FINAL REPORT
FOCUSED ENVIRONMENTAL SITE CHARACTERIZATION

Little Squalicum Creek Estuary Project

Prepared for
City of Bellingham
Public Works – Natural Resources
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ACRONYMS AND ABBREVIATIONS

AET	Apparent Effects Threshold
ARI	Analytical Resources, Inc.
ASTM	American Society for Testing and Materials
bgs	below ground surface
CGS	Coastal Geologic Services, Inc.
City	City of Bellingham
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
Herrenkohl	Herrenkohl Consulting LLC
LAET	lowest apparent effect threshold
2LAET	second lowest apparent effect threshold
LSCE	Little Squalicum Creek Estuary
MEL	Manchester Environmental Laboratory
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
MTCA	Model Toxics Control Act
NAD	North American Datum
NAVD	North American Vertical Datum
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons – Diesel-range and Heavier-range
OCDD	octachlorodibenzodioxin
OCDF	octachlorodibenzofuran
PAH	polycyclic aromatic hydrocarbon
Park	Little Squalicum Park
PCBs	Polychlorinated biphenyls
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SMS	Washington State Sediment Management Standards
SVOCs	semivolatile organic compounds
TOC	total organic carbon
USCS	Unified Soil Classification System
WAC	Washington Administrative Code

CERTIFICATION

I, Mark J. Herrenkohl, a licensed engineering geologist in the State of Washington, certify that I have reviewed the geosciences portions of this document.

Stamp and Signature of Geologist:

Name: Mark J. Herrenkohl Date: June 27, 2013

1 INTRODUCTION

This report describes the results of a focused environmental site characterization in support of the feasibility study and engineering design for the Little Squalicum Creek estuary project located in Bellingham, Washington (Figure 1). This report has been prepared by Herrenkohl Consulting LLC for the City of Bellingham Public Works Department (City) under Contract No. 2012-0376D with project cost-sharing and review by the Washington State Department of Ecology (Ecology).

The sampling operations in support of the site characterization were conducted on May 8, 2013 by Herrenkohl Consulting and its subcontractors and followed procedures described in the project sampling and analysis plan (SAP) (Herrenkohl Consulting 2013). In total, 8 soil borings ranging in depth between 10 ft and 20 ft below ground surface (bgs) were collected within the project area (Figure 2). Soil samples were collected from the borings for chemical analysis. The work described in this report has been coordinated with other work in support of the project feasibility study and engineering design (CGS 2009, 2010, Ecology 2013).

1.1 PURPOSE AND SCOPE

The primary objective of the Little Squalicum Creek estuary project is to enhance habitat along the Bellingham Bay shoreline by creating a 2-acre estuary in lower Little Squalicum Park (Park) (Figure 2). Additional subsurface soil data is recommended in the southern portion of the planned estuary footprint to further evaluate the nature and extent of petroleum hydrocarbon contamination observed during previous investigations (CGS 2009, E&E 2010, CH2M Hill 2012, Ecology 2013). The results of this focused site characterization will be compared to regulatory criteria to provide information on sediment quality of the future estuary surface and on the quality of materials excavated to create the estuary. This will also inform potential cleanup requirements and material management decisions associated with the estuary construction.

1.2 ORGANIZATION OF REPORT

Following this introduction, the report has been organized into five sections including the following:

- Section 2 describes the project background;
- Section 3 provides a summary of the field and laboratory activities conducted by Herrenkohl Consulting and Analytical Resources Inc. (ARI), respectively;
- Section 4 presents the field and laboratory testing results from this work with comparisons to Washington State Model Toxics Control Act (MTCA), Sediment Management Standards (SMS), and waste designation criteria;

- Section 5 provides summary and conclusions for the project; and
- Section 6 provides references.

Figures and tables are presented at the end of the text. This report is supplemented by four appendices:

- Appendix A: Station location data, photograph log, and detailed soil logs based on field descriptions;
- Appendix B: Data validation report for chemistry testing;
- Appendix C: Chemistry testing reports; and
- Appendix D: Landfill limits.

2 PROJECT BACKGROUND

The City and other stakeholders (e.g., Ecology) have identified Little Squalicum Creek and beach area as a priority site for shoreline enhancement and restoration in Bellingham Bay (CGS 2009). A key component of the proposed shoreline enhancement includes the construction of an estuary in the lower Park, connecting Little Squalicum Creek to the Bay.

In 2009-2010, Coastal Geologic Services (CGS) under contract with the City prepared a feasibility study and final design document describing the construction elements of the proposed estuary, including the final surface topography of the embayment (CGS 2009, 2010, Figure 2). In support of the design, CGS excavated four shallow test pits within the proposed estuary footprint to provide information on soil type and quality. Soil from one of test pits located in the northern portion of the estuary footprint was observed to have a diesel fuel odor and sheen at a depth of ~2.5 ft bgs. On October 9, Mark Herrenkohl visited the office of CGS, looked at the soil sample collected from this location and confirmed their observations. Samples were not submitted to a laboratory for analysis.

In August 2010, during remedial investigation activities associated with a non-time-critical removal action at the Little Squalicum Creek area of the Oeser Facility Superfund Site, an EPA contractor excavated 11 additional shallow soil test-pits and follow-up field screening to delineate the extent of the petroleum contamination reported by CGS (E&E 2010, CH2M Hill 2012, Ecology 2013). While no samples were submitted for laboratory analysis during this effort, EPA and their consultant E&E concluded that the extent of the petroleum contamination (again interpreted in the field as diesel fuel) was limited to a comparatively small (~3500 ft^2) area in the north-central portion of the lower park (E&E 2010). These findings were consistent with those reported by CGS (2009) and Herrenkohl Consulting (2009).

In September 2012, Ecology in coordination with the City conducted a soil and groundwater characterization of the northern portion of the proposed estuary area (Ecology 2013). Soil samples were collected from 8 boring locations (AGT425 through AGT432) to evaluate subsurface contaminant conditions within and immediately beneath the proposed estuary excavation volume, and evaluate those conditions against state regulatory criteria (Figure 2). Ecology concluded from the results of their investigation that petroleum hydrocarbon levels detected in shallow subsurface soil located in the northern portion of the estuary area was above MTCA cleanup levels and may require special handling and disposal as part of estuary construction. However, no chemicals were identified above corresponding Washington State marine SMS[1] in soil samples collected from immediately below the proposed estuary surface. Groundwater samples were also collected from temporary monitoring wells installed at two soil boring locations (AGT426, AGT427) (Figure 2). No contaminants were detected in the groundwater samples, suggesting limited mobility of the shallow soil contamination observed in this area of the site (Ecology 2013).

[1] There were no exceedances of marine chemical criteria; other SMS criteria exist including biological and human health.

Ecology also reported that one subsurface soil sample (11-12.5 ft bgs) collected at station AGT430 contained petroleum hydrocarbon concentrations above the MTCA Method A soil cleanup level of 2,000 mg/kg. The elevated concentration (26,000 mg/kg) was detected in soil at a depth above the proposed estuary surface. It was recommended that the City and Ecology consider additional investigation of subsurface soil conditions in the southern half of the estuary footprint, downgradient of location AGT430, before proceeding with the next phase of the estuary project.

In April 2013, the City consulted with and then contracted Herrenkohl Consulting to conduct a focused environmental site characterization of the soils in the southern half of the estuary footprint. The City in coordination with Ecology, requested that Herrenkohl Consulting provide a SAP for conducting the focused site characterization. The SAP provides specific guidance for field and laboratory methodology and quality assurance procedures, and was prepared in general accordance with MTCA (173-340-820 WAC for Sampling and Analysis Plans) (Herrenkohl Consulting 2013). The characterization detailed in this report was completed in May 2013 and included sampling near station AGT430 and confirming the soil concentration at this location and collecting additional soil samples from locations downgradient of this location for testing.

3 METHODS

This section describes the methods used in the collection and chemical analysis of soil samples during the site characterization in support of the Little Squalicum Creek estuary project. Except where noted, field and analytical methods followed those described in the SAP (Herrenkohl Consulting 2013).

3.1 FIELD METHODS

The soil investigation was conducted on May 8, 2013 using a limited-access, track-mounted GeoProbe® direct-push drill rig to collect soil samples from 8 station locations (Figure 2). Discrete soil samples were collected from each boring for chemical analyses and to characterize the southern area of the proposed estuary. Additional discrete soil samples were collected and archived for possible future analysis. A summary of the field methods used during the sampling are provided below. Additional information is provided in the SAP (Herrenkohl Consulting 2013).

3.1.1 Station Locating

Before sampling began, proposed stations were located by a professional land surveyor using conventional traverse methods with a digital Leica TCRP 1203 Total Station survey instrument. Survey control stations established previously within the Park (City control points #1208 and #1211, and benchmark #5849) were utilized to maintain system accuracy. Northing and easting coordinates are provided in both North American Datum NAD 1983/1998 (NAD 83/98) with recent corrections and an accuracy of 0.01 ft. Using control points established by the professional land surveyor, the elevation of each upland sample station (ground surface) was determined by differential leveling. Station elevations were referenced to the geodetic North American Vertical Datum of 1988 (NAVD 88) with an accuracy of 0.01 ft. A clearly marked stake was driven into the ground for each location prior to sampling. A summary of station locations for all samples collected is provided in Appendix A (Table A-1).

3.1.2 Soil Borings

Soil probes were hydraulically pushed to obtain continuous soil collection to the target depth at each station. Samples were collected using tube samplers equipped with disposable, clear polyethylene liners. The liners allowed collection of the soil strata in 5-ft lengths. Three to five discrete soil samples were collected from each boring location for possible chemical analysis (Table 1). The soil samples were observed and logged following the Unified Soil Classification System (USCS) (ASTM D2487) using the visual-manual procedures for describing soils (ASTM D2488) and recorded on a sample log form (Appendix A). A photograph was taken of the 5-ft soil samples collected from each boring (refer to Appendix A).

Any excess soil from sample collection was disposed of according to the SAP. Boreholes were abandoned by backfilling with bentonite chips in accordance with Washington State regulations.

3.1.3 Deviations from SAP

Two deviations from the SAP were implemented during the field and analytical program.

- Dioxins/furans were analyzed by EPA Method 1613B on one soil sample collected from station LSCE-SB-1 as requested by Ecology. The sample depth interval (13-14 ft bgs) at this station is representative of the new estuary surface proposed by the City.

