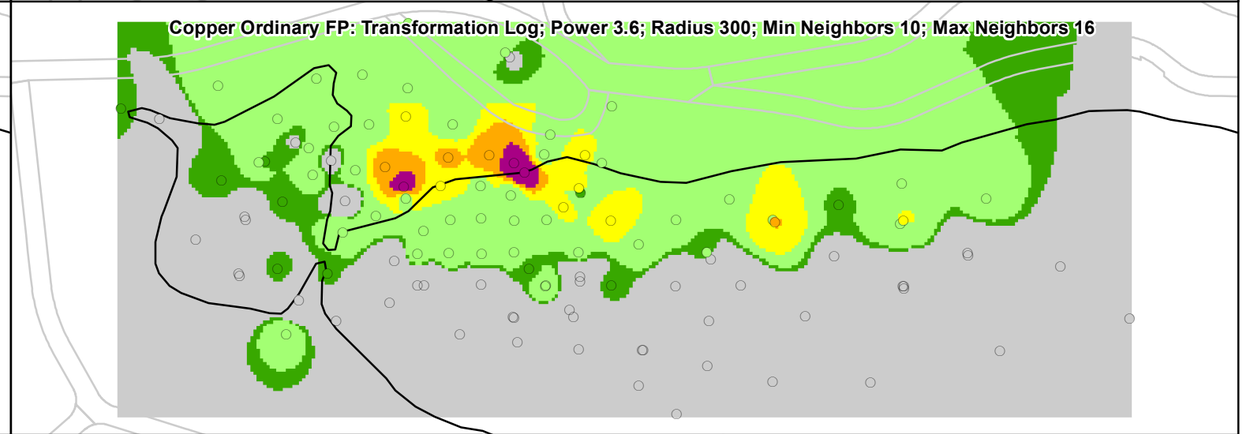






BEST-FIT IDW SETTINGS





Legend

Observed Copper Concentration (mg/kg)

- <36
- 36- 45
- 45 - 90 (2X CSO)
- 90 - 180 (4 CSO)
- 180 - 390 (Sediment SL, Protective of Benthic)
- >390

Interpolated Copper Concentration (mg/kg)

- <36
- 36- 45
- 45 - 90 (2X CSO)
- 90 - 180 (4 CSO)
- 180 - 390 (Sediment SL, Protective of Benthic)
- >390

A = Interpolation output for IDW settings that minimize CV-RMSE
B = Interpolation output for IDW settings that minimize CV-FN
C = Interpolation output for IDW settings that minimize CV-FP
D = Interpolation output for IDW settings that minimize RMSE
E = Interpolation output for IDW settings that minimize FN
F = Interpolation output for IDW settings that minimize FP

CV = Cross Validated; RMSE = Root Mean Square Error; FN = False Negative; FP = False positive

Notes:
For the log-normal results, the observed data had a log-normal transformation applied, the interpolation performed, then the anti-log transformation applied to the interpolation.

N

0 500 Feet

Interpolation of Copper in Surface Soil and Sediment using IDW Settings that minimize Error Metrics

Blakely Harbor Park Site (Bainbridge Island, WA)

Geosyntec consultants

MVI/Sea | February 2025

Figure 1

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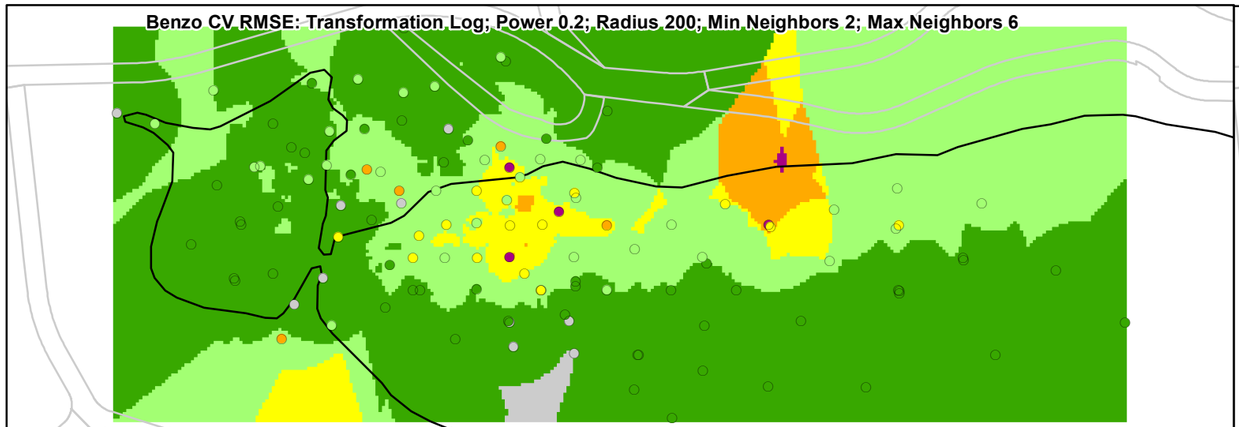
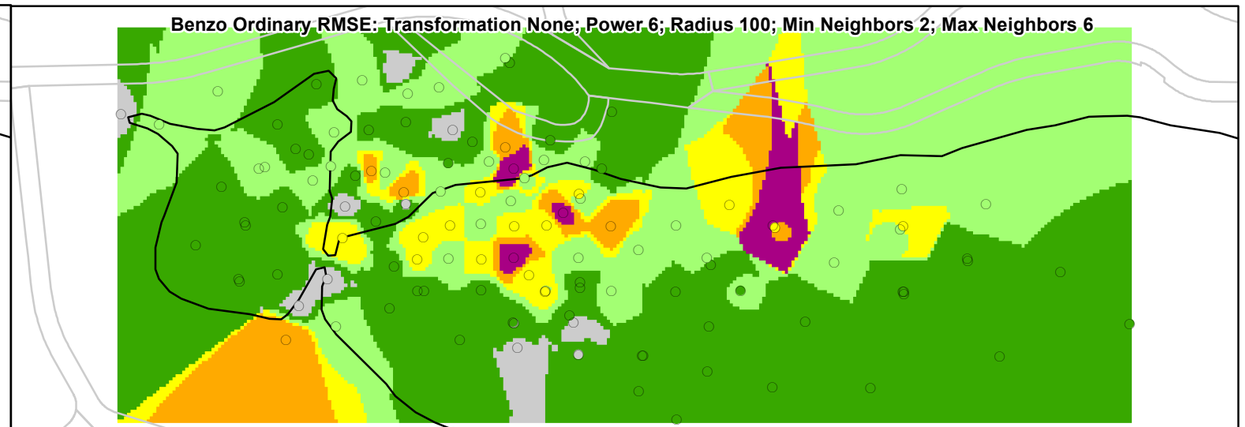
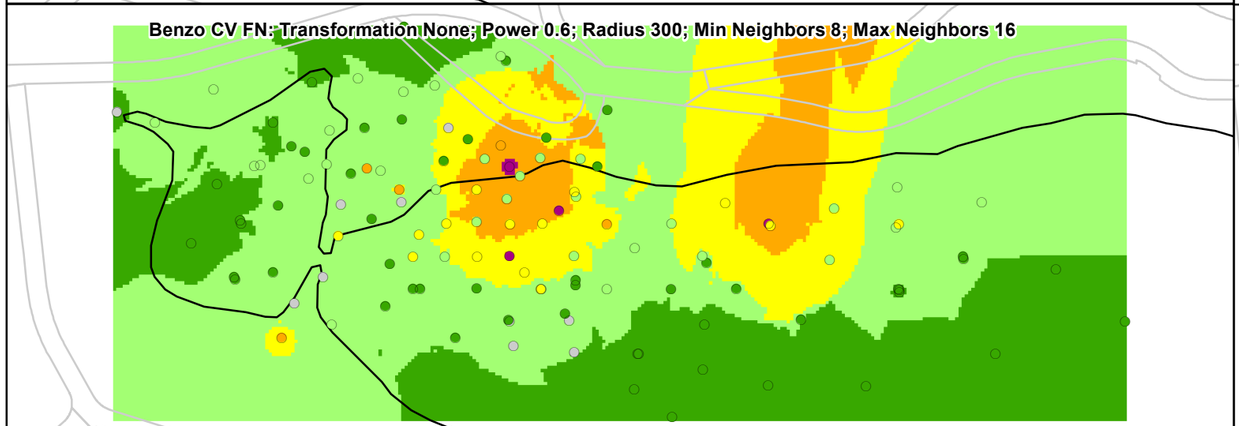
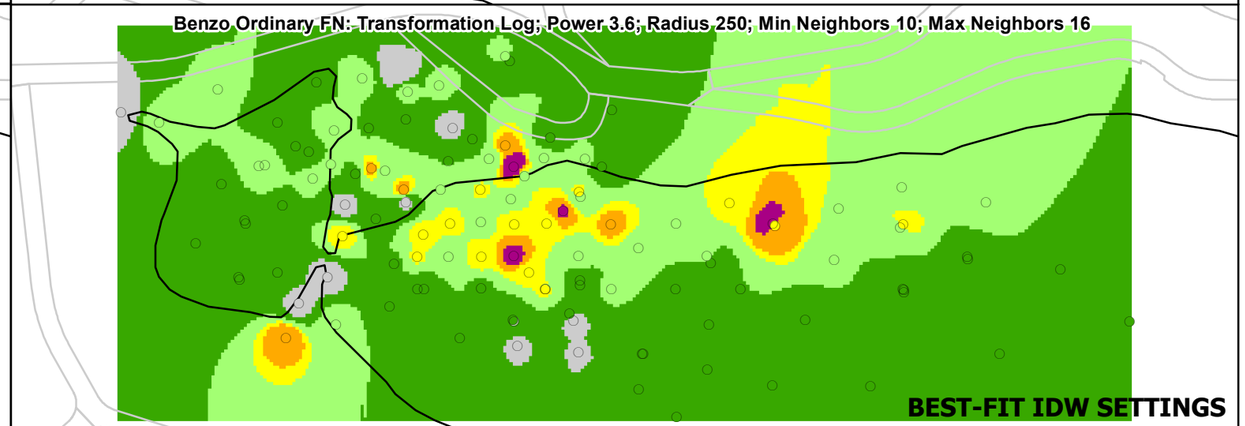
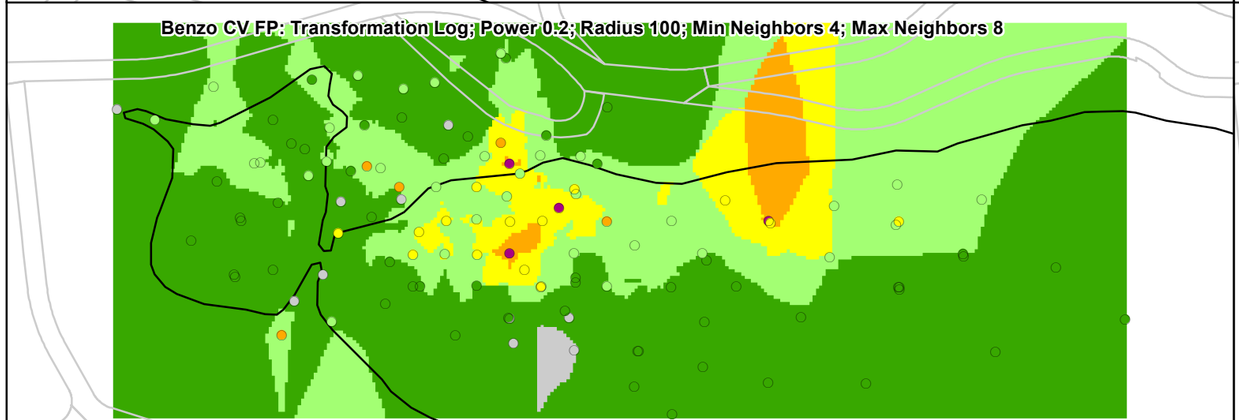


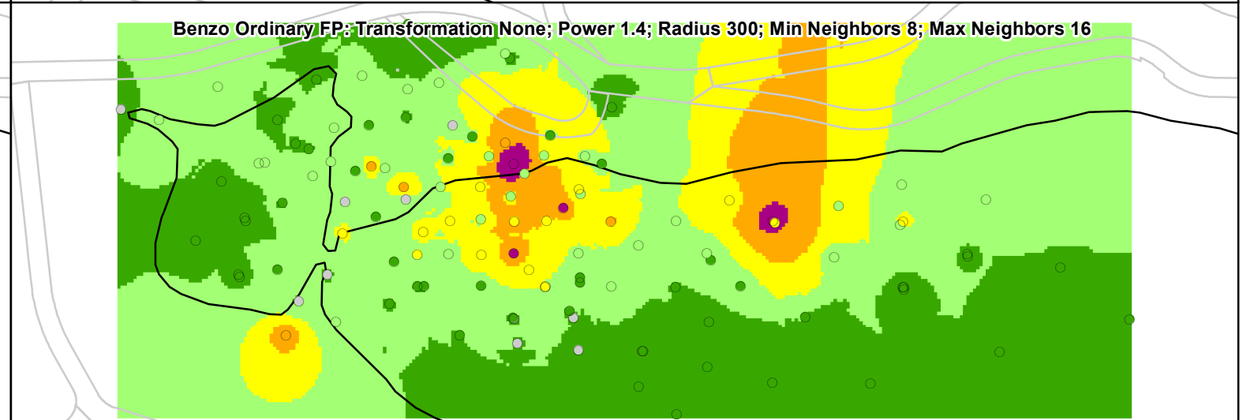






BEST-FIT IDW SETTINGS





Legend

Observed Benzo(a)Pyrene Concentration (µg/kg)

- <16 (1,000X Soil SL, Protective of Groundwater)
- 16 - 160
- 160 - 800
- 800 - 1600 (Sediment SL, Protective of Benthic)
- 1600 - 3200
- >3200

Interpolated Benzo(a)pyrene Concentrations (ug/kg)

- <16 (1,000X Soil SL, Protective of Groundwater)
- 16 - 160
- 160 - 800
- 800 - 1600 (Sediment SL, Protective of Benthic)
- 1600 - 3200
- > 3200

A = Interpolation output for IDW settings that minimize CV-RMSE
B = Interpolation output for IDW settings that minimize CV-FN
C = Interpolation output for IDW settings that minimize CV-FP
D = Interpolation output for IDW settings that minimize RMSE
E = Interpolation output for IDW settings that minimize FN
F = Interpolation output for IDW settings that minimize FP

CV = Cross Validated; RMSE = Root Mean Square Error; FN = False Negative; FP = False positive

Notes:
For the log-normal results, the observed data had a log-normal transformation applied, the interpolation performed, then the anti-log transformation applied to the interpolation.

N

0 500 Feet

Interpolation of Benzo(a)pyrene in Surface Soil and Sediment using IDW Settings that minimize Error Metrics

Blakely Harbor Park Site (Bainbridge Island, WA)

Geosyntec consultants

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Figure 2

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\Interpolation Optimization\Figure 2 Benzoapyrene ResultsV2.mxd 6/17/2022 6:55:01 AM

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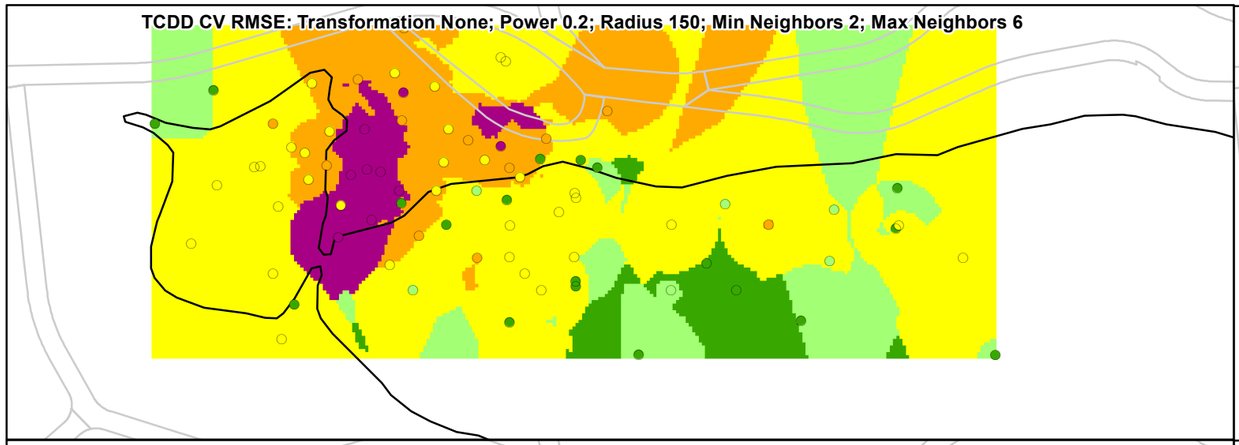
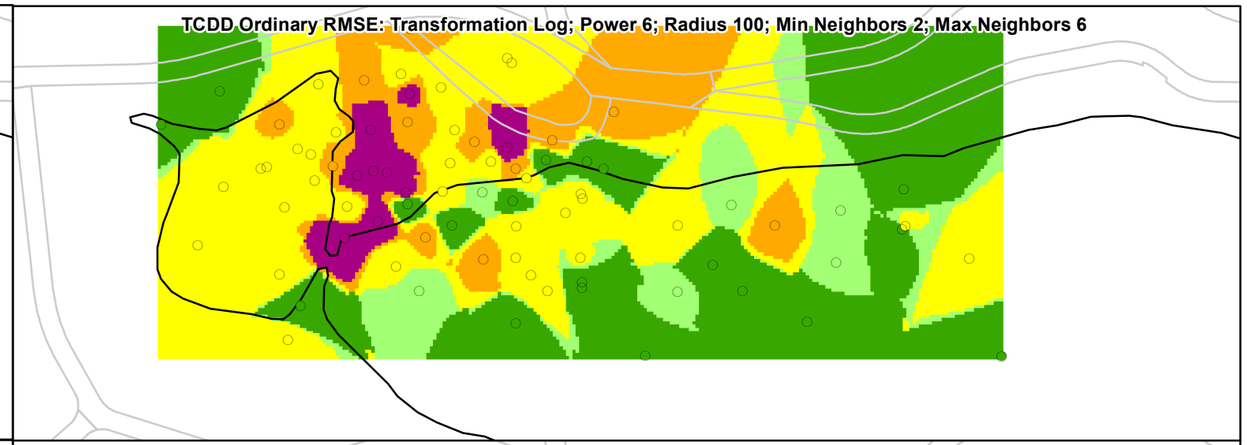
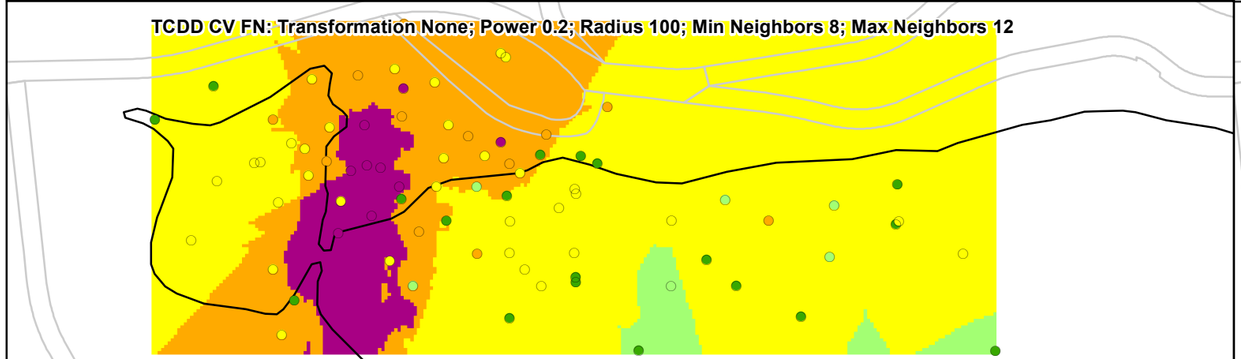
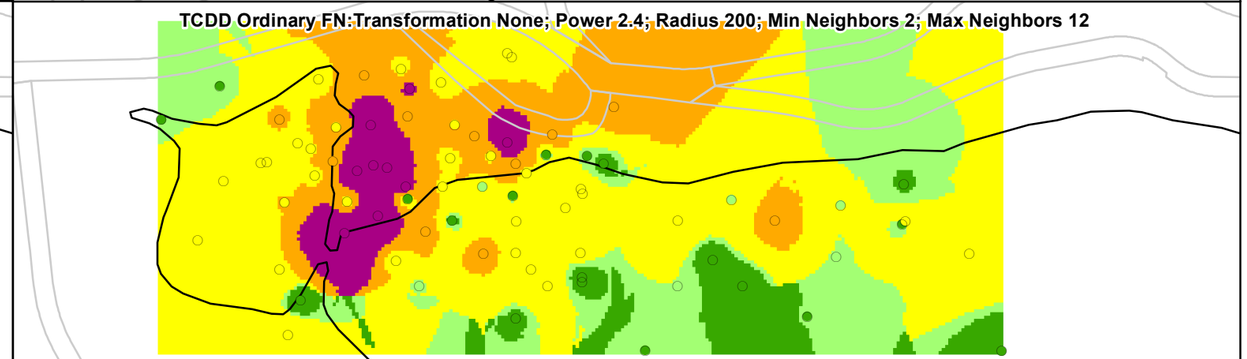
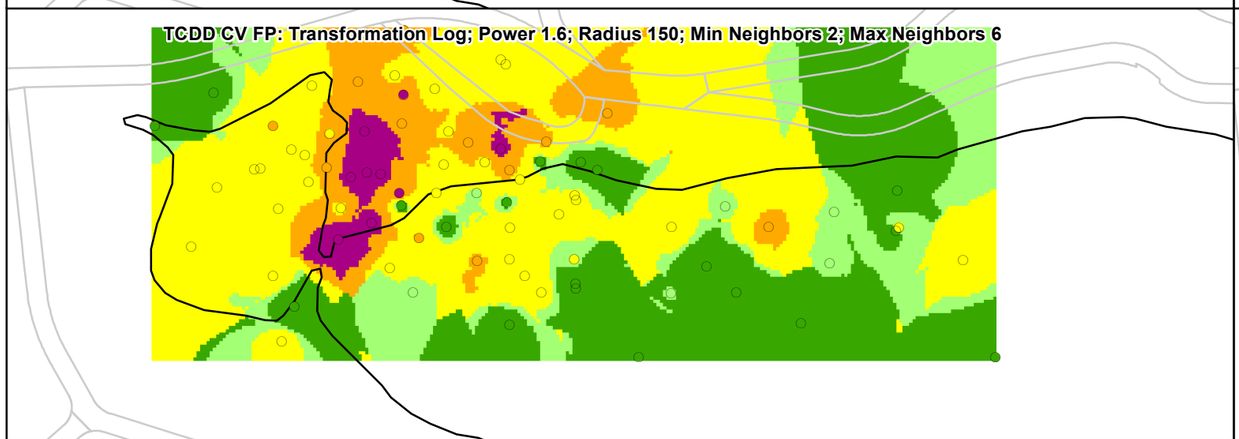


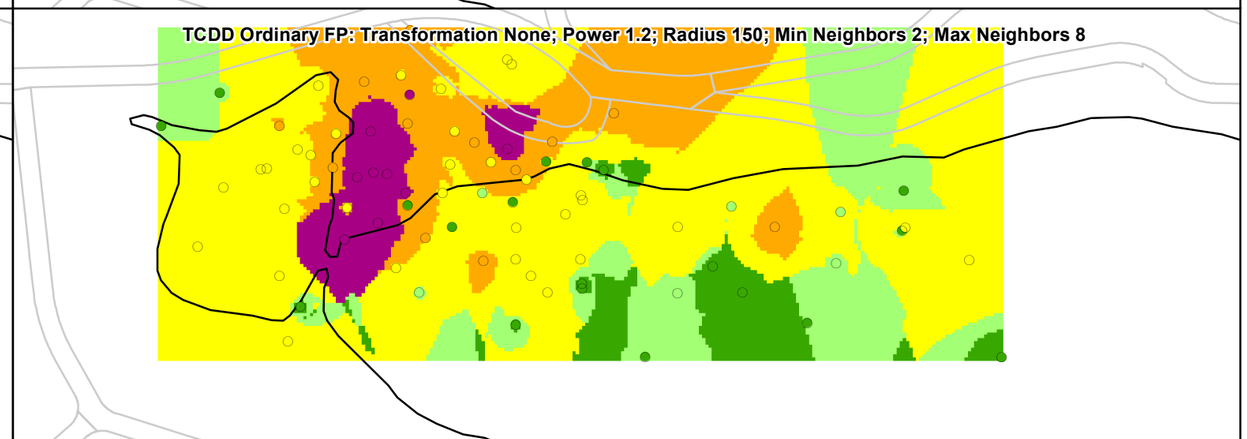






BEST-FIT IDW SETTINGS





Legend

Observed TCDD Concentration (µg/kg)

- < 4.0 (Sediment SL, Protective of Benthic)
- 4.0 - 5.21
- 5.21 - 15.0
- 15.0 - 45.0
- >45.0

Interpolated TCDD Concentration (µg/kg)

- < 4.0 (Sediment SL, Protective of Benthic)
- 4.0 - 5.21
- 5.21 - 15.0
- 15.0 - 45.0
- >45.0

A = Interpolation output for IDW settings that minimize CV-RMSE
B = Interpolation output for IDW settings that minimize CV-FN
C = Interpolation output for IDW settings that minimize CV-FP
D = Interpolation output for IDW settings that minimize RMSE
E = Interpolation output for IDW settings that minimize FN
F = Interpolation output for IDW settings that minimize FP

CV = Cross Validated; RMSE = Root Mean Square Error; FN = False Negative; FP = False positive

Notes:
For the log-normal results, the observed data had a log-normal transformation applied, the interpolation performed, then the anti-log transformation applied to the interpolation.

N

0 500 Feet

Interpolation of TCDD in Surface Soil and Sediment using IDW Settings that minimize Error Metrics

Blakely Harbor Park Site (Bainbridge Island, WA)

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Figure 3

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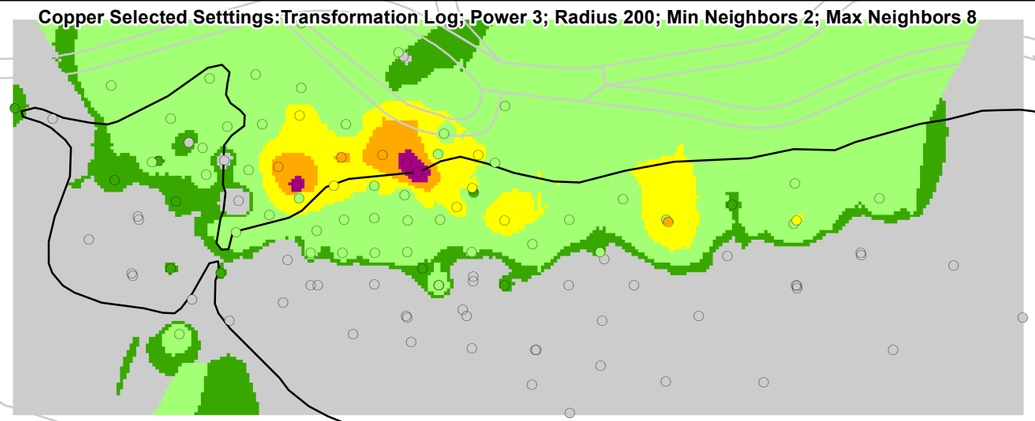
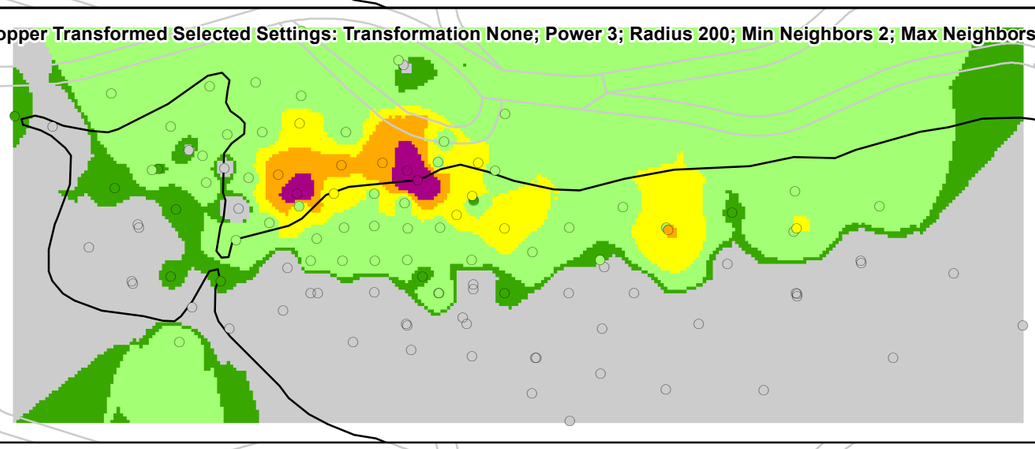
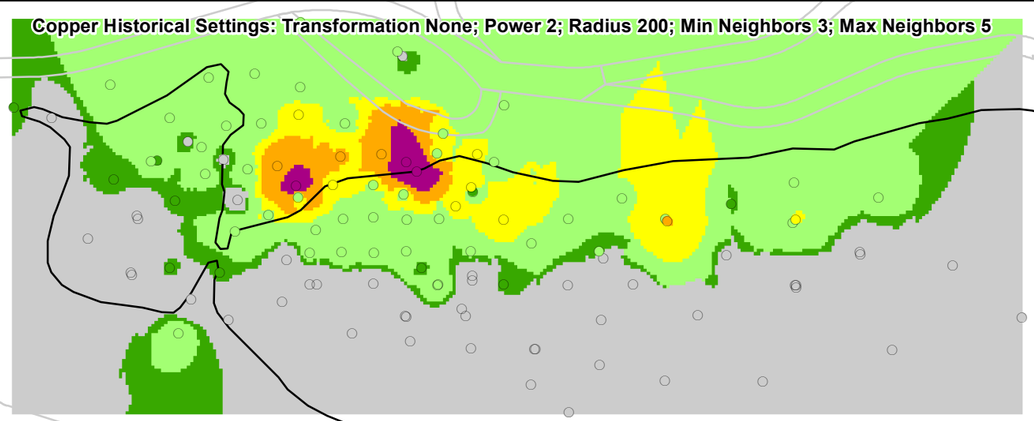
Copper Selected Setttings:Transformation Log; Power 3; Radius 200; Min Neighbors 2; Max Neighbors 8



Copper Transformed Selected Settings: Transformation None; Power 3; Radius 200; Min Neighbors 2; Max Neighbors 8



Copper Historical Settings: Transformation None; Power 2; Radius 200; Min Neighbors 3; Max Neighbors 5



Legend

Observed Copper Concentration (mg/kg)

- <36
- 36- 45
- 45 - 90 (2X CSO)
- 90 - 180 (4 CSO)
- 180 - 390 (Sediment SL, Protective of Benthic)
- >390

Interpolated Copper Concentration (mg/kg)

- <36
- 36- 45
- 45 - 90 (2X CSO)
- 90 - 180 (4 CSO)
- 180 - 390 (Sediment SL, Protective of Benthic)
- >390

Notes:
For the log-normal results, the observed data had a log-normal transformation applied, the interpolation performed, then the anti-log transformation applied to the interpolation.

N

0 500 Feet

IDW Interpolation of Copper in Surface Soil and Sediment using Optimized Settings

Blakely Harbor Park Site
(Bainbridge Island, WA)

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Figure 4

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\Interpolation Optimization\Figure 4 Copper Results Prefered.mxd 6/28/2023 8:54:59 AM

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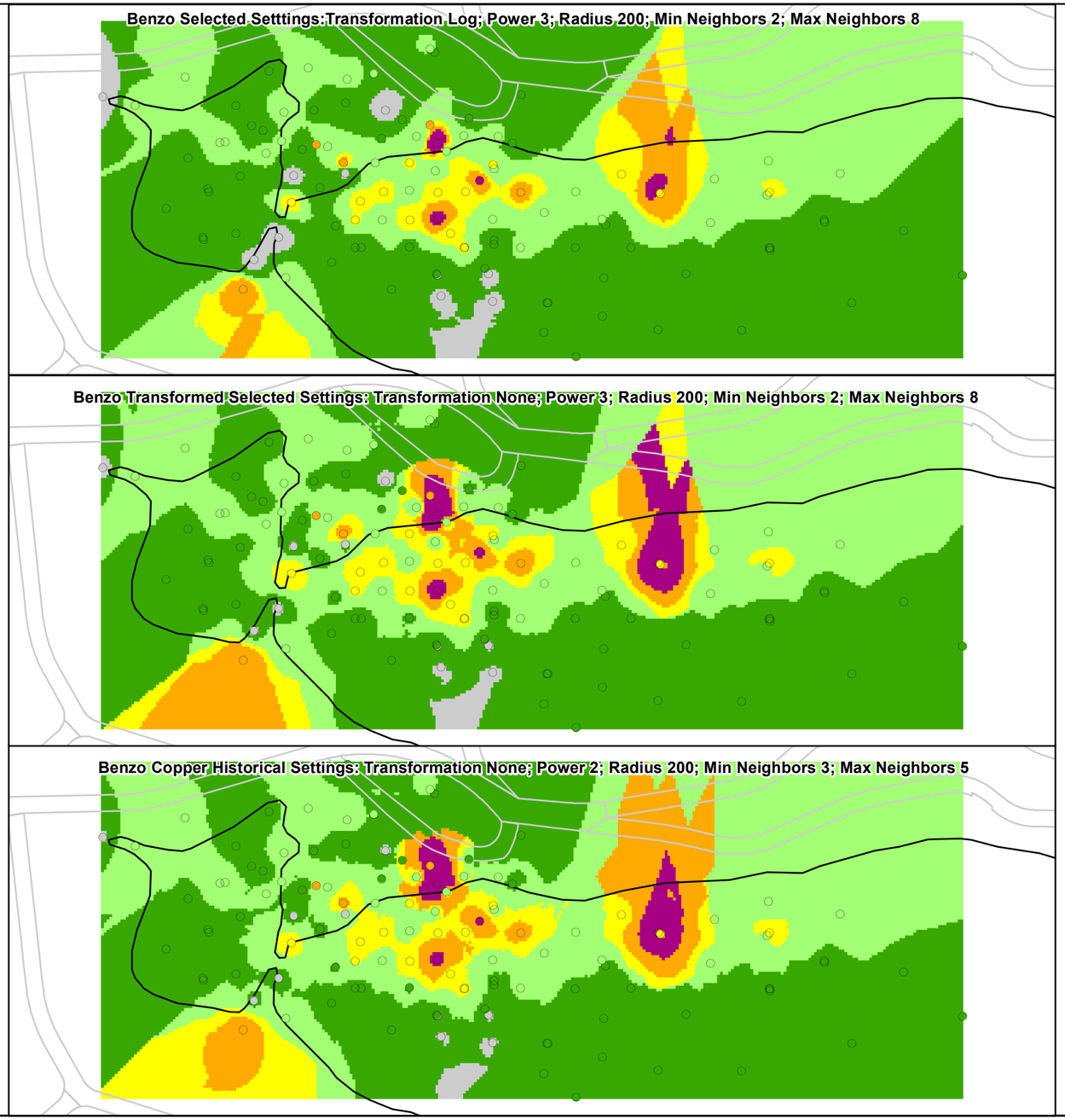

Legend

Observed Benzo(a)Pyrene Concentration (µg/kg)

- <16 (1,000X Soil SL, Protective of Groundwater)
- 16 - 160
- 160 - 800
- 800 - 1600 (Sediment SL, Protective of Benthic)
- 1600 - 3200
- >3200

Observed Benzo(a)Pyrene Concentration (µg/kg)

- <16 (1,000X Soil SL, Protective of Groundwater)
- 16 - 160
- 160 - 800
- 800 - 1600 (Sediment SL, Protective of Benthic)
- 1600 - 3200
- >3200

Notes:
For the log-normal results, the observed data had a log-normal transformation applied, the interpolation performed, then the anti-log transformation applied to the interpolation.

N

0 500 Feet

IDW Interpolation of Benzo(a)Pyrene in Surface Soil and Sediment using Optimized Settings

Blakely Harbor Park Site
(Bainbridge Island, WA)

Geosyntec consultants

Figure 5

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P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\Interpolation Optimization\Figure 5 Benzoapyrene Results Prefered.mxd 6/28/2023 8:53:20 AM

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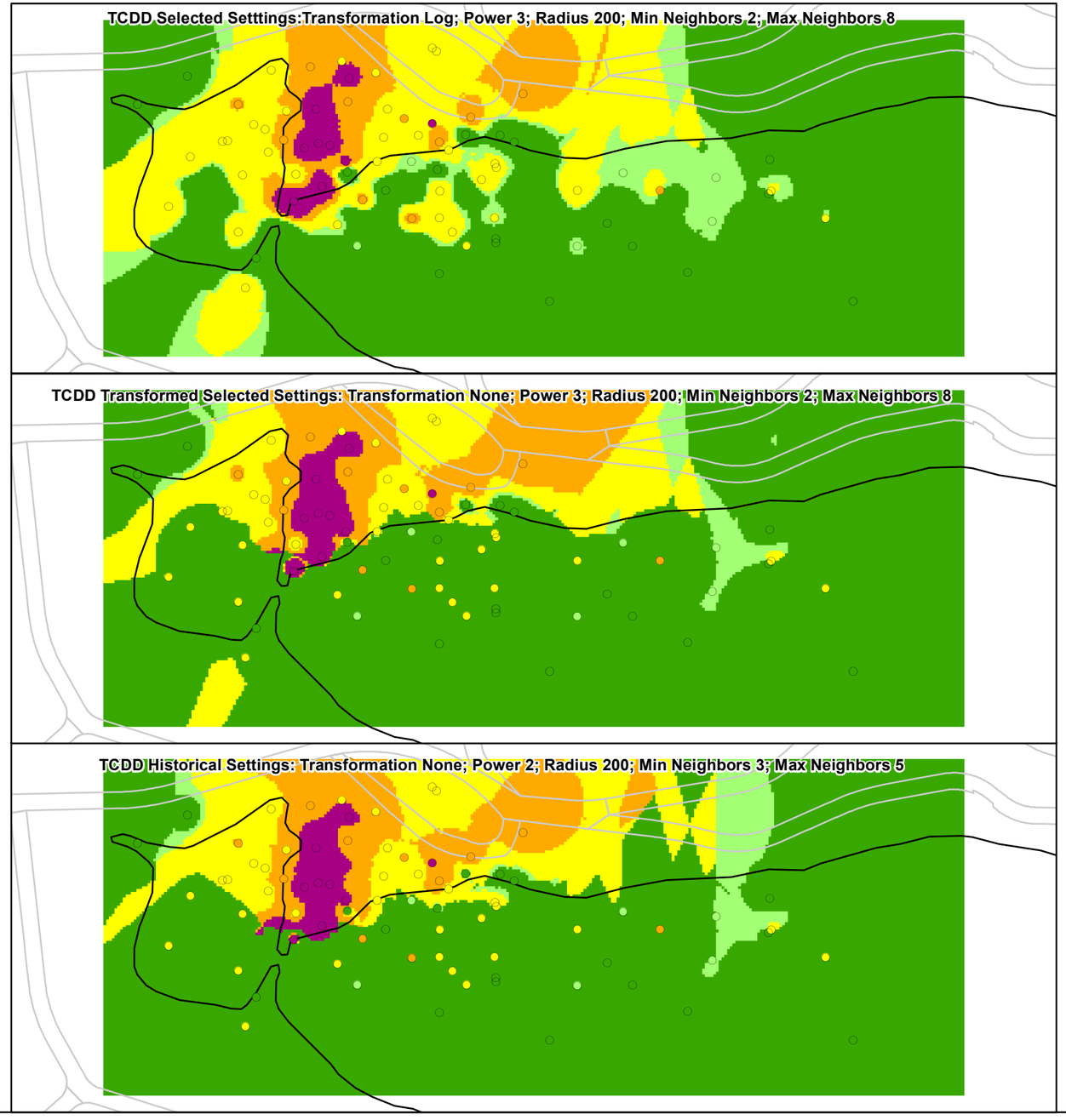

Legend

Observed TCDD Concentration (µg/kg)

- < 4.0 (Sediment SL, Protective of Benthic)
- 4.0 - 5.21
- 5.21 - 15.0
- 15.0 - 45.0
- >45.0

Interpolated TCDD Concentration (µg/kg)

- < 4.0 (Sediment SL, Protective of Benthic)
- 4.0 - 5.21
- 5.21 - 15.0
- 15.0 - 45.0
- >45.0

Notes:
For the log-normal results, the observed data had a log-normal transformation applied, the interpolation performed, then the anti-log transformation applied to the interpolation.

N

0 500 Feet

IDW Interpolation of TCDD in Surface Soil and Sediment using Optimized Settings

Blakely Harbor Park Site
(Bainbridge Island, WA)

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Figure 6

P:\Projects\Blakely Harbor\PNG0900 (Pt Blakely)\900 GIS and CAD\MXDs\Interpolation Optimization\Figure 6 TCDD Results Prefered.mxd 6/28/2023 8:59:52 AM

APPENDIX R

ProUCL Input and Output

Table R-1. Blakely Harbor Soil ProUCL Input

Arsenic	D_Arsenic	Cadmium	D_Cadmium	Chromium	D_Chromium	Copper	D_Copper	Lead	D_Lead	Mercury	D_Mercury	Zinc	D_Zinc	tph, diesel range organics	D_tph, diesel range organics
12.3	1	0.52	1	30.3	1	24.7	1	10	1	0.0288	1	57.8	1	26.7	1
5.48	1	0.11	1	30.8	1	70.7	1	1.55	1	0.00575	0	49.7	1	2.64	0
8.94	1	0.08	1	39	1	92.6	1	1.99	1	0.0102	1	84.1	1	2.8	0
12.9	1	0.15	1	19.2	1	17	1	13.7	1	0.0348	1	45.7	1	2.92	0
4.29	1	0.09	1	50.8	1	62.7	1	2.13	1	0.00902	1	67.7	1	2.67	0
8.21	1	0.73	1	27.3	1	39.8	1	31.8	1	0.076	1	63.8	1	89.6	1
7.23	1	0.14	1	37.7	1	60	1	1.53	1	0.0043	0	77.4	1	2.67	0
6.12	1	0.08	1	44.6	1	102	1	1.49	1	0.00973	1	68.8	1	2.78	0
3.54	1	0.38	1	28.2	1	95.6	1	45.1	1	0.116	1	149	1	97.4	1
4.7	1	0.06	1	33.2	1	51.1	1	1.25	1	0.00896	1	69.5	1	2.76	0
8.11	1	0.14	1	13.7	1	10	1	5.48	1	0.0216	1	37.1	1	10.4	1
10.8	1	0.36	0	14	1	37.6	1	87	1			93.6	1		
5.84	1	0.11	0	35.9	1	62.4	1	1.43	1			53.7	1		
10.7	1	0.51	1	37.2	1	107	1	112	1			922	1		
4.48	1	0.34	1	12	1	47.4	1	35.2	1	0.0283	1	81.6	1	75.4	1
7.2	1	0.1	1	36.6	1	68.7	1	13.1	1	0.0049	0	159	1	2.62	0
4.72	1	0.06	0	12	1	119	1	35.2	1	0.00753	0	124	1	13.2	1
5.62	1	0.11	1	40.5	1	66.5	1	2.01	1	0.0114	1	82.5	1	2.89	0
9.03	1	0.19	1	22.5	1	13.8	1	6.72	1	0.0191	1	52.6	1	14.5	1
7.81	1	0.14	1	58.5	1	73.5	1	21.2	1			93.9	1		
5.26	1	0.16	1	25	1	42	1	1.49	1	0.00556	0	47.5	1	2.68	0
7.5	1	0.11	0	24.8	1	52.7	1	2.13	1			64.2	1		
6.56	1	1.22	1	21.9	1	103	1	21.9	1	0.0157	0	136	1	24.9	1
7.03	1	0.07	1	35	1	60	1	2.91	1	0.00502	1	170	1	2.57	0
5.96	1	0.05	1	35.8	1	66.8	1	2.37	1	0.0134	1	75.9	1	2.71	0
8.4	1	0.1	1	17	1	120	1	14.7	1	0.00819	0	85.6	1	4.53	0
5.07	1	0.1	1	53.5	1	79.5	1	1.56	1	0.00587	1	73.5	1	2.63	0
11	1	0.09	1	51.9	1	101	1	10	1	0.0138	1	93	1	2.88	0
14.1	1	0.2	1	21.4	1	13.3	1	4.93	1	0.0275	1	51.3	1	6.86	1
7.72	1	0.21	0	20.1	1	123	1	9.23	1			115	1		
8.24	1	0.04	1	38.2	1	70.9	1	1.83	1	0.00498	1	66.5	1	2.7	0
7.28	1	1.14	1	9.27	1	24.9	1	40.9	1			436	1		
8.66	1	0.13	0	81.8	1	141	1	31.4	1			101	1		
6.39	1	0.13	1	4.97	1	147	1	483	1			732	1		
15.1	1	0.13	1	86.2	1	35.6	1	33.5	1			93.3	1		
7.25	1	0.24	1	33.4	1	79.8	1	102	1	0.0172	0	314	1	633	1
9.91	1	0.16	0	17.3	1	127	1	14	1			131	1		
6.26	1	0.59	1	17.4	1	67.7	1	11.4	1	0.0142	0	130	1	7.42	0
10.5	1	0.14	1	35.2	1	232	1	26.4	1	0.00722	0	213	1	4.45	0
8.91	1	0.08	1	19.8	1	13.9	1	9.87	1	0.0168	1	41.2	1	2.83	0

Table R-1. Blakely Harbor Soil ProUCL Input

Arsenic	D_Arsenic	Cadmium	D_Cadmium	Chromium	D_Chromium	Copper	D_Copper	Lead	D_Lead	Mercury	D_Mercury	Zinc	D_Zinc	tph, diesel range organics	D_tph, diesel range organics
10.4	1	0.13	0	39.6	1	87.4	1	24.4	1			87.6	1		
9.19	1	0.28	1	13.3	1	31.8	1	92.4	1	0.0666	1	157	1	131	1
3.54	1	0.12	1	52.1	1	62.2	1	2	1	0.035	1	61	1	2.91	0
10.8	1	0.35	1	20.3	1	145	1	341	1	0.112	1	105	1	371	1
10	1	0.32	1	25.5	1	59.1	1	1960	1	0.035	1	254	1	36.3	1
6.03	1	0.11	1	19.5	1	69.5	1	62.2	1	0.016	1	99	1	6.97	1
8.85	1	0.09	1	40.6	1	80.9	1	34.5	1	0.00986	1	262	1	2.55	0
7.24	1	0.07	1	35.2	1	52.2	1	2.42	1	0.00529	0	66.7	1	2.73	0
11.5	1	1.15	1	46.6	1	122	1	288	1	0.108	1	206	1	236	1
3.68	1	0.17	0	14.2	1	64.4	1	9.87	1	0.00888	0	74.8	1	5.38	0
6.31	1	0.26	1	44.2	1	63.2	1	1.47	1	0.00491	1	59.9	1	2.48	0
10.1	1	0.59	1	15.7	1	162	1	499	1	0.145	1	106	1	220	1
8.83	1	0.05	1	13.4	1	29.6	1	23.3	1	0.0138	1	50.6	1	14.7	1
6.23	1	0.56	1	7.33	1	27.4	1	57.8	1	0.0708	0	66.9	1	149	1
11	1	0.18	1	32.2	1	213	1	556	1	0.0583	1	258	1	83.1	1
4.11	1	0.15	1	15.3	1	165	1	1650	1	0.113	1	116	1	33.2	1
10.2	1	0.06	1	9.87	1	26.8	1	29.8	1	0.0352	1	50.6	1	40.1	1
14.4	1	0.11	0	15	1	34.9	1	189	1	0.0936	1	33.1	1	398	1
5.74	1	0.52	1	20.4	1	74.6	1	138	1	0.0655	1	303	1	18.8	1
8.54	1	1.09	1	3.17	1	120	1	1580	1	0.137	0	1980	1	1860	1
5.69	1	0.11	1	23.3	1	73	1	155	1	0.0321	0	103	1	4010	1
4.32	1	0.33	1	14.8	1	95.3	1	262	1	0.0245	1	453	1	10.9	0
3.67	1	0.13	1	16.3	1	95.5	1	288	1	0.0395	1	128	1	7.45	1
5.08	1	0.48	1	8.19	1	49.1	1	10.7	1	0.0203	0	98.1	1	8.62	0
8.02	1	0.76	1	36.5	1	136	1	724	1	0.08	1	866	1	3	0
5.91	1	0.68	1	4.22	1	18.5	1	14	1	0.026	0	154	1	49.6	1
6.17	1	0.13	1	23.8	1	103	1	134	1	0.0403	1	122	1	3.44	0
7.97	1	0.18	1	43.4	1	60.6	1	11	1	0.00729	1	65.5	1	2.52	0
4.12	1	0.05	1	10.4	1	6.4	1	6.99	1	0.0306	1	40	1	2.64	0
8.11	1	0.33	1	47.4	1	59.6	1	78.9	1	0.0544	1	114	1	21.8	1
3.61	1	0.25	1	88.9	1	115	1	10.4	1	0.0636	1	93.4	1	2.85	0
10.1	1	0.28	1	49.2	1	89.8	1	314	1	0.143	1	141	1	8.52	1
14.1	1	0.29	1	41.4	1	87.1	1	140	1	0.138	1	125	1	93.4	1
5.46	1	0.22	1	42.5	1	34.7	1	11.7	1	0.0513	1	120	1	21.4	1
2.54	1	0.04	0	27.2	1	20.3	1	7.35	1	0.0513	1	43.1	1	3.17	0
5.5	1	0.48	1	38.6	1	27.3	1	21.8	1	0.102	1	163	1	41.4	1
3.27	1	0.11	1	46.6	1	55.6	1	8.37	1	0.0493	1	76.4	1	19.2	1
13.9	1	0.54	1	19.6	1	20.1	1	51.4	1	0.0665	1	82.1	1	2.67	0
16.1	1	0.23	1	19.4	1	19	1	21.3	1	0.114	1	57.9	1	47.5	1
3.34	1	0.13	1	74.7	1	54.1	1	4.84	1	0.0371	1	74.5	1	2.73	0

Table R-1. Blakely Harbor Soil ProUCL Input

Arsenic	D_Arsenic	Cadmium	D_Cadmium	Chromium	D_Chromium	Copper	D_Copper	Lead	D_Lead	Mercury	D_Mercury	Zinc	D_Zinc	tph, diesel range organics	D_tph, diesel range organics
2.95	1	0.31	1	27.2	1	64.9	1	408	1	0.0583	1	244	1	2.77	0
15.6	1	0.33	1	12.8	1	14	1	18	1	0.049	1	54.7	1	2.63	0
11.8	1	0.1	1	20.2	1	12.3	1	5.96	1	0.029	1	41	1	2.56	0
6.69	1	0.27	1	15.3	1	12.3	1	7.2	1	0.0323	1	26.7	1	2.52	0
4.84	1	0.19	1	32.3	1	58.8	1	347	1	0.0684	1	127	1	11.1	1
2.42	1	0.07	1	25.1	1	25	1	6.29	1	0.0201	1	36.8	1	2.33	0
2.74	1	0.14	1	58.3	1	68.7	1	11.2	1	0.0428	1	85.4	1	2.83	0
3.31	1	0.24	1	68.3	1	80.5	1	10.1	1	0.07	1	74.9	1	3	0
3.53	1	0.16	1	24.6	1	38.7	1	77.5	1	0.0884	1	56	1	12.9	1
9.02	1	0.23	1	13.6	1	44.1	1	159	1	2.17	1	82.1	1	76.2	1
5.5	1	0.05	1	9.86	1	8.5	1	20.2	1	0.0111	1	33.5	1	5.5	0
5.92	1	0.18	0	31.3	1	76	1	98.7	1	0.0638	1	157	1	18.1	1
9.09	1	1.25	1	61.4	1	146	1	694	1	0.11	1	1210	1	24.7	1
3.81	1	0.61	1	18.4	1	68.5	1	51.2	1	0.052	1	549	1	5.95	0
4.4	1	0.22	1	23.5	1	109	1	202	1	0.0221	1	190	1	7.31	0
6.71	1	0.1	1	44.8	1	59.9	1	3.96	1	0.0202	1	68.5	1	9.44	1
18.4	1	0.66	1	32.8	1	384	1	758	1	0.159	1	1900	1	310	1
3.91	1	0.18	1	37.7	1	54.6	1	11	1	0.0256	1	62.9	1	8.43	1
5.22	1	0.35	1	34.1	1	45.9	1	51.3	1	1.79	1	112	1	39.9	1
43.3	1	0.7	1	31.2	1	199	1	272	1	0.226	1	258	1	861	1
8.06	1	0.14	1	31.2	1	439	1	177	1	0.0308	1	158	1	9.35	0
14.9	1	0.45	1	28	1	108	1	148	1	0.153	1	105	1	46.3	1
5.46	1	0.18	1	36.7	1	55.9	1	141	1	0.034	1	83.7	1	5.35	1
4.84	1	0.07	1	19	1			10.8	1	0.0608	1			69.8	0
8.29	1	0.49	1	39.8	1	62.6	1	119	1	0.113	1	138	1	24.6	1
5.56	1	0.18	1	75.1	1	80.8	1	32.3	1	0.0783	1	95	1	14.5	1
6.86	1	0.34	1	51.9	1	60.8	1	36.4	1	0.119	1	99.6	1	59.3	1
8.37	1	0.2	1	52.5	1	54.5	1	46.8	1	0.105	1	71.2	1	26.9	1
9.92	1	0.57	1	51.8	1	118	1	821	1	0.212	1	265	1	19.5	1
9.09	1	1.04	1	17	1	18.7	1	74.8	1	0.107	1	232	1	20.4	1
15.9	1	0.53	1	31.2	1	94.9	1	242	1	0.108	1	184	1	165	1
6.1	1	0.42	1	54.3	1	40.6	1	21	1	0.0908	1	138	1	32.8	1
4.43	1	0.18	1	31.5	1	22.3	1	16	1	0.0728	1	137	1	31.2	1
9.54	1	0.68	1	30.8	1	37.9	1	45.8	1	0.213	1	184	1	84.6	1
7.32	1	0.38	1	51.1	1	48	1	25.8	1	0.0953	1	84.1	1	37.9	1
9.67	1	0.72	1	26.1	1	35.3	1	216	1	0.0848	1	142	1	8.54	1
17	1	0.4	1	16	1	19.8	1	26.1	1	0.0892	1	65.4	1	64.9	1

Table R-1. Blakely Harbor Soil ProUCL Input

Arsenic	D_Arsenic	Cadmium	D_Cadmium	Chromium	D_Chromium	Copper	D_Copper	Lead	D_Lead	Mercury	D_Mercury	Zinc	D_Zinc	tph, diesel range organics	D_tph, diesel range organics
5.95	1	0.35	1	47.7	1	36.9	1	35.6	1	0.132	1	108	1	16.6	1
5.19	1	1.7	1	34.8	1	50.2	1	4360	1	0.0438	1	1170	1	7.32	1
16.7	1	0.79	1	92.7	1	37.4	1	23.9	1	0.0538	1	115	1	12.5	1
19.8	1	0.14	1	15.5	1	17.1	1	20	1	0.0986	1	51.4	1	6.5	1
4.84	1	0.22	1	18.2	1	24.6	1	38.7	1	0.054	1	44.1	1	8.43	1
8.44	1	0.42	1	24.5	1	85.5	1	776	1	0.0233	1	132	1	20.1	1
1.85	1	0.15	1	23.2	1	17.5	1	4.56	1	0.0257	1	34.8	1	13	1
4.42	1	0.19	1	61	1	83.9	1	16.4	1	0.0943	1	75.2	1	21.2	1
4.59	1	0.28	1	81.9	1	92	1	9.4	1	0.0799	1	102	1	2.92	0
4.83	1	0.24	1	28.2	1	30.2	1	22.1	1	0.0141	1	86.6	1	7.05	0
16	1	0.18	1	16	1	17.3	1	20.5	1	0.0613	1	53.8	1	2.5	0
30.2	1	1.93	0	14.7	1	778	1	5160	1	0.162	1	1540	1	2160	1
19.2	1	0.38	1	24.2	1	192	1	3700	1	0.119	1	379	1	69.4	1
60.3	1	0.36	1	34.3	1	655	1	656	1	0.222	1	240	1	2370	1
5.49	1	0.52	1	18.5	1	56.4	1	98.5	1	0.0507	1	620	1	15	1
6.95	1	0.15	1	20.4	1	62.9	1	115	1	0.0302	1	146	1	19.2	1
2.09	1	0.2	0	5.04	1	35.6	1	8.78	1	0.0123	0	36.9	1	6.48	0
9.55	1	0.64	1	29.7	1	121	1	243	1	0.0502	1	424	1	50	1
5.81	1	0.44	1	51.8	1	113	1	199	1	0.0561	1	278	1	36.8	1
6.14	1	0.28	1	28.9	1	64.6	1	119	1	0.0579	1	144	1	35.3	1
4.27	1	0.12	1	26.6	1	72.9	1	51.3	1	0.0834	1	68.4	1	28	0
13.9	1	0.45	1	11.7	1	59.5	1	122	1	0.261	1	96.6	1	171	1
3.54	1	0.05	1	9.6	1	6.29	1	18.8	1	0.00819	1	31.3	1	8.9	1
7.78	1	0.25	1	25.5	1	74.4	1	125	1	0.119	1	130	1	24.3	1
5.63	1	0.53	1	23.9	1	70.7	1	249	1	0.0863	1	249	1	17.8	1
6.1	1	0.29	1	32	1	236	1	252	1	0.804	1	1160	1	49.8	1
5.01	1	0.48	1	34	1	63.8	1	55.6	1	0.131	1	213	1	38.1	1
4.96	1	0.25	1	21.5	1	119	1	495	1	0.0251	1	196	1	24.2	1
8.32	1	0.16	1	20.4	1	52.4	1	28.4	1	0.0739	1	73	1	39.7	1
21.4	1	0.29	1	21.1	1	270	1	706	1	0.101	1	324	1	18.3	1
7.04	1	0.23	1	37.5	1	69.8	1	155	1	0.0713	1	87.6	1	20.7	1
3.26	1	0.16	1	26.5	1	29.5	1	50.5	1	0.246	1	65.5	1	40.5	1
8.13	1	0.1	1	31.2	1	80.3	1	71.2	1	0.0295	1	93.3	1	18.7	1
5.03	1	0.1	1	24.2	1	74.8	1	144	1	0.112	1	126	1	7.08	0
11	1	0.1	1	29.4	1	109	1	156	1	0.111	1	134	1	66.9	1
6.66	1	0.28	1	36.8	1	62.8	1	563	1	0.739	1	174	1	20.1	1
10.1	1	0.4	1	23.6	1			468	1	0.319	1			161	1
16.6	1	0.61	1	26.2	1			133	1	0.189	1				
5.96	1	0.32	1	28.1	1			161	1	0.0798	1				
5.53	1	0.21	1	33.7	1			123	1	0.0623	1			82.4	1

Lube Oil	D_Lube Oil	total TPH	D_total TPH	1-Methylnaphthalene	D_1-Methylnaphthalene	2-Methylnaphthalene	D_2-Methylnaphthalene	Acenaphthene	D_Acenaphthene	Anthracene	D_Anthracene	Fluorene	D_Fluorene	Naphthalene	D_Naphthalene	Benzo(a)anthracene	D_Benzo(a)anthracene
101	1	127.7	1	0.0397	1	0.144	1	0.0169	1	0.0264	1	0.0291	1	0.682	1	0.0127	1
3.37	0	3.37	0	0.0052	0	0.0045	0	0.0052	0	0.0072	0	0.0145	0	0.0042	0	0.0059	0
3.58	0	3.58	0	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00358	1	0.00082	0
17.1	1	20.02	1	0.0162	1	0.0045	0	0.12	1	0.117	1	0.0801	1	0.0449	1	0.186	1
3.42	0	3.42	0	0.00495	0	0.0045	0	0.0052	0	0.0071	0	0.0144	0	0.00147	1	0.0059	0
103	1	192.6	1	0.125	1	0.187	1	0.0372	1	0.107	1	0.102	1	1.96	1	0.0876	1
3.41	0	3.41	0	0.0052	0	0.0045	0	0.0052	0	0.0071	0	0.0145	0	0.00498	0	0.0059	0
3.55	0	3.55	0	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00134	1	0.00082	0
191	1	288.4	1	0.0411	1	0.0889	1	0.0182	1	0.0068	1	0.0213	1	0.314	1	0.00333	1
3.53	0	3.53	0	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00128	0	0.00082	0
26.7	1	37.1	1	0.00642	1	0.0045	0	0.00437	1	0.00418	1	0.00472	1	0.0217	1	0.00541	1
				0.0129	1	0.0103	1	0.0128	1	0.0253	1	0.0163	1	0.132	1	0.0195	1
				0.00496	0	0.0199	0	0.00173	1	0.00245	1	0.00163	1	0.00496	0	0.00374	1
				0.0682	1	0.0812	1	0.0593	1	0.205	1	0.118	1	0.969	1	0.627	1
144	1	219.4	1	0.16	1	0.0045	0	0.0423	1	0.0572	1	0.0889	1	2.73	1	0.031	1
3.34	0	3.34	0	0.005	0	0.0043	0	0.0049	0	0.0068	0	0.0138	0	0.00487	0	0.0056	0
41.3	1	54.5	1	0.0218	1	0.0395	1	0.00618	1	0.0014	1	0.00808	1	0.0902	1	0.0059	0
3.7	0	3.7	0	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00127	0	0.00082	0
45.9	1	60.4	1	0.00459	1	0.0061	1	0.00241	1	0.00624	1	0.00337	1	0.0228	1	0.0246	1
				0.00512	0	0.02	0	0.00512	0	0.00137	1	0.00512	0	0.00796	1	0.00254	1
3.43	0	3.43	0	0.0051	0	0.0044	0	0.0051	0	0.007	0	0.0142	0	0.0041	0	0.0058	0
				0.00495	0	0.0199	0	0.00495	0	0.00495	0	0.00495	0	0.00495	0	0.00495	0
34.8	1	59.7	1	0.0548	1	0.0728	1	0.00775	1	0.00477	1	0.0169	1	0.679	1	0.00158	1
3.28	0	3.28	0	0.0049	0	0.0042	0	0.0049	0	0.0067	0	0.0136	0	0.0049	0	0.0056	0
3.46	0	3.46	0	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00127	0	0.00122	1
5.78	0	5.78	0	0.014	1	0.0121	1	0.00478	1	0.00259	1	0.00523	1	0.158	1	0.00098	1
3.36	0	3.36	0	0.00497	0	0.0045	0	0.0052	0	0.0071	0	0.0145	0	0.0042	0	0.0059	0
3.68	0	3.68	0	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00127	0	0.00082	0
15.2	1	22.06	1	0.00123	1	0.0045	0	0.00161	1	0.00261	1	0.00393	1	0.00958	1	0.00279	1
				0.005	0	0.02	0	0.005	0	0.005	0	0.005	0	0.0276	1	0.005	0
3.44	0	3.44	0	0.0052	0	0.0045	0	0.0052	0	0.0071	0	0.0145	0	0.0042	0	0.0059	0
				0.0302	1	0.0372	1	0.0169	1	0.0349	1	0.0182	1	0.348	1	0.0475	1
				0.00495	0	0.0199	0	0.00495	0	0.00495	0	0.00278	1	0.00157	1	0.00089	1
				0.0148	0	0.0598	0	0.0148	0	0.0148	0	0.0148	0	0.0068	1	0.00329	1
				0.00499	0	0.02	0	0.00064	1	0.00149	1	0.00087	1	0.00195	1	0.0026	1
795	1	1428	1	0.625	1	0.67	1	0.418	1	2.76	1	0.867	1	10.5	1	6.86	1
				0.00509	0	0.02	0	0.00509	0	0.00509	0	0.00509	0	0.00464	1	0.00126	1
9.48	0	9.48	0	0.00768	1	0.0439	1	0.00121	1	0.00305	1	0.00215	1	0.119	1	0.00264	1
5.68	0	5.68	0	0.00489	0	0.0045	0	0.00083	1	0.00191	1	0.00092	1	0.0182	1	0.00204	1
3.61	0	3.61	0	0.00106	1	0.0045	0	0.00153	1	0.00236	1	0.00134	1	0.00743	1	0.00343	1

Lube Oil	D_Lube Oil	total TPH	D_total TPH	1-Methylnaphthalene	D_1-Methylnaphthalene	2-Methylnaphthalene	D_2-Methylnaphthalene	Acenaphthene	D_Acenaphthene	Anthracene	D_Anthracene	Fluorene	D_Fluorene	Naphthalene	D_Naphthalene	Benzo(a)anthracene	D_Benzo(a)anthracene
				0.00491	0	0.0199	0	0.00527	1	0.0139	1	0.00515	1	0.00477	1	0.0231	1
588	1	719	1	0.0201	0	0.0181	0	0.0201	0	0.00885	1	0.0201	0	0.067	1	0.0258	1
12.4	0	12.4	0	0.005	0	0.0011	0	0.00057	0	0.00087	0	0.00063	0	0.005	0	0.00082	0
1290	1	1661	1	0.0128	0	0.00776	1	0.0128	0	0.0138	1	0.0128	0	0.0271	1	0.0639	1
50.2	1	86.5	1	0.00499	0	0.0123	1	0.00499	0	0.0111	1	0.00499	0	0.0605	1	0.0494	1
52.6	1	59.57	1	0.00633	1	0.325	1	0.0132	1	0.0338	1	0.0119	1	0.0089	1	0.196	1
3.26	0	3.26	0	0.0053	0	0.0045	0	0.0052	0	0.00107	1	0.0146	0	0.005	0	0.00129	1
3.49	0	3.49	0	0.0052	0	0.0045	0	0.0052	0	0.0072	0	0.0145	0	0.0042	0	0.0059	0
193	1	429	1	0.0388	0	0.0394	1	0.00443	0	0.0604	1	0.0207	1	0.073	1	0.132	1
6.88	0	6.88	0	0.00498	0	0.0044	0	0.0051	0	0.00105	1	0.0143	0	0.0165	1	0.00258	1
3.17	0	3.17	0	0.0052	0	0.0045	0	0.0052	0	0.0071	0	0.0144	0	0.00186	1	0.0059	0
72.4	1	292.4	1	0.0617	0	0.135	1	0.00705	0	0.0211	1	0.00867	1	0.0676	1	0.0604	1
24.9	1	39.6	1	0.0377	1	0.0045	0	0.358	1	0.433	1	0.223	1	0.062	1	0.782	1
751	1	900	1	0.0229	0	0.0072	1	0.0229	0	0.00557	1	0.0029	0	0.0433	1	0.0229	0
140	1	223.1	1	0.0499	0	0.205	1	0.0606	1	0.538	1	0.084	1	0.689	1	2.06	1
49.8	1	83	1	0.0755	1	0.128	1	0.00432	1	0.00875	1	0.012	1	0.0371	1	0.041	1
803	1	843.1	1	0.0148	0	0.0045	0	0.00957	1	0.0114	1	0.00883	1	0.0148	0	0.035	1
878	1	1276	1	0.0185	0	0.0167	0	0.00211	0	0.0048	1	0.0185	0	0.0476	1	0.0118	1
60.4	1	79.2	1	0.005	0	0.0118	1	0.005	0	0.0128	1	0.00511	1	0.0522	1	0.106	1
4960	1	6820	1	0.0294	0	0.0223	1	0.0294	0	0.0435	1	0.0294	0	0.0944	1	0.121	1
10500	1	14510	1	0.0149	0	0.0097	1	0.0149	0	0.0183	1	0.0149	0	0.0405	1	0.0852	1
21.9	1	32.8	1	0.00499	0	0.0045	0	0.00057	0	0.00811	1	0.00499	0	0.0415	1	0.0623	1
23.4	1	30.85	1	0.005	0	0.0045	0	0.00547	1	0.0199	1	0.005	0	0.0106	1	0.0586	1
11	0	11	0	0.00498	0	0.006	1	0.00057	0	0.00087	0	0.00083	1	0.0401	1	0.00123	1
24.5	1	27.5	1	0.0149	0	0.0045	0	0.0279	1	0.0573	1	0.0238	1	0.0217	1	0.0992	1
17.1	0	66.7	1	0.02	0	0.0172	0	0.0199	0	0.0274	0	0.0555	0	0.0191	0	0.0227	0
26.9	1	30.34	1	0.00496	0	0.0109	1	0.00067	1	0.00912	1	0.00208	1	0.0208	1	0.0127	1
3.22	0	3.22	0	0.00496	0	0.0045	0	0.0052	0	0.00448	1	0.00089	1	0.00329	1	0.00387	1
3.37	0	3.37	0	0.0004	0	0.0045	0	0.00057	0	0.00103	1	0.00063	0	0.00127	0	0.00139	1
114	1	135.8	1	0.00499	0	0.0045	0	0.00499	0	0.00253	1	0.00499	0	0.012	1	0.0173	1
32.8	1	35.65	1	0.00519	0	0.0045	0	0.00059	0	0.0009	0	0.00065	0	0.0197	1	0.0044	1
51.7	1	60.22	1	0.00589	1	0.0045	0	0.00468	0	0.00929	1	0.00468	0	0.0122	1	0.08	1
875	1	968.4	1	0.00828	1	0.0166	1	0.012	1	0.0218	1	0.0088	1	0.0641	1	0.0856	1
45.6	1	67	1	0.00067	1	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00196	1	0.00108	1
27.4	1	30.57	1	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00127	0	0.00082	0
76.3	1	117.7	1	0.0012	0	0.0045	0	0.00171	0	0.00261	0	0.00189	0	0.00919	1	0.00374	1
43.8	1	63	1	0.0012	0	0.0045	0	0.00171	0	0.0026	0	0.00189	0	0.0126	1	0.00246	0
31.6	1	34.27	1	0.0004	0	0.0045	0	0.00057	0	0.00087	0	0.00063	0	0.00198	1	0.00178	1
176	1	223.5	1	0.0013	1	0.0053	1	0.00171	0	0.00407	1	0.00189	0	0.019	1	0.0045	1
3.49	0	3.49	0	0.0004	0	0.0044	0	0.00057	0	0.00086	0	0.00062	0	0.00126	0	0.00123	1

Lube Oil	D_Lube Oil	total TPH	D_total TPH	1-Methylnaphthalene	D_1-Methylnaphthalene	2-Methylnaphthalene	D_2-Methylnaphthalene	Acenaphthene	D_Acenaphthene	Anthracene	D_Anthracene	Fluorene	D_Fluorene	Naphthalene	D_Naphthalene	Benzo(a)anthracene	D_Benzo(a)anthracene
34.1	1	36.87	1	0.00499	0	0.0041	0	0.00057	0	0.00173	1	0.00084	1	0.00499	0	0.00662	1
21.9	1	24.53	1	0.00497	0	0.0043	0	0.0234	1	0.0277	1	0.0159	1	0.00653	1	0.0844	1
12.7	1	15.26	1	0.00039	0	0.0045	0	0.00056	0	0.00086	0	0.00062	0	0.00492	0	0.00081	0
14.1	1	16.62	1	0.00499	0	0.0045	0	0.00499	0	0.00116	1	0.00063	0	0.00286	1	0.00255	1
60.7	1	71.8	1	0.005	0	0.0104	1	0.0037	1	0.00775	1	0.00249	1	0.00992	1	0.0426	1
40.3	1	42.63	1	0.0004	0	0.0039	0	0.00057	0	0.00187	1	0.00063	0	0.00127	0	0.00615	1
28	1	30.83	1	0.005	0	0.0043	0	0.00057	0	0.00169	1	0.00071	1	0.005	0	0.00722	1
13.6	1	16.6	1	0.00499	0	0.004	0	0.00057	0	0.00087	0	0.00063	0	0.00499	0	0.00233	1
49.2	1	62.1	1	0.0074	1	0.00619	1	0.0529	1	0.0849	1	0.0324	1	0.014	1	0.179	1
164	1	240.2	1	0.028	1	0.0291	1	0.127	1	0.315	1	0.118	1	0.0954	1	2.67	1
11	0	11	0	0.00499	0	0.00184	1	0.00499	0	0.00712	1	0.00162	1	0.00361	1	0.0204	1
73.9	1	92	1	0.00501	0	0.00261	1	0.00501	0	0.00396	1	0.0014	1	0.0124	1	0.0314	1
99.2	1	123.9	1	0.00544	1	0.00855	1	0.005	0	0.0227	1	0.00559	1	0.0543	1	0.111	1
11.9	0	11.9	0	0.00501	0	0.00191	1	0.00501	0	0.00228	1	0.00122	1	0.00514	1	0.013	1
27.3	1	34.61	1	0.005	0	0.0011	0	0.00057	0	0.00143	1	0.00063	0	0.0122	1	0.00958	1
28.3	1	37.74	1	0.005	0	0.0011	0	0.00057	0	0.00096	1	0.00063	0	0.0066	1	0.00207	1
375	1	685	1	0.299	1	0.308	1	1.7	1	2.62	1	1.38	1	0.36	1	6.11	1
15.1	1	23.53	1	0.00894	1	0.00646	1	0.0189	1	0.0489	1	0.0297	1	0.00543	1	0.138	1
294	1	333.9	1	0.005	0	0.00268	1	0.00498	0	0.0164	1	0.0026	1	0.00239	1	0.0811	1
599	1	1460	1	0.979	1	2.14	1	0.368	1	0.262	1	2.78	1	3.96	1	6.07	1
20.7	1	30.05	1	0.0113	1	0.0103	1	0.0198	1	0.0611	1	0.0256	1	0.0161	1	0.211	1
225	1	271.3	1	0.00845	1	0.00932	1	0.0174	1	0.0378	1	0.0172	1	0.023	1	0.102	1
15.5	1	20.85	1	0.0004	0	0.00111	0	0.00057	0	0.00087	0	0.00063	0	0.00128	0	0.00225	1
140	0	209.8	0			0.0007	0	0.00022	1	0.00052	1	0.00018	1	0.00407	0	0.00054	1
181	1	205.6	1	0.005	0	0.0045	0	0.005	0	0.00423	1	0.005	0	0.0214	1	0.0225	1
78.8	1	93.3	1	0.00514	1	0.0105	1	0.00499	0	0.00268	1	0.00499	0	0.0753	1	0.0179	1
181	1	240.3	1	0.00499	0	0.0045	0	0.00499	0	0.0015	1	0.00499	0	0.03	1	0.00599	1
204	1	230.9	1	0.00496	0	0.0045	0	0.00496	0	0.00314	1	0.00496	0	0.0392	1	0.0127	1
124	1	143.5	1	0.00918	1	0.0045	0	0.0137	1	0.0235	1	0.00909	1	0.0293	1	0.0885	1
147	1	167.4	1	0.00496	0	0.0051	1	0.0179	1	0.0407	1	0.01	1	0.011	1	0.193	1
1820	1	1985	1	0.0134	1	0.0356	1	0.026	1	0.0391	1	0.0166	1	0.0982	1	0.133	1
104	1	136.8	1	0.00353	1	0.0045	0	0.00171	0	0.00261	0	0.00189	0	0.0061	1	0.00247	0
101	1	132.2	1	0.0012	0	0.0045	0	0.00171	0	0.00261	0	0.00189	0	0.0111	1	0.00299	1
159	1	243.6	1	0.00203	1	0.0045	0	0.00171	0	0.00456	1	0.00189	0	0.0311	1	0.00666	1
101	1	138.9	1	0.00171	1	0.0138	1	0.00171	0	0.0037	1	0.00189	0	0.0376	1	0.00503	1
81.7	1	90.24	1	0.0012	0	0.0045	0	0.00171	0	0.00261	0	0.00189	0	0.00706	1	0.00313	1
274	1	338.9	1	0.00183	1	0.0064	1	0.00171	0	0.00322	1	0.00189	0	0.0195	1	0.00637	1