- SMS metals were analyzed on selected soil samples instead of RCRA metals as indicated in the SAP. The soil samples were collected and analyzed from the surface depth of the proposed estuary which will become sediments after construction. The SMS is the appropriate comparison criteria for the metal results.

3.2 LABORATORY METHODS AND DATA ANALYSIS

Soil samples collected from the site were analyzed for various chemical tests as described in the following sections. A more detailed description of laboratory methods and quality control requirements is provided in the SAP.

Soil samples were analyzed for one or more of the following chemical analyses (refer to Table 1 located at end of this report):

- SMS Metals including arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc by EPA Methods 6010C/7000 Series

- Semivolatile Organic Compounds (SVOCs) by EPA Method SW 8270D low level

- PCBs by EPA Method SW 8082 low level

- Northwest Total Petroleum Hydrocarbons – Diesel and Oil Range (NWTPH-Dx) with silica and acid cleanup

- Dioxins/Furans by EPA Method 1613B

All testing was conducted by ARI. Archive soil samples were also stored frozen at ARI for possible future analysis.

4 RESULTS

This section presents the sampling and testing results for the focused site characterization with comparisons to regulatory criteria, as appropriate (refer to Table 2). Field and boring logs are presented in Appendix A. Supporting data validation for chemistry testing is presented in Appendix B. Soil chemistry laboratory reports and associated quality control documentation are provided in Appendix C. Landfill limits for chemicals in soil are presented in Appendix D.

4.1 SOIL DESCRIPTIONS

Each soil boring was drilled to a depth of 10 ft to 20 ft bgs as described in the SAP. Below the topsoil or vegetation layer in the upper 0.5 ft, the soils are primarily composed of sand and gravels (fill) with organic materials (e.g., wood fragments) ranging in thickness from 1 ft to 4.5 ft. The fill layer was the thickest in the middle of the proposed estuary (borings LSCE-SB-3, -4), where additional material was placed and graded after completion of EPA's Removal Action in the Park (CH2M Hill 2012). Underlying the fill are layers of native silty sands (USCS classification – SM) and gravels (GM) with a relatively thin layer of grey, silty clay (CL). The clay layer was observed in 7 of 8 borings at depths ranging from 4.7 ft to 12.7 ft bgs. A native silty sand (SM) or sand with trace silt (SW) underlies the clay layer in these borings. No petroleum sheen or odor was observed in the soil borings.

4.2 DATA QUALITY

Evaluation of data quality was based on the project goals and objectives presented in the SAP (Herrenkohl Consulting 2013) and summarized in Section 1.1. The following summarizes overall findings concerning data quality obtained during the field sampling and laboratory analyses. Additional documentation of quality control related issues and listing of the validated data can be found in Appendix B.

The quality of the chemical data was evaluated using guidance and quality assurance/quality control (QA/QC) criteria documented in the analytical methods, the SAP (Herrenkohl Consulting 2013), and the National Functional Guidelines for Organic and Inorganic Data Review (USEPA 1999, 2004, 2009). Overall, the data are acceptable for decision-making purposes without restrictions. No data was determined to be unusable and rejected. Consequently, completeness of the site characterization dataset was 100%. No qualifications are recommended in the data set except for the following:

- Bis(2-ethylhexyl)phthalate was detected in the laboratory blank sample. Since sample concentrations are less than 10x the blank concentration, all bis(2-ethylhexyl)phthalate results are considered undetected (U).

- 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,6,7, 8-HpCDD, and OCDD were detected in the laboratory blank sample. Since sample concentrations are less than 10x the blank concentration,

1,2,3,4,6,7,8-HpCDF and 1,2,3,4,6,7, 8-HpCDD sample results are considered undetected (U). The sample OCDD concentration is greater than 10x the blank concentration and the result is qualified as an estimate (J).

4.3 SUBSURFACE SOILS

Selected soil samples from boring LSCE-SB-1 were analyzed for NWTPH-Dx to confirm Ecology's results for station AGT430 (Table 2). Sample depths 8.0-9.5 ft, 11-12.5 ft, and 13-14 ft bgs were analyzed from LSCE-SB-1. The 11-12.5 ft sample is the same depth interval collected by Ecology from station AGT430 which previously showed a petroleum hydrocarbon concentration of 26,000 mg/kg. The 13-14 ft sample is considered to be below the proposed estuary surface at this location and was also analyzed for NWTPH-Dx and dioxins/furans (refer to Section 4.4).

All soil samples analyzed for petroleum hydrocarbons were below detection (5.6 U mg/kg to 14 U mg/kg) (Table 2). It should also be noted that there were no obvious signs of petroleum contamination in any of the borings based on field observations (sheen test, photoionization detector, or visual).

4.4 ESTUARY SURFACE SOIL RESULTS

The vertical interval of significant interest in the soil borings is the proposed estuary surface and soil quality below this depth. This "surface depth" will become the biologically active zone upon construction of the estuary. For Bellingham Bay sediments, the biologically active zone has been previously identified as the upper 12 cm (~0.4 ft) (RETEC 2006). Similarly to Ecology's investigation, in order to meet sample-volume requirements for chemical analysis, samples were collected from a 0.7 ft to 1.5 ft interval below this depth in the borings. As a result, the final concentrations reported for these "estuary surface" samples represent conditions extending 0.7 ft to 1.5 ft downward from that proposed surface.

Subsurface soil samples collected from the "new surface" of the proposed estuary at stations LSCE-SB-3, -4, -7, and -8 were analyzed for SMS chemicals of concern (Table 1). No chemicals of concern were detected above the corresponding SMS criteria (Table 2). The chemical testing results are described below.

4.4.1 Sediment Conventionals

Total organic carbon (TOC) concentrations in soil representing the estuary surface ranged from 0.1 U% to 0.19% as reported by Ecology (2013). Since TOC results were expected to be below 0.5%, TOC was not analyzed in the soil samples for this investigation, and results for non-ionizable SVOCs and PCBs were not organic carbon-normalized as described in the SMS[2].

[2] Nonionizable SVOCs and PCBs are normalized to organic carbon when sediment TOC concentrations are between 0.5% to 3.5% per current Ecology guidance (*personal communication with Dr. Peter Adolphson of Ecology*).

Results of the chemical analysis were compared to Apparent Effects Threshold (AET) values, including Lowest Apparent Effects Threshold (LAET) and Second Lowest Apparent Effects Threshold (2LAET) in accordance with SMS protocols. The LAET numerical chemical concentration criteria define the degree of sediment quality that is expected to cause no adverse effects to biological resources in Puget Sound marine sediments. The 2LAET represent concentrations above which adverse biological effects are considered to be significant.

4.4.2 SMS Chemicals of Concern

Chemical results for soil samples representing the "new estuary surface" are summarized in Table 2. All metals except silver were detected in the soil samples with the highest concentrations detected at stations LSCE-SB-8 (9.0-10 ft bgs). The polycyclic aromatic hydrocarbon (PAH) compound phenanthrene was detected in soil samples at LSCE-SB-3 (13-14 ft bgs) and LSCE-SB-4 (16-17 ft bgs) at levels below the reporting limit but above the method detection limit. These results are qualified as estimates by the laboratory. 1-Methylnaphthalene was detected in LSCE-SB-4 (16-17 ft bgs) but also below the reporting limit and qualified as an estimate. Other SVOCs and PCBs were not detected in the soil samples.

All detected chemicals in soil samples were well below the corresponding LAET criteria.

4.4.3 Dioxins/Furans

Dioxins and furans were analyzed for one soil sample from station LSCE-SB-1, representing the new estuary surface (13-14 ft bgs). Only very low levels of octachlorodibenzodioxin (OCDD) [16.0 J picogram/gram (pg/g)] and octachlorodibenzofuran (OCDF) (1.54 J pg/g) were detected in the soil sample. The calculated toxicity equivalent (TEQ) concentration for dioxins/furans in this sample is 0.0053 pg/g, which is below Puget Sound background levels (DMMP 2009).

4.5 WASTE DESIGNATION

Chemical results for the Little Squalicum Creek estuary site from this investigation and Ecology's (2013) were also compared to the maximum allowable levels for total concentrations in soils acceptable at Subtitle D landfills located in Wenatchee and Roosevelt, Washington (*personal communication with landfill representatives*) (Appendix D). Organic and metal concentrations are below the landfill limits. There is no maximum level of petroleum hydrocarbons for disposal of soils at these landfills.

5 SUMMARY AND CONCLUSIONS

The soil results from this focused site characterization were compared to SMS criteria to determine whether soils remaining after construction of the estuary pose a risk to benthic infauna and the environment. The results from this study and Ecology (2013) were also compared to landfill limits for determining appropriate disposal requirements for soil excavation and removal at the site.

Selected subsurface soil samples from boring LSCE-SB-1 were analyzed for NWTPH-Dx to confirm Ecology's elevated result at station AGT430. Petroleum hydrocarbon concentrations were below detection in all samples from LSCE-SB-1 including the same depth interval (11-12.5 ft bgs) which Ecology reported a petroleum hydrocarbon (diesel-range) concentration of 26,000 mg/kg. The discrepancy between the results is difficult to explain. Different laboratories were used for the investigations but each used the same method with one potential difference; ARI conducted a silica gel and acid cleanup of the samples to remove natural organics before analysis. It's not apparent from Ecology (2013) that the Manchester Environmental Laboratory (MEL) used similar cleanup methods which may explain some difference in results but certainly not the reported large discrepancy. Another possible explanation is that a laboratory error may have occurred during preparation of the Ecology sample. For example, a "matrix spike" of petroleum hydrocarbons may have been inadvertently added to this sample, as part of laboratory quality control testing, resulting in a "false positive" for the sample. This could explain the large discrepancy between results within Ecology's own study (all other sample results were lower by 10-fold or more) and the results from this investigation.

Subsurface soil samples collected from the "new surface" of the proposed estuary in both Ecology (2013) and this investigation were analyzed for SMS chemicals of concern including dioxins/furans[3]. There were no exceedances of marine chemical criteria. The calculated TEQ dioxin/furan concentration in soil was below Puget Sound background levels. Based on the chemistry results from these studies, bioassay testing of the "new surface" would not be required under SMS protocols.