Lube Oil	D_Lube Oil	total TPH	D_total TPH	1-Methylnaphthalene	D_1-Methylnaphthalene	2-Methylnaphthalene	D_2-Methylnaphthalene	Acenaphthene	D_Acenaphthene	Anthracene	D_Anthracene	Fluorene	D_Fluorene	Naphthalene	D_Naphthalene	Benzo(a)anthracene	D_Benzo(a)anthracene
105	1	121.6	1	0.00499	0	0.0053	1	0.00366	1	0.00456	1	0.0027	1	0.00772	1	0.0195	1
95.9	1	103.22	1	0.00497	0	0.0043	0	0.00406	1	0.00926	1	0.00253	1	0.0123	1	0.0349	1
85	1	97.5	1	0.0141	1	0.0402	1	0.103	1	0.127	1	0.0731	1	0.0639	1	0.301	1
55	1	61.5	1	0.00495	0	0.0045	0	0.00063	1	0.00252	1	0.00065	1	0.00826	1	0.00511	1
43.1	1	51.53	1	0.00486	0	0.0045	0	0.00486	0	0.00296	1	0.00486	0	0.0059	1	0.0154	1
127	1	147.1	1	0.00762	1	0.0161	1	0.00723	1	0.0145	1	0.0054	1	0.0308	1	0.0671	1
71.1	1	84.1	1	0.00493	0	0.0044	0	0.00099	1	0.00134	1	0.00122	1	0.00493	0	0.00646	1
209	1	230.2	1	0.00493	0	0.0044	0	0.00202	1	0.00271	1	0.00134	1	0.00493	0	0.00874	1
22.1	1	25.02	1	0.00496	0	0.0041	0	0.00057	1	0.00156	1	0.00097	1	0.00496	0	0.00359	1
44.4	1	51.45	1	0.005	0	0.0045	0	0.005	0	0.00526	1	0.005	0	0.0138	1	0.0264	1
39.7	1	42.2	1	0.005	0	0.002	1	0.005	0	0.00172	1	0.005	0	0.005	0	0.00787	1
4280	1	6440	1	0.317	1	0.286	1	0.271	1	0.432	1	0.601	1	0.395	1	1.39	1
203	1	272.4	1	0.0134	1	0.0135	1	0.00509	1	0.0283	1	0.00998	1	0.0505	1	0.127	1
7930	1	10300	1	0.234	1	0.217	1	2.08	1	4.43	1	2.29	1	0.402	1	17.3	1
86.1	1	101.1	1	0.00499	0	0.0054	1	0.00499	0	0.00974	1	0.00499	0	0.0575	1	0.0507	1
81.8	1	101	1	0.005	0	0.0279	1	0.0125	1	0.0498	1	0.0163	1	0.00875	1	0.233	1
8.28	0	8.28	0	0.00498	0	0.0045	0	0.00076	1	0.00148	1	0.00169	1	0.0501	1	0.00483	1
147	1	197	1	0.0147	0	0.0107	1	0.0147	0	0.0225	1	0.00959	1	0.0396	1	0.0692	1
55.3	1	92.1	1	0.0053	0	0.0045	0	0.0052	0	0.00277	1	0.0145	0	0.015	0	0.00737	1
251	1	286.3	1	0.0148	0	0.0152	1	0.013	1	0.547	1	0.0666	1	0.036	1	0.202	1
87.7	1	115.7	1	0.00573	1	0.00726	1	0.0114	1	0.0238	1	0.00768	1	0.0131	1	0.13	1
388	1	559	1	0.0906	1	0.0904	1	0.361	1	1.29	1	0.291	1	0.255	1	3.4	1
13.2	0	22.1	1	0.00501	0	0.00134	1	0.00501	0	0.00339	1	0.0013	1	0.00128	0	0.00808	1
124	1	148.3	1	0.0137	1	0.0211	1	0.00499	0	0.051	1	0.0211	1	0.0806	1	0.204	1
82.8	1	100.6	1	0.00501	0	0.00578	1	0.00501	0	0.0165	1	0.00728	1	0.031	1	0.0761	1
630	1	679.8	1	0.0399	1	0.0532	1	0.062	1	0.0854	1	0.0623	1	0.118	1	0.208	1
255	1	293.1	1	0.00499	0	0.00668	1	0.0031	1	0.0106	1	0.00373	1	0.0209	1	0.0337	1
55.9	1	80.1	1	0.00499	0	0.00461	1	0.00057	0	0.00449	1	0.00177	1	0.0432	1	0.0141	1
113	1	152.7	1	0.00499	0	0.00515	1	0.00057	0	0.00451	1	0.00169	1	0.0356	1	0.00864	1
40.5	1	58.8	1	0.00784	1	0.0116	1	0.0105	1	0.0472	1	0.0148	1	0.0197	1	0.133	1
54.2	1	74.9	1	0.0191	1	0.0146	1	0.0455	1	0.0723	1	0.0421	1	0.0179	1	0.229	1
231	1	271.5	1	0.005	0	0.0011	0	0.005	0	0.0109	1	0.00155	1	0.00127	0	0.0595	1
20.1	1	38.8	1	0.0217	1	0.0231	1	0.0216	1	0.031	1	0.0363	1	0.0403	1	0.113	1
14.2	0	14.2	0	0.005	0	0.00283	1	0.00347	1	0.0112	1	0.00343	1	0.00554	1	0.043	1
317	1	383.9	1	0.0152	1	0.0115	1	0.0762	1	0.109	1	0.0453	1	0.0182	1	0.224	1
76.1	1	96.2	1	0.005	0	0.0016	1	0.005	0	0.00298	1	0.00086	1	0.0032	1	0.0319	1
366	1	527	1	0.116	1	0.163	1	0.278	1	0.678	1	0.208	1	0.602	1	2.4	1
						0.0123	1	0.00561	1	0.0304	1	0.0089	1	0.0663	1	0.102	1
						0.00866	1	0.00445	1	0.029	1	0.00758	1	0.0355	1	0.243	1
287	1	369.4	1	0.252	1	0.125	1	0.189	1	0.362	1	0.156	1	0.229	1	1.85	1

Benzo(a)pyrene	D_Benzo(a)pyrene	Benzo(b)fluoranthene	D_Benzo(b)fluoranthene	Benzo(k)fluoranthene	D_Benzo(k)fluoranthene	2-Chloronaphthalene	D_2-Chloronaphthalene	Chrysene	D_Chrysene	Dibenzo(a,h)anthracene	D_Dibenzo(a,h)anthracene	Fluoranthene	D_Fluoranthene	Indeno(1,2,3-c,d)pyrene	D_Indeno(1,2,3-c,d)pyrene	Pyrene	D_Pyrene
0.0144	1	0.0117	1	0.00647	1	0.0076	0	0.0152	1	0.00271	1	0.0896	1	0.0198	1	0.0825	1
0.0006	0	0.00135	0	0.00075	0	0.0079	0	0.00104	0	0.00088	0	0.00046	0	0.00103	0	0.0057	0
0.00061	0	0.00136	0	0.00076	0	0.0079	0	0.00105	0	0.00089	0	0.00095	1	0.00104	0	0.0007	1
0.147	1	0.0924	1	0.0667	1	0.0079	0	0.222	1	0.0212	1	0.454	1	0.0887	1	0.466	1
0.0042	0	0.00136	0	0.00075	0	0.0079	0	0.00104	0	0.00088	0	0.00047	0	0.00104	0	0.0056	0
0.124	1	0.13	1	0.0677	1	0.0078	0	0.117	1	0.0311	1	0.368	1	0.246	1	0.339	1
0.00061	0	0.00137	0	0.00076	0	0.0079	0	0.00105	0	0.00089	0	0.00047	0	0.00105	0	0.0056	0
0.00061	0	0.00137	0	0.00076	0	0.008	0	0.00105	0	0.00089	0	0.00047	0	0.00105	0	0.00063	0
0.00305	1	0.00245	1	0.00115	1	0.008	0	0.0044	1	0.0172	0	0.0236	1	0.00263	1	0.0201	1
0.00061	0	0.00137	0	0.00076	0	0.0079	0	0.00105	0	0.00089	0	0.00047	0	0.00105	0	0.00063	0
0.00472	1	0.00305	1	0.00211	1	0.0079	0	0.00677	1	0.00091	1	0.0138	1	0.00294	1	0.0145	1
0.0175	1	0.0146	1	0.0114	1	0.0378	0	0.025	1	0.00494	1	0.0845	1	0.0185	1	0.0879	1
0.00299	1	0.00187	1	0.00122	1	0.0199	0	0.00391	1	0.00106	1	0.00509	1	0.00189	1	0.0081	1
0.932	1	0.597	1	0.361	1	0.0199	0	0.754	1	0.2	1	1.27	1	0.946	1	1.56	1
0.0464	1	0.0571	1	0.0278	1	0.0079	0	0.0446	1	0.0139	1	0.202	1	0.13	1	0.178	1
0.00078	1	0.00233	1	0.0009	1	0.0075	0	0.0019	1	0.00087	0	0.00204	1	0.00376	1	0.00156	1
0.0042	0	0.0069	0	0.0049	0	0.0078	0	0.006	0	0.017	0	0.00247	1	0.0144	0	0.0018	1
0.00061	0	0.00137	0	0.00076	0	0.008	0	0.00105	0	0.00089	0	0.00047	0	0.00105	0	0.00062	0
0.0212	1	0.0141	1	0.00997	1	0.0079	0	0.0264	1	0.00485	1	0.032	1	0.0114	1	0.0344	1
0.00314	1	0.00411	1	0.00226	1	0.02	0	0.00428	1	0.0015	1	0.00806	1	0.00603	1	0.00643	1
0.00061	0	0.00135	0	0.00075	0	0.0078	0	0.00104	0	0.00088	0	0.00046	0	0.00104	0	0.0055	0
0.00495	0	0.00495	0	0.00495	0	0.0199	0	0.00495	0	0.00495	0	0.00054	1	0.00495	0	0.00082	1
0.00165	1	0.0019	1	0.00081	1	0.0078	0	0.00263	1	0.017	0	0.0197	1	0.00238	1	0.0155	1
0.0006	0	0.00135	0	0.00075	0	0.0074	0	0.00103	0	0.00087	0	0.00102	1	0.00103	0	0.00076	1
0.00104	1	0.00137	0	0.00076	0	0.0079	0	0.00175	1	0.00089	0	0.00224	1	0.00105	0	0.00223	1
0.0042	0	0.007	0	0.005	0	0.0079	0	0.00177	1	0.0172	0	0.00999	1	0.0146	0	0.00832	1
0.0042	0	0.00136	0	0.00075	0	0.0079	0	0.00105	0	0.00088	0	0.00108	1	0.00104	0	0.00084	1
0.00061	0	0.00137	0	0.00076	0	0.0079	0	0.00105	0	0.00089	0	0.00047	0	0.00105	0	0.00063	0
0.00244	1	0.00174	1	0.00134	1	0.008	0	0.00406	1	0.00089	0	0.00929	1	0.00176	1	0.0086	1
0.00101	1	0.00185	1	0.005	0	0.02	0	0.00238	1	0.005	0	0.00282	1	0.00334	1	0.00139	1
0.0006	0	0.00135	0	0.00075	0	0.0079	0	0.00103	0	0.00087	0	0.00046	0	0.00103	0	0.0056	0
0.0802	1	0.0731	1	0.037	1	0.0403	0	0.0743	1	0.0305	1	0.109	1	0.189	1	0.125	1
0.00107	1	0.0016	1	0.00495	0	0.0199	0	0.00206	1	0.0012	1	0.00257	1	0.00205	1	0.00236	1
0.0148	0	0.0148	0	0.0148	0	0.0598	0	0.00451	1	0.0148	0	0.00193	1	0.0148	0	0.0159	1
0.00292	1	0.00499	0	0.00202	1	0.02	0	0.00369	1	0.00499	0	0.00649	1	0.00178	1	0.00493	1
8.23	1	5.91	1	3.76	1	0.0318	0	8.19	1	1.54	1	15.9	1	7	1	18.6	1
0.00231	1	0.00386	1	0.00208	1	0.02	0	0.00335	1	0.00142	1	0.00445	1	0.00981	1	0.0029	1
0.00524	1	0.00692	1	0.00376	1	0.008	0	0.00396	1	0.0017	1	0.0104	1	0.014	1	0.00934	1
0.00155	1	0.00433	1	0.00244	1	0.0079	0	0.00557	1	0.00095	1	0.00581	1	0.0029	1	0.00492	1
0.00369	1	0.00334	1	0.00208	1	0.008	0	0.00629	1	0.00098	1	0.0125	1	0.00367	1	0.0114	1

Benzo(a)pyrene	D_Benzo(a)pyrene	Benzo(b)fluoranthene	D_Benzo(b)fluoranthene	Benzo(k)fluoranthene	D_Benzo(k)fluoranthene	2-Chloronaphthalene	D_2-Chloronaphthalene	Chrysene	D_Chrysene	Dibenzo(a,h)anthracene	D_Dibenzo(a,h)anthracene	Fluoranthene	D_Fluoranthene	Indeno(1,2,3-c,d)pyrene	D_Indeno(1,2,3-c,d)pyrene	Pyrene	D_Pyrene
0.0204	1	0.0146	1	0.00996	1	0.0199	0	0.0231	1	0.00401	1	0.0374	1	0.0104	1	0.0384	1
0.0368	1	0.0372	1	0.0197	1	0.032	0	0.0441	1	0.0167	1	0.0689	1	0.0681	1	0.0878	1
0.005	0	0.0016	1	0.00076	0	0.00083	0	0.00131	1	0.00089	0	0.005	0	0.00196	1	0.005	0
0.0827	1	0.0599	1	0.0339	1	0.00213	0	0.0781	1	0.0201	1	0.104	1	0.048	1	0.0877	1
0.106	1	0.159	1	0.0729	1	0.0079	0	0.0777	1	0.0625	1	0.0854	1	0.469	1	0.0949	1
0.212	1	0.188	1	0.107	1	0.008	0	0.25	1	0.0453	1	0.352	1	0.166	1	0.601	1
0.00211	1	0.00434	1	0.00189	1	0.008	0	0.00366	1	0.00109	1	0.00478	1	0.00656	1	0.00416	1
0.00061	0	0.00137	0	0.00076	0	0.0079	0	0.00105	0	0.00089	0	0.00047	0	0.00105	0	0.0057	0
0.131	1	0.17	1	0.0649	1	0.0206	0	0.285	1	0.038	1	0.338	1	0.099	1	0.329	1
0.00285	1	0.0117	1	0.00459	1	0.0078	0	0.0083	1	0.00216	1	0.0105	1	0.0121	1	0.00534	1
0.0042	0	0.00136	0	0.00076	0	0.0079	0	0.00105	0	0.00089	0	0.0007	1	0.00104	0	0.0056	0
0.0735	1	0.0607	1	0.0335	1	0.0329	0	0.0786	1	0.0188	1	0.144	1	0.0599	1	0.125	1
0.716	1	0.417	1	0.295	1	0.0079	0	0.928	1	0.101	1	2.13	1	0.429	1	2.15	1
0.0278	1	0.0263	1	0.0131	1	0.00382	0	0.0298	1	0.0229	0	0.0574	1	0.0529	1	0.0298	1
2.29	1	1.5	1	0.964	1	0.0396	0	2.5	1	0.397	1	4.96	1	1.61	1	4.6	1
0.0489	1	0.0713	1	0.0256	1	0.008	0	0.137	1	0.0233	1	0.0741	1	0.0725	1	0.0737	1
0.0281	1	0.0293	1	0.0175	1	0.0079	0	0.0468	1	0.00834	1	0.0446	1	0.0214	1	0.0879	1
0.0318	1	0.0359	1	0.0159	1	0.0295	0	0.0415	1	0.0152	1	0.0551	1	0.0867	1	0.067	1
0.189	1	0.206	1	0.102	1	0.00083	0	0.186	1	0.0612	1	0.267	1	0.352	1	0.231	1
0.126	1	0.155	1	0.0968	1	0.00489	0	0.163	1	0.0736	1	0.103	1	0.127	1	0.134	1
0.21	1	0.159	1	0.0643	1	0.00249	0	0.125	1	0.0358	1	0.0508	1	0.026	1	0.196	1
0.27	1	0.397	1	0.165	1	0.0079	0	0.133	1	0.149	1	0.104	1	1.09	1	0.0845	1
0.0659	1	0.101	1	0.0425	1	0.008	0	0.0923	1	0.0308	1	0.14	1	0.205	1	0.193	1
0.0015	1	0.00414	1	0.00174	1	0.0079	0	0.00536	1	0.00089	0	0.0146	1	0.00505	1	0.00325	1
0.0888	1	0.0792	1	0.0458	1	0.0079	0	0.122	1	0.0247	1	0.206	1	0.117	1	0.199	1
0.00235	0	0.00524	0	0.0029	0	0.0303	0	0.00402	0	0.0034	0	0.00556	1	0.00401	0	0.00428	1
0.0129	1	0.0322	1	0.0117	1	0.0079	0	0.035	1	0.00641	1	0.0436	1	0.0286	1	0.0314	1
0.00291	1	0.00414	1	0.00247	1	0.0079	0	0.00775	1	0.00091	1	0.0126	1	0.00373	1	0.0115	1
0.00159	1	0.00197	1	0.00153	1	0.0079	0	0.0021	1	0.00146	1	0.00266	1	0.00192	1	0.00216	1
0.0183	1	0.0283	1	0.013	1	0.0079	0	0.0335	1	0.0061	1	0.0586	1	0.0227	1	0.0454	1
0.00376	1	0.0127	1	0.00422	1	0.0079	0	0.0164	1	0.00199	1	0.0583	1	0.0112	1	0.0125	1
0.0761	1	0.0556	1	0.0365	1	0.008	0	0.0911	1	0.0151	1	0.107	1	0.053	1	0.0962	1
0.102	1	0.109	1	0.0564	1	0.008	0	0.145	1	0.0252	1	0.203	1	0.134	1	0.216	1
0.005	0	0.005	0	0.00115	1	0.008	0	0.00336	1	0.00089	0	0.00589	1	0.005	0	0.00268	1
0.00061	0	0.00137	0	0.00076	0	0.008	0	0.00105	0	0.00089	0	0.00139	1	0.00105	0	0.0018	1
0.015	0	0.015	0	0.00451	1	0.008	0	0.0145	1	0.00267	0	0.0518	1	0.0161	1	0.00936	1
0.015	0	0.015	0	0.00401	1	0.0079	0	0.0116	1	0.00266	0	0.0407	1	0.015	0	0.00725	1
0.00497	0	0.00497	0	0.00076	0	0.0079	0	0.00229	1	0.00089	0	0.00275	1	0.00497	0	0.00193	1
0.015	0	0.015	0	0.00708	1	0.0079	0	0.0163	1	0.00325	1	0.0544	1	0.015	0	0.0158	1
0.00149	1	0.00169	1	0.00127	1	0.0078	0	0.00154	1	0.00088	0	0.00251	1	0.00104	0	0.0072	1

Benzo(a)pyrene	D_Benzo(a)pyrene	Benzo(b)fluoranthene	D_Benzo(b)fluoranthene	Benzo(k)fluoranthene	D_Benzo(k)fluoranthene	2-Chloronaphthalene	D_2-Chloronaphthalene	Chrysene	D_Chrysene	Dibenzo(a,h)anthracene	D_Dibenzo(a,h)anthracene	Fluoranthene	D_Fluoranthene	Indeno(1,2,3-c,d)pyrene	D_Indeno(1,2,3-c,d)pyrene	Pyrene	D_Pyrene
0.0107	1	0.0115	1	0.0053	1	0.0073	0	0.0101	1	0.00415	1	0.0104	1	0.0186	1	0.0179	1
0.0793	1	0.0503	1	0.0337	1	0.0076	0	0.0854	1	0.0118	1	0.12	1	0.0415	1	0.189	1
0.00126	1	0.00154	1	0.00075	0	0.0079	0	0.00145	1	0.00088	0	0.00341	1	0.00122	1	0.0027	1
0.00195	1	0.00393	1	0.00203	1	0.0079	0	0.00518	1	0.00092	1	0.00768	1	0.00355	1	0.00675	1
0.0474	1	0.0348	1	0.0202	1	0.0073	0	0.0496	1	0.00935	1	0.0574	1	0.036	1	0.0965	1
0.00983	1	0.00606	1	0.00484	1	0.0068	0	0.00767	1	0.00158	1	0.0116	1	0.00474	1	0.017	1
0.00746	1	0.00693	1	0.00496	1	0.0076	0	0.00938	1	0.00134	1	0.0106	1	0.00591	1	0.0174	1
0.00291	1	0.00334	1	0.00204	1	0.0071	0	0.00446	1	0.00089	0	0.00773	1	0.00355	1	0.00606	1
0.202	1	0.118	1	0.0719	1	0.008	0	0.194	1	0.0344	1	0.4	1	0.118	1	0.361	1
2.47	1	1.39	1	0.484	1	0.008	0	2.63	1	0.206	1	4.14	1	1.07	1	4.36	1
0.0284	1	0.0164	1	0.00914	1	0.008	0	0.0242	1	0.00512	1	0.0419	1	0.0195	1	0.0464	1
0.0537	1	0.0452	1	0.0234	1	0.008	0	0.0536	1	0.0121	1	0.0736	1	0.0607	1	0.0624	1
0.192	1	0.175	1	0.087	1	0.008	0	0.163	1	0.0613	1	0.238	1	0.34	1	0.202	1
0.0827	1	0.0497	1	0.0241	1	0.008	0	0.0243	1	0.0264	1	0.0438	1	0.221	1	0.0323	1
0.0403	1	0.0506	1	0.0238	1	0.0079	0	0.0196	1	0.0248	1	0.013	1	0.187	1	0.0161	1
0.00265	1	0.00325	1	0.00181	1	0.0079	0	0.0047	1	0.00089	0	0.0101	1	0.00269	1	0.012	1
6.43	1	4.33	1	2.89	1	0.0079	0	7.23	1	1.25	1	13.6	1	3.84	1	16.6	1
0.139	1	0.0958	1	0.0597	1	0.0079	0	0.149	1	0.0234	1	0.281	1	0.082	1	0.389	1
0.105	1	0.185	1	0.0906	1	0.008	0	0.166	1	0.0275	1	0.152	1	0.0737	1	0.116	1
13.9	1	10.2	1	6.7	1	0.0079	0	18.3	1	2.45	1	41.4	1	10.3	1	47.1	1
0.235	1	0.143	1	0.096	1	0.0079	0	0.277	1	0.0434	1	0.378	1	0.13	1	0.671	1
0.118	1	0.0843	1	0.0504	1	0.0079	0	0.121	1	0.0313	1	0.194	1	0.0961	1	0.292	1
0.00243	1	0.00347	1	0.00176	1	0.008	0	0.00374	1	0.00089	0	0.00404	1	0.00277	1	0.00321	1
0.00064	1	0.00109	1	0.00041	1			0.00195	1	0.00023	1	0.00481	1	0.00156	1	0.00119	1
0.0276	1	0.0397	1	0.0196	1	0.008	0	0.0452	1	0.00881	1	0.0776	1	0.0325	1	0.0613	1
0.0174	1	0.055	1	0.0168	1	0.0079	0	0.0709	1	0.00755	1	0.255	1	0.0456	1	0.0531	1
0.00867	1	0.019	1	0.00595	1	0.008	0	0.0239	1	0.00354	1	0.0553	1	0.0221	1	0.017	1
0.0173	1	0.0235	1	0.0112	1	0.0079	0	0.028	1	0.00451	1	0.0852	1	0.0236	1	0.0388	1
0.0969	1	0.0872	1	0.0497	1	0.0079	0	0.14	1	0.019	1	0.222	1	0.0834	1	0.217	1
0.177	1	0.157	1	0.0928	1	0.0079	0	0.257	1	0.0431	1	0.303	1	0.155	1	0.37	1
0.147	1	0.144	1	0.081	1	0.0079	0	0.222	1	0.0339	1	0.315	1	0.193	1	0.374	1
0.015	0	0.015	0	0.00228	0	0.008	0	0.00771	1	0.00267	0	0.0122	1	0.015	0	0.00531	1
0.015	0	0.015	0	0.00452	1	0.0079	0	0.0143	1	0.00267	0	0.0439	1	0.015	0	0.00717	1
0.015	0	0.0323	1	0.0116	1	0.008	0	0.0384	1	0.00501	1	0.16	1	0.0367	1	0.0201	1
0.015	0	0.0174	1	0.00785	1	0.008	0	0.026	1	0.00267	0	0.116	1	0.015	0	0.0132	1
0.015	0	0.015	0	0.00275	1	0.008	0	0.00775	1	0.00267	0	0.00935	1	0.015	0	0.00645	1
0.015	0	0.015	0	0.00891	1	0.008	0	0.019	1	0.00274	1	0.056	1	0.015	0	0.0187	1

Benzo(a)pyrene	D_Benzo(a)pyrene	Benzo(b)fluoranthene	D_Benzo(b)fluoranthene	Benzo(k)fluoranthene	D_Benzo(k)fluoranthene	2-Chloronaphthalene	D_2-Chloronaphthalene	Chrysene	D_Chrysene	Dibenzo(a,h)anthracene	D_Dibenzo(a,h)anthracene	Fluoranthene	D_Fluoranthene	Indeno(1,2,3-c,d)pyrene	D_Indeno(1,2,3-c,d)pyrene	Pyrene	D_Pyrene
0.0241	1	0.0159	1	0.0105	1	0.0077	0	0.0231	1	0.00526	1	0.0492	1	0.0231	1	0.0509	1
0.0438	1	0.0633	1	0.0304	1	0.0075	0	0.057	1	0.0152	1	0.0522	1	0.101	1	0.0975	1
0.297	1	0.169	1	0.119	1	0.0071	0	0.324	1	0.0389	1	0.498	1	0.153	1	0.906	1
0.00706	1	0.0065	1	0.0032	1	0.0079	0	0.00846	1	0.00088	0	0.0182	1	0.00515	1	0.0189	1
0.0151	1	0.0208	1	0.0105	1	0.008	0	0.0248	1	0.00481	1	0.0406	1	0.0195	1	0.0404	1
0.0707	1	0.058	1	0.0308	1	0.0076	0	0.0917	1	0.0134	1	0.107	1	0.0504	1	0.185	1
0.00755	1	0.00603	1	0.00421	1	0.0077	0	0.00735	1	0.00239	1	0.0133	1	0.00633	1	0.0175	1
0.0101	1	0.00726	1	0.00441	1	0.0078	0	0.011	1	0.00283	1	0.0126	1	0.0083	1	0.0224	1
0.00352	1	0.00381	1	0.00225	1	0.0073	0	0.00563	1	0.00092	1	0.00947	1	0.00417	1	0.00868	1
0.183	1	0.128	1	0.063	1	0.008	0	0.0455	1	0.0606	1	0.0537	1	0.765	1	0.0689	1
0.00872	1	0.0108	1	0.00492	1	0.00083	0	0.014	1	0.005	0	0.0232	1	0.0105	1	0.0178	1
2.11	1	1.07	1	0.689	1	0.0025	0	2.33	1	0.272	1	5.67	1	0.899	1	5.64	1
0.159	1	0.145	1	0.0773	1	0.00083	0	0.173	1	0.0347	1	0.277	1	0.135	1	0.216	1
16.9	1	9.35	1	6.59	1	0.00832	0	16	1	1.69	1	35.1	1	9.72	1	40.4	1
0.155	1	0.191	1	0.0869	1	0.008	0	0.0972	1	0.0648	1	0.128	1	0.529	1	0.135	1
0.253	1	0.208	1	0.122	1	0.008	0	0.273	1	0.0557	1	0.456	1	0.184	1	0.759	1
0.00485	1	0.0135	1	0.00479	1	0.008	0	0.0127	1	0.00304	1	0.027	1	0.0211	1	0.011	1
0.14	1	0.168	1	0.0766	1	0.0076	0	0.13	1	0.0565	1	0.19	1	0.482	1	0.162	1
0.0296	1	0.032	1	0.0164	1	0.0079	0	0.017	1	0.0155	1	0.0236	1	0.121	1	0.011	1
0.16	1	0.171	1	0.104	1	0.0078	0	0.552	1	0.0434	1	0.569	1	0.126	1	0.515	1
0.178	1	0.114	1	0.0697	1	0.008	0	0.144	1	0.0339	1	0.233	1	0.107	1	0.226	1
2.85	1	1.77	1	1.09	1	0.008	0	3.53	1	0.191	1	7.69	1	1.23	1	7.34	1
0.00912	1	0.00606	1	0.00367	1	0.008	0	0.00874	1	0.00207	1	0.0164	1	0.00654	1	0.015	1
0.268	1	0.186	1	0.117	1	0.008	0	0.259	1	0.056	1	0.444	1	0.197	1	0.358	1
0.114	1	0.115	1	0.0507	1	0.008	0	0.111	1	0.0305	1	0.19	1	0.191	1	0.163	1
0.26	1	0.232	1	0.124	1	0.008	0	0.321	1	0.0525	1	0.663	1	0.216	1	0.452	1
0.0675	1	0.076	1	0.0377	1	0.0079	0	0.0729	1	0.0176	1	0.118	1	0.0631	1	0.111	1
0.0319	1	0.0523	1	0.0215	1	0.0079	0	0.0407	1	0.0177	1	0.0335	1	0.128	1	0.0297	1
0.00783	1	0.0109	1	0.00519	1	0.0079	0	0.0193	1	0.00129	1	0.049	1	0.0104	1	0.0607	1
0.163	1	0.169	1	0.0914	1	0.0079	0	0.188	1	0.0546	1	0.194	1	0.183	1	0.312	1
0.225	1	0.164	1	0.112	1	0.0079	0	0.27	1	0.0428	1	0.427	1	0.141	1	0.687	1
0.0687	1	0.138	1	0.0684	1	0.008	0	0.125	1	0.0181	1	0.113	1	0.0536	1	0.0769	1
0.238	1	0.186	1	0.127	1	0.008	0	0.291	1	0.0435	1	0.603	1	0.168	1	0.713	1
0.0681	1	0.0678	1	0.0407	1	0.008	0	0.0735	1	0.0201	1	0.1	1	0.0553	1	0.144	1
0.239	1	0.176	1	0.118	1	0.0079	0	0.272	1	0.0467	1	0.494	1	0.144	1	0.646	1
0.0241	1	0.0347	1	0.0167	1	0.008	0	0.0507	1	0.00493	1	0.0647	1	0.0213	1	0.0542	1
2	1	0.994	1	0.605	1	0.02	0	3.26	1	0.276	1	8.21	1	1.14	1	8.48	1
0.0923	1	0.0873	1	0.0488	1			0.186	1	0.0181	1	0.359	1	0.0912	1	0.293	1
0.229	1	0.126	1	0.0737	1			0.264	1	0.0829	1	0.422	1	0.214	1	0.503	1
2.01	1	0.556	1	0.335	1	0.0199	0	2.43	1	0.156	1	6.09	1	0.741	1	7.19	1

Dibenzofuran	D_Dibenzofuran	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	LMWPAH ND_halfRL	D_LMWPAH ND_halfRL	LMWPAH ND_0	D_LMWPAH ND_0	HMWPAH ND_halfRL	D_HMWPAH ND_halfRL	HMWPAH ND_0	D_HMWPAH ND_0	2,4,5-Trichlorophenol	D_2,4,5-Trichlorophenol
0.0991	1	0.01989	1	0.01989	1	0.9381	1	0.9381	1	0.25508	1	0.25508	1	0.0246	0
0.0141	0	0.00492	0	0.00492	0	0.0145	0	0.0145	0	0.00492	0	0.00492	0		
0.014	0	0.00497	0	0.00497	0	0.007065	1	0.00358	1	0.00492	1	0.00165	1	0.0256	0
0.0141	0	0.19472	1	0.19472	1	0.38045	1	0.3782	1	1.744	1	1.744	1	0.0257	0
0.0139	0	0.0198	0	0.0198	0	0.019545	1	0.00147	1	0.0198	0	0.0198	0	0.0254	0
0.149	1	0.18141	1	0.18141	1	2.5182	1	2.5182	1	1.5104	1	1.5104	1	0.0251	0
0.014	0	0.00498	0	0.00498	0	0.0145	0	0.0145	0	0.00498	0	0.00498	0	0.0256	0
0.0141	0	0.005	0	0.005	0	0.004825	1	0.00134	1	0.005	0	0.005	0	0.0258	0
0.0582	1	0.00491	1	0.00405	1	0.4903	1	0.4903	1	0.06931	1	0.06071	1	0.0257	0
0.0141	0	0.005	0	0.005	0	0.0045	0	0.0045	0	0.005	0	0.005	0	0.0256	0
0.0141	0	0.0062297	1	0.0062297	1	0.04364	1	0.04139	1	0.05421	1	0.05421	1	0.0257	0
0.0378	0	0.024644	1	0.024644	1	0.2096	1	0.2096	1	0.28384	1	0.28384	1	0.189	0
0.0199	0	0.0040071	1	0.0040071	1	0.02072	1	0.00581	1	0.02987	1	0.02987	1	0.0997	0
0.0825	1	1.21264	1	1.21264	1	1.5007	1	1.5007	1	7.247	1	7.247	1	0.0997	0
0.014	0	0.072826	1	0.072826	1	3.08065	1	3.0784	1	0.7308	1	0.7308	1	0.0255	0
0.0134	0	0.0018215	1	0.001498	1	0.0138	0	0.0138	0	0.01651	1	0.01327	1	0.0244	0
0.0139	0	0.0197	0	0.0197	0	0.16716	1	0.16716	1	0.03392	1	0.00427	1	0.0253	0
0.0141	0	0.00498	0	0.00498	0	0.0045	0	0.0045	0	0.00498	0	0.00498	0	0.0258	0
0.0141	0	0.027956	1	0.027956	1	0.04551	1	0.04551	1	0.17892	1	0.17892	1	0.0257	0
0.02	0	0.0048268	1	0.0048268	1	0.02701	1	0.00933	1	0.03835	1	0.03835	1	0.0998	0
0.0138	0	0.00494	0	0.00494	0	0.0142	0	0.0142	0	0.00494	0	0.00494	0		
0.0199	0	0.00495	0	0.00495	0	0.0199	0	0.0199	0	0.01869	1	0.00136	1	0.0996	0
0.046	1	0.0031933	1	0.0023433	1	0.83602	1	0.83602	1	0.05465	1	0.04615	1	0.0254	0
0.0132	0	0.0049	0	0.0049	0	0.0136	0	0.0136	0	0.0074	1	0.00178	1	0.024	0
0.014	0	0.001383	1	0.0011795	1	0.0045	0	0.0045	0	0.01052	1	0.00848	1	0.0255	0
0.0141	0	0.0045991	1	0.0001157	1	0.1967	1	0.1967	1	0.04506	1	0.02106	1	0.0257	0
0.014	0	0.0198	0	0.0198	0	0.0145	0	0.0145	0	0.00951	1	0.00192	1	0.0256	0
0.0141	0	0.00499	0	0.00499	0	0.0045	0	0.0045	0	0.00499	0	0.00499	0	0.0257	0
0.0141	0	0.0032782	1	0.0032337	1	0.02121	1	0.01896	1	0.03247	1	0.03202	1	0.0257	0
0.02	0	0.0023028	1	0.0015528	1	0.0476	1	0.0276	1	0.02029	1	0.01279	1	0.0998	0
0.014	0	0.00491	0	0.00491	0	0.0145	0	0.0145	0	0.00491	0	0.00491	0		
0.047	1	0.118653	1	0.118653	1	0.4854	1	0.4854	1	0.7656	1	0.7656	1	0.201	0
0.0199	0	0.0019121	1	0.0016646	1	0.021725	1	0.00435	1	0.01628	1	0.0138	1	0.0997	0
0.0598	0	0.0107341	1	0.0003741	1	0.0663	1	0.0068	1	0.06263	1	0.02563	1	0.299	0
0.02	0	0.0040959	1	0.0035969	1	0.017445	1	0.00495	1	0.02942	1	0.02443	1	0.1	0
0.823	1	10.8189	1	10.8189	1	15.84	1	15.84	1	75.99	1	75.99	1	0.103	0
0.02	0	0.0041865	1	0.0041865	1	0.02482	1	0.00464	1	0.03144	1	0.03144	1	0.1	0
0.0227	1	0.0081816	1	0.0081816	1	0.17699	1	0.17699	1	0.05796	1	0.05796	1	0.0258	0
0.014	0	0.0028717	1	0.0028717	1	0.026555	1	0.02186	1	0.03051	1	0.03051	1	0.0256	0
0.0141	0	0.0051029	1	0.0051029	1	0.01597	1	0.01372	1	0.04738	1	0.04738	1	0.0257	0

Dibenzofuran	D_Dibenzofuran	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	LMWPAH ND_halfRL	D_LMWPAH ND_halfRL	LMWPAH ND_0	D_LMWPAH ND_0	HMWPAH ND_halfRL	D_HMWPAH ND_halfRL	HMWPAH ND_0	D_HMWPAH ND_0	2,4,5-Trichlorophenol	D_2,4,5-Trichlorophenol
0.0199	0	0.026838	1	0.026838	1	0.041495	1	0.02909	1	0.18137	1	0.18137	1	0.0996	0
0.0568	0	0.053991	1	0.053991	1	0.11505	1	0.07585	1	0.4051	1	0.4051	1	0.104	0
0.00138	0	0.0029926	1	0.0003691	1	0.005	0	0.005	0	0.01361	1	0.00487	1	0.0257	0
0.00653	1	0.106061	1	0.106061	1	0.06786	1	0.04866	1	0.5783	1	0.5783	1	0.0659	0
0.0191	1	0.188057	1	0.188057	1	0.091385	1	0.0839	1	1.1768	1	1.1768	1	0.0257	0
0.146	1	0.28473	1	0.28473	1	0.39913	1	0.39913	1	2.1173	1	2.1173	1	0.0257	0
0.0141	0	0.0036636	1	0.0036636	1	0.01837	1	0.00107	1	0.02988	1	0.02988	1	0.0257	0
0.0141	0	0.00499	0	0.00499	0	0.0145	0	0.0145	0	0.00499	0	0.00499	0		
0.0366	0	0.18424	1	0.18424	1	0.215115	1	0.1935	1	1.5869	1	1.5869	1	0.0667	0
0.0178	1	0.006246	1	0.006246	1	0.03194	1	0.01755	1	0.06012	1	0.06012	1	0.0252	0
0.014	0	0.0198	0	0.0198	0	0.02006	1	0.00186	1	0.0111	1	0.0007	1	0.0255	0
0.237	1	0.097616	1	0.097616	1	0.266745	1	0.23237	1	0.6544	1	0.6544	1	0.106	0
0.0141	0	0.92768	1	0.92768	1	1.11595	1	1.1137	1	7.948	1	7.948	1	0.0257	0
0.0101	1	0.039618	1	0.037328	1	0.08042	1	0.05607	1	0.26	1	0.2371	1	0.118	0
0.295	1	2.9681	1	2.9681	1	1.60155	1	1.5766	1	20.881	1	20.881	1	0.128	0
0.0171	1	0.07364	1	0.07364	1	0.26567	1	0.26567	1	0.5674	1	0.5674	1	0.0257	0
0.014	0	0.039722	1	0.039722	1	0.04685	1	0.0298	1	0.31894	1	0.31894	1	0.0256	0
0.0523	0	0.048765	1	0.048765	1	0.080305	1	0.0524	1	0.3609	1	0.3609	1	0.0953	0
0.0115	1	0.27358	1	0.27358	1	0.08691	1	0.08191	1	1.7002	1	1.7002	1	0.0257	0
0.0239	1	0.18032	1	0.18032	1	0.2043	1	0.1602	1	1.0994	1	1.0994	1	0.151	0
0.00914	1	0.24828	1	0.24828	1	0.09085	1	0.0685	1	0.9521	1	0.9521	1	0.0257	0
0.0141	0	0.45766	1	0.45766	1	0.057135	1	0.04961	1	2.4548	1	2.4548	1	0.0257	0
0.0141	0	0.110613	1	0.110613	1	0.04322	1	0.03597	1	0.9291	1	0.9291	1	0.0257	0
0.014	0	0.0028141	1	0.0027696	1	0.05014	1	0.04693	1	0.03732	1	0.03687	1	0.0256	0
0.0141	0	0.12661	1	0.12661	1	0.1404	1	0.1307	1	0.9817	1	0.9817	1	0.0256	0
0.0538	0	0.0191	0	0.0191	0	0.0555	0	0.0555	0	0.03215	1	0.00984	1	0.098	0
0.0151	1	0.022411	1	0.022411	1	0.04605	1	0.04357	1	0.21451	1	0.21451	1	0.0256	0
0.0141	0	0.0044995	1	0.0044995	1	0.01599	1	0.00866	1	0.04988	1	0.04988	1	0.0257	0
0.0141	0	0.0021868	1	0.0021423	1	0.004715	1	0.00103	1	0.01678	1	0.01678	1	0.0257	0
0.0141	0	0.027375	1	0.027375	1	0.024265	1	0.01453	1	0.2432	1	0.2432	1	0.0256	0
0.0141	0	0.007375	1	0.007375	1	0.025615	1	0.0197	1	0.12547	1	0.12547	1	0.0257	0
0.0141	0	0.101031	1	0.101031	1	0.03431	1	0.02738	1	0.6106	1	0.6106	1	0.0257	0
0.0305	1	0.14447	1	0.14447	1	0.13158	1	0.13158	1	1.0762	1	1.0762	1	0.0257	0
0.0141	0	0.0033011	1	0.0002566	1	0.005915	1	0.00263	1	0.02211	1	0.01416	1	0.0258	0
0.0141	0	0.00499	0	0.00499	0	0.0045	0	0.0045	0	0.00647	1	0.00319	1	0.0257	0
0.0141	0	0.0109635	1	0.00258	1	0.015145	1	0.00919	1	0.11635	1	0.10001	1	0.0257	0
0.0141	1	0.009773	1	0.000517	1	0.01855	1	0.0126	1	0.08862	1	0.06356	1	0.0257	0
0.0141	0	0.0032654	1	0.0002009	1	0.005465	1	0.00198	1	0.01703	1	0.00875	1	0.0257	0
0.0146	1	0.010646	1	0.001646	1	0.03147	1	0.02967	1	0.12383	1	0.10133	1	0.0257	0
0.0138	0	0.0020204	1	0.0019244	1	0.0044	0	0.0044	0	0.01789	1	0.01693	1	0.0252	0

Dibenzofuran	D_Dibenzofuran	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	LMWPAH ND_halfRL	D_LMWPAH ND_halfRL	LMWPAH ND_0	D_LMWPAH ND_0	HMWPAH ND_halfRL	D_HMWPAH ND_halfRL	HMWPAH ND_0	D_HMWPAH ND_0	2,4,5-Trichlorophenol	D_2,4,5-Trichlorophenol
0.0129	0	0.015418	1	0.015418	1	0.009895	1	0.00257	1	0.09527	1	0.09527	1	0.0235	0
0.0135	0	0.102324	1	0.102324	1	0.078165	1	0.07353	1	0.6954	1	0.6954	1	0.0247	0
0.014	0	0.0016725	1	0.0015505	1	0.00492	0	0.00492	0	0.0128	1	0.01158	1	0.0255	0
0.014	0	0.0032998	1	0.0032998	1	0.011575	1	0.00402	1	0.03454	1	0.03454	1	0.0255	0
0.013	0	0.062191	1	0.062191	1	0.03676	1	0.03426	1	0.39385	1	0.39385	1	0.0236	0
0.0121	0	0.0122437	1	0.0122437	1	0.005255	1	0.00187	1	0.06947	1	0.06947	1	0.022	0
0.0135	0	0.0101898	1	0.0101898	1	0.009835	1	0.0024	1	0.0712	1	0.0712	1	0.0247	0
0.0126	0	0.0041251	1	0.0040806	1	0.00499	0	0.00499	0	0.03287	1	0.03242	1	0.023	0
0.0141	0	0.25607	1	0.25607	1	0.19779	1	0.19779	1	1.6783	1	1.6783	1	0.0257	0
0.0364	1	3.0783	1	3.0783	1	0.7125	1	0.7125	1	19.42	1	19.42	1	0.0258	0
0.0141	0	0.035698	1	0.035698	1	0.01918	1	0.01419	1	0.21146	1	0.21146	1	0.0257	0
0.0141	0	0.071516	1	0.071516	1	0.02538	1	0.02037	1	0.4161	1	0.4161	1	0.0257	0
0.0141	0	0.27106	1	0.27106	1	0.09908	1	0.09658	1	1.5693	1	1.5693	1	0.0257	0
0.0141	0	0.116363	1	0.116363	1	0.01556	1	0.01055	1	0.5173	1	0.5173	1	0.0258	0
0.0141	0	0.070074	1	0.070074	1	0.01728	1	0.01363	1	0.38478	1	0.38478	1	0.0257	0
0.014	0	0.0037235	1	0.003679	1	0.01121	1	0.00756	1	0.03972	1	0.03927	1	0.0256	0
0.121	1	8.3443	1	8.3443	1	6.667	1	6.667	1	62.28	1	62.28	1	0.0256	0
0.0141	0	0.18038	1	0.18038	1	0.11833	1	0.11833	1	1.3569	1	1.3569	1	0.0256	0
0.0141	0	0.15245	1	0.15245	1	0.02906	1	0.02407	1	0.9969	1	0.9969	1	0.0257	0
2.54	1	17.655	1	17.655	1	10.489	1	10.489	1	156.42	1	156.42	1	0.0257	0
0.0141	0	0.30011	1	0.30011	1	0.1442	1	0.1442	1	2.1844	1	2.1844	1	0.0256	0
0.0278	1	0.15562	1	0.15562	1	0.11317	1	0.11317	1	1.0891	1	1.0891	1	0.0257	0
0.0141	0	0.0035369	1	0.0034924	1	0.00128	0	0.00128	0	0.02412	1	0.02367	1	0.0258	0
		0.0010425	1	0.0010425	1	0.003305	1	0.00092	1	0.01242	1	0.01242	1		
0.0141	1	0.040363	1	0.040363	1	0.03538	1	0.02563	1	0.33481	1	0.33481	1	0.0258	0
0.0563	1	0.032394	1	0.032394	1	0.09861	1	0.09362	1	0.53925	1	0.53925	1	0.0256	0
0.0212	1	0.01438	1	0.01438	1	0.041235	1	0.0315	1	0.16145	1	0.16145	1	0.0257	0
0.017	1	0.025131	1	0.025131	1	0.05203	1	0.04234	1	0.24481	1	0.24481	1	0.0256	0
0.014	0	0.13108	1	0.13108	1	0.08702	1	0.08477	1	1.0037	1	1.0037	1	0.0255	0
0.0141	0	0.24366	1	0.24366	1	0.08718	1	0.0847	1	1.7479	1	1.7479	1	0.0256	0
0.0822	1	0.20771	1	0.20771	1	0.2289	1	0.2289	1	1.6429	1	1.6429	1	0.0257	0
0.0141	0	0.0094481	1	0.0000771	1	0.014985	1	0.00963	1	0.05143	1	0.02522	1	0.0258	0
0.0141	0	0.0100275	1	0.000894	1	0.017055	1	0.0111	1	0.09672	1	0.07288	1	0.0257	0
0.0405	1	0.017111	1	0.009611	1	0.04174	1	0.03769	1	0.31827	1	0.31077	1	0.0257	0
0.0739	1	0.0116715	1	0.003288	1	0.05861	1	0.05681	1	0.20182	1	0.18548	1	0.0258	0
0.0141	0	0.009799	1	0.0006655	1	0.013015	1	0.00706	1	0.05327	1	0.02943	1	0.0257	0
0.017	1	0.010992	1	0.001992	1	0.03275	1	0.03095	1	0.13422	1	0.11172	1	0.0258	0

Dibenzofuran	D_Dibenzofuran	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL	Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	D_Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0	LMWPAH ND_halfRL	D_LMWPAH ND_halfRL	LMWPAH ND_0	D_LMWPAH ND_0	HMWPAH ND_halfRL	D_HMWPAH ND_halfRL	HMWPAH ND_0	D_HMWPAH ND_0	2,4,5-Trichlorophenol	D_2,4,5-Trichlorophenol
0.0137	0	0.031185	1	0.031185	1	0.026435	1	0.02394	1	0.22156	1	0.22156	1	0.0249	0
0.0133	0	0.06885	1	0.06885	1	0.032785	1	0.02815	1	0.4953	1	0.4953	1	0.0243	0
0.0372	1	0.37833	1	0.37833	1	0.4213	1	0.4213	1	2.8059	1	2.8059	1	0.0229	0
0.0141	0	0.0091846	1	0.0091406	1	0.016785	1	0.01206	1	0.07302	1	0.07258	1	0.0256	0
0.0141	0	0.022449	1	0.022449	1	0.0184	1	0.00886	1	0.19191	1	0.19191	1	0.0257	0
0.0149	1	0.093587	1	0.093587	1	0.08165	1	0.08165	1	0.6741	1	0.6741	1	0.0247	0
0.0136	0	0.0101655	1	0.0101655	1	0.01068	1	0.00355	1	0.07112	1	0.07112	1	0.0249	0
0.0138	0	0.013364	1	0.013364	1	0.0132	1	0.00607	1	0.08764	1	0.08764	1	0.0251	0
0.013	0	0.0050503	1	0.0050503	1	0.01011	1	0.0031	1	0.04204	1	0.04204	1	0.0237	0
0.0141	0	0.287755	1	0.287755	1	0.02881	1	0.01906	1	1.3941	1	1.3941	1	0.0258	0
0.00207	1	0.012519	1	0.012269	1	0.01372	1	0.00372	1	0.10031	1	0.09781	1	0.0257	0
0.415	1	2.5653	1	2.5653	1	2.302	1	2.302	1	20.07	1	20.07	1	0.0258	0
0.0142	1	0.21263	1	0.21263	1	0.12077	1	0.12077	1	1.344	1	1.344	1	0.0257	0
0.621	1	21.525	1	21.525	1	9.653	1	9.653	1	153.05	1	153.05	1	0.257	0
0.0141	0	0.248212	1	0.248212	1	0.080125	1	0.07264	1	1.4376	1	1.4376	1	0.0258	0
0.0245	1	0.336	1	0.336	1	0.11775	1	0.11525	1	2.5437	1	2.5437	1	0.0257	0
0.0172	1	0.009703	1	0.009703	1	0.05877	1	0.05403	1	0.10281	1	0.10281	1	0.0257	0
0.0185	1	0.22653	1	0.22653	1	0.09709	1	0.08239	1	1.4743	1	1.4743	1	0.0247	0
0.0141	0	0.048997	1	0.048997	1	0.02502	1	0.00277	1	0.27347	1	0.27347	1	0.0257	0
0.0228	1	0.23016	1	0.23016	1	0.6852	1	0.6778	1	2.4424	1	2.4424	1	0.0252	0
0.0141	0	0.2249	1	0.2249	1	0.06897	1	0.06897	1	1.2356	1	1.2356	1	0.0257	0
0.465	1	3.6534	1	3.6534	1	2.378	1	2.378	1	29.091	1	29.091	1	0.0257	0
0.0141	0	0.0118494	1	0.0118494	1	0.01168	1	0.00603	1	0.07568	1	0.07568	1	0.0258	0
0.0141	0	0.34659	1	0.34659	1	0.189995	1	0.1875	1	2.089	1	2.089	1	0.0258	0
0.0141	0	0.16144	1	0.16144	1	0.06557	1	0.06056	1	1.0413	1	1.0413	1	0.0257	0
0.0323	1	0.34646	1	0.34646	1	0.4208	1	0.4208	1	2.5285	1	2.5285	1	0.0258	0
0.0141	0	0.091039	1	0.091039	1	0.047505	1	0.04501	1	0.5975	1	0.5975	1	0.0257	0
0.0254	1	0.055667	1	0.055667	1	0.05685	1	0.05407	1	0.3694	1	0.3694	1	0.0256	0
0.0141	0	0.011665	1	0.011665	1	0.04973	1	0.04695	1	0.17325	1	0.17325	1	0.0257	0
0.102	1	0.22798	1	0.22798	1	0.11164	1	0.11164	1	1.488	1	1.488	1	0.0257	0
0.0526	1	0.29658	1	0.29658	1	0.2115	1	0.2115	1	2.2978	1	2.2978	1	0.0256	0
0.0141	0	0.10371	1	0.10371	1	0.018635	1	0.01245	1	0.7212	1	0.7212	1	0.0258	0
0.08	1	0.30466	1	0.30466	1	0.174	1	0.174	1	2.4825	1	2.4825	1	0.0258	0
0.0141	0	0.091525	1	0.091525	1	0.02897	1	0.02647	1	0.6125	1	0.6125	1	0.0257	0
0.0161	1	0.31259	1	0.31259	1	0.2754	1	0.2754	1	2.3597	1	2.3597	1	0.0256	0
0.0141	0	0.03556	1	0.03556	1	0.01364	1	0.00864	1	0.30323	1	0.30323	1	0.0257	0
0.22	1	2.5741	1	2.5741	1	2.045	1	2.045	1	27.365	1	27.365	1	0.0998	0
		0.1289	1	0.1289	1	0.12351	1	0.12351	1	1.2777	1	1.2777	1		
		0.3056	1	0.3056	1	0.08519	1	0.08519	1	2.1576	1	2.1576	1		
0.187	1	2.3981	1	2.3981	1	1.313	1	1.313	1	21.358	1	21.358	1	0.0996	0

2,4,6-Trichlorophenol	D_2,4,6-Trichlorophenol	2,4-Dichlorophenol	D_2,4-Dichlorophenol	2,4-Dimethylphenol	D_2,4-Dimethylphenol	2,4-Dinitrophenol	D_2,4-Dinitrophenol	2-Chlorophenol	D_2-Chlorophenol	2-Methylphenol (o-Cresol)	D_2-Methylphenol (o-Cresol)	4,6-Dinitro-2-methylphenol	D_4,6-Dinitro-2-methylphenol	4-Chloro-3-Methylphenol	D_4-Chloro-3-Methylphenol	4-Methylphenol (p-Cresol)	D_4-Methylphenol (p-Cresol)
0.0086	0	0.0147	0	0.0158	1	0.0324	0	0.0133	0	0.04	1	0.0364	0	0.0119	0	0.139	1
										0.0066	0					0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0073	0
0.009	0	0.0153	0			0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.0089	0	0.0151	0	0.0037	0	0.0334	0	0.0137	0	0.0066	0	0.0375	0	0.0123	0	0.0073	0
0.0088	0	0.0149	0	0.0365	1	0.033	0	0.0135	0	0.133	1	0.0371	0	0.0121	0	0.347	1
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0073	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.235	1	0.0338	0	0.0138	0	0.316	1	0.038	0	0.0124	0	1	1
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.0089	0	0.0153	0			0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.189	0	0.189	0	0.189	0	0.378	0	0.0378	0	0.0378	0	0.378	0	0.189	0	0.0305	1
0.0997	0	0.0997	0	0.0997	0	0.199	0	0.0199	0	0.0199	0	0.199	0	0.0997	0	0.0199	0
0.0997	0	0.0997	0	0.008	1	0.199	0	0.0199	0	0.0188	1	0.199	0	0.0997	0	0.067	1
0.0089	0	0.0151	0	0.0037	0	0.0334	0	0.0137	0	0.0066	0	0.0376	0	0.0123	0	0.0073	0
0.0085	0	0.0145	0	0.0036	0	0.032	0	0.0131	0	0.0063	0	0.0359	0	0.0117	0	0.007	0
0.0088	0	0.0151	0	0.0584	1	0.0333	0	0.0136	0	0.0904	1	0.0374	0	0.0122	0	0.211	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0088	0	0.0151	0	0.0584	1	0.0333	0	0.0136	0	0.0904	1	0.0374	0	0.0122	0	0.211	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0			0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0998	0	0.0998	0	0.0998	0	0.2	0	0.02	0	0.02	0	0.2	0	0.0998	0	0.02	0
										0.0065	0					0.0072	0
0.0996	0	0.0996	0	0.0996	0	0.199	0	0.0199	0	0.0199	0	0.199	0	0.0996	0	0.0199	0
0.0088	0	0.0151	0	0.0037	0	0.0333	0	0.0136	0	0.0066	0	0.0374	0	0.0122	0	0.101	1
0.0084	0	0.0143	0	0.0035	0	0.0315	0	0.0129	0	0.0062	0	0.0354	0	0.0116	0	0.0069	0
0.0089	0	0.0152	0	0.0037	0	0.0335	0	0.0137	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0115	1
0.0089	0	0.0152	0	0.0038	0	0.0335	0	0.0137	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0			0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0998	0	0.0998	0	0.0998	0	0.2	0	0.02	0	0.02	0	0.2	0	0.0998	0	0.02	0
										0.0066	0					0.0073	0
0.201	0	0.201	0	0.201	0	0.403	0	0.0403	0	0.0403	0	0.403	0	0.201	0	0.0387	1
0.0997	0	0.0997	0	0.0997	0	0.199	0	0.0199	0	0.0199	0	0.199	0	0.0997	0	0.0199	0
0.299	0	0.299	0	0.299	0	0.598	0	0.0598	0	0.0598	0	0.598	0	0.299	0	0.0598	0
0.1	0	0.1	0	0.1	0	0.2	0	0.02	0	0.02	0	0.2	0	0.1	0	0.942	1
0.0359	0	0.0613	0	0.082	1	0.135	0	0.0554	0	0.115	1	0.152	0	0.0496	0	0.417	1
0.1	0	0.1	0	0.1	0	0.2	0	0.02	0	0.02	0	0.2	0	0.1	0	0.02	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0533	1	0.038	0	0.0124	0	0.161	1
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0137	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.009	0	0.0153	0			0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0

2,4,6-Trichlorophenol	D_2,4,6-Trichlorophenol	2,4-Dichlorophenol	D_2,4-Dichlorophenol	2,4-Dimethylphenol	D_2,4-Dimethylphenol	2,4-Dinitrophenol	D_2,4-Dinitrophenol	2-Chlorophenol	D_2-Chlorophenol	2-Methylphenol (o-Cresol)	D_2-Methylphenol (o-Cresol)	4,6-Dinitro-2-methylphenol	D_4,6-Dinitro-2-methylphenol	4-Chloro-3-Methylphenol	D_4-Chloro-3-Methylphenol	4-Methylphenol (p-Cresol)	D_4-Methylphenol (p-Cresol)
0.0996	0	0.0996	0	0.0996	0	0.199	0	0.0199	0	0.0199	0	0.199	0	0.0996	0	0.0199	0
0.0361	0	0.0617	0	0.0152	0	0.136	0	0.0557	0	0.0268	0	0.153	0	0.0499	0	0.0297	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.023	0	0.0392	0	0.0097	0	0.0865	0	0.0354	0	0.017	0	0.0972	0	0.0317	0	0.0189	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0082	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
										0.0066	0					0.0074	0
0.0233	0	0.0397	0	0.0098	0	0.0876	0	0.0359	0	0.0173	0	0.0984	0	0.0321	0	0.0191	0
0.0088	0	0.015	0	0.0037	0	0.0331	0	0.0136	0	0.0065	0	0.0372	0	0.0122	0	0.0072	0
0.0089	0	0.0152	0	0.0037	0	0.0335	0	0.0137	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.0371	0	0.0633	0	0.0156	0	0.14	0	0.0573	0	0.0275	0	0.157	0	0.0513	0	0.0306	0
0.0089	0	0.0153	0			0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.041	0	0.07	0	0.0173	0	0.154	0	0.0632	0	0.0304	0	0.173	0	0.0567	0	0.0337	0
0.0446	0	0.0761	0	0.0188	0	0.168	0	0.0688	0	0.0331	0	0.189	0	0.0617	0	0.0367	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0089	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0074	0
0.0333	0	0.0567	0	0.014	0	0.125	0	0.0513	0	0.0247	0	0.141	0	0.046	0	0.0274	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.0528	0	0.09	0	0.0222	0	0.199	0	0.0814	0	0.0391	0	0.223	0	0.0729	0	0.101	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0103	1
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0377	0	0.0123	0	0.0146	1
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0074	0
0.0342	0	0.0583	0	0.0144	0	0.129	0	0.0527	0	0.0254	0	0.145	0	0.0473	0	0.0281	0
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0			0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0088	1	0.038	0	0.0124	0	0.0092	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0088	0	0.015	0	0.0087	0	0.0331	0	0.0136	0	0.0065	0	0.0372	0	0.0121	0	0.0072	0

2,4,6-Trichlorophenol	D_2,4,6-Trichlorophenol	2,4-Dichlorophenol	D_2,4-Dichlorophenol	2,4-Dimethylphenol	D_2,4-Dimethylphenol	2,4-Dinitrophenol	D_2,4-Dinitrophenol	2-Chlorophenol	D_2-Chlorophenol	2-Methylphenol (o-Cresol)	D_2-Methylphenol (o-Cresol)	4,6-Dinitro-2-methylphenol	D_4,6-Dinitro-2-methylphenol	4-Chloro-3-Methylphenol	D_4-Chloro-3-Methylphenol	4-Methylphenol (p-Cresol)	D_4-Methylphenol (p-Cresol)
0.0082	0	0.014	0	0.0082	0	0.0309	0	0.0127	0	0.0061	0	0.0347	0	0.0113	0	0.0068	0
0.0086	0	0.0147	0	0.0085	0	0.0324	0	0.0133	0	0.0133	1	0.0364	0	0.0119	0	0.0071	0
0.0089	0	0.0152	0	0.0088	0	0.0335	0	0.0137	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.0089	0	0.0152	0	0.0037	0	0.0335	0	0.0137	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.0082	0	0.0141	0	0.0082	0	0.031	0	0.0127	0	0.0061	0	0.0349	0	0.0114	0	0.0068	0
0.0077	0	0.0131	0	0.0076	0	0.0289	0	0.0118	0	0.0057	0	0.0324	0	0.0106	0	0.0063	0
0.0086	0	0.0147	0	0.0085	0	0.0324	0	0.0133	0	0.0064	0	0.0364	0	0.0119	0	0.0071	0
0.008	0	0.0137	0	0.008	0	0.0302	0	0.0124	0	0.0059	0	0.0339	0	0.0111	0	0.0066	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0377	0	0.0123	0	0.0073	0
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0138	1
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.135	1	0.0337	0	0.0138	0	0.115	1	0.0379	0	0.0124	0	0.387	1
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0429	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0073	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0336	0	0.0138	0	0.0066	0	0.0378	0	0.0123	0	0.0074	0
0.0089	0	0.0152	0	0.0037	0	0.0334	0	0.0137	0	0.0066	0	0.0376	0	0.0123	0	0.0073	0
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0139	1	0.0379	0	0.0124	0	0.0364	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0

2,4,6-Trichlorophenol	D_2,4,6-Trichlorophenol	2,4-Dichlorophenol	D_2,4-Dichlorophenol	2,4-Dimethylphenol	D_2,4-Dimethylphenol	2,4-Dinitrophenol	D_2,4-Dinitrophenol	2-Chlorophenol	D_2-Chlorophenol	2-Methylphenol (o-Cresol)	D_2-Methylphenol (o-Cresol)	4,6-Dinitro-2-methylphenol	D_4,6-Dinitro-2-methylphenol	4-Chloro-3-Methylphenol	D_4-Chloro-3-Methylphenol	4-Methylphenol (p-Cresol)	D_4-Methylphenol (p-Cresol)
0.0087	0	0.0148	0	0.0086	0	0.0327	0	0.0134	0	0.0065	1	0.0368	0	0.012	0	0.0072	0
0.0085	0	0.0145	0	0.0084	0	0.032	0	0.0131	0	0.0063	0	0.0359	0	0.0117	0	0.007	0
0.008	0	0.0136	0	0.0079	0	0.03	0	0.0123	0	0.0059	0	0.0337	0	0.011	0	0.0066	0
0.0089	0	0.0153	0	0.0089	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0222	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0086	0	0.0147	0	0.0085	0	0.0324	0	0.0133	0	0.0064	0	0.0364	0	0.0119	0	0.0095	1
0.0087	0	0.0148	0	0.0086	0	0.0326	0	0.0134	0	0.0064	0	0.0367	0	0.012	0	0.0071	0
0.0087	0	0.0149	0	0.0087	0	0.0329	0	0.0135	0	0.0065	0	0.037	0	0.0121	0	0.0072	0
0.0083	0	0.0141	0	0.0082	0	0.0311	0	0.0127	0	0.0061	0	0.0349	0	0.0114	0	0.0068	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0173	1
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0897	0	0.153	0	0.0378	0	0.338	0	0.138	0	0.0665	0	0.38	0	0.124	0	0.0738	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0086	0	0.0147	0	0.0036	0	0.0324	0	0.0133	0	0.0064	0	0.0365	0	0.0119	0	0.0071	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0086	0	0.0147	0	0.0036	0	0.0324	0	0.0133	0	0.0064	0	0.0365	0	0.0119	0	0.0071	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0088	0	0.015	0	0.0037	0	0.0331	0	0.0136	0	0.0065	0	0.0372	0	0.0121	0	0.0072	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0245	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0089	0	0.0152	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0379	0	0.0124	0	0.0074	0
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0139	0	0.0067	0	0.038	0	0.0124	0	0.0113	1
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0089	0	0.0153	0	0.0038	0	0.0337	0	0.0138	0	0.0066	0	0.0378	0	0.0124	0	0.0074	0
0.009	0	0.0153	0	0.0038	0	0.0338	0	0.0138	0	0.0067	0	0.038	0	0.0124	0	0.0074	0
0.0998	0	0.0998	0	0.0998	0	0.2	0	0.02	0	0.0085	1	0.2	0	0.0998	0	0.0234	1
0.0996	0	0.0996	0	0.0996	0	0.199	0	0.0199	0	0.0199	0	0.199	0	0.0996	0	0.0199	0

Phenol	D_Phenol	Pentachlorophenol	D_Pentachlorophenol	bis(2-Ethylhexyl)phthalate	D_bis(2-Ethylhexyl)phthalate	Butylbenzylphthalate	D_Butylbenzylphthalate	Diethylphthalate	D_Diethylphthalate	Dimethylphthalate	D_Dimethylphthalate	Di-n-butylphthalate	D_Di-n-butylphthalate	Di-n-octylphthalate	D_Di-n-octylphthalate	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	D_2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
0.0368	1	0.0299	0	0.0052	0	0.009	0	0.0189	0	0.0042	0	0.0054	0	0.0042	0	0.493	1
				0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0645	1
0.0199	0	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0907	1
0.02	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.222	1
0.0043	0	0.0309	0	0.0054	0	0.0093	0	0.0195	0	0.0043	0	0.0055	0	0.0043	0	0.63	1
0.0922	1	0.0305	0	0.0053	0	0.0092	0	0.0192	0	0.0043	0	0.0055	0	0.0043	0	4.46	1
0.0044	0	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0881	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.0206	1	0.0044	0	0.0056	0	0.0044	0	0.195	1
0.255	1	0.0312	0	0.0055	0	0.0094	0	0.0235	1	0.0044	0	0.0056	0	0.0044	0	1.07	1
0.0044	0	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.128	1
0.0199	0	0.0311	0	0.0054	0	0.0094	0	0.0249	1	0.0044	0	0.0056	0	0.0044	0	0.156	1
0.0427	1	0.189	0	0.0179	1	0.0378	0	0.0946	0	0.0378	0	0.0378	0	0.0378	0	0.542	1
0.0098	1	0.0997	0	0.0075	1	0.0199	0	0.0499	0	0.0199	0	0.0199	0	0.0199	0	0.0876	1
0.0488	1	0.0997	0	0.014	1	0.0199	0	0.0204	1	0.0199	0	0.0199	0	0.0199	0	54	1
0.0043	0	0.0309	0	0.0054	0	0.0093	0	0.0195	0	0.0043	0	0.0055	0	0.0043	0	1.25	1
0.0042	0	0.0296	0	0.0052	0	0.0089	0	0.0186	0	0.0042	0	0.0053	0	0.0042	0	0.198	1
0.114	1	0.0308	0	0.0054	0	0.0093	0	0.0223	1	0.0043	0	0.0055	0	0.0043	0	0.169	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.0967	1
0.0199	0	0.0312	0	0.0054	0	0.0094	0	0.161	1	0.0044	0	0.0056	0	0.0044	0	0.376	1
0.0063	1	0.0998	0	0.0119	1	0.02	0	0.0499	0	0.02	0	0.02	0	0.02	0	0.481	1
0.0218	1			0.0053	0	0.0092	0	0.0289	1	0.0043	0	0.0055	0	0.0043	0	0.107	1
0.0063	1	0.0996	0	0.0091	1	0.0199	0	0.0498	0	0.0199	0	0.0199	0	0.0199	0	0.0635	1
0.0442	1	0.0308	0	0.0054	0	0.0093	0	0.0217	1	0.0043	0	0.0055	0	0.0043	0	2.76	1
0.0041	0	0.0292	0	0.0051	0	0.0088	0	0.0184	0	0.0041	0	0.0052	0	0.0041	0	0.0929	1
0.0198	0	0.031	0	0.0054	0	0.0093	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0891	1
0.0044	0	0.0311	0	0.0054	0	0.0094	0	0.045	1	0.0044	0	0.0056	0	0.0044	0	0.158	1
0.0044	0	0.031	0	0.0054	0	0.0093	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0972	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0202	1	0.0044	0	0.0056	0	0.0044	0	0.0974	1
0.02	0	0.0312	0	0.0055	0	0.0094	0	0.0267	1	0.0044	0	0.0056	0	0.0044	0	0.26	1
0.0053	1	0.0998	0	0.0251	1	0.02	0	0.0499	0	0.02	0	0.02	0	0.02	0	0.103	1
0.0134	1			0.0054	0	0.0093	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0638	1
0.0592	1	0.201	0	0.101	0	0.0403	0	0.101	0	0.0403	0	0.0403	0	0.0403	0	0.607	1
0.007	1	0.0997	0	0.0129	1	0.0199	0	0.0498	0	0.0199	0	0.0199	0	0.0199	0	0.805	1
0.0288	1	0.299	0	0.0291	1	0.0598	0	0.149	0	0.0598	0	0.0598	0	0.0598	0	0.0582	0
0.0861	1	0.1	0	0.05	0	0.02	0	0.0232	1	0.02	0	0.02	0	0.02	0	0.163	1
0.289	1	0.125	0	0.343	1	0.0376	0	0.0788	0	0.0176	0	0.0917	1	0.0176	0	12.1	1
0.007	1	0.1	0	0.0094	1	0.02	0	0.05	0	0.02	0	0.02	0	0.02	0	0.211	1
0.0723	1	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.397	1
0.0044	0	0.031	0	0.0054	0	0.0093	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.265	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0568	1	0.0044	0	0.0056	0	0.0044	0	0.133	1

Phenol	D_Phenol	Pentachlorophenol	D_Pentachlorophenol	bis(2-Ethylhexyl)phthalate	D_bis(2-Ethylhexyl)phthalate	Butylbenzylphthalate	D_Butylbenzylphthalate	Diethylphthalate	D_Diethylphthalate	Dimethylphthalate	D_Dimethylphthalate	Di-n-butylphthalate	D_Di-n-butylphthalate	Di-n-octylphthalate	D_Di-n-octylphthalate	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	D_2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
0.0071	1	0.0996	0	0.0073	1	0.0199	0	0.0498	0	0.0199	0	0.0199	0	0.0199	0	0.205	1
0.0907	1	0.126	0	0.121	1	0.0379	0	0.0793	0	0.0177	0	0.11	1	0.0177	0	0.873	1
0.0044	0	0.0312	0	0.0215	1	0.0094	0	0.0499	0	0.0044	0	0.0498	1	0.0044	0	0.26	1
0.0112	0	0.0799	0	0.014	0	0.0241	0	0.143	1	0.0112	0	0.108	1	0.0112	0	2.4	1
0.0126	1	0.0312	0	0.0164	1	0.0094	0	0.0197	0	0.0044	0	0.0128	1	0.0044	0	515	1
0.0057	1	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	1.97	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.389	1
0.0162	1			0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.0707	1
0.131	1	0.081	0	0.0141	0	0.0244	0	0.0511	0	0.0114	0	0.0145	0	0.0114	0	0.669	1
0.0043	0	0.0306	0	0.0054	0	0.0092	0	0.0193	0	0.0043	0	0.0055	0	0.0043	0	0.201	1
0.0044	0	0.031	0	0.0054	0	0.0093	0	0.0195	0	0.0044	0	0.0056	0	0.0044	0	0.108	1
0.103	1	0.129	0	0.307	1	0.0389	0	0.0815	0	0.0182	0	0.0232	0	0.0182	0	0.938	1
0.0199	0	0.0311	0	0.0054	0	0.0094	0	0.0223	1	0.0044	0	0.0056	0	0.0044	0	0.305	1
0.02	0	0.143	0	0.0249	0	0.043	0	0.09	0	0.02	0	0.183	1	0.02	0	0.754	1
0.0994	0	0.155	0	0.0271	0	0.0468	0	0.098	0	0.0218	0	0.0279	0	0.0218	0	2.49	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	2.09	1
0.0044	0	0.0311	0	0.014	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	1.56	1
0.0321	1	0.116	0	0.0987	1	0.0348	0	0.073	0	0.0163	0	0.0952	1	0.0163	0	2.49	1
0.0065	1	0.0312	0	0.0055	0	0.0094	0	0.0499	0	0.0044	0	0.0056	0	0.0044	0	11.9	1
0.0258	0	0.184	0	0.258	1	0.0553	0	0.294	0	0.0258	0	0.66	1	0.0258	0	0.97	1
0.0081	1	0.0312	0	0.0055	0	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	6.2	1
0.0068	1	0.0312	0	0.0186	1	0.0094	0	0.0197	0	0.0044	0	0.0079	1	0.0044	0	33.3	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	6.88	1
0.0044	0	0.0311	0	0.0067	1	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.351	1
0.0071	1	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	5.51	1
0.0607	1	0.119	0	0.0208	0	0.0358	0	0.075	0	0.0167	0	0.0214	0	0.0167	0	0.06	1
0.0044	0	0.0311	0	0.0054	0	0.0094	0	0.0198	1	0.0044	0	0.0056	0	0.0044	0	1.01	1
0.0079	1	0.0312	0	0.0054	0	0.0094	0	0.023	1	0.0044	0	0.0056	0	0.0044	0	0.632	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0301	1	0.0044	0	0.0056	0	0.0044	0	0.0746	1
0.0132	1	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.457	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.734	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	1.33	1
0.0044	0	0.0312	0	0.0223	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	32.5	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	0.163	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.199	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.279	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.127	1	0.0044	0	0.0056	0	0.0044	0	0.435	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.464	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.715	1
0.0043	0	0.0306	0	0.0138	0	0.0092	0	0.0193	0	0.0043	0	0.0055	0	0.0043	0	0.169	0

Phenol	D_Phenol	Pentachlorophenol	D_Pentachlorophenol	bis(2-Ethylhexyl)phthalate	D_bis(2-Ethylhexyl)phthalate	Butylbenzylphthalate	D_Butylbenzylphthalate	Diethylphthalate	D_Diethylphthalate	Dimethylphthalate	D_Dimethylphthalate	Di-n-butylphthalate	D_Di-n-butylphthalate	Di-n-octylphthalate	D_Di-n-octylphthalate	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	D_2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
0.004	0	0.0286	0	0.0129	0	0.0086	0	0.018	0	0.004	0	0.0051	0	0.004	0	0.202	1
0.0042	0	0.0299	0	0.0135	0	0.009	0	0.0189	0	0.0042	0	0.0054	0	0.0042	0	0.656	1
0.0044	0	0.031	0	0.0139	0	0.0093	0	0.0195	0	0.0044	0	0.0056	0	0.0044	0	0.173	1
0.0054	1	0.031	0	0.011	1	0.0093	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.16	1
0.004	0	0.0287	0	0.0129	0	0.0086	0	0.0181	0	0.004	0	0.0052	0	0.004	0	1.28	1
0.0554	1	0.0267	0	0.012	0	0.008	0	0.0168	0	0.0037	0	0.0048	0	0.0037	0	0.175	0
0.0042	0	0.0299	0	0.0135	0	0.009	0	0.0189	0	0.0042	0	0.0054	0	0.0042	0	0.172	1
0.0039	0	0.0279	0	0.0126	0	0.0084	0	0.0176	0	0.0039	0	0.005	0	0.0039	0	0.502	1
0.0044	0	0.0312	0	0.0075	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.5	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	1.67	1
0.0044	0	0.0312	0	0.0115	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.177	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	2.13	1
0.0069	1	0.0312	0	0.0055	0	0.0094	0	0.0269	1	0.0044	0	0.0056	0	0.0044	0	16.2	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.055	1	0.0044	0	0.0056	0	0.0044	0	1.23	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0499	0	0.0044	0	0.0056	0	0.0044	0	10.9	1
0.0047	1	0.0311	0	0.0101	1	0.0094	0	0.0919	1	0.0044	0	0.006	1	0.0044	0	0.257	1
0.0186	1	0.0311	0	0.0576	1	0.0094	0	0.0497	0	0.0044	0	0.0056	0	0.0044	0	2.24	1
0.0044	0	0.0311	0	0.0148	1	0.0094	0	0.0498	0	0.0044	0	0.0056	0	0.0044	0	0.238	1
0.0051	1	0.0312	0	0.163	1	0.0094	0	0.0498	0	0.0058	1	0.0095	1	0.0044	0	0.82	1
0.301	1	0.0312	0	0.281	1	0.0094	0	0.0499	0	0.0044	0	0.0056	0	0.0044	0	0.63	1
0.0091	1	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	2.17	1
0.0492	1	0.0312	0	0.0054	0	0.0094	0	0.0499	0	0.0044	0	0.0056	0	0.0044	0	0.259	1
0.0044	0	0.0313	0	0.0074	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.719	1
																0.55	1
0.0284	1	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.701	1
0.0044	0	0.0311	0	0.0054	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	2.34	1
0.0165	1	0.0312	0	0.0204	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	2.47	1
0.021	1	0.0311	0	0.0243	1	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	1.18	1
0.0188	1	0.0309	0	0.0054	0	0.0093	0	0.0195	0	0.0043	0	0.0055	0	0.0043	0	3.91	1
0.0165	1	0.0311	0	0.0175	1	0.0129	1	0.0196	0	0.0044	0	0.0056	0	0.0044	0	1.77	1
0.0044	0	0.0312	0	0.0196	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	28.9	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.493	1
0.0044	0	0.0312	0	0.0054	0	0.0094	0	0.0499	0	0.0044	0	0.0056	0	0.0044	0	0.216	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	1.28	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	1.51	1
0.0044	0	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.741	1
0.0044	0	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	1.04	1

Phenol	D_Phenol	Pentachlorophenol	D_Pentachlorophenol	bis(2-Ethylhexyl)phthalate	D_bis(2-Ethylhexyl)phthalate	Butylbenzylphthalate	D_Butylbenzylphthalate	Diethylphthalate	D_Diethylphthalate	Dimethylphthalate	D_Dimethylphthalate	Di-n-butylphthalate	D_Di-n-butylphthalate	Di-n-octylphthalate	D_Di-n-octylphthalate	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	D_2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
0.0105	1	0.0303	0	0.0136	0	0.0091	0	0.0191	0	0.0043	0	0.0054	0	0.0043	0	1.09	1
0.0042	0	0.0295	0	0.0133	0	0.0089	0	0.0186	0	0.0042	0	0.0053	0	0.0042	0	0.839	1
0.0039	0	0.0278	0	0.0125	0	0.0084	0	0.0175	0	0.0039	0	0.005	0	0.0039	0	2.36	1
0.0155	1	0.0311	0	0.014	0	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	0.499	1
0.0044	0	0.0312	0	0.0119	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.492	1
0.0042	0	0.0299	0	0.0182	1	0.009	0	0.0189	0	0.0042	0	0.0054	0	0.0042	0	2.53	1
0.0042	0	0.0302	0	0.0136	0	0.0154	1	0.019	0	0.0042	0	0.0054	0	0.0042	0	0.16	0
0.0043	0	0.0304	0	0.0137	0	0.0092	0	0.0192	0	0.0043	0	0.0055	0	0.0043	0	0.987	1
0.004	0	0.0287	0	0.0129	0	0.0086	0	0.0181	0	0.004	0	0.0052	0	0.004	0	0.323	1
0.0061	1	0.0313	0	0.0055	0	0.0094	0	0.0214	1	0.0044	0	0.0056	0	0.0044	0	5.1	1
0.0044	0	0.0312	0	0.0333	1	0.0094	0	0.05	0	0.0044	0	0.0478	1	0.0044	0	0.898	1
0.0187	1	0.0313	0	0.0055	0	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	6.5	1
0.0119	1	0.0311	0	0.0054	0	0.0094	0	0.0498	0	0.0044	0	0.0056	0	0.0044	0	1.84	1
0.0439	0	0.312	0	0.0545	0	0.094	0	0.197	0	0.0439	0	0.056	0	0.0439	0	5.24	1
0.0069	1	0.0313	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	16.2	1
0.0055	1	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	2.27	1
0.0122	1	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0065	1	0.0044	0	0.683	1
0.0042	0	0.03	0	0.0052	0	0.009	0	0.0189	0	0.0042	0	0.0054	0	0.0042	0	18.2	1
0.0144	1	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	1.91	1
0.0043	0	0.0306	0	0.0053	0	0.0092	0	0.0628	1	0.0043	0	0.0055	0	0.0043	0	2.59	1
0.0044	0	0.0312	0	0.0146	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.621	1
0.0201	1	0.0312	0	0.0055	0	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	1.49	1
0.0044	0	0.0313	0	0.015	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.0688	1
0.0057	1	0.0313	0	0.0127	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	4.04	1
0.0044	0	0.0312	0	0.0174	1	0.0094	0	0.0402	1	0.0044	0	0.0154	1	0.0044	0	12.8	1
0.0044	0	0.0313	0	0.0218	1	0.0094	0	0.0334	1	0.0044	0	0.0056	0	0.0044	0	6.81	1
0.0044	0	0.0312	0	0.0149	1	0.0094	0	0.0196	0	0.0044	0	0.0056	0	0.0044	0	3.03	1
0.0055	1	0.0311	0	0.0054	0	0.0094	0	0.0498	0	0.0044	0	0.0056	0	0.0044	0	3.68	1
0.0251	1	0.0312	0	0.0054	0	0.0094	0	0.0499	0	0.0044	0	0.0056	0	0.0044	0	1.4	1
0.0088	1	0.0312	0	0.0214	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.425	1
0.0051	1	0.0311	0	0.0439	1	0.0094	0	0.0498	0	0.0044	0	0.0056	0	0.0044	0	0.787	1
0.0044	0	0.0313	0	0.027	1	0.0094	0	0.0197	0	0.0044	0	0.0056	0	0.0044	0	0.416	1
0.0146	1	0.0313	0	0.0055	0	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	0.442	1
0.0058	1	0.0312	0	0.0361	1	0.0094	0	0.05	0	0.0044	0	0.0056	0	0.0044	0	1.3	1
0.0066	1	0.0311	0	0.0504	1	0.0094	0	0.0498	0	0.0066	1	0.0056	0	0.0044	0	0.302	1
0.0044	0	0.0312	0	0.524	1	0.0094	0	0.257	1	0.0044	0	0.0056	0	0.0044	0	2.56	1
0.0238	1	0.0998	0	0.0499	0	0.02	0	0.02	0	0.02	0	0.02	0	0.02	0	7.88	1
																2.96	1
																0.517	0
0.0199	0	0.0996	0	0.0498	0	0.0199	0	0.0199	0	0.0199	0	0.0199	0	0.0199	0	7.08	1