The estimated area of petroleum contamination in shallow soils (0-5 ft bgs) of the proposed estuary excavation is approximately 8,000 ft^2 based on laboratory data and field observations from this study and previous investigations (Figure 3). The total volume of contaminated soils is estimated to be 1,500 cy (*in situ*). If excavated as part of the estuary project, the petroleum-impacted soils located in the northern portion of the excavation, some reported above MTCA A soil cleanup levels, would be considered non-regulated solid waste and acceptable for disposal at a Subtitle D landfill. No other restrictions on disposal are likely based on the soil results from these investigations.

[3] Additional SMS marine criteria exist including human health and biological.

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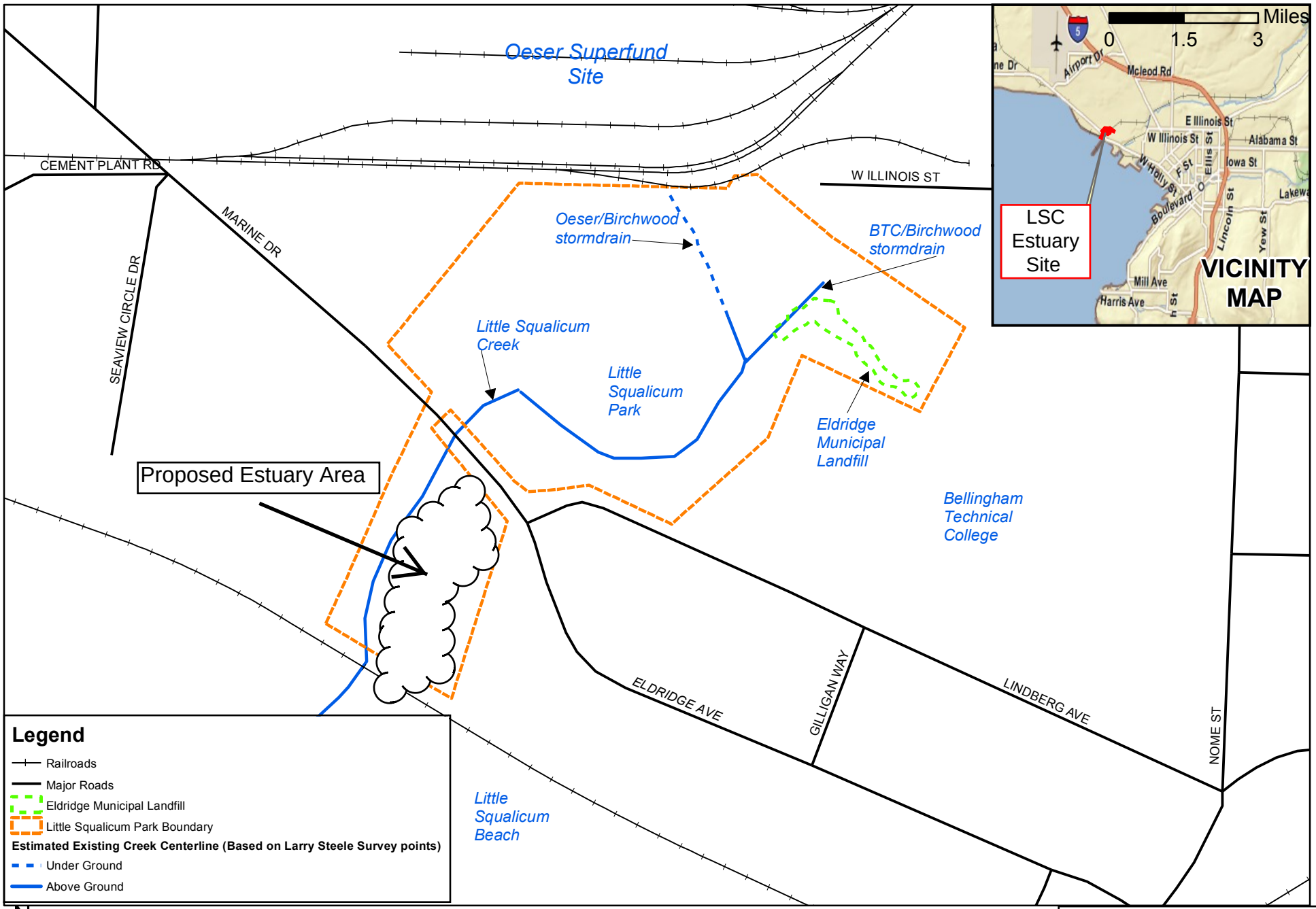


Herrenkohl Consulting LLC

Figure 1
Site and Vicinity Map
Little Squalicum Creek
Estuary Project
Bellingham, Washington

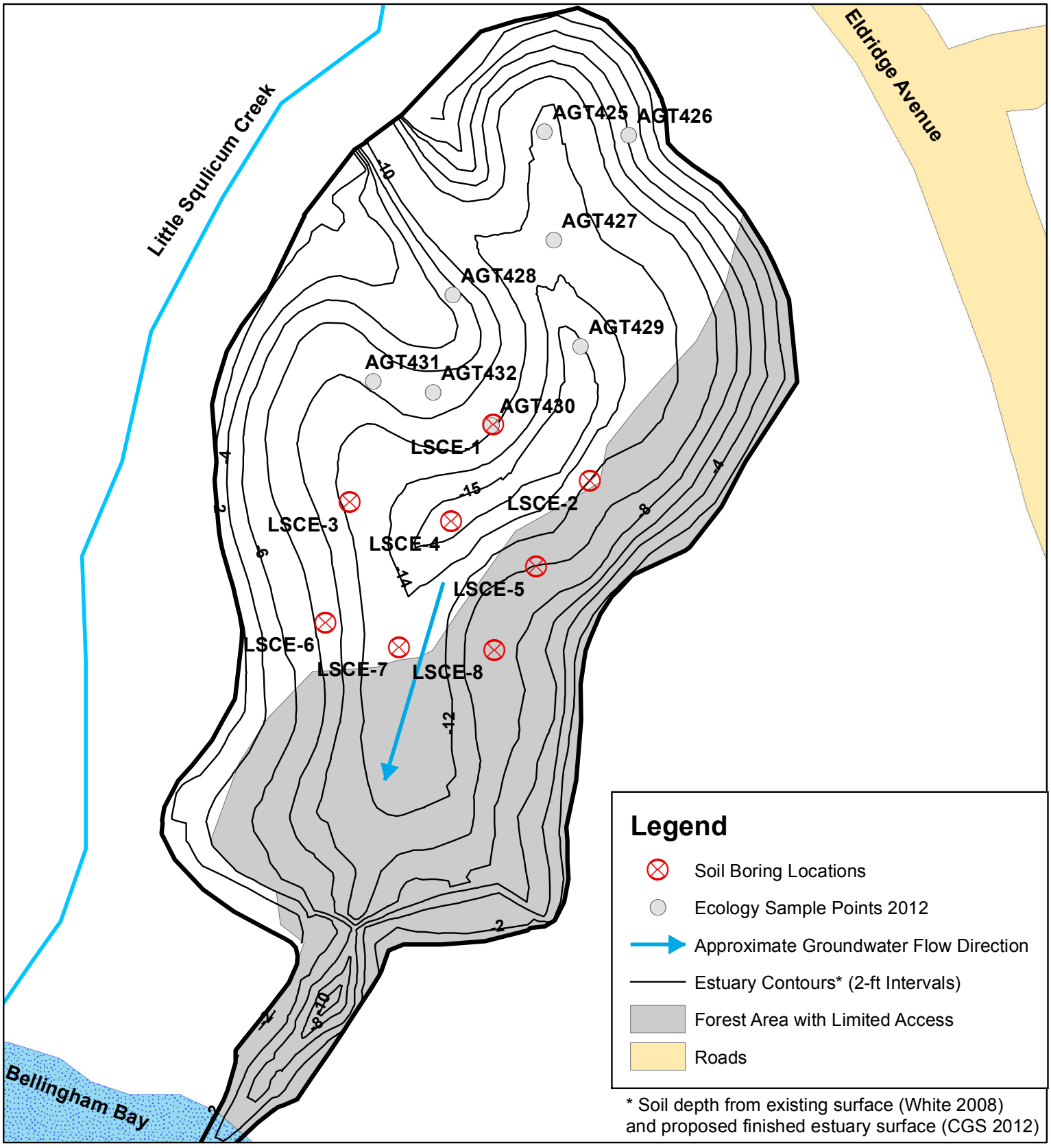


FIGURE 2

Soil Boring Locations:
Little Squalicum Creek Estuary
Focused Environmental Site Charcaterization

N
W E
S
0 25 50 100
FEET

Herrenkohl Consulting LLC

Jeff Ninnemann, June 17, 2013
Estuary Surface From CGS 2013
NAVD88, Horizontal Datum is NAD 83/91
(converting to MLLW +0.52ft)