1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	D_1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	Dioxins and Furans TEQ ND_halfRL	D_Dioxins and Furans TEQ ND_halfRL	Dioxins and Furans TEQ ND0	D_Dioxins and Furans TEQ ND0
2.5	0	3.5086435	1	0.8809	1
0.217	1	0.4997357	1	0.4834412	1
0.298	1	0.714047545	1	0.692914	1
2.42	0	3.986888	1	1.7571	1
2.43	0	2.563582	1	0.796	1
4.91	1	19.782603	1	19.5183	1
0.187	1	0.46903501	1	0.446599	1
0.525	1	1.1853558	1	1.1649018	1
1.26	1	6.0196121	1	6.0196121	1
0.388	1	0.91635814	1	0.896359	1
2.41	0	3.393184	1	1.2907	1
0.441	1	2.460876	1	2.139675	1
0.267	1	0.788471	1	0.6019	1
379	1	1177.613	1	1177.613	1
2.77	1	9.029802	1	9.018302	1
0.6	1	1.8397498	1	1.8372848	1
0.206	1	1.379638	1	1.367288	1
0.315	1	0.758905065	1	0.739116	1
2.35	0	2.956382565	1	1.66313	1
2.51	1	12.877623	1	12.7564	1
0.232	1	1.68340793	1	0.34799	1
0.151	1	0.549603745	1	0.39774	1
5.95	1	22.57006	1	22.32331	1
0.208	1	0.625747	1	0.6231345	1
0.361	1	0.81998632	1	0.79936432	1
0.168	1	0.8138789	1	0.8002039	1
0.293	1	0.8699813	1	0.8648573	1
0.413	1	1.01259227	1	0.99297827	1
1.68	1	3.13449511	1	3.129511	1
0.0731	1	0.456541	1	0.167997	1
0.194	1	1.714756	1	0.24898	1
0.56	1	2.711839	1	2.38342	1
1.63	1	14.3298	1	14.2088	1
0.0792	1	0.608976	1	0.21438	1
0.431	1	2.20305	1	1.98053	1
15.4	1	63.50045	1	63.38745	1
0.301	1	1.1418195	1	0.8414	1
2.48	0	3.4738325	1	1.09229	1
0.392	1	1.541182	1	1.538852	1
1.14	1	1.8576821	1	1.8526841	1

1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	D_1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	Dioxins and Furans TEQ ND_halfRL	D_Dioxins and Furans TEQ ND_halfRL	Dioxins and Furans TEQ ND0	D_Dioxins and Furans TEQ ND0
0.293	1	1.282486	1	0.996172	1
1.65	1	5.536988	1	4.4666	1
0.614	1	1.9283549	1	1.7955639	1
3.94	1	34.07681	1	33.88481	1
4140	1	11387.4	1	11387.4	1
9.79	1	31.52366	1	30.849	1
1.1	1	3.563746	1	3.563746	1
0.15	1	1.983112	1	0.21976	1
2.12	1	8.32676	1	8.32676	1
0.468	1	1.34329	1	1.340825	1
0.338	1	1.0292593	1	1.0266358	1
1.59	1	7.405697	1	7.405697	1
1.19	1	2.5363891	1	2.5340091	1
0.605	1	2.797275	1	2.768675	1
5.52	1	27.712075	1	27.712075	1
4.05	1	17.495979	1	17.495979	1
4.65	1	15.921824	1	15.896124	1
3.06	1	10.7430455	1	9.8441	1
29.9	1	98.20698	1	98.09398	1
0.649	1	3.4734367	1	3.3409867	1
12.7	1	129.27984	1	129.27984	1
18.7	1	93.61294	1	92.2651	1
6.77	1	22.479294	1	22.22868	1
2.26	0	2.681744	1	0.47508	1
12.4	1	57.7714	1	57.7714	1
0.068	1	2.252122355	1	0.0853	1
2.15	1	7.686324	1	7.686324	1
0.697	1	4.691891	1	4.691891	1
0.363	1	0.8480792	1	0.8447542	1
1.04	1	3.3593775	1	1.9857	1
1.01	1	3.284001	1	1.87289	1
2.52	1	10.913803	1	10.913803	1
21.4	1	199.29427	1	199.29427	1
0.483	1	1.3943695	1	1.3943695	1
1.92	1	6.083423	1	6.0179	1
0.427	1	1.526121	1	1.523691	1
0.836	1	2.893893	1	2.891428	1
3.39	1	4.92769975	1	4.847	1
4.23	1	6.7775464	1	6.7222214	1
0.373	1	1.02992335	1	0.89655	1

1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	D_1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	Dioxins and Furans TEQ ND_halfRL	D_Dioxins and Furans TEQ ND_halfRL	Dioxins and Furans TEQ ND0	D_Dioxins and Furans TEQ ND0
0.775	1	3.018893	1	3.000393	1
3.23	1	5.0761399	1	5.0453	1
1.52	1	1.9718858	1	1.92505	1
0.594	1	2.319415	1	0.86515	1
2.56	1	11.14668	1	11.12743	1
0.542	1	0.721217	1	0.488622	1
0.908	1	2.830895	1	2.808685	1
1.22	1	3.266879	1	3.250229	1
1.31	1	5.861276	1	5.861276	1
3.21	1	10.858617	1	10.858617	1
1.28	1	2.634341	1	2.634341	1
8.08	1	25.0125	1	25.0125	1
38.9	1	135.635	1	135.635	1
1.38	1	6.134505	1	6.134505	1
17.8	1	71.5146	1	71.5146	1
1.01	1	2.7551021	1	2.7430521	1
4.8	1	17.63698	1	17.63698	1
0.473	1	1.6863937	1	1.6739502	1
6.48	1	25.4503	1	25.4503	1
0.852	1	3.437999	1	3.437999	1
1.45	1	13.66344	1	13.66344	1
0.963	1	3.95612	1	3.95612	1
1.1	1	5.848421	1	5.848421	1
4.54	1	8.6745835	1	8.56984	1
1.58	1	4.43466	1	3.03346	1
3.47	1	11.123111	1	11.000611	1
3.12	1	13.60606	1	13.48456	1
3.17	1	11.29785	1	11.13426	1
6.18	1	26.55189	1	26.55189	1
3.66	1	15.740486	1	15.740486	1
24	1	191.30994	1	191.30994	1
1.22	1	3.533228	1	3.36732	1
2.21	1	6.997665	1	6.997665	1
2.17	1	6.90825	1	6.90825	1
2.57	1	9.604929	1	9.604929	1
3.78	1	6.770901	1	6.760351	1
4.18	1	7.950619	1	7.942919	1

1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	D_1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	Dioxins and Furans TEQ ND_halfRL	D_Dioxins and Furans TEQ ND_halfRL	Dioxins and Furans TEQ ND0	D_Dioxins and Furans TEQ ND0
1.76	1	5.973461	1	5.958761	1
1.69	1	8.23305	1	8.21235	1
6.42	1	11.776428	1	11.763678	1
2.61	1	4.386764	1	4.374814	1
0.864	1	3.18132	1	1.78577	1
4.29	1	19.94242	1	19.90907	1
0.334	1	0.665367	1	0.535252	1
2.69	1	6.67555	1	6.6549	1
0.664	1	2.980559	1	2.965579	1
6.73	1	40.80146	1	40.80146	1
3.2	1	8.6303	1	8.5098	1
8.36	1	56.97269	1	56.84069	1
2.1	1	8.920012	1	8.800512	1
3.44	1	39.51631	1	39.39881	1
24.1	1	99.14899	1	99.14899	1
13.1	1	47.96998	1	47.96998	1
2.31	0	3.368153	1	0.99971	1
54.6	1	173.13364	1	173.13364	1
3.17	1	10.797136	1	10.2559	1
5.27	1	18.79256	1	18.79256	1
2.43	0	3.853629	1	1.6173	1
3.13	1	9.1137775	1	8.6149	1
2.41	0	2.890823	1	0.4105	1
11.1	1	35.91118	1	35.77368	1
24.4	1	78.6132	1	78.4947	1
14.2	1	57.31306	1	57.18806	1
6.26	1	22.834	1	22.714	1
8.55	1	32.699	1	32.577	1
4.61	1	13.857945	1	13.609095	1
2.5	0	10.13013	1	8.63013	1
2.42	0	7.8213	1	7.4462	1
2.37	0	6.22647	1	4.16457	1
2.4	0	3.5513215	1	1.2226	1
5.62	1	24.27514	1	24.11624	1
2.43	0	4.23066	1	1.99506	1
3.39	1	25.59313	1	25.47263	1
31.5	1	116.3891	1	116.3891	1
10.7	1	39.14312	1	39.14312	1
1.56	1	6.00973	1	6.00973	1
21.3	1	78.84781	1	78.84781	1

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2/13/2025 3:55:01 PM
From File	ProUCL HH Soil Input_2.13.2025.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Arsenic (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	140
		Number of Missing Observations	0
Minimum	1.85	Mean	8.521
Maximum	60.3	Median	7.03
SD	6.595	Std. Error of Mean	0.526
Coefficient of Variation	0.774	Skewness	4.456

Normal GOF Test

Shapiro Wilk Test Statistic	0.652	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0822	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	9.392	95% Adjusted-CLT UCL (Chen-1995)	9.587
		95% Modified-t UCL (Johnson-1978)	9.423

Gamma GOF Test

A-D Test Statistic	2.613	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.1	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0752	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.147	k star (bias corrected MLE)	3.092
Theta hat (MLE)	2.707	Theta star (bias corrected MLE)	2.756
nu hat (MLE)	988.3	nu star (bias corrected)	970.7
MLE Mean (bias corrected)	8.521	MLE Sd (bias corrected)	4.846
		Approximate Chi Square Value (0.05)	899.4
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	898.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	9.197	95% Adjusted Gamma UCL	9.203

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.258	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0587	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0651	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.615	Mean of logged Data	1.975
Maximum of Logged Data	4.099	SD of logged Data	0.542

Assuming Lognormal Distribution

95% H-UCL	9.052	90% Chebyshev (MVUE) UCL	9.497
95% Chebyshev (MVUE) UCL	10.02	97.5% Chebyshev (MVUE) UCL	10.75
99% Chebyshev (MVUE) UCL	12.17		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	9.387	95% BCA Bootstrap UCL	9.596
95% Standard Bootstrap UCL	9.378	95% Bootstrap-t UCL	9.756
95% Hall's Bootstrap UCL	10.14	95% Percentile Bootstrap UCL	9.436
90% Chebyshev(Mean, Sd) UCL	10.1	95% Chebyshev(Mean, Sd) UCL	10.82
97.5% Chebyshev(Mean, Sd) UCL	11.81	99% Chebyshev(Mean, Sd) UCL	13.76

Suggested UCL to Use

95% H-UCL	9.052

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Cadmium (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	63
Number of Detects	143	Number of Non-Detects	14
Number of Distinct Detects	61	Number of Distinct Non-Detects	11
Minimum Detect	0.04	Minimum Non-Detect	0.04
Maximum Detect	1.7	Maximum Non-Detect	1.93
Variance Detects	0.0785	Percent Non-Detects	8.917%
Mean Detects	0.321	SD Detects	0.28
Median Detects	0.23	CV Detects	0.872
Skewness Detects	2.019	Kurtosis Detects	5.206
Mean of Logged Detects	-1.456	SD of Logged Detects	0.809

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.803	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level

Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0861	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.302	KM Standard Error of Mean	0.0221
90KM SD	0.275	95% KM (BCA) UCL	0.339
95% KM (t) UCL	0.339	95% KM (Percentile Bootstrap) UCL	0.339
95% KM (z) UCL	0.338	95% KM Bootstrap t UCL	0.345
90% KM Chebyshev UCL	0.368	95% KM Chebyshev UCL	0.399
97.5% KM Chebyshev UCL	0.44	99% KM Chebyshev UCL	0.522

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.259	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.768	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0836	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0796	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.709	k star (bias corrected MLE)	1.678
Theta hat (MLE)	0.188	Theta star (bias corrected MLE)	0.192
nu hat (MLE)	488.8	nu star (bias corrected)	479.8
Mean (detects)	0.321		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.299
Maximum	1.7	Median	0.21
SD	0.278	CV	0.93
k hat (MLE)	1.393	k star (bias corrected MLE)	1.371
Theta hat (MLE)	0.214	Theta star (bias corrected MLE)	0.218
nu hat (MLE)	437.4	nu star (bias corrected)	430.4
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (430.38, α)	383.3	Adjusted Chi Square Value (430.38, β)	382.9
95% Gamma Approximate UCL	0.335	95% Gamma Adjusted UCL	0.336

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.302	SD (KM)	0.275
Variance (KM)	0.0758	SE of Mean (KM)	0.0221
k hat (KM)	1.204	k star (KM)	1.185
nu hat (KM)	378.1	nu star (KM)	372.2
theta hat (KM)	0.251	theta star (KM)	0.255
80% gamma percentile (KM)	0.479	90% gamma percentile (KM)	0.667
95% gamma percentile (KM)	0.853	99% gamma percentile (KM)	1.278

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (372.22, α)	328.5	Adjusted Chi Square Value (372.22, β)	328.1
95% KM Approximate Gamma UCL	0.342	95% KM Adjusted Gamma UCL	0.343

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.974	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.149	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0507	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0681	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.301	Mean in Log Scale	-1.544
SD in Original Scale	0.275	SD in Log Scale	0.838
95% t UCL (assumes normality of ROS data)	0.338	95% Percentile Bootstrap UCL	0.339
95% BCA Bootstrap UCL	0.343	95% Bootstrap t UCL	0.342
95% H-UCL (Log ROS)	0.348		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.545	KM Geo Mean	0.213
KM SD (logged)	0.838	95% Critical H Value (KM-Log)	2.068
KM Standard Error of Mean (logged)	0.068	95% H-UCL (KM -Log)	0.348
KM SD (logged)	0.838	95% Critical H Value (KM-Log)	2.068
KM Standard Error of Mean (logged)	0.068		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.305	Mean in Log Scale	-1.551
SD in Original Scale	0.281	SD in Log Scale	0.869
95% t UCL (Assumes normality)	0.342	95% H-Stat UCL	0.358

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.348

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chromium (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	138
		Number of Missing Observations	0
Minimum	3.17	Mean	31.18
Maximum	92.7	Median	28.1

SD	17.46	Std. Error of Mean	1.393
Coefficient of Variation	0.56	Skewness	1.222

Normal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	1.998E-14	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.0996	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0822	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	33.49	95% Adjusted-CLT UCL (Chen-1995)	33.62
		95% Modified-t UCL (Johnson-1978)	33.51

Gamma GOF Test

A-D Test Statistic	0.26	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0406	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0752	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.292	k star (bias corrected MLE)	3.233
Theta hat (MLE)	9.471	Theta star (bias corrected MLE)	9.643
nu hat (MLE)	1034	nu star (bias corrected)	1015
MLE Mean (bias corrected)	31.18	MLE Sd (bias corrected)	17.34
		Approximate Chi Square Value (0.05)	942.3
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	941.7

Assuming Gamma Distribution

95% Approximate Gamma UCL	33.59	95% Adjusted Gamma UCL	33.62

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.0227	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0595	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0651	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.154	Mean of logged Data	3.28
Maximum of Logged Data	4.529	SD of logged Data	0.597

Assuming Lognormal Distribution

95% H-UCL	34.79	90% Chebyshev (MVUE) UCL	36.64
95% Chebyshev (MVUE) UCL	38.86	97.5% Chebyshev (MVUE) UCL	41.94
99% Chebyshev (MVUE) UCL	48		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	33.47	95% BCA Bootstrap UCL	33.47
95% Standard Bootstrap UCL	33.47	95% Bootstrap-t UCL	33.64
95% Hall's Bootstrap UCL	33.67	95% Percentile Bootstrap UCL	33.43
90% Chebyshev(Mean, Sd) UCL	35.36	95% Chebyshev(Mean, Sd) UCL	37.25
97.5% Chebyshev(Mean, Sd) UCL	39.88	99% Chebyshev(Mean, Sd) UCL	45.04

Suggested UCL to Use

95% Approximate Gamma UCL	33.59

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Copper (mg/kg)

General Statistics

Total Number of Observations	152	Number of Distinct Observations	143
		Number of Missing Observations	1
Minimum	6.29	Mean	83.71
Maximum	778	Median	63.05
SD	95.85	Std. Error of Mean	7.775
Coefficient of Variation	1.145	Skewness	4.595

Normal GOF Test

Shapiro Wilk Test Statistic	0.582	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0836	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	96.58	95% Adjusted-CLT UCL (Chen-1995)	99.6
		95% Modified-t UCL (Johnson-1978)	97.06

Gamma GOF Test

A-D Test Statistic	2.416	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.77	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.101	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0774	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.58	k star (bias corrected MLE)	1.553
Theta hat (MLE)	52.98	Theta star (bias corrected MLE)	53.89
nu hat (MLE)	480.3	nu star (bias corrected)	472.2

MLE Mean (bias corrected)	83.71	MLE Sd (bias corrected)	67.17
		Approximate Chi Square Value (0.05)	422.8
Adjusted Level of Significance	0.0484	Adjusted Chi Square Value	422.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	93.49	95% Adjusted Gamma UCL	93.59

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	0.08	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0983	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.0661	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.839	Mean of logged Data	4.079
Maximum of Logged Data	6.657	SD of logged Data	0.824

Assuming Lognormal Distribution

95% H-UCL	95.21	90% Chebyshev (MVUE) UCL	101.7
95% Chebyshev (MVUE) UCL	110.4	97.5% Chebyshev (MVUE) UCL	122.3
99% Chebyshev (MVUE) UCL	145.8		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	96.5	95% BCA Bootstrap UCL	99.21
95% Standard Bootstrap UCL	96.46	95% Bootstrap-t UCL	102.5
95% Hall's Bootstrap UCL	105.8	95% Percentile Bootstrap UCL	97.14
90% Chebyshev(Mean, Sd) UCL	107	95% Chebyshev(Mean, Sd) UCL	117.6
97.5% Chebyshev(Mean, Sd) UCL	132.3	99% Chebyshev(Mean, Sd) UCL	161.1

Suggested UCL to Use

95% Student's-t UCL	96.58

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Lead (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	146

		Number of Missing Observations	0
Minimum	1.25	Mean	230.8
Maximum	5160	Median	35.6
SD	655.9	Std. Error of Mean	52.35
Coefficient of Variation	2.842	Skewness	5.581

Normal GOF Test

Shapiro Wilk Test Statistic	0.37	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.363	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0822	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	317.4	95% Adjusted-CLT UCL (Chen-1995)	341.8
		95% Modified-t UCL (Johnson-1978)	321.3

Gamma GOF Test

A-D Test Statistic	6.235	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.847	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.149	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0802	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.39	k star (bias corrected MLE)	0.386
Theta hat (MLE)	592.4	Theta star (bias corrected MLE)	597.3
nu hat (MLE)	122.4	nu star (bias corrected)	121.4
MLE Mean (bias corrected)	230.8	MLE Sd (bias corrected)	371.3
		Approximate Chi Square Value (0.05)	96.91
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	96.71

Assuming Gamma Distribution

95% Approximate Gamma UCL	289	95% Adjusted Gamma UCL	289.6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.0163	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0477	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0651	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.223	Mean of logged Data	3.746
Maximum of Logged Data	8.549	SD of logged Data	1.882

Assuming Lognormal Distribution

95% H-UCL	400.6	90% Chebyshev (MVUE) UCL	412.7
95% Chebyshev (MVUE) UCL	490.4	97.5% Chebyshev (MVUE) UCL	598.1

99% Chebyshev (MVUE) UCL	809.8

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	316.9	95% BCA Bootstrap UCL	354.1
95% Standard Bootstrap UCL	318.4	95% Bootstrap-t UCL	377.2
95% Hall's Bootstrap UCL	354.6	95% Percentile Bootstrap UCL	324
90% Chebyshev(Mean, Sd) UCL	387.9	95% Chebyshev(Mean, Sd) UCL	459
97.5% Chebyshev(Mean, Sd) UCL	557.7	99% Chebyshev(Mean, Sd) UCL	751.7

Suggested UCL to Use

95% H-UCL	400.6

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Mercury (mg/kg)

General Statistics

Total Number of Observations	145	Number of Distinct Observations	135
		Number of Missing Observations	12
Number of Detects	127	Number of Non-Detects	18
Number of Distinct Detects	118	Number of Distinct Non-Detects	18
Minimum Detect	0.00491	Minimum Non-Detect	0.0043
Maximum Detect	2.17	Maximum Non-Detect	0.137
Variance Detects	0.0678	Percent Non-Detects	12.41%
Mean Detects	0.114	SD Detects	0.26
Median Detects	0.0613	CV Detects	2.293
Skewness Detects	6.372	Kurtosis Detects	44.28
Mean of Logged Detects	-2.893	SD of Logged Detects	1.092

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.347	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0913	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.101	KM Standard Error of Mean	0.0204
90KM SD	0.245	95% KM (BCA) UCL	0.134
95% KM (t) UCL	0.135	95% KM (Percentile Bootstrap) UCL	0.135

95% KM (z) UCL	0.134	95% KM Bootstrap t UCL	0.177
90% KM Chebyshev UCL	0.162	95% KM Chebyshev UCL	0.19
97.5% KM Chebyshev UCL	0.228	99% KM Chebyshev UCL	0.304

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.043	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.792	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.182	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0855	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.824	k star (bias corrected MLE)	0.81
Theta hat (MLE)	0.138	Theta star (bias corrected MLE)	0.14
nu hat (MLE)	209.3	nu star (bias corrected)	205.7
Mean (detects)	0.114		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00491	Mean	0.101
Maximum	2.17	Median	0.052
SD	0.246	CV	2.443
k hat (MLE)	0.74	k star (bias corrected MLE)	0.73
Theta hat (MLE)	0.136	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	214.7	nu star (bias corrected)	211.6
Adjusted Level of Significance (β)	0.0483		
Approximate Chi Square Value (211.61, α)	178.9	Adjusted Chi Square Value (211.61, β)	178.6
95% Gamma Approximate UCL	0.119	95% Gamma Adjusted UCL	0.119

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.101	SD (KM)	0.245
Variance (KM)	0.0601	SE of Mean (KM)	0.0204
k hat (KM)	0.169	k star (KM)	0.17
nu hat (KM)	48.97	nu star (KM)	49.29
theta hat (KM)	0.597	theta star (KM)	0.593
80% gamma percentile (KM)	0.12	90% gamma percentile (KM)	0.303
95% gamma percentile (KM)	0.54	99% gamma percentile (KM)	1.212

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (49.29, α)	34.17	Adjusted Chi Square Value (49.29, β)	34.04
95% KM Approximate Gamma UCL	0.145	95% KM Adjusted Gamma UCL	0.146

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.964	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.0208	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0845	**Lilliefors GOF Test**

10% Lilliefors Critical Value	0.0723	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.101	Mean in Log Scale	-3.13
SD in Original Scale	0.246	SD in Log Scale	1.219
95% t UCL (assumes normality of ROS data)	0.135	95% Percentile Bootstrap UCL	0.137
95% BCA Bootstrap UCL	0.152	95% Bootstrap t UCL	0.179
95% H-UCL (Log ROS)	0.117		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.149	KM Geo Mean	0.0429
KM SD (logged)	1.25	95% Critical H Value (KM-Log)	2.441
KM Standard Error of Mean (logged)	0.105	95% H-UCL (KM -Log)	0.121
KM SD (logged)	1.25	95% Critical H Value (KM-Log)	2.441
KM Standard Error of Mean (logged)	0.105		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.101	Mean in Log Scale	-3.159
SD in Original Scale	0.246	SD in Log Scale	1.286
95% t UCL (Assumes normality)	0.135	95% H-Stat UCL	0.127

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.135

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Zinc (mg/kg)

General Statistics

Total Number of Observations	152	Number of Distinct Observations	138
		Number of Missing Observations	1
Minimum	26.7	Mean	195.2
Maximum	1980	Median	100.3
SD	306	Std. Error of Mean	24.82
Coefficient of Variation	1.567	Skewness	3.929

Normal GOF Test

Shapiro Wilk Test Statistic	0.493	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0836	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	236.3	95% Adjusted-CLT UCL (Chen-1995)	244.5
		95% Modified-t UCL (Johnson-1978)	237.6

Gamma GOF Test

A-D Test Statistic	10.58	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.78	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.207	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0781	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.137	k star (bias corrected MLE)	1.119
Theta hat (MLE)	171.7	Theta star (bias corrected MLE)	174.5
nu hat (MLE)	345.7	nu star (bias corrected)	340.2
MLE Mean (bias corrected)	195.2	MLE Sd (bias corrected)	184.5
		Approximate Chi Square Value (0.05)	298.5
Adjusted Level of Significance	0.0484	Adjusted Chi Square Value	298.1

Assuming Gamma Distribution

95% Approximate Gamma UCL	222.5	95% Adjusted Gamma UCL	222.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	1.005E-13	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0661	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.285	Mean of logged Data	4.774
Maximum of Logged Data	7.591	SD of logged Data	0.854

Assuming Lognormal Distribution

95% H-UCL	197	90% Chebyshev (MVUE) UCL	210.8
95% Chebyshev (MVUE) UCL	229.3	97.5% Chebyshev (MVUE) UCL	255
99% Chebyshev (MVUE) UCL	305.5		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	236.1	95% BCA Bootstrap UCL	247
95% Standard Bootstrap UCL	237.3	95% Bootstrap-t UCL	250.8
95% Hall's Bootstrap UCL	246.4	95% Percentile Bootstrap UCL	239.8
90% Chebyshev(Mean, Sd) UCL	269.7	95% Chebyshev(Mean, Sd) UCL	303.4
97.5% Chebyshev(Mean, Sd) UCL	350.2	99% Chebyshev(Mean, Sd) UCL	442.2

Suggested UCL to Use

95% Student's-t UCL	236.3

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

tph, diesel range organics (mg/kg)

General Statistics

Total Number of Observations	143	Number of Distinct Observations	130
		Number of Missing Observations	14
Number of Detects	92	Number of Non-Detects	51
Number of Distinct Detects	88	Number of Distinct Non-Detects	42
Minimum Detect	5.35	Minimum Non-Detect	2.33
Maximum Detect	4010	Maximum Non-Detect	28
Variance Detects	315271	Percent Non-Detects	35.66%
Mean Detects	181.1	SD Detects	561.5
Median Detects	32	CV Detects	3.101
Skewness Detects	5.03	Kurtosis Detects	27.78
Mean of Logged Detects	3.709	SD of Logged Detects	1.395

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.343	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.388	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.107	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	117.4	KM Standard Error of Mean	38.34
90KM SD	456	95% KM (BCA) UCL	185.5
95% KM (t) UCL	180.9	95% KM (Percentile Bootstrap) UCL	186.6
95% KM (z) UCL	180.5	95% KM Bootstrap t UCL	253.6
90% KM Chebyshev UCL	232.4	95% KM Chebyshev UCL	284.5
97.5% KM Chebyshev UCL	356.8	99% KM Chebyshev UCL	498.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	10.72	**Anderson-Darling GOF Test**	

5% A-D Critical Value	0.834	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.266	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0995	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.436	k star (bias corrected MLE)	0.429
Theta hat (MLE)	415.6	Theta star (bias corrected MLE)	422.4
nu hat (MLE)	80.16	nu star (bias corrected)	78.88
Mean (detects)	181.1		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	116.5
Maximum	4010	Median	14.7
SD	457.8	CV	3.93
k hat (MLE)	0.185	k star (bias corrected MLE)	0.186
Theta hat (MLE)	628	Theta star (bias corrected MLE)	625.4
nu hat (MLE)	53.05	nu star (bias corrected)	53.27
Adjusted Level of Significance (β)	0.0483		
Approximate Chi Square Value (53.27, α)	37.5	Adjusted Chi Square Value (53.27, β)	37.37
95% Gamma Approximate UCL	165.5	95% Gamma Adjusted UCL	166.1

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	117.4	SD (KM)	456
Variance (KM)	207939	SE of Mean (KM)	38.34
k hat (KM)	0.0663	k star (KM)	0.0696
nu hat (KM)	18.96	nu star (KM)	19.89
theta hat (KM)	1771	theta star (KM)	1688
80% gamma percentile (KM)	41.42	90% gamma percentile (KM)	252
95% gamma percentile (KM)	674.7	99% gamma percentile (KM)	2219

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (19.89, α)	10.77	Adjusted Chi Square Value (19.89, β)	10.7
95% KM Approximate Gamma UCL	216.8	95% KM Adjusted Gamma UCL	218.2

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.894	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	1.1015E-8	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0847	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	117.2	Mean in Log Scale	2.594
SD in Original Scale	457.7	SD in Log Scale	1.883

95% t UCL (assumes normality of ROS data)	180.5	95% Percentile Bootstrap UCL	182.9
95% BCA Bootstrap UCL	200.9	95% Bootstrap t UCL	231.7
95% H-UCL (Log ROS)	129.6		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.702	KM Geo Mean	14.91
KM SD (logged)	1.757	95% Critical H Value (KM-Log)	2.995
KM Standard Error of Mean (logged)	0.148	95% H-UCL (KM -Log)	108.6
KM SD (logged)	1.757	95% Critical H Value (KM-Log)	2.995
KM Standard Error of Mean (logged)	0.148		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	117.3	Mean in Log Scale	2.596
SD in Original Scale	457.6	SD in Log Scale	1.895
95% t UCL (Assumes normality)	180.6	95% H-Stat UCL	133.4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	180.9

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Lube Oil (mg/kg)

General Statistics

Total Number of Observations	143	Number of Distinct Observations	132
		Number of Missing Observations	14
Number of Detects	110	Number of Non-Detects	33
Number of Distinct Detects	103	Number of Distinct Non-Detects	30
Minimum Detect	12.7	Minimum Non-Detect	3.17
Maximum Detect	10500	Maximum Non-Detect	17.1
Variance Detects	1904853	Percent Non-Detects	23.08%
Mean Detects	422.4	SD Detects	1380
Median Detects	85.55	CV Detects	3.267
Skewness Detects	5.677	Kurtosis Detects	34.7
Mean of Logged Detects	4.642	SD of Logged Detects	1.37

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.312	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.383	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.098	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	325.7	KM Standard Error of Mean	102.3
90KM SD	1218	95% KM (BCA) UCL	517.9
95% KM (t) UCL	495.1	95% KM (Percentile Bootstrap) UCL	505.8
95% KM (z) UCL	494	95% KM Bootstrap t UCL	725.8
90% KM Chebyshev UCL	632.6	95% KM Chebyshev UCL	771.6
97.5% KM Chebyshev UCL	964.6	99% KM Chebyshev UCL	1344

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	10.82	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.829	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.239	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0924	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.459	k star (bias corrected MLE)	0.452
Theta hat (MLE)	921.2	Theta star (bias corrected MLE)	934.3
nu hat (MLE)	100.9	nu star (bias corrected)	99.46
Mean (detects)	422.4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	324.9
Maximum	10500	Median	52.6
SD	1222	CV	3.762
k hat (MLE)	0.221	k star (bias corrected MLE)	0.221
Theta hat (MLE)	1469	Theta star (bias corrected MLE)	1469
nu hat (MLE)	63.25	nu star (bias corrected)	63.25
Adjusted Level of Significance (β)	0.0483		
Approximate Chi Square Value (63.25, α)	45.96	Adjusted Chi Square Value (63.25, β)	45.81
95% Gamma Approximate UCL	447.2	95% Gamma Adjusted UCL	448.7

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	325.7	SD (KM)	1218
Variance (KM)	1483141	SE of Mean (KM)	102.3
k hat (KM)	0.0715	k star (KM)	0.0747
nu hat (KM)	20.46	nu star (KM)	21.36
theta hat (KM)	4554	theta star (KM)	4361
80% gamma percentile (KM)	134.7	90% gamma percentile (KM)	737.6

95% gamma percentile (KM)	1886	99% gamma percentile (KM)	5957

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (21.36, α)	11.86	Adjusted Chi Square Value (21.36, β)	11.79
95% KM Approximate Gamma UCL	586.6	95% KM Adjusted Gamma UCL	590.2

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.924	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	8.6607E-7	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0874	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0776	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	326.2	Mean in Log Scale	3.956
SD in Original Scale	1222	SD in Log Scale	1.74
95% t UCL (assumes normality of ROS data)	495.4	95% Percentile Bootstrap UCL	503.3
95% BCA Bootstrap UCL	549.9	95% Bootstrap t UCL	638.7
95% H-UCL (Log ROS)	366.3		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.84	KM Geo Mean	46.52
KM SD (logged)	1.892	95% Critical H Value (KM-Log)	3.154
KM Standard Error of Mean (logged)	0.159	95% H-UCL (KM -Log)	459.6
KM SD (logged)	1.892	95% Critical H Value (KM-Log)	3.154
KM Standard Error of Mean (logged)	0.159		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	325.6	Mean in Log Scale	3.785
SD in Original Scale	1222	SD in Log Scale	1.994
95% t UCL (Assumes normality)	494.8	95% H-Stat UCL	556.6

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	495.1

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

total TPH (mg/kg)

General Statistics

Total Number of Observations	143	Number of Distinct Observations	140
		Number of Missing Observations	14
Number of Detects	112	Number of Non-Detects	31
Number of Distinct Detects	112	Number of Distinct Non-Detects	28
Minimum Detect	15.26	Minimum Non-Detect	3.17
Maximum Detect	14510	Maximum Non-Detect	14.2
Variance Detects	3497283	Percent Non-Detects	21.68%
Mean Detects	564.8	SD Detects	1870
Median Detects	102.2	CV Detects	3.311
Skewness Detects	5.72	Kurtosis Detects	35.43
Mean of Logged Detects	4.895	SD of Logged Detects	1.393

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.31	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.384	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0972	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	443.1	KM Standard Error of Mean	139.8
90KM SD	1664	95% KM (BCA) UCL	695.6
95% KM (t) UCL	674.5	95% KM (Percentile Bootstrap) UCL	691.9
95% KM (z) UCL	672.9	95% KM Bootstrap t UCL	972.8
90% KM Chebyshev UCL	862.3	95% KM Chebyshev UCL	1052
97.5% KM Chebyshev UCL	1316	99% KM Chebyshev UCL	1834

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	11	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.831	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.256	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.092	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.448	k star (bias corrected MLE)	0.442
Theta hat (MLE)	1260	Theta star (bias corrected MLE)	1278
nu hat (MLE)	100.4	nu star (bias corrected)	99.03
Mean (detects)	564.8		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	442.4
Maximum	14510	Median	71.8

SD	1670	CV	3.775
k hat (MLE)	0.222	k star (bias corrected MLE)	0.222
Theta hat (MLE)	1991	Theta star (bias corrected MLE)	1991
nu hat (MLE)	63.56	nu star (bias corrected)	63.56
Adjusted Level of Significance (β)	0.0483		
Approximate Chi Square Value (63.56, α)	46.22	Adjusted Chi Square Value (63.56, β)	46.07
95% Gamma Approximate UCL	608.4	95% Gamma Adjusted UCL	610.3

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	443.1	SD (KM)	1664
Variance (KM)	2768234	SE of Mean (KM)	139.8
k hat (KM)	0.0709	k star (KM)	0.0741
nu hat (KM)	20.28	nu star (KM)	21.19
theta hat (KM)	6248	theta star (KM)	5980
80% gamma percentile (KM)	180.2	90% gamma percentile (KM)	997.7
95% gamma percentile (KM)	2563	99% gamma percentile (KM)	8134

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (21.19, α)	11.73	Adjusted Chi Square Value (21.19, β)	11.66
95% KM Approximate Gamma UCL	800.2	95% KM Adjusted Gamma UCL	805.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.925	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	8.8251E-7	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0899	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0769	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	443.8	Mean in Log Scale	4.24
SD in Original Scale	1669	SD in Log Scale	1.755
95% t UCL (assumes normality of ROS data)	674.9	95% Percentile Bootstrap UCL	685.3
95% BCA Bootstrap UCL	749.6	95% Bootstrap t UCL	878.2
95% H-UCL (Log ROS)	503.2		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.084	KM Geo Mean	59.36
KM SD (logged)	1.97	95% Critical H Value (KM-Log)	3.248
KM Standard Error of Mean (logged)	0.165	95% H-UCL (KM -Log)	707.3
KM SD (logged)	1.97	95% Critical H Value (KM-Log)	3.248
KM Standard Error of Mean (logged)	0.165		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	443	Mean in Log Scale	4.02
SD in Original Scale	1670	SD in Log Scale	2.087
95% t UCL (Assumes normality)	674.1	95% H-Stat UCL	889.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 674.5

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

1-Methylnaphthalene (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	86
		Number of Missing Observations	3
Number of Detects	54	Number of Non-Detects	100
Number of Distinct Detects	53	Number of Distinct Non-Detects	33
Minimum Detect	6.7000E-4	Minimum Non-Detect	3.9000E-4
Maximum Detect	0.979	Maximum Non-Detect	0.0617
Variance Detects	0.0276	Percent Non-Detects	64.94%
Mean Detects	0.0726	SD Detects	0.166
Median Detects	0.0136	CV Detects	2.288
Skewness Detects	4.028	Kurtosis Detects	18.42
Mean of Logged Detects	-4.061	SD of Logged Detects	1.667

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.475	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.139	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0262	KM Standard Error of Mean	0.0084
90KM SD	0.103	95% KM (BCA) UCL	0.0426
95% KM (t) UCL	0.0401	95% KM (Percentile Bootstrap) UCL	0.0417
95% KM (z) UCL	0.04	95% KM Bootstrap t UCL	0.0523
90% KM Chebyshev UCL	0.0514	95% KM Chebyshev UCL	0.0628
97.5% KM Chebyshev UCL	0.0786	99% KM Chebyshev UCL	0.11

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.089	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.827	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.207	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.129	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.449	k star (bias corrected MLE)	0.437
Theta hat (MLE)	0.161	Theta star (bias corrected MLE)	0.166
nu hat (MLE)	48.53	nu star (bias corrected)	47.17
Mean (detects)	0.0726		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	6.7000E-4	Mean	0.0319
Maximum	0.979	Median	0.01
SD	0.102	CV	3.201
k hat (MLE)	0.632	k star (bias corrected MLE)	0.624
Theta hat (MLE)	0.0505	Theta star (bias corrected MLE)	0.0512
nu hat (MLE)	194.7	nu star (bias corrected)	192.2
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (192.20, α)	161.1	Adjusted Chi Square Value (192.20, β)	160.9
95% Gamma Approximate UCL	0.0381	95% Gamma Adjusted UCL	0.0382

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0262	SD (KM)	0.103
Variance (KM)	0.0107	SE of Mean (KM)	0.0084
k hat (KM)	0.0644	k star (KM)	0.0675
nu hat (KM)	19.85	nu star (KM)	20.79
theta hat (KM)	0.407	theta star (KM)	0.388
80% gamma percentile (KM)	0.00861	90% gamma percentile (KM)	0.0549
95% gamma percentile (KM)	0.15	99% gamma percentile (KM)	0.502

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (20.79, α)	11.44	Adjusted Chi Square Value (20.79, β)	11.37
95% KM Approximate Gamma UCL	0.0476	95% KM Adjusted Gamma UCL	0.0479

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.967	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.261	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.11	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0258	Mean in Log Scale	-6.73
SD in Original Scale	0.104	SD in Log Scale	2.47
95% t UCL (assumes normality of ROS data)	0.0396	95% Percentile Bootstrap UCL	0.04
95% BCA Bootstrap UCL	0.0441	95% Bootstrap t UCL	0.0503
95% H-UCL (Log ROS)	0.0549		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.182	KM Geo Mean	0.00207
KM SD (logged)	1.968	95% Critical H Value (KM-Log)	3.261
KM Standard Error of Mean (logged)	0.187	95% H-UCL (KM -Log)	0.0241
KM SD (logged)	1.968	95% Critical H Value (KM-Log)	3.261
KM Standard Error of Mean (logged)	0.187		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0278	Mean in Log Scale	-5.423
SD in Original Scale	0.103	SD in Log Scale	1.666
95% t UCL (Assumes normality)	0.0415	95% H-Stat UCL	0.0262

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.0241

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

2-Methylnaphthalene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	88
Number of Detects	75	Number of Non-Detects	82
Number of Distinct Detects	72	Number of Distinct Non-Detects	16
Minimum Detect	0.00134	Minimum Non-Detect	7.0000E-4
Maximum Detect	2.14	Maximum Non-Detect	0.0598
Variance Detects	0.0686	Percent Non-Detects	52.23%
Mean Detects	0.082	SD Detects	0.262
Median Detects	0.0121	CV Detects	3.192
Skewness Detects	6.912	Kurtosis Detects	53.17
Mean of Logged Detects	-3.975	SD of Logged Detects	1.543

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.32	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.379	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.118	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0402	KM Standard Error of Mean	0.0148
90KM SD	0.184	95% KM (BCA) UCL	0.0674
95% KM (t) UCL	0.0646	95% KM (Percentile Bootstrap) UCL	0.0663
95% KM (z) UCL	0.0645	95% KM Bootstrap t UCL	0.109
90% KM Chebyshev UCL	0.0846	95% KM Chebyshev UCL	0.105
97.5% KM Chebyshev UCL	0.133	99% KM Chebyshev UCL	0.187

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.69	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.832	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.234	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.11	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.439	k star (bias corrected MLE)	0.431
Theta hat (MLE)	0.187	Theta star (bias corrected MLE)	0.19
nu hat (MLE)	65.92	nu star (bias corrected)	64.62
Mean (detects)	0.082		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00134	Mean	0.0444
Maximum	2.14	Median	0.01
SD	0.184	CV	4.141
k hat (MLE)	0.529	k star (bias corrected MLE)	0.523
Theta hat (MLE)	0.0839	Theta star (bias corrected MLE)	0.0849
nu hat (MLE)	166.1	nu star (bias corrected)	164.3
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (164.29, α)	135.7	Adjusted Chi Square Value (164.29, β)	135.4
95% Gamma Approximate UCL	0.0538	95% Gamma Adjusted UCL	0.0539

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0402	SD (KM)	0.184
Variance (KM)	0.0339	SE of Mean (KM)	0.0148
k hat (KM)	0.0475	k star (KM)	0.0509
nu hat (KM)	14.93	nu star (KM)	15.97
theta hat (KM)	0.845	theta star (KM)	0.789
80% gamma percentile (KM)	0.00579	90% gamma percentile (KM)	0.0627
95% gamma percentile (KM)	0.215	99% gamma percentile (KM)	0.868

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (15.97, α)	7.943	Adjusted Chi Square Value (15.97, β)	7.891
95% KM Approximate Gamma UCL	0.0808	95% KM Adjusted Gamma UCL	0.0813

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.942	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.00337	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0936	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0399	Mean in Log Scale	-5.726
SD in Original Scale	0.185	SD in Log Scale	2.199
95% t UCL (assumes normality of ROS data)	0.0643	95% Percentile Bootstrap UCL	0.0678
95% BCA Bootstrap UCL	0.0821	95% Bootstrap t UCL	0.103
95% H-UCL (Log ROS)	0.0684		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.348	KM Geo Mean	0.00476
KM SD (logged)	1.762	95% Critical H Value (KM-Log)	3.019
KM Standard Error of Mean (logged)	0.162	95% H-UCL (KM -Log)	0.0344
KM SD (logged)	1.762	95% Critical H Value (KM-Log)	3.019
KM Standard Error of Mean (logged)	0.162		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.041	Mean in Log Scale	-5.027
SD in Original Scale	0.185	SD in Log Scale	1.555
95% t UCL (Assumes normality)	0.0654	95% H-Stat UCL	0.0311

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.0646

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Acenaphthene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	94
Number of Detects	70	Number of Non-Detects	87

Number of Distinct Detects	69	Number of Distinct Non-Detects	28
Minimum Detect	2.2000E-4	Minimum Non-Detect	5.6000E-4
Maximum Detect	2.08	Maximum Non-Detect	0.0294
Variance Detects	0.106	Percent Non-Detects	55.41%
Mean Detects	0.103	SD Detects	0.325
Median Detects	0.0127	CV Detects	3.145
Skewness Detects	5.138	Kurtosis Detects	27.68
Mean of Logged Detects	-4.322	SD of Logged Detects	1.984

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.344	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.376	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.122	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0466	KM Standard Error of Mean	0.0178
90KM SD	0.222	95% KM (BCA) UCL	0.0784
95% KM (t) UCL	0.0761	95% KM (Percentile Bootstrap) UCL	0.0787
95% KM (z) UCL	0.0759	95% KM Bootstrap t UCL	0.143
90% KM Chebyshev UCL	0.1	95% KM Chebyshev UCL	0.124
97.5% KM Chebyshev UCL	0.158	99% KM Chebyshev UCL	0.224

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.714	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.858	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.222	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.115	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.331	k star (bias corrected MLE)	0.326
Theta hat (MLE)	0.313	Theta star (bias corrected MLE)	0.317
nu hat (MLE)	46.3	nu star (bias corrected)	45.65
Mean (detects)	0.103		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.2000E-4	Mean	0.0516
Maximum	2.08	Median	0.01
SD	0.221	CV	4.284
k hat (MLE)	0.429	k star (bias corrected MLE)	0.425
Theta hat (MLE)	0.12	Theta star (bias corrected MLE)	0.121
nu hat (MLE)	134.8	nu star (bias corrected)	133.6
Adjusted Level of Significance (β)	0.0485		

Approximate Chi Square Value (133.58, α)	107.9	Adjusted Chi Square Value (133.58, β)	107.7
95% Gamma Approximate UCL	0.0639	95% Gamma Adjusted UCL	0.0641

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0466	SD (KM)	0.222
Variance (KM)	0.0491	SE of Mean (KM)	0.0178
k hat (KM)	0.0442	k star (KM)	0.0476
nu hat (KM)	13.89	nu star (KM)	14.96
theta hat (KM)	1.053	theta star (KM)	0.978
80% gamma percentile (KM)	0.0053	90% gamma percentile (KM)	0.0666
95% gamma percentile (KM)	0.243	99% gamma percentile (KM)	1.033

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (14.96, α)	7.234	Adjusted Chi Square Value (14.96, β)	7.185
95% KM Approximate Gamma UCL	0.0964	95% KM Adjusted Gamma UCL	0.097

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.972	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.319	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0774	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0969	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0464	Mean in Log Scale	-6.618
SD in Original Scale	0.222	SD in Log Scale	2.7
95% t UCL (assumes normality of ROS data)	0.0757	95% Percentile Bootstrap UCL	0.0785
95% BCA Bootstrap UCL	0.089	95% Bootstrap t UCL	0.13
95% H-UCL (Log ROS)	0.126		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.254	KM Geo Mean	0.00192
KM SD (logged)	2.311	95% Critical H Value (KM-Log)	3.692
KM Standard Error of Mean (logged)	0.202	95% H-UCL (KM -Log)	0.055
KM SD (logged)	2.311	95% Critical H Value (KM-Log)	3.692
KM Standard Error of Mean (logged)	0.202		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0474	Mean in Log Scale	-5.591
SD in Original Scale	0.222	SD in Log Scale	1.936
95% t UCL (Assumes normality)	0.0767	95% H-Stat UCL	0.04

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.055

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Anthracene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	132
Number of Detects	120	Number of Non-Detects	37
Number of Distinct Detects	119	Number of Distinct Non-Detects	15
Minimum Detect	5.2000E-4	Minimum Non-Detect	8.6000E-4
Maximum Detect	4.43	Maximum Non-Detect	0.0274
Variance Detects	0.296	Percent Non-Detects	23.57%
Mean Detects	0.141	SD Detects	0.544
Median Detects	0.0102	CV Detects	3.847
Skewness Detects	6.027	Kurtosis Detects	39.72
Mean of Logged Detects	-4.301	SD of Logged Detects	1.911

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.29	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.402	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0939	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.108	KM Standard Error of Mean	0.0383
90KM SD	0.478	95% KM (BCA) UCL	0.176
95% KM (t) UCL	0.172	95% KM (Percentile Bootstrap) UCL	0.177
95% KM (z) UCL	0.171	95% KM Bootstrap t UCL	0.246
90% KM Chebyshev UCL	0.223	95% KM Chebyshev UCL	0.275
97.5% KM Chebyshev UCL	0.347	99% KM Chebyshev UCL	0.489

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	12.3	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.871	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.244	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0916	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.295	k star (bias corrected MLE)	0.293
Theta hat (MLE)	0.48	Theta star (bias corrected MLE)	0.483
nu hat (MLE)	70.77	nu star (bias corrected)	70.33
Mean (detects)	0.141		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.2000E-4	Mean	0.11
Maximum	4.43	Median	0.01
SD	0.479	CV	4.332
k hat (MLE)	0.315	k star (bias corrected MLE)	0.313
Theta hat (MLE)	0.35	Theta star (bias corrected MLE)	0.352
nu hat (MLE)	98.99	nu star (bias corrected)	98.43
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (98.43, α)	76.55	Adjusted Chi Square Value (98.43, β)	76.37
95% Gamma Approximate UCL	0.142	95% Gamma Adjusted UCL	0.142

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.108	SD (KM)	0.478
Variance (KM)	0.228	SE of Mean (KM)	0.0383
k hat (KM)	0.0516	k star (KM)	0.0549
nu hat (KM)	16.2	nu star (KM)	17.22
theta hat (KM)	2.102	theta star (KM)	1.977
80% gamma percentile (KM)	0.02	90% gamma percentile (KM)	0.185
95% gamma percentile (KM)	0.594	99% gamma percentile (KM)	2.273

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.22, α)	8.833	Adjusted Chi Square Value (17.22, β)	8.777
95% KM Approximate Gamma UCL	0.212	95% KM Adjusted Gamma UCL	0.213

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.932	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	2.6601E-6	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0983	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0743	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.108	Mean in Log Scale	-5.069
SD in Original Scale	0.479	SD in Log Scale	2.254
95% t UCL (assumes normality of ROS data)	0.172	95% Percentile Bootstrap UCL	0.177
95% BCA Bootstrap UCL	0.199	95% Bootstrap t UCL	0.221
95% H-UCL (Log ROS)	0.153		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.927	KM Geo Mean	0.00725
KM SD (logged)	2.05	95% Critical H Value (KM-Log)	3.367
KM Standard Error of Mean (logged)	0.166	95% H-UCL (KM -Log)	0.103
KM SD (logged)	2.05	95% Critical H Value (KM-Log)	3.367
KM Standard Error of Mean (logged)	0.166		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.109	Mean in Log Scale	-4.859
SD in Original Scale	0.479	SD in Log Scale	2.013
95% t UCL (Assumes normality)	0.172	95% H-Stat UCL	0.101

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.172

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Fluorene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	110
Number of Detects	90	Number of Non-Detects	67
Number of Distinct Detects	85	Number of Distinct Non-Detects	27
Minimum Detect	1.8000E-4	Minimum Non-Detect	6.2000E-4
Maximum Detect	2.78	Maximum Non-Detect	0.0555
Variance Detects	0.17	Percent Non-Detects	42.68%
Mean Detects	0.114	SD Detects	0.412
Median Detects	0.00882	CV Detects	3.612
Skewness Detects	5.215	Kurtosis Detects	28.55
Mean of Logged Detects	-4.57	SD of Logged Detects	1.995

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.308	Normal GOF Test on Detected Observations Only	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.396	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.108	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0659	KM Standard Error of Mean	0.0253
90KM SD	0.315	95% KM (BCA) UCL	0.112
95% KM (t) UCL	0.108	95% KM (Percentile Bootstrap) UCL	0.109
95% KM (z) UCL	0.108	95% KM Bootstrap t UCL	0.165

90% KM Chebyshev UCL	0.142	95% KM Chebyshev UCL	0.176
97.5% KM Chebyshev UCL	0.224	99% KM Chebyshev UCL	0.318

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	8.643	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.873	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.239	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.102	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.289	k star (bias corrected MLE)	0.287
Theta hat (MLE)	0.394	Theta star (bias corrected MLE)	0.397
nu hat (MLE)	52.05	nu star (bias corrected)	51.65
Mean (detects)	0.114		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.8000E-4	Mean	0.0697
Maximum	2.78	Median	0.01
SD	0.315	CV	4.529
k hat (MLE)	0.35	k star (bias corrected MLE)	0.348
Theta hat (MLE)	0.199	Theta star (bias corrected MLE)	0.2
nu hat (MLE)	109.9	nu star (bias corrected)	109.2
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (109.16, α)	86.05	Adjusted Chi Square Value (109.16, β)	85.86
95% Gamma Approximate UCL	0.0884	95% Gamma Adjusted UCL	0.0886

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0659	SD (KM)	0.315
Variance (KM)	0.0993	SE of Mean (KM)	0.0253
k hat (KM)	0.0438	k star (KM)	0.0472
nu hat (KM)	13.74	nu star (KM)	14.81
theta hat (KM)	1.507	theta star (KM)	1.398
80% gamma percentile (KM)	0.00723	90% gamma percentile (KM)	0.093
95% gamma percentile (KM)	0.343	99% gamma percentile (KM)	1.467

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (14.81, α)	7.13	Adjusted Chi Square Value (14.81, β)	7.081
95% KM Approximate Gamma UCL	0.137	95% KM Adjusted Gamma UCL	0.138

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.95	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.00536	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0737	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0856	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0657	Mean in Log Scale	-6.005
SD in Original Scale	0.316	SD in Log Scale	2.43
95% t UCL (assumes normality of ROS data)	0.107	95% Percentile Bootstrap UCL	0.111
95% BCA Bootstrap UCL	0.125	95% Bootstrap t UCL	0.152
95% H-UCL (Log ROS)	0.0997		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.869	KM Geo Mean	0.00282
KM SD (logged)	2.284	95% Critical H Value (KM-Log)	3.658
KM Standard Error of Mean (logged)	0.196	95% H-UCL (KM -Log)	0.0748
KM SD (logged)	2.284	95% Critical H Value (KM-Log)	3.658
KM Standard Error of Mean (logged)	0.196		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0669	Mean in Log Scale	-5.349
SD in Original Scale	0.316	SD in Log Scale	1.955
95% t UCL (Assumes normality)	0.109	95% H-Stat UCL	0.0534

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.0748

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Naphthalene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	136
Number of Detects	122	Number of Non-Detects	35
Number of Distinct Detects	118	Number of Distinct Non-Detects	18
Minimum Detect	0.00134	Minimum Non-Detect	0.00126
Maximum Detect	10.5	Maximum Non-Detect	0.0191
Variance Detects	1.11	Percent Non-Detects	22.29%
Mean Detects	0.233	SD Detects	1.054
Median Detects	0.0251	CV Detects	4.531
Skewness Detects	8.295	Kurtosis Detects	76.95

Mean of Logged Detects	-3.53	SD of Logged Detects	1.712

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.238	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.413	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0932	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.181	KM Standard Error of Mean	0.0745
90KM SD	0.93	95% KM (BCA) UCL	0.32
95% KM (t) UCL	0.304	95% KM (Percentile Bootstrap) UCL	0.324
95% KM (z) UCL	0.304	95% KM Bootstrap t UCL	0.564
90% KM Chebyshev UCL	0.405	95% KM Chebyshev UCL	0.506
97.5% KM Chebyshev UCL	0.647	99% KM Chebyshev UCL	0.923

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	13	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.861	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.273	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0906	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.328	k star (bias corrected MLE)	0.326
Theta hat (MLE)	0.709	Theta star (bias corrected MLE)	0.714
nu hat (MLE)	80.06	nu star (bias corrected)	79.43
Mean (detects)	0.233		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00134	Mean	0.183
Maximum	10.5	Median	0.0138
SD	0.933	CV	5.098
k hat (MLE)	0.328	k star (bias corrected MLE)	0.326
Theta hat (MLE)	0.557	Theta star (bias corrected MLE)	0.561
nu hat (MLE)	103	nu star (bias corrected)	102.4
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (102.40, α)	80.05	Adjusted Chi Square Value (102.40, β)	79.87
95% Gamma Approximate UCL	0.234	95% Gamma Adjusted UCL	0.235

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.181	SD (KM)	0.93
Variance (KM)	0.865	SE of Mean (KM)	0.0745
k hat (KM)	0.038	k star (KM)	0.0415

nu hat (KM)	11.92	nu star (KM)	13.02
theta hat (KM)	4.773	theta star (KM)	4.368
80% gamma percentile (KM)	0.0117	90% gamma percentile (KM)	0.209
95% gamma percentile (KM)	0.887	99% gamma percentile (KM)	4.227

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (13.02, α)	5.908	Adjusted Chi Square Value (13.02, β)	5.863
95% KM Approximate Gamma UCL	0.399	95% KM Adjusted Gamma UCL	0.402

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.952	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.00102	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0915	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0737	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.181	Mean in Log Scale	-4.286
SD in Original Scale	0.933	SD in Log Scale	2.104
95% t UCL (assumes normality of ROS data)	0.304	95% Percentile Bootstrap UCL	0.319
95% BCA Bootstrap UCL	0.388	95% Bootstrap t UCL	0.508
95% H-UCL (Log ROS)	0.224		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.163	KM Geo Mean	0.0156
KM SD (logged)	1.927	95% Critical H Value (KM-Log)	3.217
KM Standard Error of Mean (logged)	0.156	95% H-UCL (KM -Log)	0.164
KM SD (logged)	1.927	95% Critical H Value (KM-Log)	3.217
KM Standard Error of Mean (logged)	0.156		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.181	Mean in Log Scale	-4.16
SD in Original Scale	0.933	SD in Log Scale	1.949
95% t UCL (Assumes normality)	0.304	95% H-Stat UCL	0.173

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.304

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Benzo(a)anthracene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	136
Number of Detects	132	Number of Non-Detects	25
Number of Distinct Detects	125	Number of Distinct Non-Detects	11
Minimum Detect	5.4000E-4	Minimum Non-Detect	8.1000E-4
Maximum Detect	17.3	Maximum Non-Detect	0.0229
Variance Detects	3.29	Percent Non-Detects	15.92%
Mean Detects	0.439	SD Detects	1.814
Median Detects	0.0261	CV Detects	4.131
Skewness Detects	7.096	Kurtosis Detects	59.44
Mean of Logged Detects	-3.565	SD of Logged Detects	2.195

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.277	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.445	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0896	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.369	KM Standard Error of Mean	0.133
90KM SD	1.665	95% KM (BCA) UCL	0.605
95% KM (t) UCL	0.59	95% KM (Percentile Bootstrap) UCL	0.61
95% KM (z) UCL	0.589	95% KM Bootstrap t UCL	0.87
90% KM Chebyshev UCL	0.77	95% KM Chebyshev UCL	0.951
97.5% KM Chebyshev UCL	1.202	99% KM Chebyshev UCL	1.696

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	12.47	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.889	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.251	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.089	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.258	k star (bias corrected MLE)	0.257
Theta hat (MLE)	1.704	Theta star (bias corrected MLE)	1.709
nu hat (MLE)	68.04	nu star (bias corrected)	67.83
Mean (detects)	0.439		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.4000E-4	Mean	0.371
Maximum	17.3	Median	0.0127
SD	1.67	CV	4.503
k hat (MLE)	0.258	k star (bias corrected MLE)	0.257
Theta hat (MLE)	1.437	Theta star (bias corrected MLE)	1.441
nu hat (MLE)	81.02	nu star (bias corrected)	80.81
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (80.81, α)	61.09	Adjusted Chi Square Value (80.81, β)	60.94
95% Gamma Approximate UCL	0.49	95% Gamma Adjusted UCL	0.492

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.369	SD (KM)	1.665
Variance (KM)	2.771	SE of Mean (KM)	0.133
k hat (KM)	0.0493	k star (KM)	0.0526
nu hat (KM)	15.47	nu star (KM)	16.51
theta hat (KM)	7.5	theta star (KM)	7.029
80% gamma percentile (KM)	0.0595	90% gamma percentile (KM)	0.601
95% gamma percentile (KM)	1.999	99% gamma percentile (KM)	7.877

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (16.51, α)	8.32	Adjusted Chi Square Value (16.51, β)	8.266
95% KM Approximate Gamma UCL	0.733	95% KM Adjusted Gamma UCL	0.738

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.949	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	2.4305E-4	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0749	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0709	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.369	Mean in Log Scale	-4.15
SD in Original Scale	1.67	SD in Log Scale	2.48
95% t UCL (assumes normality of ROS data)	0.59	95% Percentile Bootstrap UCL	0.614
95% BCA Bootstrap UCL	0.7	95% Bootstrap t UCL	0.792
95% H-UCL (Log ROS)	0.741		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.07	KM Geo Mean	0.0171
KM SD (logged)	2.342	95% Critical H Value (KM-Log)	3.731
KM Standard Error of Mean (logged)	0.189	95% H-UCL (KM -Log)	0.534
KM SD (logged)	2.342	95% Critical H Value (KM-Log)	3.731
KM Standard Error of Mean (logged)	0.189		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.37	Mean in Log Scale	-4.023
SD in Original Scale	1.67	SD in Log Scale	2.309
95% t UCL (Assumes normality)	0.59	95% H-Stat UCL	0.51

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.59

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Benzo(a)pyrene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	130
Number of Detects	125	Number of Non-Detects	32
Number of Distinct Detects	121	Number of Distinct Non-Detects	9
Minimum Detect	6.4000E-4	Minimum Non-Detect	6.0000E-4
Maximum Detect	16.9	Maximum Non-Detect	0.015
Variance Detects	4.714	Percent Non-Detects	20.38%
Mean Detects	0.552	SD Detects	2.171
Median Detects	0.0474	CV Detects	3.932
Skewness Detects	5.946	Kurtosis Detects	38.04
Mean of Logged Detects	-3.228	SD of Logged Detects	2.236

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.281	Normal GOF Test on Detected Observations Only	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.451	Lilliefors GOF Test	
1% Lilliefors Critical Value	0.092	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.44	KM Standard Error of Mean	0.156
90KM SD	1.942	95% KM (BCA) UCL	0.712
95% KM (t) UCL	0.697	95% KM (Percentile Bootstrap) UCL	0.709
95% KM (z) UCL	0.696	95% KM Bootstrap t UCL	1.047
90% KM Chebyshev UCL	0.907	95% KM Chebyshev UCL	1.118
97.5% KM Chebyshev UCL	1.412	99% KM Chebyshev UCL	1.988

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	10.35	Anderson-Darling GOF Test	
5% A-D Critical Value	0.885	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.27	Kolmogorov-Smirnov GOF	

5% K-S Critical Value	0.0908	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.267	k star (bias corrected MLE)	0.266
Theta hat (MLE)	2.069	Theta star (bias corrected MLE)	2.077
nu hat (MLE)	66.72	nu star (bias corrected)	66.45
Mean (detects)	0.552		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	6.4000E-4	Mean	0.442
Maximum	16.9	Median	0.0183
SD	1.948	CV	4.411
k hat (MLE)	0.262	k star (bias corrected MLE)	0.261
Theta hat (MLE)	1.686	Theta star (bias corrected MLE)	1.691
nu hat (MLE)	82.26	nu star (bias corrected)	82.02
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (82.02, α)	62.15	Adjusted Chi Square Value (82.02, β)	61.99
95% Gamma Approximate UCL	0.583	95% Gamma Adjusted UCL	0.584

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.44	SD (KM)	1.942
Variance (KM)	3.772	SE of Mean (KM)	0.156
k hat (KM)	0.0513	k star (KM)	0.0546
nu hat (KM)	16.11	nu star (KM)	17.14
theta hat (KM)	8.574	theta star (KM)	8.061
80% gamma percentile (KM)	0.08	90% gamma percentile (KM)	0.748
95% gamma percentile (KM)	2.407	99% gamma percentile (KM)	9.237

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.14, α)	8.77	Adjusted Chi Square Value (17.14, β)	8.714
95% KM Approximate Gamma UCL	0.86	95% KM Adjusted Gamma UCL	0.865

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.953	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.00132	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0915	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0728	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.44	Mean in Log Scale	-4.059
SD in Original Scale	1.948	SD in Log Scale	2.665
95% t UCL (assumes normality of ROS data)	0.697	95% Percentile Bootstrap UCL	0.717
95% BCA Bootstrap UCL	0.783	95% Bootstrap t UCL	0.935

95% H-UCL (Log ROS)	1.458

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.952	KM Geo Mean	0.0192
KM SD (logged)	2.479	95% Critical H Value (KM-Log)	3.906
KM Standard Error of Mean (logged)	0.201	95% H-UCL (KM -Log)	0.902
KM SD (logged)	2.479	95% Critical H Value (KM-Log)	3.906
KM Standard Error of Mean (logged)	0.201		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.44	Mean in Log Scale	-3.893
SD in Original Scale	1.948	SD in Log Scale	2.467
95% t UCL (Assumes normality)	0.697	95% H-Stat UCL	0.922

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.697

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Benzo(b)fluoranthene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	129
Number of Detects	126	Number of Non-Detects	31
Number of Distinct Detects	117	Number of Distinct Non-Detects	12
Minimum Detect	0.00109	Minimum Non-Detect	0.00135
Maximum Detect	10.2	Maximum Non-Detect	0.015
Variance Detects	1.919	Percent Non-Detects	19.75%
Mean Detects	0.363	SD Detects	1.385
Median Detects	0.0515	CV Detects	3.815
Skewness Detects	5.849	Kurtosis Detects	35.86
Mean of Logged Detects	-3.194	SD of Logged Detects	1.983

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.277	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.435	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0917	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.292	KM Standard Error of Mean	0.0997
90KM SD	1.245	95% KM (BCA) UCL	0.466
95% KM (t) UCL	0.457	95% KM (Percentile Bootstrap) UCL	0.464
95% KM (z) UCL	0.456	95% KM Bootstrap t UCL	0.68
90% KM Chebyshev UCL	0.591	95% KM Chebyshev UCL	0.727
97.5% KM Chebyshev UCL	0.915	99% KM Chebyshev UCL	1.284

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	9.644	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.865	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0897	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.314	k star (bias corrected MLE)	0.312
Theta hat (MLE)	1.157	Theta star (bias corrected MLE)	1.165
nu hat (MLE)	79.09	nu star (bias corrected)	78.54
Mean (detects)	0.363		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00109	Mean	0.293
Maximum	10.2	Median	0.0235
SD	1.248	CV	4.254
k hat (MLE)	0.306	k star (bias corrected MLE)	0.304
Theta hat (MLE)	0.959	Theta star (bias corrected MLE)	0.964
nu hat (MLE)	96.07	nu star (bias corrected)	95.57
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (95.57, α)	74.02	Adjusted Chi Square Value (95.57, β)	73.85
95% Gamma Approximate UCL	0.379	95% Gamma Adjusted UCL	0.38

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.292	SD (KM)	1.245
Variance (KM)	1.549	SE of Mean (KM)	0.0997
k hat (KM)	0.055	k star (KM)	0.0582
nu hat (KM)	17.27	nu star (KM)	18.27
theta hat (KM)	5.307	theta star (KM)	5.015
80% gamma percentile (KM)	0.0645	90% gamma percentile (KM)	0.532
95% gamma percentile (KM)	1.624	99% gamma percentile (KM)	5.966

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (18.27, α)	9.589	Adjusted Chi Square Value (18.27, β)	9.531

95% KM Approximate Gamma UCL	0.556	95% KM Adjusted Gamma UCL	0.56

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.952	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	8.1427E-4	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0953	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0725	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.292	Mean in Log Scale	-3.93
SD in Original Scale	1.249	SD in Log Scale	2.368
95% t UCL (assumes normality of ROS data)	0.457	95% Percentile Bootstrap UCL	0.47
95% BCA Bootstrap UCL	0.517	95% Bootstrap t UCL	0.592
95% H-UCL (Log ROS)	0.662		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.836	KM Geo Mean	0.0216
KM SD (logged)	2.211	95% Critical H Value (KM-Log)	3.567
KM Standard Error of Mean (logged)	0.178	95% H-UCL (KM -Log)	0.468
KM SD (logged)	2.211	95% Critical H Value (KM-Log)	3.567
KM Standard Error of Mean (logged)	0.178		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.292	Mean in Log Scale	-3.819
SD in Original Scale	1.248	SD in Log Scale	2.226
95% t UCL (Assumes normality)	0.457	95% H-Stat UCL	0.496

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.457

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Benzo(k)fluoranthene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	135
Number of Detects	130	Number of Non-Detects	27

Number of Distinct Detects	127	Number of Distinct Non-Detects	8
Minimum Detect	4.1000E-4	Minimum Non-Detect	7.5000E-4
Maximum Detect	6.7	Maximum Non-Detect	0.0148
Variance Detects	0.839	Percent Non-Detects	17.2%
Mean Detects	0.222	SD Detects	0.916
Median Detects	0.0225	CV Detects	4.118
Skewness Detects	6.082	Kurtosis Detects	38.62
Mean of Logged Detects	-3.827	SD of Logged Detects	1.955

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.256	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.441	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0903	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.184	KM Standard Error of Mean	0.0669
90KM SD	0.834	95% KM (BCA) UCL	0.301
95% KM (t) UCL	0.295	95% KM (Percentile Bootstrap) UCL	0.299
95% KM (z) UCL	0.294	95% KM Bootstrap t UCL	0.461
90% KM Chebyshev UCL	0.385	95% KM Chebyshev UCL	0.476
97.5% KM Chebyshev UCL	0.602	99% KM Chebyshev UCL	0.85

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	11.79	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.87	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.267	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0888	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.297	k star (bias corrected MLE)	0.295
Theta hat (MLE)	0.749	Theta star (bias corrected MLE)	0.753
nu hat (MLE)	77.25	nu star (bias corrected)	76.8
Mean (detects)	0.222		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4.1000E-4	Mean	0.186
Maximum	6.7	Median	0.0114
SD	0.837	CV	4.501
k hat (MLE)	0.302	k star (bias corrected MLE)	0.301
Theta hat (MLE)	0.615	Theta star (bias corrected MLE)	0.618
nu hat (MLE)	94.9	nu star (bias corrected)	94.42
Adjusted Level of Significance (β)	0.0485		

Approximate Chi Square Value (94.42, α)	73.01	Adjusted Chi Square Value (94.42, β)	72.84
95% Gamma Approximate UCL	0.24	95% Gamma Adjusted UCL	0.241

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.184	SD (KM)	0.834
Variance (KM)	0.696	SE of Mean (KM)	0.0669
k hat (KM)	0.0488	k star (KM)	0.0521
nu hat (KM)	15.32	nu star (KM)	16.36
theta hat (KM)	3.777	theta star (KM)	3.537
80% gamma percentile (KM)	0.0288	90% gamma percentile (KM)	0.297
95% gamma percentile (KM)	0.994	99% gamma percentile (KM)	3.944

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (16.36, α)	8.219	Adjusted Chi Square Value (16.36, β)	8.166
95% KM Approximate Gamma UCL	0.367	95% KM Adjusted Gamma UCL	0.369

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.956	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.00238	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0835	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0714	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.184	Mean in Log Scale	-4.503
SD in Original Scale	0.837	SD in Log Scale	2.358
95% t UCL (assumes normality of ROS data)	0.295	95% Percentile Bootstrap UCL	0.304
95% BCA Bootstrap UCL	0.337	95% Bootstrap t UCL	0.405
95% H-UCL (Log ROS)	0.363		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.456	KM Geo Mean	0.0116
KM SD (logged)	2.265	95% Critical H Value (KM-Log)	3.634
KM Standard Error of Mean (logged)	0.182	95% H-UCL (KM -Log)	0.292
KM SD (logged)	2.265	95% Critical H Value (KM-Log)	3.634
KM Standard Error of Mean (logged)	0.182		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.184	Mean in Log Scale	-4.43
SD in Original Scale	0.837	SD in Log Scale	2.249
95% t UCL (Assumes normality)	0.295	95% H-Stat UCL	0.286

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.295

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

2-Chloronaphthalene (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	29
		Number of Missing Observations	3
Number of Detects	0	Number of Non-Detects	154
Number of Distinct Detects	0	Number of Distinct Non-Detects	29

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2-Chloronaphthalene was not processed!