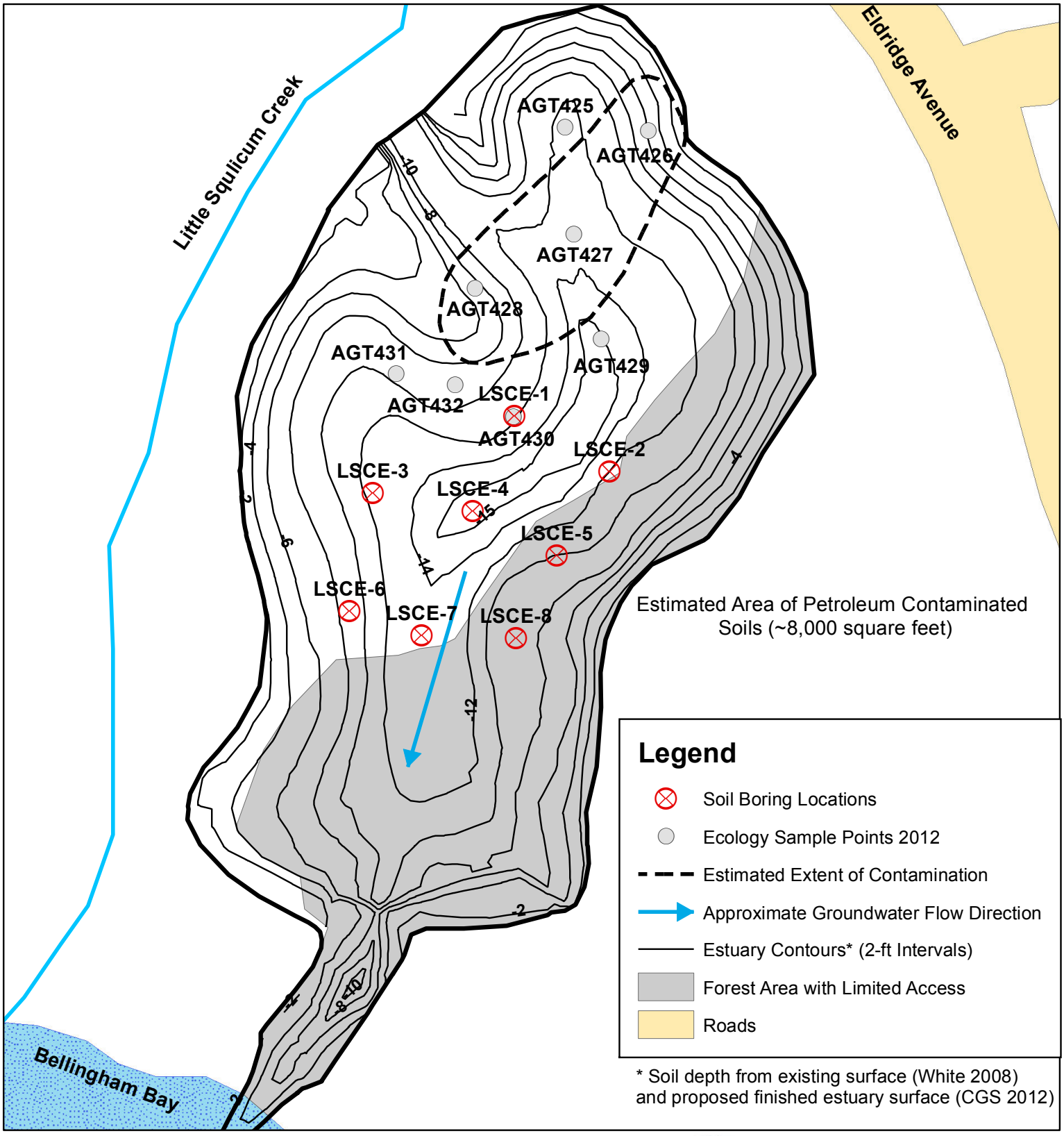


FIGURE 3

Estimated Extent of Petroleum Hydrocarbon Contamination
Little Squalicum Creek Estuary
Focused Environmental Site Charcaterization

N
W E
S
0 25 50 100
FEET

Herrenkohl Consulting LLC

Jeff Ninnemann, June 17, 2013

Estuary Surface From CGS 2013
NAVD88, Horizontial Datum is NAD 83/91
(converting to MLLW +0.52ft)

Table 1. Analytical Summary for Soil Samples Collected for Little Squalicum Creek Estuary Project

Station	Depth (ft)*	SVOCs	PCBs	NWTPH-Dx	Metals	Dioxins/Furans	Archive
LSCE-SB-1	3.0-4.0						✓
	6.0-7.0						✓
	8.0-9.5			✓			
	11-12.5			✓			
	13-14			✓		✓	
LSCE-SB-2	2.0-3.0						✓
	7.0-8.0						✓
	11.5-12.5						✓
	12.5-13.2						✓
LSCE-SB-3	1.5-2.2						✓
	7.0-8.0						✓
	13-14	✓	✓	✓	✓		
LSCE-SB-4	4.0-5.0						✓
	9.0-10						✓
	13-14						✓
	16-17	✓	✓	✓	✓		
LSCE-SB-5	3.5-4.7						✓
	8.0-9.0						✓
	11-12						✓
LSCE-SB-6	0-1.2						✓
	9.0-10						✓
	10.5-11.5						✓
LSCE-SB-7	4.0-5.0						✓
	6.5-7.5						✓
	13.5-15	✓	✓	✓	✓		
LSCE-SB-8	4.0-5.0						✓
	7.5-8.5						✓
	9.0-10	✓	✓	✓	✓		
Total Samples		4	4	7	4	1	21

Notes:
* Depth below ground surface.

Table 2. Summary of Soil Chemistry Results

	Sample Station			LSCE-SB-1	LSCE-SB-1	AGT-430	LSCE-SB-1	AGT-430	LSCE-SB-3	LSCE-SB-4	LSCE-SB-7	LSCE-SB-8
	Sampling Depth			8.0-9.5 ft	11-12.5 ft	11-12.5 ft	13-14 ft	13.4-15.4 ft	13-14 ft	16-17 ft	13.5-15 ft	9.0-10 ft
	Sampling Date			5/8/2013	5/8/2013	9/25/2012	5/8/2013	9/25/2012	5/8/2013	5/8/2013	5/8/2013	5/8/2013
		AETs LAET	AETs 2LAET									
TOC		**Percent**		--	--	--	--	0.15	--	--	--	--
NWTPH-Dx		**mg/kg**										
	Diesel-Range	--	--	6.2 U	6.1 U	**26000 J**	6.1 U	**440**	6.3 U	6.4 U	5.6 U	6.8 U
	Motor Oil-Range	--	--	12 U	12 U	14 U	12 U	15 U	13 U	13 U	11 U	14 U
Metals in mg/kg												
	Arsenic	57	93	--	--	--	--	**3.85**	**3.4**	**2.9**	**2.4**	**4.2**
	Cadmium	5.1	6.7	--	--	--	--	**0.242**	**0.7**	**0.5**	**0.4**	**0.9**
	Chromium	260	270	--	--	--	--	**29.4**	**31.6**	**35.6**	**29.5**	**60**
	Copper	390	390	--	--	--	--	**21.4**	**28.5**	**25.0**	**16.0**	**55.0**
	Lead	450	530	--	--	--	--	**2.74**	**2.8**	**2.5**	**1.8**	**5.8**
	Mercury	0.41	0.59	--	--	--	--	**0.0258**	**0.03**	0.03 U	0.03 U	**0.06**
	Silver	6.1	6.1	--	--	--	--	**0.096**	0.4 U	0.4 U	0.3 U	1 U
	Zinc	410	960	--	--	--	--	**50**	**63**	**48**	**34**	**93**
PCBs		**ug/kg**										
	Total PCBs	130	1000	--	--	--	--	--	3.9 U	3.8 U	3.7 U	3.9 U
PAHs		**ug/kg**										
	Phenanthrene	1500	5400	--	--	--	--	**14 J**	**11 J**	**12 J**	19 U	19 U
	1-Methylnaphthalene			--	--	--	--	--	19 U	**9.9 J**	19 U	19 U
Dioxins/Furans		**pg/g**										
	2,3,7,8-TCDF	**--**	**--**	--	--		0.0716 U	--	--	--	--	--
	2,3,7,8-TCDD	**--**	**--**	--	--		0.123 U	--	--	--	--	--
	OCDF	--	--	--	--		**1.54 J**	--	--	--	--	--
	OCDD	--	--	--	--		**16.0 J**	--	--	--	--	--

NOTES:
U = Not detected at the reporting limit indicated.
J = Estimated value.
-- indicates no AET/SMS criteria established or sample not analyzed for specific analyte.
Bold indicate detected value.
26000 indicates value exceeds MTCA Method A soil cleanup level of 2,000 mg/kg.

APPENDIX A

FIELD LOGS

Station Location Information

City of Bellingham Public Works Department
Little Squalicum Creek Estuary Project
Soil Boring Location Staked
for Herrenkohl Consulting, LLC
5/15/2013

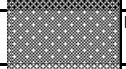
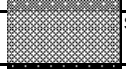
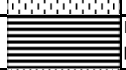
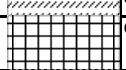
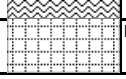
NAD 83/98
NAVD 88

Point #	Northing - Y (Feet)	Easting - X (Feet)	Elevation - Z (Feet)	Description
124	648437.03	1234505.02	19.41	LSCE-1
125	648409.91	1234552.90	19.60	LSCE-2
126	648399.00	1234439.03	17.85	LSCE-3
127	648389.99	1234487.99	18.37	LSCE-4
128	648369.05	1234528.98	18.07	LSCE-5
129	648342.05	1234428.00	16.57	LSCE-6
130	648330.03	1234463.01	16.31	LSCE-7
131	648329.03	1234508.96	17.43	LSCE-8

Prepared by Larry Steele & Associates, Inc.
Land Surveyors
1334 King Street
Bellingham, WA 98229
(360) 676-9350
Job #05613

Soil Boring Logs

SOIL BORING LOG KEY

Major Divisions		Symbols		Typical Names
Coarse Grained Soils (More than 1/2 of soil >No. 200 sieve size)	Gravels (More than 50% coarse fraction > no. 4 sieve	GW		Well-graded gravels or gravel-sand mixtures, little to no fines
		GP		Poorly-graded gravels or gravel-sand mixtures, little to no fines
		GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels or gravel-sand-clay mixtures
	Sands (Less than 50% coars fraction > no. 4 sieve)	SW		Well-graded sands or gravel-sand mixtures, little to no fines
		SP		poorly-graded sands or gravelly sands, little to no fines
		SM		Silty sands, sand-silt mixtures
		SC		Clayey sands, sand-clay mixtures
Fine Grained Soils (More than 1/2 of soil <No. 200 sieve size)	Silts & Clays Liquid limit* less than 50%	ML		Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy or silty clays, lean clays
		OL		Organic silts and organic silty clays of low plasticity
	Silts & Clays Liquid limit* greater than 50%	MH		Inorganic silts, micaceous or ditomaceous fine sand or silty soils, elastic silts
		CH		Inorganic clays of high plasticity, fat clays
		OH		Organic clays of medium to high plasticity, organic silty clay, organic silts
Highly Organic Soils		Pt		Peat or other highly organic soils

*Liquid limit represents the moisture contnet (in percent) of a soil at which point the soil no longer behaves like a plastic and starts to behave like a liquid.