Chrysene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	139
Number of Detects	139	Number of Non-Detects	18
Number of Distinct Detects	133	Number of Distinct Non-Detects	6
Minimum Detect	0.00131	Minimum Non-Detect	0.00103
Maximum Detect	18.3	Maximum Non-Detect	0.006
Variance Detects	5.2	Percent Non-Detects	11.46%
Mean Detects	0.56	SD Detects	2.28
Median Detects	0.0415	CV Detects	4.073
Skewness Detects	6.239	Kurtosis Detects	42.12
Mean of Logged Detects	-3.154	SD of Logged Detects	2.083

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.27	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.448	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0873	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.496	KM Standard Error of Mean	0.172
90KM SD	2.145	95% KM (BCA) UCL	0.795
95% KM (t) UCL	0.78	95% KM (Percentile Bootstrap) UCL	0.79
95% KM (z) UCL	0.778	95% KM Bootstrap t UCL	1.14

90% KM Chebyshev UCL	1.011	95% KM Chebyshev UCL	1.245
97.5% KM Chebyshev UCL	1.569	99% KM Chebyshev UCL	2.206

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	13.29	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.882	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.26	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0867	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.272	k star (bias corrected MLE)	0.271
Theta hat (MLE)	2.057	Theta star (bias corrected MLE)	2.065
nu hat (MLE)	75.66	nu star (bias corrected)	75.36
Mean (detects)	0.56		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00131	Mean	0.497
Maximum	18.3	Median	0.025
SD	2.152	CV	4.331
k hat (MLE)	0.268	k star (bias corrected MLE)	0.267
Theta hat (MLE)	1.854	Theta star (bias corrected MLE)	1.86
nu hat (MLE)	84.14	nu star (bias corrected)	83.87
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (83.87, α)	63.76	Adjusted Chi Square Value (83.87, β)	63.6
95% Gamma Approximate UCL	0.653	95% Gamma Adjusted UCL	0.655

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.496	SD (KM)	2.145
Variance (KM)	4.603	SE of Mean (KM)	0.172
k hat (KM)	0.0534	k star (KM)	0.0566
nu hat (KM)	16.77	nu star (KM)	17.78
theta hat (KM)	9.283	theta star (KM)	8.754
80% gamma percentile (KM)	0.101	90% gamma percentile (KM)	0.878
95% gamma percentile (KM)	2.741	99% gamma percentile (KM)	10.25

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.78, α)	9.235	Adjusted Chi Square Value (17.78, β)	9.178
95% KM Approximate Gamma UCL	0.955	95% KM Adjusted Gamma UCL	0.961

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.948	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	7.8167E-5	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0717	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0691	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.496	Mean in Log Scale	-3.673
SD in Original Scale	2.152	SD in Log Scale	2.453
95% t UCL (assumes normality of ROS data)	0.78	95% Percentile Bootstrap UCL	0.805
95% BCA Bootstrap UCL	0.88	95% Bootstrap t UCL	1.055
95% H-UCL (Log ROS)	1.099		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.57	KM Geo Mean	0.0282
KM SD (logged)	2.271	95% Critical H Value (KM-Log)	3.642
KM Standard Error of Mean (logged)	0.182	95% H-UCL (KM -Log)	0.72
KM SD (logged)	2.271	95% Critical H Value (KM-Log)	3.642
KM Standard Error of Mean (logged)	0.182		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.496	Mean in Log Scale	-3.629
SD in Original Scale	2.152	SD in Log Scale	2.373
95% t UCL (Assumes normality)	0.78	95% H-Stat UCL	0.907

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.78

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Dibenzo(a,h)anthracene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	117
Number of Detects	112	Number of Non-Detects	45
Number of Distinct Detects	104	Number of Distinct Non-Detects	13
Minimum Detect	2.3000E-4	Minimum Non-Detect	8.7000E-4
Maximum Detect	2.45	Maximum Non-Detect	0.0229
Variance Detects	0.111	Percent Non-Detects	28.66%
Mean Detects	0.0977	SD Detects	0.333
Median Detects	0.0185	CV Detects	3.404
Skewness Detects	5.37	Kurtosis Detects	30.39

Mean of Logged Detects	-4.167	SD of Logged Detects	1.807

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.309	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.406	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0972	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.07	KM Standard Error of Mean	0.0227
90KM SD	0.283	95% KM (BCA) UCL	0.108
95% KM (t) UCL	0.108	95% KM (Percentile Bootstrap) UCL	0.108
95% KM (z) UCL	0.107	95% KM Bootstrap t UCL	0.147
90% KM Chebyshev UCL	0.138	95% KM Chebyshev UCL	0.169
97.5% KM Chebyshev UCL	0.212	99% KM Chebyshev UCL	0.296

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	7.87	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.852	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.236	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.093	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.363	k star (bias corrected MLE)	0.359
Theta hat (MLE)	0.269	Theta star (bias corrected MLE)	0.272
nu hat (MLE)	81.3	nu star (bias corrected)	80.46
Mean (detects)	0.0977		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.3000E-4	Mean	0.0726
Maximum	2.45	Median	0.01
SD	0.283	CV	3.905
k hat (MLE)	0.395	k star (bias corrected MLE)	0.392
Theta hat (MLE)	0.184	Theta star (bias corrected MLE)	0.185
nu hat (MLE)	124	nu star (bias corrected)	123
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (122.96, α)	98.35	Adjusted Chi Square Value (122.96, β)	98.15
95% Gamma Approximate UCL	0.0908	95% Gamma Adjusted UCL	0.0909

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.07	SD (KM)	0.283
Variance (KM)	0.0802	SE of Mean (KM)	0.0227
k hat (KM)	0.061	k star (KM)	0.0641

nu hat (KM)	19.16	nu star (KM)	20.13
theta hat (KM)	1.146	theta star (KM)	1.091
80% gamma percentile (KM)	0.0202	90% gamma percentile (KM)	0.14
95% gamma percentile (KM)	0.397	99% gamma percentile (KM)	1.371

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (20.13, α)	10.95	Adjusted Chi Square Value (20.13, β)	10.88
95% KM Approximate Gamma UCL	0.129	95% KM Adjusted Gamma UCL	0.129

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.965	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.0396	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0804	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0769	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0699	Mean in Log Scale	-5.208
SD in Original Scale	0.284	SD in Log Scale	2.32
95% t UCL (assumes normality of ROS data)	0.107	95% Percentile Bootstrap UCL	0.111
95% BCA Bootstrap UCL	0.121	95% Bootstrap t UCL	0.138
95% H-UCL (Log ROS)	0.16		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.25	KM Geo Mean	0.00525
KM SD (logged)	2.343	95% Critical H Value (KM-Log)	3.732
KM Standard Error of Mean (logged)	0.191	95% H-UCL (KM -Log)	0.164
KM SD (logged)	2.343	95% Critical H Value (KM-Log)	3.732
KM Standard Error of Mean (logged)	0.191		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0703	Mean in Log Scale	-4.977
SD in Original Scale	0.284	SD in Log Scale	2.072
95% t UCL (Assumes normality)	0.108	95% H-Stat UCL	0.104

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.108

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Fluoranthene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	141
Number of Detects	146	Number of Non-Detects	11
Number of Distinct Detects	138	Number of Distinct Non-Detects	3
Minimum Detect	5.4000E-4	Minimum Non-Detect	4.6000E-4
Maximum Detect	41.4	Maximum Non-Detect	0.005
Variance Detects	23.82	Percent Non-Detects	7.006%
Mean Detects	1.106	SD Detects	4.88
Median Detects	0.0567	CV Detects	4.415
Skewness Detects	6.659	Kurtosis Detects	48.25
Mean of Logged Detects	-2.832	SD of Logged Detects	2.243

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.252	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.454	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0852	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.028	KM Standard Error of Mean	0.376
90KM SD	4.699	95% KM (BCA) UCL	1.7
95% KM (t) UCL	1.651	95% KM (Percentile Bootstrap) UCL	1.686
95% KM (z) UCL	1.647	95% KM Bootstrap t UCL	2.556
90% KM Chebyshev UCL	2.157	95% KM Chebyshev UCL	2.668
97.5% KM Chebyshev UCL	3.378	99% KM Chebyshev UCL	4.772

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	15.32	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.897	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.267	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0853	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.243	k star (bias corrected MLE)	0.243
Theta hat (MLE)	4.544	Theta star (bias corrected MLE)	4.552
nu hat (MLE)	71.04	nu star (bias corrected)	70.91
Mean (detects)	1.106		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.4000E-4	Mean	1.029
Maximum	41.4	Median	0.0522
SD	4.714	CV	4.582
k hat (MLE)	0.24	k star (bias corrected MLE)	0.239
Theta hat (MLE)	4.294	Theta star (bias corrected MLE)	4.299
nu hat (MLE)	75.24	nu star (bias corrected)	75.13
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (75.13, α)	56.17	Adjusted Chi Square Value (75.13, β)	56.02
95% Gamma Approximate UCL	1.376	95% Gamma Adjusted UCL	1.38

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.028	SD (KM)	4.699
Variance (KM)	22.08	SE of Mean (KM)	0.376
k hat (KM)	0.0479	k star (KM)	0.0512
nu hat (KM)	15.03	nu star (KM)	16.08
theta hat (KM)	21.47	theta star (KM)	20.08
80% gamma percentile (KM)	0.152	90% gamma percentile (KM)	1.618
95% gamma percentile (KM)	5.514	99% gamma percentile (KM)	22.15

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (16.08, α)	8.018	Adjusted Chi Square Value (16.08, β)	7.965
95% KM Approximate Gamma UCL	2.062	95% KM Adjusted Gamma UCL	2.075

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.963	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.00941	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0679	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0675	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.028	Mean in Log Scale	-3.188
SD in Original Scale	4.714	SD in Log Scale	2.532
95% t UCL (assumes normality of ROS data)	1.651	95% Percentile Bootstrap UCL	1.702
95% BCA Bootstrap UCL	1.893	95% Bootstrap t UCL	2.337
95% H-UCL (Log ROS)	2.278		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.166	KM Geo Mean	0.0422
KM SD (logged)	2.477	95% Critical H Value (KM-Log)	3.903
KM Standard Error of Mean (logged)	0.198	95% H-UCL (KM -Log)	1.966
KM SD (logged)	2.477	95% Critical H Value (KM-Log)	3.903
KM Standard Error of Mean (logged)	0.198		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.028	Mean in Log Scale	-3.205
SD in Original Scale	4.714	SD in Log Scale	2.562
95% t UCL (Assumes normality)	1.651	95% H-Stat UCL	2.459

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 1.651

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Indeno(1,2,3-c,d)pyrene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	133
Number of Detects	126	Number of Non-Detects	31
Number of Distinct Detects	122	Number of Distinct Non-Detects	11
Minimum Detect	0.00122	Minimum Non-Detect	0.00103
Maximum Detect	10.3	Maximum Non-Detect	0.015
Variance Detects	2.058	Percent Non-Detects	19.75%
Mean Detects	0.395	SD Detects	1.435
Median Detects	0.0545	CV Detects	3.627
Skewness Detects	5.811	Kurtosis Detects	35.03
Mean of Logged Detects	-3.057	SD of Logged Detects	2.025

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.289	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.392	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0917	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.318	KM Standard Error of Mean	0.103
90KM SD	1.29	95% KM (BCA) UCL	0.498
95% KM (t) UCL	0.489	95% KM (Percentile Bootstrap) UCL	0.497
95% KM (z) UCL	0.488	95% KM Bootstrap t UCL	0.701
90% KM Chebyshev UCL	0.628	95% KM Chebyshev UCL	0.768
97.5% KM Chebyshev UCL	0.963	99% KM Chebyshev UCL	1.346

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	7.841	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.863	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.224	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0896	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.32	k star (bias corrected MLE)	0.318
Theta hat (MLE)	1.234	Theta star (bias corrected MLE)	1.243
nu hat (MLE)	80.74	nu star (bias corrected)	80.15
Mean (detects)	0.395		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00122	Mean	0.319
Maximum	10.3	Median	0.0221
SD	1.293	CV	4.05
k hat (MLE)	0.309	k star (bias corrected MLE)	0.307
Theta hat (MLE)	1.034	Theta star (bias corrected MLE)	1.039
nu hat (MLE)	97.02	nu star (bias corrected)	96.5
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (96.50, α)	74.84	Adjusted Chi Square Value (96.50, β)	74.66
95% Gamma Approximate UCL	0.412	95% Gamma Adjusted UCL	0.413

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.318	SD (KM)	1.29
Variance (KM)	1.663	SE of Mean (KM)	0.103
k hat (KM)	0.0607	k star (KM)	0.0638
nu hat (KM)	19.07	nu star (KM)	20.04
theta hat (KM)	5.233	theta star (KM)	4.98
80% gamma percentile (KM)	0.0907	90% gamma percentile (KM)	0.634
95% gamma percentile (KM)	1.803	99% gamma percentile (KM)	6.242

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (20.04, α)	10.88	Adjusted Chi Square Value (20.04, β)	10.82
95% KM Approximate Gamma UCL	0.585	95% KM Adjusted Gamma UCL	0.589

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.958	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.00484	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0648	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0725	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.318	Mean in Log Scale	-3.844
SD in Original Scale	1.294	SD in Log Scale	2.466
95% t UCL (assumes normality of ROS data)	0.489	95% Percentile Bootstrap UCL	0.503
95% BCA Bootstrap UCL	0.553	95% Bootstrap t UCL	0.613
95% H-UCL (Log ROS)	0.966		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.738	KM Geo Mean	0.0238
KM SD (logged)	2.289	95% Critical H Value (KM-Log)	3.664
KM Standard Error of Mean (logged)	0.185	95% H-UCL (KM -Log)	0.64
KM SD (logged)	2.289	95% Critical H Value (KM-Log)	3.664
KM Standard Error of Mean (logged)	0.185		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.318	Mean in Log Scale	-3.738
SD in Original Scale	1.294	SD in Log Scale	2.34
95% t UCL (Assumes normality)	0.489	95% H-Stat UCL	0.739

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.64

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Pyrene (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	144
Number of Detects	145	Number of Non-Detects	12
Number of Distinct Detects	138	Number of Distinct Non-Detects	6
Minimum Detect	7.0000E-4	Minimum Non-Detect	6.2000E-4
Maximum Detect	47.1	Maximum Non-Detect	0.0057
Variance Detects	31.32	Percent Non-Detects	7.643%
Mean Detects	1.245	SD Detects	5.597
Median Detects	0.0531	CV Detects	4.497
Skewness Detects	6.67	Kurtosis Detects	48.03
Mean of Logged Detects	-2.918	SD of Logged Detects	2.345

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.248	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.445	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0855	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.15	KM Standard Error of Mean	0.43
90KM SD	5.37	95% KM (BCA) UCL	1.92
95% KM (t) UCL	1.861	95% KM (Percentile Bootstrap) UCL	1.898
95% KM (z) UCL	1.857	95% KM Bootstrap t UCL	2.896
90% KM Chebyshev UCL	2.44	95% KM Chebyshev UCL	3.024
97.5% KM Chebyshev UCL	3.835	99% KM Chebyshev UCL	5.429

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	14.93	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.904	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.25	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0859	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.23	k star (bias corrected MLE)	0.229
Theta hat (MLE)	5.422	Theta star (bias corrected MLE)	5.426
nu hat (MLE)	66.56	nu star (bias corrected)	66.52
Mean (detects)	1.245		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.0000E-4	Mean	1.15
Maximum	47.1	Median	0.0384
SD	5.387	CV	4.684
k hat (MLE)	0.226	k star (bias corrected MLE)	0.226
Theta hat (MLE)	5.08	Theta star (bias corrected MLE)	5.082
nu hat (MLE)	71.09	nu star (bias corrected)	71.07
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (71.07, α)	52.66	Adjusted Chi Square Value (71.07, β)	52.51
95% Gamma Approximate UCL	1.552	95% Gamma Adjusted UCL	1.557

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.15	SD (KM)	5.37
Variance (KM)	28.84	SE of Mean (KM)	0.43
k hat (KM)	0.0458	k star (KM)	0.0492
nu hat (KM)	14.39	nu star (KM)	15.45
theta hat (KM)	25.09	theta star (KM)	23.37
80% gamma percentile (KM)	0.147	90% gamma percentile (KM)	1.717
95% gamma percentile (KM)	6.078	99% gamma percentile (KM)	25.17

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (15.45, α)	7.574	Adjusted Chi Square Value (15.45, β)	7.523
95% KM Approximate Gamma UCL	2.345	95% KM Adjusted Gamma UCL	2.361

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.96	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.00358	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0771	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0677	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.15	Mean in Log Scale	-3.255
SD in Original Scale	5.387	SD in Log Scale	2.564
95% t UCL (assumes normality of ROS data)	1.861	95% Percentile Bootstrap UCL	1.926
95% BCA Bootstrap UCL	2.135	95% Bootstrap t UCL	2.697
95% H-UCL (Log ROS)	2.356		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.205	KM Geo Mean	0.0406
KM SD (logged)	2.467	95% Critical H Value (KM-Log)	3.89
KM Standard Error of Mean (logged)	0.198	95% H-UCL (KM -Log)	1.832
KM SD (logged)	2.467	95% Critical H Value (KM-Log)	3.89
KM Standard Error of Mean (logged)	0.198		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.15	Mean in Log Scale	-3.201
SD in Original Scale	5.387	SD in Log Scale	2.476
95% t UCL (Assumes normality)	1.861	95% H-Stat UCL	1.891

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.861

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Dibenzofuran (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	74
		Number of Missing Observations	3
Number of Detects	54	Number of Non-Detects	100

Number of Distinct Detects	52	Number of Distinct Non-Detects	23
Minimum Detect	0.00207	Minimum Non-Detect	0.00138
Maximum Detect	2.54	Maximum Non-Detect	0.0598
Variance Detects	0.136	Percent Non-Detects	64.94%
Mean Detects	0.141	SD Detects	0.368
Median Detects	0.0314	CV Detects	2.613
Skewness Detects	5.583	Kurtosis Detects	35.2
Mean of Logged Detects	-3.117	SD of Logged Detects	1.355

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.382	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.139	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.054	KM Standard Error of Mean	0.0184
90KM SD	0.225	95% KM (BCA) UCL	0.0927
95% KM (t) UCL	0.0844	95% KM (Percentile Bootstrap) UCL	0.0898
95% KM (z) UCL	0.0842	95% KM Bootstrap t UCL	0.128
90% KM Chebyshev UCL	0.109	95% KM Chebyshev UCL	0.134
97.5% KM Chebyshev UCL	0.169	99% KM Chebyshev UCL	0.237

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.021	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.811	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.203	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.128	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.542	k star (bias corrected MLE)	0.524
Theta hat (MLE)	0.26	Theta star (bias corrected MLE)	0.269
nu hat (MLE)	58.54	nu star (bias corrected)	56.63
Mean (detects)	0.141		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00207	Mean	0.0559
Maximum	2.54	Median	0.01
SD	0.226	CV	4.036
k hat (MLE)	0.526	k star (bias corrected MLE)	0.52
Theta hat (MLE)	0.106	Theta star (bias corrected MLE)	0.108
nu hat (MLE)	161.9	nu star (bias corrected)	160.1
Adjusted Level of Significance (β)	0.0484		

Approximate Chi Square Value (160.06, α)	131.8	Adjusted Chi Square Value (160.06, β)	131.6
95% Gamma Approximate UCL	0.0679	95% Gamma Adjusted UCL	0.068

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.054	SD (KM)	0.225
Variance (KM)	0.0508	SE of Mean (KM)	0.0184
k hat (KM)	0.0574	k star (KM)	0.0606
nu hat (KM)	17.69	nu star (KM)	18.68
theta hat (KM)	0.94	theta star (KM)	0.89
80% gamma percentile (KM)	0.0134	90% gamma percentile (KM)	0.103
95% gamma percentile (KM)	0.303	99% gamma percentile (KM)	1.084

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (18.68, α)	9.883	Adjusted Chi Square Value (18.68, β)	9.823
95% KM Approximate Gamma UCL	0.102	95% KM Adjusted Gamma UCL	0.103

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.948	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.0378	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.11	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0518	Mean in Log Scale	-5.047
SD in Original Scale	0.227	SD in Log Scale	1.881
95% t UCL (assumes normality of ROS data)	0.0821	95% Percentile Bootstrap UCL	0.085
95% BCA Bootstrap UCL	0.0993	95% Bootstrap t UCL	0.123
95% H-UCL (Log ROS)	0.0609		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.496	KM Geo Mean	0.0112
KM SD (logged)	1.457	95% Critical H Value (KM-Log)	2.669
KM Standard Error of Mean (logged)	0.249	95% H-UCL (KM -Log)	0.0441
KM SD (logged)	1.457	95% Critical H Value (KM-Log)	2.669
KM Standard Error of Mean (logged)	0.249		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0547	Mean in Log Scale	-4.266
SD in Original Scale	0.226	SD in Log Scale	1.206
95% t UCL (Assumes normality)	0.0849	95% H-Stat UCL	0.0367

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.0844

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND_halfRL (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	150
Number of Detects	139	Number of Non-Detects	18
Number of Distinct Detects	139	Number of Distinct Non-Detects	12
Minimum Detect	0.00104	Minimum Non-Detect	0.0049
Maximum Detect	21.53	Maximum Non-Detect	0.0198
Variance Detects	6.956	Percent Non-Detects	11.46%
Mean Detects	0.642	SD Detects	2.637
Median Detects	0.0488	CV Detects	4.108
Skewness Detects	6.249	Kurtosis Detects	42.05
Mean of Logged Detects	-3.058	SD of Logged Detects	2.148

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.268	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.446	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0873	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.569	KM Standard Error of Mean	0.199
90KM SD	2.481	95% KM (BCA) UCL	0.914
95% KM (t) UCL	0.898	95% KM (Percentile Bootstrap) UCL	0.912
95% KM (z) UCL	0.896	95% KM Bootstrap t UCL	1.34
90% KM Chebyshev UCL	1.165	95% KM Chebyshev UCL	1.435
97.5% KM Chebyshev UCL	1.81	99% KM Chebyshev UCL	2.546

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	12.43	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.884	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.259	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0868	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.269	k star (bias corrected MLE)	0.268
Theta hat (MLE)	2.391	Theta star (bias corrected MLE)	2.4
nu hat (MLE)	74.65	nu star (bias corrected)	74.37

Mean (detects)	0.642

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00104	Mean	0.57
Maximum	21.53	Median	0.0274
SD	2.489	CV	4.37
k hat (MLE)	0.264	k star (bias corrected MLE)	0.263
Theta hat (MLE)	2.161	Theta star (bias corrected MLE)	2.168
nu hat (MLE)	82.75	nu star (bias corrected)	82.5
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (82.50, α)	62.57	Adjusted Chi Square Value (82.50, β)	62.41
95% Gamma Approximate UCL	0.751	95% Gamma Adjusted UCL	0.753

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.569	SD (KM)	2.481
Variance (KM)	6.155	SE of Mean (KM)	0.199
k hat (KM)	0.0526	k star (KM)	0.0558
nu hat (KM)	16.51	nu star (KM)	17.52
theta hat (KM)	10.82	theta star (KM)	10.19
80% gamma percentile (KM)	0.111	90% gamma percentile (KM)	0.991
95% gamma percentile (KM)	3.132	99% gamma percentile (KM)	11.83

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.52, α)	9.048	Adjusted Chi Square Value (17.52, β)	8.991
95% KM Approximate Gamma UCL	1.102	95% KM Adjusted Gamma UCL	1.109

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.946	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	4.2455E-5	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0906	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0691	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.569	Mean in Log Scale	-3.359
SD in Original Scale	2.489	SD in Log Scale	2.196
95% t UCL (assumes normality of ROS data)	0.898	95% Percentile Bootstrap UCL	0.922
95% BCA Bootstrap UCL	1.014	95% Bootstrap t UCL	1.191
95% H-UCL (Log ROS)	0.723		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.36	KM Geo Mean	0.0347
KM SD (logged)	2.189	95% Critical H Value (KM-Log)	3.539
KM Standard Error of Mean (logged)	0.176	95% H-UCL (KM -Log)	0.709
KM SD (logged)	2.189	95% Critical H Value (KM-Log)	3.539

KM Standard Error of Mean (logged)	0.176

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.569	Mean in Log Scale	-3.351
SD in Original Scale	2.489	SD in Log Scale	2.19
95% t UCL (Assumes normality)	0.898	95% H-Stat UCL	0.716

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.898

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Carcinogenic Polycyclic Aromatic Hydrocarbons TEQ ND0 (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	151
Number of Detects	139	Number of Non-Detects	18
Number of Distinct Detects	139	Number of Distinct Non-Detects	12
Minimum Detect	7.7100E-5	Minimum Non-Detect	0.0049
Maximum Detect	21.53	Maximum Non-Detect	0.0198
Variance Detects	6.957	Percent Non-Detects	11.46%
Mean Detects	0.641	SD Detects	2.638
Median Detects	0.0488	CV Detects	4.114
Skewness Detects	6.249	Kurtosis Detects	42.04
Mean of Logged Detects	-3.317	SD of Logged Detects	2.502

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.268	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.446	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0873	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.568	KM Standard Error of Mean	0.199
90KM SD	2.481	95% KM (BCA) UCL	0.913
95% KM (t) UCL	0.897	95% KM (Percentile Bootstrap) UCL	0.911
95% KM (z) UCL	0.895	95% KM Bootstrap t UCL	1.338

90% KM Chebyshev UCL	1.164	95% KM Chebyshev UCL	1.434
97.5% KM Chebyshev UCL	1.809	99% KM Chebyshev UCL	2.545

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	9.775	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.895	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0872	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.248	k star (bias corrected MLE)	0.247
Theta hat (MLE)	2.589	Theta star (bias corrected MLE)	2.595
nu hat (MLE)	68.84	nu star (bias corrected)	68.69
Mean (detects)	0.641		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.7100E-5	Mean	0.569
Maximum	21.53	Median	0.0274
SD	2.489	CV	4.376
k hat (MLE)	0.246	k star (bias corrected MLE)	0.245
Theta hat (MLE)	2.316	Theta star (bias corrected MLE)	2.32
nu hat (MLE)	77.11	nu star (bias corrected)	76.97
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (76.97, α)	57.76	Adjusted Chi Square Value (76.97, β)	57.61
95% Gamma Approximate UCL	0.758	95% Gamma Adjusted UCL	0.76

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.568	SD (KM)	2.481
Variance (KM)	6.156	SE of Mean (KM)	0.199
k hat (KM)	0.0524	k star (KM)	0.0557
nu hat (KM)	16.46	nu star (KM)	17.47
theta hat (KM)	10.84	theta star (KM)	10.21
80% gamma percentile (KM)	0.11	90% gamma percentile (KM)	0.987
95% gamma percentile (KM)	3.125	99% gamma percentile (KM)	11.83

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.47, α)	9.012	Adjusted Chi Square Value (17.47, β)	8.956
95% KM Approximate Gamma UCL	1.101	95% KM Adjusted Gamma UCL	1.108

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.972	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.109	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0827	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0691	Detected Data Not Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.568	Mean in Log Scale	-3.634
SD in Original Scale	2.489	SD in Log Scale	2.522
95% t UCL (assumes normality of ROS data)	0.897	95% Percentile Bootstrap UCL	0.921
95% BCA Bootstrap UCL	1.013	95% Bootstrap t UCL	1.19
95% H-UCL (Log ROS)	1.412		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.665	KM Geo Mean	0.0256
KM SD (logged)	2.567	95% Critical H Value (KM-Log)	4.018
KM Standard Error of Mean (logged)	0.209	95% H-UCL (KM -Log)	1.575
KM SD (logged)	2.567	95% Critical H Value (KM-Log)	4.018
KM Standard Error of Mean (logged)	0.209		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.568	Mean in Log Scale	-3.581
SD in Original Scale	2.489	SD in Log Scale	2.474
95% t UCL (Assumes normality)	0.897	95% H-Stat UCL	1.286

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	1.575

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

LMWPAH ND_halfRL (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	149
Number of Detects	137	Number of Non-Detects	20
Number of Distinct Detects	137	Number of Distinct Non-Detects	12
Minimum Detect	0.00331	Minimum Non-Detect	0.00128
Maximum Detect	15.84	Maximum Non-Detect	0.0555
Variance Detects	3.693	Percent Non-Detects	12.74%
Mean Detects	0.539	SD Detects	1.922
Median Detects	0.0569	CV Detects	3.565
Skewness Detects	5.872	Kurtosis Detects	38.08

Mean of Logged Detects	-2.601	SD of Logged Detects	1.712

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.31	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.39	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.088	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.471	KM Standard Error of Mean	0.144
90KM SD	1.797	95% KM (BCA) UCL	0.721
95% KM (t) UCL	0.709	95% KM (Percentile Bootstrap) UCL	0.725
95% KM (z) UCL	0.708	95% KM Bootstrap t UCL	0.961
90% KM Chebyshev UCL	0.903	95% KM Chebyshev UCL	1.099
97.5% KM Chebyshev UCL	1.37	99% KM Chebyshev UCL	1.903

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	14.23	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.858	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.254	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0863	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.341	k star (bias corrected MLE)	0.338
Theta hat (MLE)	1.582	Theta star (bias corrected MLE)	1.595
nu hat (MLE)	93.33	nu star (bias corrected)	92.62
Mean (detects)	0.539		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00331	Mean	0.472
Maximum	15.84	Median	0.0432
SD	1.803	CV	3.823
k hat (MLE)	0.324	k star (bias corrected MLE)	0.322
Theta hat (MLE)	1.457	Theta star (bias corrected MLE)	1.466
nu hat (MLE)	101.6	nu star (bias corrected)	101
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (101.01, α)	78.82	Adjusted Chi Square Value (101.01, β)	78.64
95% Gamma Approximate UCL	0.604	95% Gamma Adjusted UCL	0.606

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.471	SD (KM)	1.797
Variance (KM)	3.23	SE of Mean (KM)	0.144
k hat (KM)	0.0687	k star (KM)	0.0716

nu hat (KM)	21.57	nu star (KM)	22.49
theta hat (KM)	6.858	theta star (KM)	6.577
80% gamma percentile (KM)	0.178	90% gamma percentile (KM)	1.034
95% gamma percentile (KM)	2.716	99% gamma percentile (KM)	8.784

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (22.49, α)	12.7	Adjusted Chi Square Value (22.49, β)	12.64
95% KM Approximate Gamma UCL	0.834	95% KM Adjusted Gamma UCL	0.838

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.933	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	3.2186E-7	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0911	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0696	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.471	Mean in Log Scale	-3.027
SD in Original Scale	1.803	SD in Log Scale	1.972
95% t UCL (assumes normality of ROS data)	0.709	95% Percentile Bootstrap UCL	0.732
95% BCA Bootstrap UCL	0.798	95% Bootstrap t UCL	0.868
95% H-UCL (Log ROS)	0.568		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.992	KM Geo Mean	0.0502
KM SD (logged)	1.92	95% Critical H Value (KM-Log)	3.208
KM Standard Error of Mean (logged)	0.157	95% H-UCL (KM -Log)	0.519
KM SD (logged)	1.92	95% Critical H Value (KM-Log)	3.208
KM Standard Error of Mean (logged)	0.157		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.471	Mean in Log Scale	-2.968
SD in Original Scale	1.803	SD in Log Scale	1.89
95% t UCL (Assumes normality)	0.709	95% H-Stat UCL	0.495

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.709

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

LMWPAH ND_0 (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	149
Number of Detects	137	Number of Non-Detects	20
Number of Distinct Detects	137	Number of Distinct Non-Detects	12
Minimum Detect	9.2000E-4	Minimum Non-Detect	0.00128
Maximum Detect	15.84	Maximum Non-Detect	0.0555
Variance Detects	3.698	Percent Non-Detects	12.74%
Mean Detects	0.532	SD Detects	1.923
Median Detects	0.047	CV Detects	3.613
Skewness Detects	5.868	Kurtosis Detects	38.04
Mean of Logged Detects	-2.976	SD of Logged Detects	2.082

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.31	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.088	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.465	KM Standard Error of Mean	0.144
90KM SD	1.799	95% KM (BCA) UCL	0.716
95% KM (t) UCL	0.703	95% KM (Percentile Bootstrap) UCL	0.72
95% KM (z) UCL	0.702	95% KM Bootstrap t UCL	0.954
90% KM Chebyshev UCL	0.897	95% KM Chebyshev UCL	1.093
97.5% KM Chebyshev UCL	1.365	99% KM Chebyshev UCL	1.898

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	10.54	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.871	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0868	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.295	k star (bias corrected MLE)	0.293
Theta hat (MLE)	1.805	Theta star (bias corrected MLE)	1.815
nu hat (MLE)	80.78	nu star (bias corrected)	80.35
Mean (detects)	0.532		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	9.2000E-4	Mean	0.466
Maximum	15.84	Median	0.0315
SD	1.804	CV	3.874
k hat (MLE)	0.287	k star (bias corrected MLE)	0.286
Theta hat (MLE)	1.622	Theta star (bias corrected MLE)	1.629
nu hat (MLE)	90.14	nu star (bias corrected)	89.75
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (89.75, α)	68.9	Adjusted Chi Square Value (89.75, β)	68.74
95% Gamma Approximate UCL	0.607	95% Gamma Adjusted UCL	0.608

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.465	SD (KM)	1.799
Variance (KM)	3.235	SE of Mean (KM)	0.144
k hat (KM)	0.0669	k star (KM)	0.0698
nu hat (KM)	20.99	nu star (KM)	21.92
theta hat (KM)	6.956	theta star (KM)	6.66
80% gamma percentile (KM)	0.166	90% gamma percentile (KM)	1.001
95% gamma percentile (KM)	2.674	99% gamma percentile (KM)	8.773

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (21.92, α)	12.28	Adjusted Chi Square Value (21.92, β)	12.21
95% KM Approximate Gamma UCL	0.83	95% KM Adjusted Gamma UCL	0.835

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.968	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.0463	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0523	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0696	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.465	Mean in Log Scale	-3.347
SD in Original Scale	1.804	SD in Log Scale	2.196
95% t UCL (assumes normality of ROS data)	0.703	95% Percentile Bootstrap UCL	0.726
95% BCA Bootstrap UCL	0.793	95% Bootstrap t UCL	0.862
95% H-UCL (Log ROS)	0.732		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.34	KM Geo Mean	0.0354
KM SD (logged)	2.18	95% Critical H Value (KM-Log)	3.527
KM Standard Error of Mean (logged)	0.176	95% H-UCL (KM -Log)	0.705
KM SD (logged)	2.18	95% Critical H Value (KM-Log)	3.527
KM Standard Error of Mean (logged)	0.176		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.465	Mean in Log Scale	-3.296
SD in Original Scale	1.804	SD in Log Scale	2.137
95% t UCL (Assumes normality)	0.703	95% H-Stat UCL	0.659

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.705

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

HMWPAH ND_halfRL (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	154
Number of Detects	147	Number of Non-Detects	10
Number of Distinct Detects	147	Number of Distinct Non-Detects	7
Minimum Detect	0.00492	Minimum Non-Detect	0.00491
Maximum Detect	156.4	Maximum Non-Detect	0.0198
Variance Detects	396.5	Percent Non-Detects	6.369%
Mean Detects	4.643	SD Detects	19.91
Median Detects	0.303	CV Detects	4.288
Skewness Detects	6.467	Kurtosis Detects	44.78
Mean of Logged Detects	-1.185	SD of Logged Detects	2.17

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.252	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.455	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.085	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.348	KM Standard Error of Mean	1.54
90KM SD	19.23	95% KM (BCA) UCL	7.032
95% KM (t) UCL	6.897	95% KM (Percentile Bootstrap) UCL	7.007
95% KM (z) UCL	6.881	95% KM Bootstrap t UCL	10.45
90% KM Chebyshev UCL	8.969	95% KM Chebyshev UCL	11.06
97.5% KM Chebyshev UCL	13.97	99% KM Chebyshev UCL	19.67

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	13.9	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.889	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0847	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.259	k star (bias corrected MLE)	0.259
Theta hat (MLE)	17.89	Theta star (bias corrected MLE)	17.95
nu hat (MLE)	76.29	nu star (bias corrected)	76.07
Mean (detects)	4.643		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.00492	Mean	4.348
Maximum	156.4	Median	0.245
SD	19.3	CV	4.438
k hat (MLE)	0.248	k star (bias corrected MLE)	0.247
Theta hat (MLE)	17.56	Theta star (bias corrected MLE)	17.59
nu hat (MLE)	77.75	nu star (bias corrected)	77.6
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (77.60, α)	58.31	Adjusted Chi Square Value (77.60, β)	58.15
95% Gamma Approximate UCL	5.787	95% Gamma Adjusted UCL	5.802

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.348	SD (KM)	19.23
Variance (KM)	370	SE of Mean (KM)	1.54
k hat (KM)	0.0511	k star (KM)	0.0544
nu hat (KM)	16.04	nu star (KM)	17.07
theta hat (KM)	85.09	theta star (KM)	79.97
80% gamma percentile (KM)	0.781	90% gamma percentile (KM)	7.356
95% gamma percentile (KM)	23.76	99% gamma percentile (KM)	91.43

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.07, α)	8.723	Adjusted Chi Square Value (17.07, β)	8.668
95% KM Approximate Gamma UCL	8.509	95% KM Adjusted Gamma UCL	8.563

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.955	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	6.1473E-4	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.076	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0672	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.348	Mean in Log Scale	-1.494
SD in Original Scale	19.3	SD in Log Scale	2.415
95% t UCL (assumes normality of ROS data)	6.896	95% Percentile Bootstrap UCL	7.138
95% BCA Bootstrap UCL	7.833	95% Bootstrap t UCL	9.469
95% H-UCL (Log ROS)	8.687		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.445	KM Geo Mean	0.236
KM SD (logged)	2.318	95% Critical H Value (KM-Log)	3.701
KM Standard Error of Mean (logged)	0.186	95% H-UCL (KM -Log)	6.884
KM SD (logged)	2.318	95% Critical H Value (KM-Log)	3.701
KM Standard Error of Mean (logged)	0.186		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.348	Mean in Log Scale	-1.483
SD in Original Scale	19.3	SD in Log Scale	2.394
95% t UCL (Assumes normality)	6.896	95% H-Stat UCL	8.25

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	6.897

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

HMWPAH ND_0 (mg/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	154
Number of Detects	147	Number of Non-Detects	10
Number of Distinct Detects	147	Number of Distinct Non-Detects	7
Minimum Detect	7.0000E-4	Minimum Non-Detect	0.00491
Maximum Detect	156.4	Maximum Non-Detect	0.0198
Variance Detects	396.5	Percent Non-Detects	6.369%
Mean Detects	4.64	SD Detects	19.91
Median Detects	0.303	CV Detects	4.291
Skewness Detects	6.467	Kurtosis Detects	44.78
Mean of Logged Detects	-1.333	SD of Logged Detects	2.39

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.252	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.455	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.085	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.345	KM Standard Error of Mean	1.54
90KM SD	19.23	95% KM (BCA) UCL	7.029
95% KM (t) UCL	6.894	95% KM (Percentile Bootstrap) UCL	7.005
95% KM (z) UCL	6.879	95% KM Bootstrap t UCL	10.45
90% KM Chebyshev UCL	8.966	95% KM Chebyshev UCL	11.06
97.5% KM Chebyshev UCL	13.96	99% KM Chebyshev UCL	19.67

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	12.1	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.895	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.257	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.085	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.248	k star (bias corrected MLE)	0.247
Theta hat (MLE)	18.71	Theta star (bias corrected MLE)	18.75
nu hat (MLE)	72.91	nu star (bias corrected)	72.76
Mean (detects)	4.64		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.0000E-4	Mean	4.345
Maximum	156.4	Median	0.243
SD	19.3	CV	4.441
k hat (MLE)	0.238	k star (bias corrected MLE)	0.238
Theta hat (MLE)	18.27	Theta star (bias corrected MLE)	18.29
nu hat (MLE)	74.68	nu star (bias corrected)	74.58
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (74.58, α)	55.69	Adjusted Chi Square Value (74.58, β)	55.54
95% Gamma Approximate UCL	5.819	95% Gamma Adjusted UCL	5.835

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.345	SD (KM)	19.23
Variance (KM)	370	SE of Mean (KM)	1.54
k hat (KM)	0.051	k star (KM)	0.0543
nu hat (KM)	16.02	nu star (KM)	17.05
theta hat (KM)	85.15	theta star (KM)	80.02
80% gamma percentile (KM)	0.777	90% gamma percentile (KM)	7.339
95% gamma percentile (KM)	23.74	99% gamma percentile (KM)	91.42

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (17.05, α)	8.707	Adjusted Chi Square Value (17.05, β)	8.652
95% KM Approximate Gamma UCL	8.507	95% KM Adjusted Gamma UCL	8.562

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.975	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.166	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.083	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0672	Detected Data Not Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.345	Mean in Log Scale	-1.616
SD in Original Scale	19.3	SD in Log Scale	2.557
95% t UCL (assumes normality of ROS data)	6.893	95% Percentile Bootstrap UCL	7.136
95% BCA Bootstrap UCL	7.83	95% Bootstrap t UCL	9.466
95% H-UCL (Log ROS)	11.87		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.637	KM Geo Mean	0.195
KM SD (logged)	2.588	95% Critical H Value (KM-Log)	4.046
KM Standard Error of Mean (logged)	0.208	95% H-UCL (KM -Log)	12.82
KM SD (logged)	2.588	95% Critical H Value (KM-Log)	4.046
KM Standard Error of Mean (logged)	0.208		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.345	Mean in Log Scale	-1.621
SD in Original Scale	19.3	SD in Log Scale	2.567
95% t UCL (Assumes normality)	6.893	95% H-Stat UCL	12.16

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	12.82

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

2,4,5-Trichlorophenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	38
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150

Number of Distinct Detects	0	Number of Distinct Non-Detects	38

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4,5-Trichlorophenol was not processed!

2,4,6-Trichlorophenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	29
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	29

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4,6-Trichlorophenol was not processed!

2,4-Dichlorophenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	32
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	32

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dichlorophenol was not processed!

2,4-Dimethylphenol (mg/kg)

General Statistics

Total Number of Observations	143	Number of Distinct Observations	37
		Number of Missing Observations	14
Number of Detects	7	Number of Non-Detects	136
Number of Distinct Detects	7	Number of Distinct Non-Detects	31
Minimum Detect	0.008	Minimum Non-Detect	0.0035
Maximum Detect	0.235	Maximum Non-Detect	0.299
Variance Detects	0.00645	Percent Non-Detects	95.1%
Mean Detects	0.0815	SD Detects	0.0803

Median Detects	0.0584	CV Detects	0.985
Skewness Detects	1.343	Kurtosis Detects	1.5
Mean of Logged Detects	-3.011	SD of Logged Detects	1.186

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00749	KM Standard Error of Mean	0.00217
90KM SD	0.0238	95% KM (BCA) UCL	0.0121
95% KM (t) UCL	0.0111	95% KM (Percentile Bootstrap) UCL	0.0114
95% KM (z) UCL	0.0111	95% KM Bootstrap t UCL	0.0132
90% KM Chebyshev UCL	0.014	95% KM Chebyshev UCL	0.017
97.5% KM Chebyshev UCL	0.0211	99% KM Chebyshev UCL	0.0291

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.146	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.135	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.319	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.129	k star (bias corrected MLE)	0.74
Theta hat (MLE)	0.0722	Theta star (bias corrected MLE)	0.11
nu hat (MLE)	15.8	nu star (bias corrected)	10.36
Mean (detects)	0.0815		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.008	Mean	0.0135
Maximum	0.235	Median	0.01
SD	0.0226	CV	1.677
k hat (MLE)	2.404	k star (bias corrected MLE)	2.358
Theta hat (MLE)	0.00562	Theta star (bias corrected MLE)	0.00573
nu hat (MLE)	687.5	nu star (bias corrected)	674.4
Adjusted Level of Significance (β)	0.0483		
Approximate Chi Square Value (674.43, α)	615.2	Adjusted Chi Square Value (674.43, β)	614.6
95% Gamma Approximate UCL	0.0148	95% Gamma Adjusted UCL	0.0148

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00749	SD (KM)	0.0238
Variance (KM)	5.6551E-4	SE of Mean (KM)	0.00217
k hat (KM)	0.0993	k star (KM)	0.102
nu hat (KM)	28.4	nu star (KM)	29.14
theta hat (KM)	0.0755	theta star (KM)	0.0736
80% gamma percentile (KM)	0.00534	90% gamma percentile (KM)	0.0201
95% gamma percentile (KM)	0.0434	99% gamma percentile (KM)	0.118

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (29.14, α)	17.82	Adjusted Chi Square Value (29.14, β)	17.73
95% KM Approximate Gamma UCL	0.0123	95% KM Adjusted Gamma UCL	0.0123

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.129	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00451	Mean in Log Scale	-9.148
SD in Original Scale	0.0241	SD in Log Scale	2.595
95% t UCL (assumes normality of ROS data)	0.00785	95% Percentile Bootstrap UCL	0.00824
95% BCA Bootstrap UCL	0.0098	95% Bootstrap t UCL	0.0131
95% H-UCL (Log ROS)	0.00741		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.515	KM Geo Mean	0.00403
KM SD (logged)	0.637	95% Critical H Value (KM-Log)	1.913
KM Standard Error of Mean (logged)	0.0593	95% H-UCL (KM -Log)	0.00546
KM SD (logged)	0.637	95% Critical H Value (KM-Log)	1.913
KM Standard Error of Mean (logged)	0.0593		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0123	Mean in Log Scale	-5.6
SD in Original Scale	0.0304	SD in Log Scale	1.214
95% t UCL (Assumes normality)	0.0165	95% H-Stat UCL	0.00987

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0111

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

2,4-Dinitrophenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	35
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	35

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrophenol was not processed!