Boring Log Symbols

Sample Interval

Groundwater, First Observed

Groundwater, Static

Sample Types

SS	Split Spoon
G	Grab
ST	Shelby Tube
GS	Geoprobe Sampler

Sheen Types

NS	No Sheen Observed
SS	Slight Sheen observed (Spotty coverage of sheen pan, no irridescence)
MS	Moderate Sheen (Full Coverage)
HS	Heavy Sheen (Full Coverage, Irredescent)

Sample Moisture

Dry	No Moisture, dry to touch
Moist	Damp but no visible moisture
Wet	Visible free water

Sample Plasticity (Fine-Grained Soils)

Non-Plastic - Cannot be rolled at any moisture content

Low - Barely rolled, lump cannot be formed when drier than plastic limit

Medium - Easily rolled, lump crumbles when drier than plastic limit

High - Easily rolled yet takes considerable time to reach the plastic limit, lump can be formed without crumbling when drier than the plastic limit

Partical Size Range (Course-Grained Soils)

Gravel - Fine, Course

Sand - Fine, Medium, Coarse

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Bellingham, Washington 98229
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mherrenkohl@msn.com

Based on Unified Soil Classification System and ASTM Standard D2487 and D2488

35-35.5* * Indicates sample was selected for analysis

HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

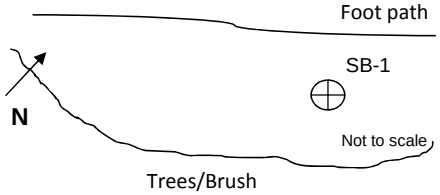
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-1**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 0837

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
									Topsoil, dry, dark brown, silty F-C SAND with fine gravel, no odor or sheen, root fragments (FILL)
							1--	SM	
							2--	GM	Dry, dark brown, F-C sandy, F-C GRAVEL with silt (FILL)
								PT	Wood debris (Natural?)
							3--		
3.0-4.0	0837	--	80	0.0	No			GM	Moist, olive-grey to light grey, silty M-C sandy, F-C GRAVEL, no odor or sheen observed (Native)
							4--		
								▽	(4 ft recovery)
							5--		Moist to wet
									Color change @ 5.5 ft to tan-light grey
							6--		
6.0-7.0	0840	--	100	0.0	No			GM	
							7--		
							8--	SM	Wet, tan-yellow orange-greenish-gray (mottling), F-M SAND with silt and fine gravels, no odor or sheen (Native)
8.0-9.5*	0845	--		1.6	No				
							9--		(5 ft recovery)
									* Soil sample tested.

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648437.03, E 1234505.02
	NAD 83/98
SURFACE ELEVATION	19.41 ft
DATUM	NAVD 88

LOCATION SKETCH



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Bellingham, WA 98229

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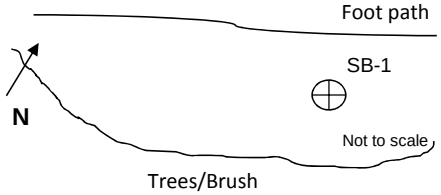
BOREHOLE NUMBER	**LSCE-SB-1**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 0837

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
							11-	SM/ SW	
11-12.5*	0850	--	80	0.0	No				Wet, grey-olive grey, F-M SAND with silt, no odor or sheen (Native)
									(bordering on trace silt)
							12-		
							13-		
13-14*	0855	--		0.0	No			SM/ SW	Same as above
									(4 ft recovery)
							14-		
							15-		Base of Boring @ 15 ft bgs
							16-		
							17-		
							18-		
							19-		
									* Soil sample tested.

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648437.03, E 1234505.02
	NAD 83/98
SURFACE ELEVATION	19.41 ft
DATUM	NAVD 88

LOCATION SKETCH



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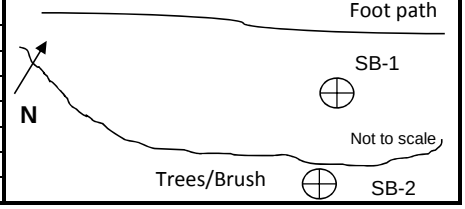
BOREHOLE NUMBER	**LSCE-SB-2**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 0910

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
								SM	Topsoil, dry-moist, dark brown, silty, F-C SAND with fine gravel, no odor
									or sheen, wood fragments (FILL)
							1--		
									Wet, light brown-dark grey with mottling, silty, F-M SAND, no odor
								SM	or sheen (Native)
							2--		
2.0-3.0	0910	--	100	0.0	No				
							3--		
									(5 ft recovery)
							4--		
							5--		
							6--		
							7--		
7.0-8.0	0915	--	100	0.0	No			SM	Same as above
									Wet, light brown-dark grey with mottling, silty, F-M SAND, no odor
							8--		or sheen (Native)
							9--		(5 ft recovery)

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648409.91, E 1234552.90
	NAD 83/98
SURFACE ELEVATION	19.60 ft
DATUM	NAVD 88

LOCATION SKETCH



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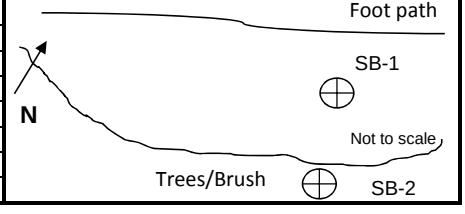
BOREHOLE NUMBER	**LSCE-SB-2**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 0910

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
							11	SM	
									Wet, light brown-dark grey with mottling, silty F-M SAND grading into
									C SAND, no odor or sheen (Native)
11.5-12.5	0925	--	100	0.2	No		12		
								CL	Moist, grey, silty CLAY, no odor or sheen (Native)
12.5-13.2	0930	--		-	No		13		(change at 13.2 ft)
								SM	Wet, grey, silty, M SAND, no odor or sheen (Native)
							14		
									(5 ft recovery)
							15		Base of Boring @ 15 ft bgs
							16		
							17		
							18		
							19		

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648409.91, E 1234552.90
	NAD 83/98
SURFACE ELEVATION	19.60 ft
DATUM	NAVD 88

LOCATION SKETCH



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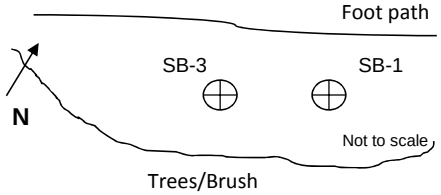
BOREHOLE NUMBER	**LSCE-SB-3**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 0945

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
								SM	Topsoil, dry, dark brown, silty, F-C SAND with fine gravel, no odor or sheen, root fragments (FILL)
							1--		
								CL/ ML	Moist, dark brown-light grey, silty CLAY to clayey SILT, no odor or sheen (FILL)
1.5-2.2	0945	--	52	1.3	No		2--		change at 2.2 ft
								ML	Moist, olive-grey, clayey SILT, no odor or sheen (FILL)
							3--		(Note: hit rock and lost recovery out bottom of sampler)
							4--		(2.6 ft recovery)
								? ?	
							5--	SM	
								▽	Wet, light brown-grey with mottling, silty F-C SAND, no odor or sheen (Native)
							6--		
							7--		
7.0-8.0	0950	--	100	0.0	No			GM	Wet, brown-grey, silty, F-C sandy, F-C GRAVEL, no odor or sheen (Native)
							8--		
							9--		(5 ft recovery)

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648399.00, E 1234439.03
	NAD 83/98
SURFACE ELEVATION	17.85 ft
DATUM	NAVD 88

LOCATION SKETCH



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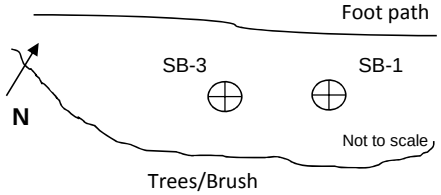
BOREHOLE NUMBER	**LSCE-SB-3**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 0945

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
									Same as above
									Wet, brown-grey, silty, F-C sandy, F-C GRAVEL, no odor or sheen
							11	GM	(Native)
							12		
								CL	Moist, grey, silty CLAY, no odor or sheen (Native)
							13		
13-14*	0955	--	100	1.2	No			SM	Wet, grey, silty, F-M SAND with trace fine gravel, no odor or sheen.
									(Native)
							14		
									(5 ft recovery)
							15		
									Base of Boring @ 15 ft bgs
							16		
							17		* Soil sample tested.
							18		
							19		

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648399.00, E 1234439.03
	NAD 83/98
SURFACE ELEVATION	17.85 ft
DATUM	NAVD 88

LOCATION SKETCH



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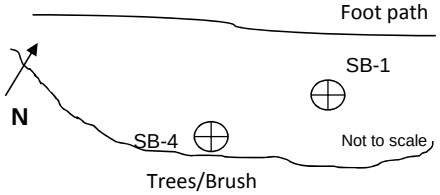
BOREHOLE NUMBER	**LSCE-SB-4**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1020

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
									Topsoil, dry, dark brown, silty F-C SAND with F-C gravel, no odor
									or sheen, root fragments (FILL)
								SM	
							1--		
							2--		
								GM	Moist, brown-grey, silty F-C sandy, F-C GRAVEL, no odor or sheen
							3--		(FILL)
									(3.2 ft recovery)
								▽	
							4--		
4.0-5.0	1020	--	64	0.0	No			**SM/**	Wet, grey-olive grey, fine gravelly, M-C SAND with silt, no odor or
								SW	sheen (Native)
							5--		
							6--		
							7--		
									color change @ 7 ft to light brown-yellow orange
							8--		
								SM	Wet, dark grey-olive grey, silty, F SAND, no odor or sheen (Native)
							9--		
									(5 ft recovery)
9.0-10	1025	--	100	0.3	No				

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648389.99, E 1234487.99
	NAD 83/98
SURFACE ELEVATION	18.37 ft
DATUM	NAVD 88

LOCATION SKETCH



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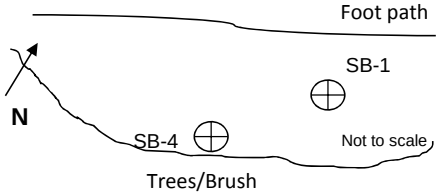
BOREHOLE NUMBER	**LSCE-SB-4**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1020

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
									Same as above
							11	SM	Wet, dark grey-olive grey, silty F SAND, no odor or sheen (Native)
									Less silt with depth.
							12		
							13		
13-14	1030	--	100	0.0	No				
							14		(5 ft recovery)
							15		(Note:Drillers collected 2 cores from 15-20 ft because of poor recovery)
								CL	Moist, low plasticity, grey, silty CLAY, no odor or sheen (Native)
							16		
16-17*	1050	--	100	0.4	No			SM	Wet, grey, silty, F-M SAND, no odor or sheen (Native)
							17		
							18		* Soil sample tested.
							19		(5 ft recovery for second core collected at this depth)
									Base of Boring @ 20 ft bgs

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648389.99, E 1234487.99
	NAD 83/98
SURFACE ELEVATION	18.37 ft
DATUM	NAVD 88