2-Chlorophenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	29
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	29

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2-Chlorophenol was not processed!

2-Methylphenol (o-Cresol) (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	35
		Number of Missing Observations	3
Number of Detects	13	Number of Non-Detects	141
Number of Distinct Detects	12	Number of Distinct Non-Detects	24
Minimum Detect	0.0065	Minimum Non-Detect	0.0057
Maximum Detect	0.316	Maximum Non-Detect	0.0665
Variance Detects	0.00755	Percent Non-Detects	91.56%
Mean Detects	0.0717	SD Detects	0.0869
Median Detects	0.04	CV Detects	1.212
Skewness Detects	2.043	Kurtosis Detects	4.926
Mean of Logged Detects	-3.32	SD of Logged Detects	1.273

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.749	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.814	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.271	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0114	KM Standard Error of Mean	0.00255
90KM SD	0.0304	95% KM (BCA) UCL	0.0158
95% KM (t) UCL	0.0156	95% KM (Percentile Bootstrap) UCL	0.0157
95% KM (z) UCL	0.0156	95% KM Bootstrap t UCL	0.0193
90% KM Chebyshev UCL	0.019	95% KM Chebyshev UCL	0.0225
97.5% KM Chebyshev UCL	0.0273	99% KM Chebyshev UCL	0.0368

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.498	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.765	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.197	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.245	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.859	k star (bias corrected MLE)	0.712
Theta hat (MLE)	0.0835	Theta star (bias corrected MLE)	0.101
nu hat (MLE)	22.33	nu star (bias corrected)	18.51
Mean (detects)	0.0717		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0065	Mean	0.0152
Maximum	0.316	Median	0.01
SD	0.0298	CV	1.96
k hat (MLE)	1.756	k star (bias corrected MLE)	1.726
Theta hat (MLE)	0.00866	Theta star (bias corrected MLE)	0.00881
nu hat (MLE)	541	nu star (bias corrected)	531.8
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (531.76, α)	479.3	Adjusted Chi Square Value (531.76, β)	478.8
95% Gamma Approximate UCL	0.0169	95% Gamma Adjusted UCL	0.0169

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0114	SD (KM)	0.0304
Variance (KM)	9.2534E-4	SE of Mean (KM)	0.00255
k hat (KM)	0.139	k star (KM)	0.141
nu hat (KM)	42.91	nu star (KM)	43.41
theta hat (KM)	0.0815	theta star (KM)	0.0806

80% gamma percentile (KM)	0.0117	90% gamma percentile (KM)	0.0333
95% gamma percentile (KM)	0.0632	99% gamma percentile (KM)	0.151

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (43.41, α)	29.3	Adjusted Chi Square Value (43.41, β)	29.19
95% KM Approximate Gamma UCL	0.0168	95% KM Adjusted Gamma UCL	0.0169

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.889	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.215	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00651	Mean in Log Scale	-9.107
SD in Original Scale	0.0314	SD in Log Scale	2.903
95% t UCL (assumes normality of ROS data)	0.0107	95% Percentile Bootstrap UCL	0.011
95% BCA Bootstrap UCL	0.0124	95% Bootstrap t UCL	0.0143
95% H-UCL (Log ROS)	0.0213		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.001	KM Geo Mean	0.00673
KM SD (logged)	0.626	95% Critical H Value (KM-Log)	1.911
KM Standard Error of Mean (logged)	0.0532	95% H-UCL (KM -Log)	0.00902
KM SD (logged)	0.626	95% Critical H Value (KM-Log)	1.911
KM Standard Error of Mean (logged)	0.0532		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0106	Mean in Log Scale	-5.316
SD in Original Scale	0.031	SD in Log Scale	0.866
95% t UCL (Assumes normality)	0.0148	95% H-Stat UCL	0.00827

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0156

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

4,6-Dinitro-2-methylphenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	37
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	37

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 4,6-Dinitro-2-methylphenol was not processed!

4-Chloro-3-Methylphenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	31
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	31

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 4-Chloro-3-Methylphenol was not processed!

4-Methylphenol (p-Cresol) (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	47
		Number of Missing Observations	3
Number of Detects	27	Number of Non-Detects	127
Number of Distinct Detects	26	Number of Distinct Non-Detects	21
Minimum Detect	0.0082	Minimum Non-Detect	0.0063
Maximum Detect	1	Maximum Non-Detect	0.0738
Variance Detects	0.0693	Percent Non-Detects	82.47%
Mean Detects	0.155	SD Detects	0.263
Median Detects	0.0364	CV Detects	1.694
Skewness Detects	2.47	Kurtosis Detects	5.759
Mean of Logged Detects	-2.974	SD of Logged Detects	1.491

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.603	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.894	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.288	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.194	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0325	KM Standard Error of Mean	0.01
90KM SD	0.122	95% KM (BCA) UCL	0.0513
95% KM (t) UCL	0.0491	95% KM (Percentile Bootstrap) UCL	0.0502
95% KM (z) UCL	0.049	95% KM Bootstrap t UCL	0.0672
90% KM Chebyshev UCL	0.0626	95% KM Chebyshev UCL	0.0763
97.5% KM Chebyshev UCL	0.0952	99% KM Chebyshev UCL	0.132

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.551	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.802	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.219	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.177	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.561	k star (bias corrected MLE)	0.523
Theta hat (MLE)	0.277	Theta star (bias corrected MLE)	0.297
nu hat (MLE)	30.29	nu star (bias corrected)	28.26
Mean (detects)	0.155		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0082	Mean	0.0355
Maximum	1	Median	0.01
SD	0.122	CV	3.433
k hat (MLE)	0.626	k star (bias corrected MLE)	0.618
Theta hat (MLE)	0.0567	Theta star (bias corrected MLE)	0.0574
nu hat (MLE)	192.8	nu star (bias corrected)	190.4
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (190.36, α)	159.4	Adjusted Chi Square Value (190.36, β)	159.2
95% Gamma Approximate UCL	0.0424	95% Gamma Adjusted UCL	0.0425

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0325	SD (KM)	0.122
Variance (KM)	0.0149	SE of Mean (KM)	0.01
k hat (KM)	0.071	k star (KM)	0.0739
nu hat (KM)	21.86	nu star (KM)	22.77
theta hat (KM)	0.458	theta star (KM)	0.44
80% gamma percentile (KM)	0.0132	90% gamma percentile (KM)	0.0732

95% gamma percentile (KM)	0.188	99% gamma percentile (KM)	0.598

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (22.77, α)	12.92	Adjusted Chi Square Value (22.77, β)	12.85
95% KM Approximate Gamma UCL	0.0574	95% KM Adjusted Gamma UCL	0.0577

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.912	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.935	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.153	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0278	Mean in Log Scale	-7.88
SD in Original Scale	0.124	SD in Log Scale	3.126
95% t UCL (assumes normality of ROS data)	0.0443	95% Percentile Bootstrap UCL	0.0449
95% BCA Bootstrap UCL	0.0485	95% Bootstrap t UCL	0.0571
95% H-UCL (Log ROS)	0.166		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.692	KM Geo Mean	0.00916
KM SD (logged)	1.005	95% Critical H Value (KM-Log)	2.212
KM Standard Error of Mean (logged)	0.0829	95% H-UCL (KM -Log)	0.0182
KM SD (logged)	1.005	95% Critical H Value (KM-Log)	2.212
KM Standard Error of Mean (logged)	0.0829		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0315	Mean in Log Scale	-5
SD in Original Scale	0.123	SD in Log Scale	1.2
95% t UCL (Assumes normality)	0.0479	95% H-Stat UCL	0.0175

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.0182

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

General Statistics

Total Number of Observations	153	Number of Distinct Observations	73
		Number of Missing Observations	4
Number of Detects	68	Number of Non-Detects	85
Number of Distinct Detects	60	Number of Distinct Non-Detects	13
Minimum Detect	0.0047	Minimum Non-Detect	0.0039
Maximum Detect	0.301	Maximum Non-Detect	0.0994
Variance Detects	0.00365	Percent Non-Detects	55.56%
Mean Detects	0.0373	SD Detects	0.0605
Median Detects	0.0145	CV Detects	1.622
Skewness Detects	3.182	Kurtosis Detects	10.65
Mean of Logged Detects	-4.018	SD of Logged Detects	1.107

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.559	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.124	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0189	KM Standard Error of Mean	0.00353
90KM SD	0.0433	95% KM (BCA) UCL	0.0258
95% KM (t) UCL	0.0248	95% KM (Percentile Bootstrap) UCL	0.0253
95% KM (z) UCL	0.0248	95% KM Bootstrap t UCL	0.0282
90% KM Chebyshev UCL	0.0295	95% KM Chebyshev UCL	0.0343
97.5% KM Chebyshev UCL	0.041	99% KM Chebyshev UCL	0.054

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.081	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.789	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.112	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.814	k star (bias corrected MLE)	0.788
Theta hat (MLE)	0.0458	Theta star (bias corrected MLE)	0.0473
nu hat (MLE)	110.6	nu star (bias corrected)	107.1
Mean (detects)	0.0373		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0047	Mean	0.0221

Maximum	0.301	Median	0.01
SD	0.0424	CV	1.916
k hat (MLE)	1.075	k star (bias corrected MLE)	1.058
Theta hat (MLE)	0.0206	Theta star (bias corrected MLE)	0.0209
nu hat (MLE)	328.9	nu star (bias corrected)	323.8
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (323.75, α)	283.1	Adjusted Chi Square Value (323.75, β)	282.7
95% Gamma Approximate UCL	0.0253	95% Gamma Adjusted UCL	0.0253

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0189	SD (KM)	0.0433
Variance (KM)	0.00187	SE of Mean (KM)	0.00353
k hat (KM)	0.192	k star (KM)	0.192
nu hat (KM)	58.67	nu star (KM)	58.85
theta hat (KM)	0.0988	theta star (KM)	0.0985
80% gamma percentile (KM)	0.0244	90% gamma percentile (KM)	0.0573
95% gamma percentile (KM)	0.0986	99% gamma percentile (KM)	0.213

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (58.85, α)	42.21	Adjusted Chi Square Value (58.85, β)	42.08
95% KM Approximate Gamma UCL	0.0264	95% KM Adjusted Gamma UCL	0.0265

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.893	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	2.6400E-6	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0982	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0175	Mean in Log Scale	-5.588
SD in Original Scale	0.0439	SD in Log Scale	1.767
95% t UCL (assumes normality of ROS data)	0.0233	95% Percentile Bootstrap UCL	0.0236
95% BCA Bootstrap UCL	0.0248	95% Bootstrap t UCL	0.025
95% H-UCL (Log ROS)	0.0275		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.84	KM Geo Mean	0.00791
KM SD (logged)	1.053	95% Critical H Value (KM-Log)	2.255
KM Standard Error of Mean (logged)	0.0867	95% H-UCL (KM -Log)	0.0167
KM SD (logged)	1.053	95% Critical H Value (KM-Log)	2.255
KM Standard Error of Mean (logged)	0.0867		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0188	Mean in Log Scale	-5.05
SD in Original Scale	0.0437	SD in Log Scale	1.275
95% t UCL (Assumes normality)	0.0246	95% H-Stat UCL	0.0187

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL 0.0248

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Pentachlorophenol (mg/kg)

General Statistics

Total Number of Observations	150	Number of Distinct Observations	39
		Number of Missing Observations	7
Number of Detects	0	Number of Non-Detects	150
Number of Distinct Detects	0	Number of Distinct Non-Detects	39

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pentachlorophenol was not processed!

bis(2-Ethylhexyl)phthalate (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	69
		Number of Missing Observations	3
Number of Detects	48	Number of Non-Detects	106
Number of Distinct Detects	46	Number of Distinct Non-Detects	25
Minimum Detect	0.0067	Minimum Non-Detect	0.0051
Maximum Detect	0.524	Maximum Non-Detect	0.101
Variance Detects	0.0113	Percent Non-Detects	68.83%
Mean Detects	0.0597	SD Detects	0.106
Median Detects	0.0184	CV Detects	1.782
Skewness Detects	2.855	Kurtosis Detects	8.289
Mean of Logged Detects	-3.659	SD of Logged Detects	1.124

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.534	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.359	**Lilliefors GOF Test**	

1% Lilliefors Critical Value	0.148	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0224	KM Standard Error of Mean	0.00521
90KM SD	0.0639	95% KM (BCA) UCL	0.0322
95% KM (t) UCL	0.031	95% KM (Percentile Bootstrap) UCL	0.0313
95% KM (z) UCL	0.0309	95% KM Bootstrap t UCL	0.0355
90% KM Chebyshev UCL	0.038	95% KM Chebyshev UCL	0.0451
97.5% KM Chebyshev UCL	0.0549	99% KM Chebyshev UCL	0.0742

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.333	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.795	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.281	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.133	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.717	k star (bias corrected MLE)	0.686
Theta hat (MLE)	0.0833	Theta star (bias corrected MLE)	0.087
nu hat (MLE)	68.82	nu star (bias corrected)	65.85
Mean (detects)	0.0597		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0067	Mean	0.0255
Maximum	0.524	Median	0.01
SD	0.0633	CV	2.484
k hat (MLE)	0.911	k star (bias corrected MLE)	0.898
Theta hat (MLE)	0.028	Theta star (bias corrected MLE)	0.0284
nu hat (MLE)	280.6	nu star (bias corrected)	276.5
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (276.47, α)	239	Adjusted Chi Square Value (276.47, β)	238.6
95% Gamma Approximate UCL	0.0295	95% Gamma Adjusted UCL	0.0295

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0224	SD (KM)	0.0639
Variance (KM)	0.00409	SE of Mean (KM)	0.00521
k hat (KM)	0.122	k star (KM)	0.124
nu hat (KM)	37.68	nu star (KM)	38.28
theta hat (KM)	0.183	theta star (KM)	0.18
80% gamma percentile (KM)	0.0204	90% gamma percentile (KM)	0.064
95% gamma percentile (KM)	0.127	99% gamma percentile (KM)	0.318

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (38.28, α)	25.11	Adjusted Chi Square Value (38.28, β)	25.01
95% KM Approximate Gamma UCL	0.0341	95% KM Adjusted Gamma UCL	0.0342

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.954	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.117	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0197	Mean in Log Scale	-5.928
SD in Original Scale	0.0649	SD in Log Scale	1.922
95% t UCL (assumes normality of ROS data)	0.0283	95% Percentile Bootstrap UCL	0.0285
95% BCA Bootstrap UCL	0.0304	95% Bootstrap t UCL	0.0323
95% H-UCL (Log ROS)	0.0278		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.748	KM Geo Mean	0.00867
KM SD (logged)	0.974	95% Critical H Value (KM-Log)	2.184
KM Standard Error of Mean (logged)	0.0803	95% H-UCL (KM -Log)	0.0165
KM SD (logged)	0.974	95% Critical H Value (KM-Log)	2.184
KM Standard Error of Mean (logged)	0.0803		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.022	Mean in Log Scale	-4.996
SD in Original Scale	0.0644	SD in Log Scale	1.21
95% t UCL (Assumes normality)	0.0306	95% H-Stat UCL	0.0178

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.031

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Butylbenzyl phthalate (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	28
		Number of Missing Observations	3
Number of Detects	2	Number of Non-Detects	152
Number of Distinct Detects	2	Number of Distinct Non-Detects	26
Minimum Detect	0.0129	Minimum Non-Detect	0.008
Maximum Detect	0.0154	Maximum Non-Detect	0.094
Variance Detects	3.1250E-6	Percent Non-Detects	98.7%
Mean Detects	0.0142	SD Detects	0.00177
Median Detects	0.0142	CV Detects	0.125
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-4.262	SD of Logged Detects	0.125

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0081	KM Standard Error of Mean	9.6571E-5
90KM SD	7.7558E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00826	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00825	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00839	95% KM Chebyshev UCL	0.00852
97.5% KM Chebyshev UCL	0.0087	99% KM Chebyshev UCL	0.00906

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	127.8	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.1071E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	511.2	nu star (bias corrected)	N/A
Mean (detects)	0.0142		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0081	SD (KM)	7.7558E-4
Variance (KM)	6.0153E-7	SE of Mean (KM)	9.6571E-5
k hat (KM)	108.9	k star (KM)	106.8
nu hat (KM)	33556	nu star (KM)	32903
theta hat (KM)	7.4305E-5	theta star (KM)	7.5779E-5
80% gamma percentile (KM)	0.00875	90% gamma percentile (KM)	0.00911
95% gamma percentile (KM)	0.00943	99% gamma percentile (KM)	0.01

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0484
Approximate Chi Square Value (N/A, α)	32482	Adjusted Chi Square Value (N/A, β)	32479
95% KM Approximate Gamma UCL	0.0082	95% KM Adjusted Gamma UCL	0.0082

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00304	Mean in Log Scale	-5.984
SD in Original Scale	0.00213	SD in Log Scale	0.604
95% t UCL (assumes normality of ROS data)	0.00332	95% Percentile Bootstrap UCL	0.00334
95% BCA Bootstrap UCL	0.00338	95% Bootstrap t UCL	0.00337
95% H-UCL (Log ROS)	0.00332		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.82	KM Geo Mean	0.00807
KM SD (logged)	0.0708	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.00882	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0708	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.00882		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00671	Mean in Log Scale	-5.167
SD in Original Scale	0.00569	SD in Log Scale	0.478
95% t UCL (Assumes normality)	0.00747	95% H-Stat UCL	0.00686

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.00826

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Diethyl phthalate (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	60
		Number of Missing Observations	3
Number of Detects	27	Number of Non-Detects	127
Number of Distinct Detects	26	Number of Distinct Non-Detects	34
Minimum Detect	0.0198	Minimum Non-Detect	0.0168
Maximum Detect	0.257	Maximum Non-Detect	0.294
Variance Detects	0.0032	Percent Non-Detects	82.47%
Mean Detects	0.0537	SD Detects	0.0566
Median Detects	0.0269	CV Detects	1.054
Skewness Detects	2.375	Kurtosis Detects	5.862
Mean of Logged Detects	-3.258	SD of Logged Detects	0.744

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.646	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.894	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.275	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.194	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0239	KM Standard Error of Mean	0.00227
90KM SD	0.0273	95% KM (BCA) UCL	0.029
95% KM (t) UCL	0.0276	95% KM (Percentile Bootstrap) UCL	0.0279
95% KM (z) UCL	0.0276	95% KM Bootstrap t UCL	0.0297
90% KM Chebyshev UCL	0.0307	95% KM Chebyshev UCL	0.0338
97.5% KM Chebyshev UCL	0.0381	99% KM Chebyshev UCL	0.0465

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.551	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.761	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.25	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.171	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.647	k star (bias corrected MLE)	1.488
Theta hat (MLE)	0.0326	Theta star (bias corrected MLE)	0.0361
nu hat (MLE)	88.91	nu star (bias corrected)	80.37
Mean (detects)	0.0537		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0178
Maximum	0.257	Median	0.01
SD	0.0286	CV	1.605
k hat (MLE)	1.663	k star (bias corrected MLE)	1.635
Theta hat (MLE)	0.0107	Theta star (bias corrected MLE)	0.0109
nu hat (MLE)	512.2	nu star (bias corrected)	503.6
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (503.56, α)	452.5	Adjusted Chi Square Value (503.56, β)	452.1
95% Gamma Approximate UCL	0.0199	95% Gamma Adjusted UCL	0.0199

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0239	SD (KM)	0.0273
Variance (KM)	7.4719E-4	SE of Mean (KM)	0.00227
k hat (KM)	0.762	k star (KM)	0.752
nu hat (KM)	234.7	nu star (KM)	231.5
theta hat (KM)	0.0313	theta star (KM)	0.0317
80% gamma percentile (KM)	0.0391	90% gamma percentile (KM)	0.0589

95% gamma percentile (KM)	0.0792	99% gamma percentile (KM)	0.127

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (231.50, α)	197.3	Adjusted Chi Square Value (231.50, β)	197
95% KM Approximate Gamma UCL	0.028	95% KM Adjusted Gamma UCL	0.028

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.813	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.935	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.222	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.153	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0136	Mean in Log Scale	-5.212
SD in Original Scale	0.0301	SD in Log Scale	1.25
95% t UCL (assumes normality of ROS data)	0.0176	95% Percentile Bootstrap UCL	0.0179
95% BCA Bootstrap UCL	0.0189	95% Bootstrap t UCL	0.02
95% H-UCL (Log ROS)	0.0153		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.918	KM Geo Mean	0.0199
KM SD (logged)	0.449	95% Critical H Value (KM-Log)	1.803
KM Standard Error of Mean (logged)	0.0384	95% H-UCL (KM -Log)	0.0235
KM SD (logged)	0.449	95% Critical H Value (KM-Log)	1.803
KM Standard Error of Mean (logged)	0.0384		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0242	Mean in Log Scale	-4.078
SD in Original Scale	0.0314	SD in Log Scale	0.729
95% t UCL (Assumes normality)	0.0284	95% H-Stat UCL	0.0248

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.0276

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

General Statistics

Total Number of Observations	154	Number of Distinct Observations	24
		Number of Missing Observations	3
Number of Detects	2	Number of Non-Detects	152
Number of Distinct Detects	2	Number of Distinct Non-Detects	22
Minimum Detect	0.0058	Minimum Non-Detect	0.0037
Maximum Detect	0.0066	Maximum Non-Detect	0.0598
Variance Detects	3.2000E-7	Percent Non-Detects	98.7%
Mean Detects	0.0062	SD Detects	5.6569E-4
Median Detects	0.0062	CV Detects	0.0912
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.085	SD of Logged Detects	0.0914

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00374	KM Standard Error of Mean	3.8955E-5
90KM SD	3.1285E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0038	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0038	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00386	95% KM Chebyshev UCL	0.00391
97.5% KM Chebyshev UCL	0.00398	99% KM Chebyshev UCL	0.00413

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	239.9	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.5842E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	959.7	nu star (bias corrected)	N/A
Mean (detects)	0.0062		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00374	SD (KM)	3.1285E-4
Variance (KM)	9.7878E-8	SE of Mean (KM)	3.8955E-5
k hat (KM)	142.8	k star (KM)	140
nu hat (KM)	43987	nu star (KM)	43131
theta hat (KM)	2.6179E-5	theta star (KM)	2.6698E-5
80% gamma percentile (KM)	0.004	90% gamma percentile (KM)	0.00415
95% gamma percentile (KM)	0.00427	99% gamma percentile (KM)	0.00451

Gamma Kaplan-Meier (KM) Statistics

Adjusted Level of Significance (β)	0.0484

Approximate Chi Square Value (N/A, α)	42649	Adjusted Chi Square Value (N/A, β)	42645
95% KM Approximate Gamma UCL	0.00378	95% KM Adjusted Gamma UCL	0.00378

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00195	Mean in Log Scale	-6.342
SD in Original Scale	9.5216E-4	SD in Log Scale	0.451
95% t UCL (assumes normality of ROS data)	0.00208	95% Percentile Bootstrap UCL	0.00208
95% BCA Bootstrap UCL	0.00209	95% Bootstrap t UCL	0.00209
95% H-UCL (Log ROS)	0.00208		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.591	KM Geo Mean	0.00373
KM SD (logged)	0.064	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.00797	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.064	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.00797		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00375	Mean in Log Scale	-5.859
SD in Original Scale	0.0041	SD in Log Scale	0.614
95% t UCL (Assumes normality)	0.0043	95% H-Stat UCL	0.00379

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.0038

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Di-n-butyl phthalate (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	32
		Number of Missing Observations	3
Number of Detects	14	Number of Non-Detects	140
Number of Distinct Detects	14	Number of Distinct Non-Detects	18
Minimum Detect	0.006	Minimum Non-Detect	0.0048
Maximum Detect	0.66	Maximum Non-Detect	0.0598
Variance Detects	0.0288	Percent Non-Detects	90.91%
Mean Detects	0.1	SD Detects	0.17
Median Detects	0.0488	CV Detects	1.694
Skewness Detects	3.136	Kurtosis Detects	10.66

Mean of Logged Detects	-3.251	SD of Logged Detects	1.454

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.566	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.263	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0135	KM Standard Error of Mean	0.00472
90KM SD	0.0565	95% KM (BCA) UCL	0.022
95% KM (t) UCL	0.0213	95% KM (Percentile Bootstrap) UCL	0.022
95% KM (z) UCL	0.0213	95% KM Bootstrap t UCL	0.0371
90% KM Chebyshev UCL	0.0277	95% KM Chebyshev UCL	0.0341
97.5% KM Chebyshev UCL	0.043	99% KM Chebyshev UCL	0.0605

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.63	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.78	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.239	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.643	k star (bias corrected MLE)	0.553
Theta hat (MLE)	0.156	Theta star (bias corrected MLE)	0.181
nu hat (MLE)	18.01	nu star (bias corrected)	15.49
Mean (detects)	0.1		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.006	Mean	0.0182
Maximum	0.66	Median	0.01
SD	0.0559	CV	3.072
k hat (MLE)	1.189	k star (bias corrected MLE)	1.171
Theta hat (MLE)	0.0153	Theta star (bias corrected MLE)	0.0156
nu hat (MLE)	366.4	nu star (bias corrected)	360.5
Adjusted Level of Significance (β)	0.0484		
Approximate Chi Square Value (360.55, α)	317.5	Adjusted Chi Square Value (360.55, β)	317.2
95% Gamma Approximate UCL	0.0207	95% Gamma Adjusted UCL	0.0207

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0135	SD (KM)	0.0565
Variance (KM)	0.00319	SE of Mean (KM)	0.00472
k hat (KM)	0.0573	k star (KM)	0.0605

nu hat (KM)	17.64	nu star (KM)	18.63
theta hat (KM)	0.236	theta star (KM)	0.223
80% gamma percentile (KM)	0.00334	90% gamma percentile (KM)	0.0256
95% gamma percentile (KM)	0.0759	99% gamma percentile (KM)	0.272

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (18.63, α)	9.849	Adjusted Chi Square Value (18.63, β)	9.789
95% KM Approximate Gamma UCL	0.0256	95% KM Adjusted Gamma UCL	0.0257

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.166	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.208	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0094	Mean in Log Scale	-10.01
SD in Original Scale	0.0573	SD in Log Scale	3.506
95% t UCL (assumes normality of ROS data)	0.017	95% Percentile Bootstrap UCL	0.0178
95% BCA Bootstrap UCL	0.0225	95% Bootstrap t UCL	0.0305
95% H-UCL (Log ROS)	0.0933		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.145	KM Geo Mean	0.00583
KM SD (logged)	0.736	95% Critical H Value (KM-Log)	1.987
KM Standard Error of Mean (logged)	0.0618	95% H-UCL (KM -Log)	0.0086
KM SD (logged)	0.736	95% Critical H Value (KM-Log)	1.987
KM Standard Error of Mean (logged)	0.0618		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0129	Mean in Log Scale	-5.467
SD in Original Scale	0.0569	SD in Log Scale	0.962
95% t UCL (Assumes normality)	0.0205	95% H-Stat UCL	0.00795

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL	0.0256

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Di-n-octyl phthalate (mg/kg)

General Statistics

Total Number of Observations	154	Number of Distinct Observations	22
		Number of Missing Observations	3
Number of Detects	0	Number of Non-Detects	154
Number of Distinct Detects	0	Number of Distinct Non-Detects	22

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octyl phthalate was not processed!

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (ng/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	148
Number of Detects	152	Number of Non-Detects	5
Number of Distinct Detects	145	Number of Distinct Non-Detects	5
Minimum Detect	0.06	Minimum Non-Detect	0.0582
Maximum Detect	515	Maximum Non-Detect	0.517
Variance Detects	1771	Percent Non-Detects	3.185%
Mean Detects	6.18	SD Detects	42.08
Median Detects	0.708	CV Detects	6.809
Skewness Detects	11.88	Kurtosis Detects	144.3
Mean of Logged Detects	-0.205	SD of Logged Detects	1.61

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.14	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.442	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0836	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	5.987	KM Standard Error of Mean	3.305
90KM SD	41.28	95% KM (BCA) UCL	12.94
95% KM (t) UCL	11.46	95% KM (Percentile Bootstrap) UCL	12.58
95% KM (z) UCL	11.42	95% KM Bootstrap t UCL	39.04
90% KM Chebyshev UCL	15.9	95% KM Chebyshev UCL	20.39
97.5% KM Chebyshev UCL	26.63	99% KM Chebyshev UCL	38.88

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	15.5	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.86	Detected Data Not Gamma Distributed at 5% Significance Level

K-S Test Statistic	0.255	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0822	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.334	k star (bias corrected MLE)	0.332
Theta hat (MLE)	18.48	Theta star (bias corrected MLE)	18.6
nu hat (MLE)	101.7	nu star (bias corrected)	101
Mean (detects)	6.18		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.983
Maximum	515	Median	0.669
SD	41.41	CV	6.921
k hat (MLE)	0.32	k star (bias corrected MLE)	0.318
Theta hat (MLE)	18.71	Theta star (bias corrected MLE)	18.82
nu hat (MLE)	100.4	nu star (bias corrected)	99.84
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (99.84, α)	77.78	Adjusted Chi Square Value (99.84, β)	77.61
95% Gamma Approximate UCL	7.68	95% Gamma Adjusted UCL	7.697

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.987	SD (KM)	41.28
Variance (KM)	1704	SE of Mean (KM)	3.305
k hat (KM)	0.021	k star (KM)	0.0249
nu hat (KM)	6.604	nu star (KM)	7.811
theta hat (KM)	284.6	theta star (KM)	240.7
80% gamma percentile (KM)	0.0175	90% gamma percentile (KM)	2.012
95% gamma percentile (KM)	18.91	99% gamma percentile (KM)	161.5

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (7.81, α)	2.626	Adjusted Chi Square Value (7.81, β)	2.599
95% KM Approximate Gamma UCL	17.81	95% KM Adjusted Gamma UCL	18

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.958	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk P Value	0.0011	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0525	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.0661	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.986	Mean in Log Scale	-0.286
SD in Original Scale	41.41	SD in Log Scale	1.658
95% t UCL (assumes normality of ROS data)	11.45	95% Percentile Bootstrap UCL	12.54

95% BCA Bootstrap UCL	16.18	95% Bootstrap t UCL	37.52
95% H-UCL (Log ROS)	4.36		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.272	KM Geo Mean	0.762
KM SD (logged)	1.624	95% Critical H Value (KM-Log)	2.86
KM Standard Error of Mean (logged)	0.13	95% H-UCL (KM -Log)	4.134
KM SD (logged)	1.624	95% Critical H Value (KM-Log)	2.86
KM Standard Error of Mean (logged)	0.13		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.986	Mean in Log Scale	-0.277
SD in Original Scale	41.41	SD in Log Scale	1.638
95% t UCL (Assumes normality)	11.46	95% H-Stat UCL	4.226

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	4.134

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) (ng/kg)

General Statistics

Total Number of Observations	157	Number of Distinct Observations	146
Number of Detects	142	Number of Non-Detects	15
Number of Distinct Detects	136	Number of Distinct Non-Detects	10
Minimum Detect	0.068	Minimum Non-Detect	2.26
Maximum Detect	4140	Maximum Non-Detect	2.5
Variance Detects	121319	Percent Non-Detects	9.554%
Mean Detects	36.51	SD Detects	348.3
Median Detects	1.84	CV Detects	9.54
Skewness Detects	11.77	Kurtosis Detects	139.5
Mean of Logged Detects	0.672	SD of Logged Detects	1.642

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.103	**Normal GOF Test on Detected Observations Only**	
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level	

Lilliefors Test Statistic	0.478	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0864	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	33.1	KM Standard Error of Mean	26.45
90KM SD	330.3	95% KM (BCA) UCL	87.46
95% KM (t) UCL	76.87	95% KM (Percentile Bootstrap) UCL	85.88
95% KM (z) UCL	76.61	95% KM Bootstrap t UCL	1397
90% KM Chebyshev UCL	112.5	95% KM Chebyshev UCL	148.4
97.5% KM Chebyshev UCL	198.3	99% KM Chebyshev UCL	296.3

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	24.07	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.897	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.318	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.0865	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.244	k star (bias corrected MLE)	0.243
Theta hat (MLE)	149.8	Theta star (bias corrected MLE)	150
nu hat (MLE)	69.24	nu star (bias corrected)	69.11
Mean (detects)	36.51		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	33.02
Maximum	4140	Median	1.56
SD	331.3	CV	10.03
k hat (MLE)	0.218	k star (bias corrected MLE)	0.218
Theta hat (MLE)	151.4	Theta star (bias corrected MLE)	151.4
nu hat (MLE)	68.47	nu star (bias corrected)	68.5
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (68.50, α)	50.45	Adjusted Chi Square Value (68.50, β)	50.3
95% Gamma Approximate UCL	44.84	95% Gamma Adjusted UCL	44.97

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	33.1	SD (KM)	330.3
Variance (KM)	109065	SE of Mean (KM)	26.45
k hat (KM)	0.01	k star (KM)	0.0141
nu hat (KM)	3.155	nu star (KM)	4.428
theta hat (KM)	3295	theta star (KM)	2347
80% gamma percentile (KM)	1.7901E-4	90% gamma percentile (KM)	0.759
95% gamma percentile (KM)	35.62	99% gamma percentile (KM)	934.6

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (4.43, α)	0.898	Adjusted Chi Square Value (4.43, β)	0.884
95% KM Approximate Gamma UCL	163.3	95% KM Adjusted Gamma UCL	165.9

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.963	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.00904	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.056	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0684	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	33.1	Mean in Log Scale	0.574
SD in Original Scale	331.3	SD in Log Scale	1.595
95% t UCL (assumes normality of ROS data)	76.85	95% Percentile Bootstrap UCL	85.73
95% BCA Bootstrap UCL	116.5	95% Bootstrap t UCL	1335
95% H-UCL (Log ROS)	9.089		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.561	KM Geo Mean	1.753
KM SD (logged)	1.615	95% Critical H Value (KM-Log)	2.849
KM Standard Error of Mean (logged)	0.131	95% H-UCL (KM -Log)	9.336
KM SD (logged)	1.615	95% Critical H Value (KM-Log)	2.849
KM Standard Error of Mean (logged)	0.131		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	33.14	Mean in Log Scale	0.626
SD in Original Scale	331.3	SD in Log Scale	1.568
95% t UCL (Assumes normality)	76.89	95% H-Stat UCL	9.073

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	9.336

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Dioxins and Furans TEQ ND_halfRL

General Statistics

Total Number of Observations	157	Number of Distinct Observations	157
		Number of Missing Observations	0
Minimum	0.457	Mean	98.37
Maximum	11387	Median	5.973
SD	912.1	Std. Error of Mean	72.79
Coefficient of Variation	9.272	Skewness	12.32

Normal GOF Test

Shapiro Wilk Test Statistic	0.105	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.457	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.0822	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	218.8	95% Adjusted-CLT UCL (Chen-1995)	294.6
		95% Modified-t UCL (Johnson-1978)	230.7

Gamma GOF Test

A-D Test Statistic	24.32	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.887	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.286	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0818	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.264	k star (bias corrected MLE)	0.263
Theta hat (MLE)	372.7	Theta star (bias corrected MLE)	373.8
nu hat (MLE)	82.88	nu star (bias corrected)	82.63
MLE Mean (bias corrected)	98.37	MLE Sd (bias corrected)	191.8
		Approximate Chi Square Value (0.05)	62.68
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	62.52

Assuming Gamma Distribution

95% Approximate Gamma UCL	129.7	95% Adjusted Gamma UCL	130

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	3.7193E-5	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0775	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0651	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.784	Mean of logged Data	1.921
Maximum of Logged Data	9.34	SD of logged Data	1.607

Assuming Lognormal Distribution

95% H-UCL	35.82	90% Chebyshev (MVUE) UCL	38.08
95% Chebyshev (MVUE) UCL	44.28	97.5% Chebyshev (MVUE) UCL	52.88
99% Chebyshev (MVUE) UCL	69.77		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	218.1	95% BCA Bootstrap UCL	378.7
95% Standard Bootstrap UCL	219.6	95% Bootstrap-t UCL	2399
95% Hall's Bootstrap UCL	969.8	95% Percentile Bootstrap UCL	243.3
90% Chebyshev(Mean, Sd) UCL	316.7	95% Chebyshev(Mean, Sd) UCL	415.7
97.5% Chebyshev(Mean, Sd) UCL	553	99% Chebyshev(Mean, Sd) UCL	822.6

Suggested UCL to Use

95% Student's-t UCL	218.8

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Dioxins and Furans TEQ ND0

General Statistics

Total Number of Observations	157	Number of Distinct Observations	157
		Number of Missing Observations	0
Minimum	0.0853	Mean	98
Maximum	11387	Median	5.861
SD	912.1	Std. Error of Mean	72.8
Coefficient of Variation	9.307	Skewness	12.32

Normal GOF Test

Shapiro Wilk Test Statistic	0.105	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.457	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.0822	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	218.5	95% Adjusted-CLT UCL (Chen-1995)	294.2
		95% Modified-t UCL (Johnson-1978)	230.4

Gamma GOF Test

A-D Test Statistic	21.68	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.895	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.272	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0821	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.248	k star (bias corrected MLE)	0.248
Theta hat (MLE)	395	Theta star (bias corrected MLE)	395.8
nu hat (MLE)	77.91	nu star (bias corrected)	77.75
MLE Mean (bias corrected)	98	MLE Sd (bias corrected)	196.9
		Approximate Chi Square Value (0.05)	58.44
Adjusted Level of Significance	0.0485	Adjusted Chi Square Value	58.29

Assuming Gamma Distribution

95% Approximate Gamma UCL	130.4	95% Adjusted Gamma UCL	130.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.274	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.053	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0651	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.462	Mean of logged Data	1.719
Maximum of Logged Data	9.34	SD of logged Data	1.806

Assuming Lognormal Distribution

95% H-UCL	44.38	90% Chebyshev (MVUE) UCL	46.23
95% Chebyshev (MVUE) UCL	54.6	97.5% Chebyshev (MVUE) UCL	66.23
99% Chebyshev (MVUE) UCL	89.08		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	217.7	95% BCA Bootstrap UCL	329.3
95% Standard Bootstrap UCL	219.2	95% Bootstrap-t UCL	2391
95% Hall's Bootstrap UCL	964.5	95% Percentile Bootstrap UCL	242.9
90% Chebyshev(Mean, Sd) UCL	316.4	95% Chebyshev(Mean, Sd) UCL	415.3
97.5% Chebyshev(Mean, Sd) UCL	552.6	99% Chebyshev(Mean, Sd) UCL	822.3

Suggested UCL to Use

95% H-UCL	44.38

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.