LOCATION SKETCH



HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

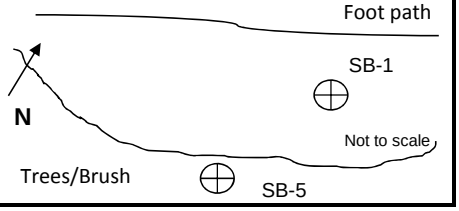
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-5**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1110

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
							1--		
							2--	SM	Duff layer, dry, brown, silty F-C SAND (probably from surface)
							3--	GM	Dry, grey-white, F-C sandy, F-C GRAVEL with broken cobble-size material, no odor or sheen (Fill?)
								SM	Moist, brown-tan-grey, silty M-C SAND with fine gravels, no odor or sheen (Native)
3.5-4.7	1110	--	60	0.7	No		4--	▽	Moist-wet, becoming F-M SAND
									Change @ 4.7 ft
							5--	CL	Moist, grey, silty CLAY, no odor or sheen (Native)
									(Note: Drillers encountered rock which shattered core, a second core was collected from 5-10 ft)
							6--		
							7--		
							8--	SM	Wet, dark grey-grey, silty F-M SAND, no odor or sheen (Native)
8.0-9.0	1130	--	90	4.5	No		9--		(4.5 ft recovery for second core collected from this depth)

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648369.05, E 1234528.98
	NAD 83/98
SURFACE ELEVATION	18.07 ft
DATUM	NAVD 88

LOCATION SKETCH



HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

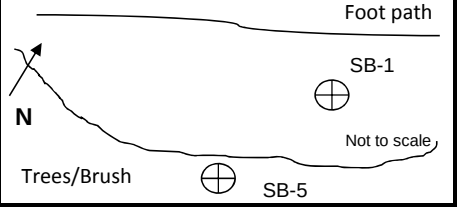
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-5**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1110

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
							11-		
11-12	1135	--	80	1.5	No			**SM**	Wet, dark grey-grey, silty F-M SAND, no odor or sheen (Native)
							12-		
							13-		
							14-		(4 ft recovery)
							15-		Base of Boring @ 15 ft bgs
							16-		
							17-		
							18-		
							19-		

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648369.05, E 1234528.98
	NAD 83/98
SURFACE ELEVATION	18.07 ft
DATUM	NAVD 88

LOCATION SKETCH



HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

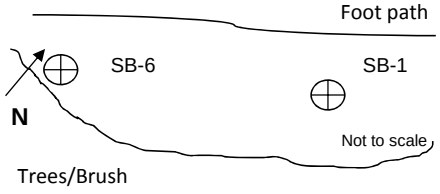
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-6**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1240

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
								SM	Dry, brown, silty F SAND grading to
0-1.2	1240	--	48	0.6	No			SM	Dry, brown-yellow, silty fine gravelly, F-C SAND, no odor or sheen
							1--		(Fill?)
								GM	Moist, dark brown-brown-grey, silty, F-M sandy, C GRAVEL, no odor
									or sheen (Native)
							2--		(Note: Drillers hit a rock or other obstruction, assumed recovery was
									from the surface)
							3--		(2.4 ft recovery)
							4--		
							5--		
							6--		
									Water table was undetermined.
							7--		
							8--		
								GM	
							9--		Wet, grey-brown, silty F-M sandy, F-C GRAVEL, no odor or sheen
9.0-10	1245	--	80	2.6	No				(Native)
									(4 ft recovery)

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648342.05, E 1234428.00
	NAD 83/98
SURFACE ELEVATION	16.57 ft
DATUM	NAVD 88

LOCATION SKETCH



HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

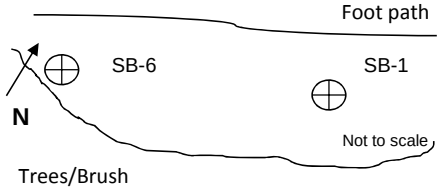
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-6**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1240

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
10.5-11.5	1250	--	90	-	No		11		Wet, brown-grey, silty, F-C SAND with F-C gravel, no odor or sheen
								SM	(Native)
								CL	Moist, grey, silty CLAY, no odor or sheen (Native)
							12		(changes @ 12.2 ft)
							13	SM	Wet, grey-light brown, silty F-M SAND, no odor or sheen (Native)
							14		(4.5 ft recovery)
							15		Base of Boring @ 15 ft bgs
							16		
							17		
							18		
							19		

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648342.05, E 1234428.00
	NAD 83/98
SURFACE ELEVATION	16.57 ft
DATUM	NAVD 88

LOCATION SKETCH



HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

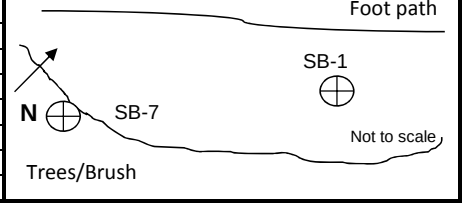
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-7**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1310

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
									Poor recovery due to gravel content of sample (2.0-5.0 ft)
							1--		
								? ?	
							2--	**SM**	Moist, dark brown, silty, F SAND, no odor or sheen observed (Native?)
									root fragments
								GM	Moist-wet, dark brown-grey-dark grey, silty F-C sandy, F-C GRAVEL
							3--		no odor or sheen (Native)
								▽	
							4--		
4.0-5.0	1310	--	60	0.0	No				(3 ft recovery)
							5--		
								SW	Wet, grey-dark grey, fine gravelly, F-C SAND, no odor or sheen (Native)
									(little to no fines)
							6--		
6.5-7.5	1315	--	90	1.6	No		7--		
								CL	Moist, light grey, silty CLAY, no odor or sheen (Native)
							8--		(change @ 8.4 ft)
								SM	Wet, brown-yellow-grey, silty, M-C SAND with fine gravel, no odor or
							9--		sheen (Native)
									Becoming light brown in color with mostly F-M SAND
									(4.5 ft recovery)

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648330.03, E 1234463.01
	NAD 83/98
SURFACE ELEVATION	16.31 ft
DATUM	NAVD 88

LOCATION SKETCH



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Bellingham, WA 98229

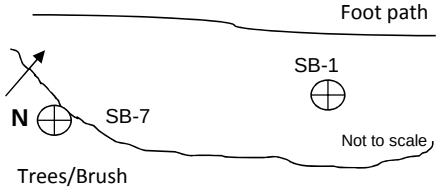
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-7**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1310

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
							11	SM	Same as above but silty F-M SAND with fine gravel (Native)
							12		
							13	SW	Wet, grey-brown-light brown, fine gravelly, M SAND with trace silt no odor or sheen (Native)
							14		* Soil sample tested.
13.5-15*	1320	--	80	0.2	No				(4 ft recovery)
							15		Base of Boring @ 15 ft bgs
							16		
							17		
							18		
							19		

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648330.03, E 1234463.01
	NAD 83/98
SURFACE ELEVATION	16.31 ft
DATUM	NAVD 88

LOCATION SKETCH



HERRENKOHL CONSULTING LLC

321 Summerland Road
Bellingham, WA 98229

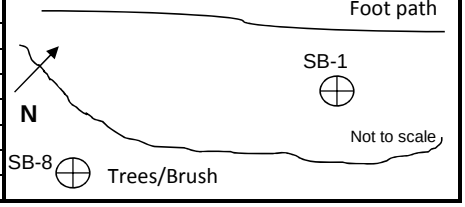
(360) 319-0721 FAX (360) 647-6980

BOREHOLE NUMBER	**LSCE-SB-8**
PROJECT	Little Squalicum Creek Estuary Project
LOCATION	Little Squalicum Park, Bellingham, WA
PROJECT NUMBER	HCL030
LOGGED BY	J. Ninnemann/M. Herrenkohl
DATE AND TIME	5/8/2013 1340

SAMPLE INFORMATION							Depth (ft)	STRATA	DESCRIPTION
Sample ID	Time	Blow Counts	% Recovery	PID	Sheen	Sample Depth (ft)			USCS group name, moisture content and plasticity, color, minor and MAJOR constituents with grain size range, odor, sheen, texture, weathering, cementation, geologic interpretation, etc.
									Poor recovery due to gravel content of sample (2.5-5.0 ft)
							1--		
							2--		
							3--	**GM**	Dry, brown-grey, silty, F-C sandy, F-C GRAVEL, no odor or sheen (Native?)
								GM	Moist-wet, brown-light brown, silty, F-C sandy, F GRAVEL, no odor or sheen (Native)
							4--		
4.0-5.0	1340	--	50	-	No				(2.5 ft recovery)
							5--		
							6--		
									Wet, red-light brown, silty F-M SAND, no odor or sheen (Native)
								SM	
							7--		@ 6.5 ft grading to a dark grey-grey, silty, F gravelly, F-C SAND
7.5-8.5	1350	--	70	0.0	No		8--	**SW**	Wet, dark grey, F-M SAND with trace silt, no odor or sheen (Native)
							9--		
9.0-10*	1345	--		-	No			**CL**	Moist, grey, silty CLAY with no odor or sheen (Native)
									* Soil sample tested.
									(3.5 ft recovery) Base of Boring @ 10 ft bgs

DRILLING CONTRACTOR	Cascade Drilling
DRILLING METHOD	Limited-Access,Track-Mount GeoProbe
SAMPLING EQUIPMENT	5-ft core sampler
COORDINATES	N 648329.03, E 1234508.96
	NAD 83/98
SURFACE ELEVATION	17.43 ft
DATUM	NAVD 88

LOCATION SKETCH



Photograph Log

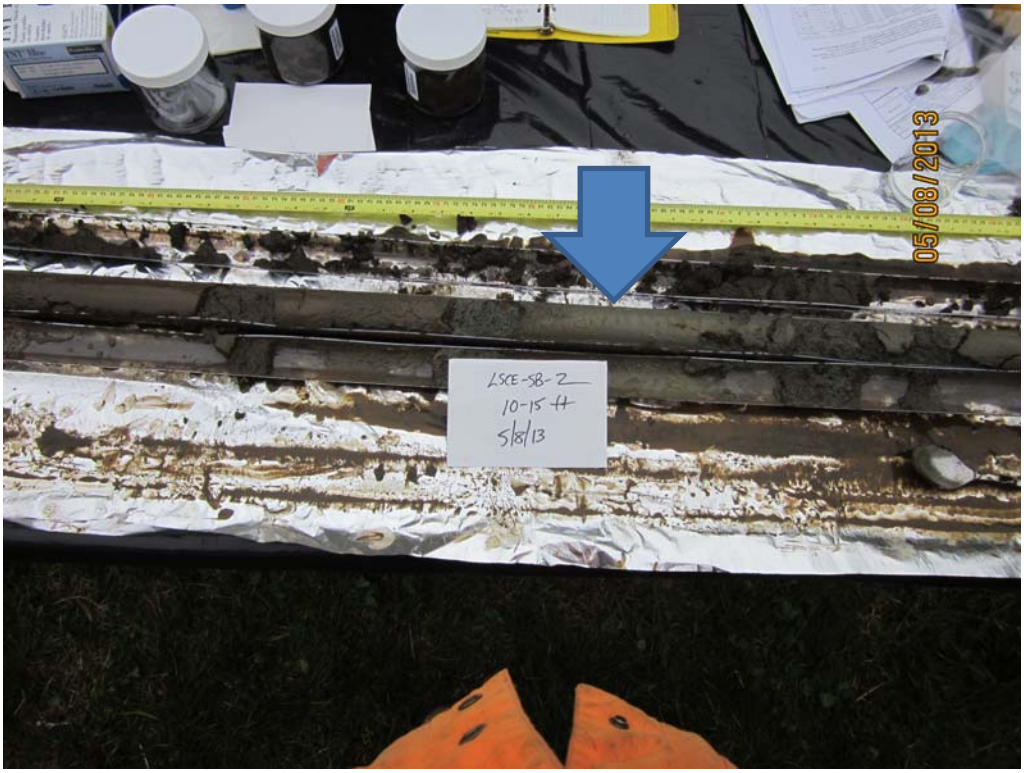
Photograph 1. Station layout and processing area in lower Little Squalicum Park.

Photograph 2. Surveyed station locations with ground elevation.

Photograph 3. Soil core from LSCE-SB-1 (0-5 ft depth), note the topsoil and fill material.

Photograph 4. Soil core from LSCE-SB-1 (5-10 ft depth), note native, sandy gravel below fill.

Photograph 5. Soil core from LSCE-SB-1 (10-15 ft depth), note native silty sands. Only boring without clay layer.



Photograph 6. Soil core from LSCE-SB-2 (10-15 ft depth), note the ~1 ft clay layer above sand layer.

APPENDIX B

DATA VALIDATION REPORT FOR CHEMISTRY TESTING

APPENDIX B
LABORATORY DATA VALIDATION

The data were validated using guidance and quality control (QC) criteria documented in the analytical methods, the sampling and analysis plan (Herrenkohl Consulting 2013), and the National Functional Guidelines for Organic and Inorganic Data Review (USEPA 1999, 2004, 2009). Sediment samples were analyzed by Analytical Resources, Inc. (ARI) of Tukwila, Washington. Samples submitted to ARI were analyzed for one or more of the following:

Test	Method
Petroleum Hydrocarbons	NWTPH-Dx
Arsenic, Cadmium, Chromium, Copper, Lead, Silver, Zinc	SW 6010C series
Mercury	SW 7471A
Semivolatile Organic Compounds	SW 8270D low level
Polychlorinated Biphenyls	SW 8082 low level
Dioxins/Furans	EPA 1613B

Sample data are presented in the following sample delivery groups (SDGs):

Laboratory Sample Delivery Group	Samples
WP31	LSCE-SB-1-8-9.5. LSCE-SB-1-11-12.5, LSCE-SB-1-13-14
WR73	LSCE-SB-3-13-14, LSCE-SB-4-16-17, LSCE-SB-7-13.5-15, LSCE-SB-8-9-10

Summary data packages are provided in Appendix C. Electronic data deliverables (EDD) are available upon request.

A partial data review was completed for both data packages which included review of the following:

- Data package completeness
- Analytical holding time and sample preservation
- Reporting limits
- Blank contamination
- Accuracy (compound recovery)
- Precision (replicate analyses)

DATA PACKAGE COMPLETENESS

Completeness is defined as the total number of usable results (results that were not rejected during data validation) divided by the total results reported by the laboratory. The results reported by the laboratory were 100% complete for the soil analyses.

HOLDING TIME AND SAMPLE PRESERVATION

The time between sample collection, extraction (if applicable), and analysis was determined to be within method and project-specified holding times. No qualifications of the data are necessary.

The initial sample preservation requirement (cooler temperature of 4°C ±2°) was met for all samples upon receipt by the laboratory.

REPORTING LIMITS

Reporting limits were at or below target reporting limits for the project.

BLANK CONTAMINATION

At least one method blank was analyzed with each batch of samples for each analysis. No contamination was detected in any of the method blanks except for the following:

SDG	Analysis	Compound
WP31	Dioxins/Furans	1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7, 8-HpCDD OCDD
WR73	SVOCs	Bis(2-ethylhexyl)phthalate

Soil sample concentrations were less than 10x the 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,6,7,8-HpCDD, and bis(2-ethylhexyl)phthalate concentrations detected in the blank. Detected concentrations were qualified as undetected "U". The soil sample concentration was greater than 10x the OCDD concentration detected in the blank. This sample result was qualified as an estimate "J".

ACCURACY

Surrogate Compound Recoveries

Surrogate compounds were added to samples analyzed for NWTPH-Dx and organics by EPA methods SW8270D and SW8082. The surrogate recoveries reported by the laboratory met the criteria for acceptable performance.

Matrix Spike Recoveries

Matrix spike and/or matrix spike duplicate (MS/MSD) analyses were performed at the proper frequency for NWTPH-Dx, metals, and organic analyses. All spike recoveries reported by the laboratory for MS/MSD analyses met the criteria for acceptable performance.

Laboratory Control Spike Recoveries

Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses were performed at the proper frequency for metals and organic analyses of samples. All of the spike

recoveries reported by the laboratory for LCS/LSCD analyses met the criteria for acceptable performance.

PRECISION

MS/MSD, LCS/LCSD, and laboratory replicate analyses were evaluated for laboratory precision. All of the relative percent difference (RPD) values for MS/MSD, laboratory replicate, and LCS/LCSD analyses met the criteria for acceptable performance.
.

REFERENCES

EPA. 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. OSWER No. 9200.1-85 EPA 540-R-08-005. U.S. Environmental Protection Agency. January.

EPA. 2004. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA-540/R-04-004. U.S. Environmental Protection Agency. Office of Superfund Remediation and Technology Innovation (OSRTI). Washington, D.C. October.

EPA. 1999. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA-540/R-99-008. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Washington, D.C. October.

Herrenkohl Consulting. 2013. Sampling and Analysis Plan, Focused Environmental Site Characterization, Little Squalicum Creek Estuary Project, Bellingham, WA. Prepared for the City of Bellingham, Washington. May 3.

APPENDIX C

CHEMISTRY TESTING REPORTS

Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 24, 2013

Mark Herrenkohl
Herrenkohl Consulting, LLC
321 Summerland Road
Bellingham, WA 98229

Client Project Name: Little Squaliam Creek
Client Project Number: HCC030
ARI ID: WP31

Dear Mr. Herrenkohl:

Please find enclosed the original Chain of Custody records, sample receipt documentation, and the final results for the project referenced above. Analytical Resources, Inc. (ARI) accepted thirteen soil samples in good condition on May 9, 2013 at a cooler temperature of 1.2°C. For further details regarding sample receipt please refer to the enclosed Cooler Receipt Form. Several samples were placed on hold pending further instructions.

Select samples were analyzed for NWTPH-Dx, and Dioxins and Furans, as requested on the Chain of Custody.

The Dioxins and Furans method blank had hits below the RL. The associated samples that contain analyte have been flagged with a "B" qualifier.

There were no other irregularities with the samples.

A copy of this report and all associated ARI raw data will be kept on file with ARI. Should you have any questions or problems, please feel free to call me at any time.

Respectfully,

ANALYTICAL RESOURCES, INC.

Kelly Bottem
Client Services Manager
(206) 695-6211
kellyb@arilabs.com
www.arilabs.com

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: WP31	Turn-around Requested: Standard Turnaround	Page: 1 of 2
ARI Client Company: HERRENKOHL CONSULTING LLC	Phone: 360-319-0721	Date: 5/8/13 / Ice Present?
Client Contact: MARK HERRENKOHL		No. of Coolers: / Cooler Temps: 1.2
Client Project Name: Little Squalicum Creek Estuary		
Client Project #: HCL030	Samplers: Mark H. / Jeff N.	

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	NWTPH-Dx *	Archive (froz)	Dioxins/Furans						Notes/Comments
LSCE-SB-1-3-4	5/8/13	0837	Soil	1		✓							* Silica Gel
LSCE-SB-1-6-7	↓	0840	↓	1		✓							Cleanup
LSCE-SB-1-8-9.5		0845		1		✓							
LSCE-SB-1-11-12.5		0850		1	✓								Note: After
LSCE-SB-1-13-14		0855		2	✓		✓						analysis, remaining
LSCE-SB-2-2-3		0910		1		✓							sample should be
LSCE-SB-2-7-8		0915		1		✓							archived (frozen)
LSCE-SB-2-11.5-12.5		0925		1		✓							
LSCE-SB-2-12.5-13.2	↓	0920	↓	1		✓							

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
Refer to SAP	(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: MARK J. HERRENKOHL	Printed Name: Taylor Streeter	Printed Name:	Printed Name:
	Company: HERRENKOHL CONSULTING	Company: ARI	Company:	Company:
	Date & Time: 5/8/13 1600	Date & Time: 5-9-13 720	Date & Time:	Date & Time:

00057.TEDP

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested: Standard turnaround	Page: 2 of 2	
ARI Client Company: HERRENKOHL CONSULTING LLC	Phone: 360-319-0721	Date: 5/8/13	Ice Present?
Client Contact: MARK HERRENKOHL		No. of Coolers:	Cooler Temps: 1.2
Client Project Name: Little Squalicum Creek Estuary			
Client Project #: HEC030	Samplers: Mark H. / Jeff N.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Analysis Requested

Sample ID	Date	Time	Matrix	No. Containers	Archive (Frozen)								Notes/Comments
~~LSCE-SB-3-1.5-2.2~~	5/8/13	~~0945~~	Soil	1	✓								Refer to
~~LSCE-SB-3-7-8~~	↓	~~0950~~		1	✓								SAP
~~LSCE-SB-3-13-14~~		~~0955~~		1	✓								
LSCE-SB-4-4-5		1020		1	✓								
LSCE-SB-4-9-10		1025		1	✓								
LSCE-SB-4-13-14		1030		1	✓								
LSCE-SB-4-16-17	↓	1050		1	✓								

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	[signature]	[signature]		
	Printed Name: MARK J. HERRENKOHL	Printed Name: Taylor Streeter	Printed Name:	Printed Name:
	Company: HERRENKOHL Consulting	Company: ARI	Company:	Company:
	Date & Time: 5/8/13 1600	Date & Time: 5-9-13 720	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

00002 : TEcm

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Hart-en Kohl Project Name: Little Squalian Creek Estuary

COC No(s): _____ NA Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: WP31 Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? TS YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 1.2

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90877957

Cooler Accepted by: TS Date: 5-9-13 Time: 720

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA _____

Was Sample Split by ARI : NA YES Date/Time: _____ Equipment: _____ Split by: _____

TS

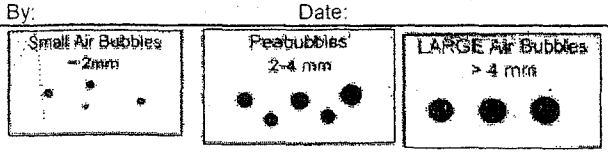
Samples Logged by: _____ Date: 5-9-13 Time: 1238

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:



Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: WP31
Client: Herrenkohl Consulting, LLC.
Project Event: HCL030
Project Name: Little Squalian Creek Estuary

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	LSCE-SB-1-11-12.5	WP31A	13-10004	Soil	05/08/13 08:50	05/09/13 07:20
2.	LSCE-SB-1-13-14	WP31B	13-10005	Soil	05/08/13 08:55	05/09/13 07:20
3.	LSCE-SB-1-3-4	WP31C	13-10006	Soil	05/08/13 08:37	05/09/13 07:20
4.	LSCE-SB-1-6-7	WP31D	13-10007	Soil	05/08/13 08:40	05/09/13 07:20
5.	LSCE-SB-1-8-9.5	WP31E	13-10008	Soil	05/08/13 08:45	05/09/13 07:20
6.	LSCE-SB-2-2-3	WP31F	13-10009	Soil	05/08/13 09:10	05/09/13 07:20
7.	LSCE-SB-2-7-8	WP31G	13-10010	Soil	05/08/13 09:15	05/09/13 07:20
8.	LSCE-SB-2-11.5-12.5	WP31H	13-10011	Soil	05/08/13 09:25	05/09/13 07:20
9.	LSCE-SB-2-12.5-13.2	WP31I	13-10012	Soil	05/08/13 09:20	05/09/13 07:20
10.	LSCE-SB-4-4-5	WP31J	13-10013	Soil	05/08/13 10:20	05/09/13 07:20
11.	LSCE-SB-4-9-10	WP31K	13-10014	Soil	05/08/13 10:25	05/09/13 07:20
12.	LSCE-SB-4-13-14	WP31L	13-10015	Soil	05/08/13 10:30	05/09/13 07:20
13.	LSCE-SB-4-16-17	WP31M	13-10016	Soil	05/08/13 10:50	05/09/13 07:20

Subject: Little Squalicum Creek Estuary Samples
From: Mark Herrenkohl <mherrenkohl@msn.com>
Date: 5/8/2013 6:38 PM
To: "'Kelly Bottem'" <kellyb@arilabs.com>

Kelly – you should receive soil samples for Little Squalicum Creek estuary project before noon tomorrow. As you may recall many of the samples will be archived (frozen) for possible analysis. However, I would like to add one more analysis than indicated on the COCs:

- LSCE-SB-1-8-9.5 = NWTPH-Dx with cleanup

Based on the results of the samples, we will make decisions on other possible sample analysis. Thanks!

Regards,

Mark J. Herrenkohl, LEG

Herrenkohl Consulting LLC
321 Summerland Road
Bellingham, WA 98229
360-319-0721
mherrenkohl@msn.com

Please send mark the login confirmation

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TOTAL DIESEL RANGE HYDROCARBONS

NWTPHD by GC/FID-Silica and Acid Cleaned
Extraction Method: SW3546
Page 1 of 1

QC Report No: WP31-Herrenkohl Consulting, LL
Project: Little Squalian Creek Estuary
HCL030

Matrix: Soil
Data Release Authorized: MW
Reported: 05/17/13

ARI ID	Sample ID	Extraction Date	Analysis Date	EFV DF	Range/Surrogate	RL	Result
MB-051013	Method Blank	05/10/13	05/16/13	1.00	Diesel Range	5.0	< 5.0 U
13-10004	HC ID: ---		FID3B	1.0	Motor Oil Range	10	< 10 U
					o-Terphenyl		92.8%
WP31A	LSCE-SB-1-11-12.5	05/10/13	05/16/13	1.00	Diesel Range	6.1	< 6.1 U
13-10004	HC ID: ---		FID3B	1.0	Motor Oil Range	12	< 12 U
					o-Terphenyl		80.4%
WP31B	LSCE-SB-1-13-14	05/10/13	05/16/13	1.00	Diesel Range	6.1	< 6.1 U
13-10005	HC ID: ---		FID3B	1.0	Motor Oil Range	12	< 12 U
					o-Terphenyl		78.1%
WP31E	LSCE-SB-1-8-9.5	05/10/13	05/16/13	1.00	Diesel Range	6.2	< 6.2 U
13-10008	HC ID: ---		FID3B	1.0	Motor Oil Range	12	< 12 U
					o-Terphenyl		78.3%

Reported in mg/kg (ppm)

EFV-Effective Final Volume in mL.
DL-Dilution of extract prior to analysis.
RL-Reporting limit.

Diesel range quantitation on total peaks in the range from C12 to C24.
Motor Oil range quantitation on total peaks in the range from C24 to C38.
HC ID: DRO/RRO indicate results of organics or additional hydrocarbons in ranges are not identifiable.

ANALYTICAL RESOURCES INCORPORATED

CLEANED TPHD SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030

Client ID	OTER	TOT OUT
MB-051013	92.8%	0
LCS-051013	74.2%	0
LCSD-051013	93.4%	0
LSCE-SB-1-11-12.5	80.4%	0
LSCE-SB-1-13-14	78.1%	0
LSCE-SB-1-8-9.5	78.3%	0

	LCS/MB LIMITS	QC LIMITS
(OTER) = o-Terphenyl	(50-150)	(50-150)

Prep Method: SW3546
Log Number Range: 13-10004 to 13-10008

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
NWTPHD by GC/FID-Silica and Acid Cleaned **Sample ID: LCS-051013**
Page 1 of 1 **LCS/LCSD**

Lab Sample ID: LCS-051013 QC Report No: WP31-Herrenkohl Consulting, LLC.
LIMS ID: 13-10004 Project: Little Squalian Creek Estuary
Matrix: Soil HCL030
Data Release Authorized: Date Sampled: 05/08/13
Reported: 05/17/13 Date Received: 05/09/13

Date Extracted LCS/LCSD: 05/10/13 Sample Amount LCS: 10.0 g
LCSD: 10.0 g
Date Analyzed LCS: 05/16/13 10:51 Final Extract Volume LCS: 1.0 mL
LCSD: 05/16/13 11:11 LCSD: 1.0 mL
Instrument/Analyst LCS: FID/JLW Dilution Factor LCS: 1.0
LCSD: FID/JLW LCSD: 1.0

Range	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Diesel	118	150	78.7%	120	150	80.0%	1.7%

TPHD Surrogate Recovery

	LCS	LCSD
o-Terphenyl	74.2%	93.4%

Results reported in mg/kg
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

TOTAL DIESEL RANGE HYDROCARBONS-EXTRACTION REPORT

ARI Job: WP31
Matrix: Soil — Project: Little Squalian Creek Estuary
Date Received: 05/09/13 — HCL030

ARI ID	Client ID	Client Amt	Final Vol	Basis	Prep Date
13-10004-051013MB1	Method Blank	10.0 g	1.00 mL	-	05/10/13
13-10004-051013LCS1	Lab Control	10.0 g	1.00 mL	-	05/10/13
13-10004-051013LCSD1	Lab Control Dup	10.0 g	1.00 mL	-	05/10/13
13-10004-WP31A	LSCE-SB-1-11-12.5	8.25 g	1.00 mL	D	05/10/13
13-10005-WP31B	LSCE-SB-1-13-14	8.14 g	1.00 mL	D	05/10/13
13-10008-WP31E	LSCE-SB-1-8-9.5	8.13 g	1.00 mL	D	05/10/13

Basis: D=Dry Weight W=As Received

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: MB-051413**

Lab Sample ID: MB-051413
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized:
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 05/14/13
Date Analyzed: 05/17/13 13:43
Instrument/Analyst: AS1/PK
Acid Cleanup: Yes
Silica-Carbon Cleanup: No

Sample Amount: 10.0 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00
Silica-Florisil Cleanup: Yes

Analyte	Ion Ratio	Ratio Limits	EDL	RL	Result	
2,3,7,8-TCDF		0.65-0.89	0.0580	1.00	< 0.0580	U
2,3,7,8-TCDD		0.65-0.89	0.108	1.00	< 0.108	U
1,2,3,7,8-PeCDF		1.32-1.78	0.0500	1.00	< 0.0500	U
2,3,4,7,8-PeCDF		1.32-1.78	0.0540	1.00	< 0.0540	U
1,2,3,7,8-PeCDD		1.32-1.78	0.0540	1.00	< 0.0540	U
1,2,3,4,7,8-HxCDF		1.05-1.43	0.0460	1.00	< 0.0460	U
1,2,3,6,7,8-HxCDF		1.05-1.43	0.0440	1.00	< 0.0440	U
2,3,4,6,7,8-HxCDF		1.05-1.43	0.0500	1.00	< 0.0500	U
1,2,3,7,8,9-HxCDF		1.05-1.43	0.0660	1.00	< 0.0660	U
1,2,3,4,7,8-HxCDD		1.05-1.43	0.0560	1.00	< 0.0560	U
1,2,3,6,7,8-HxCDD		1.05-1.43	0.0580	1.00	< 0.0580	U
1,2,3,7,8,9-HxCDD		1.05-1.43	0.0600	1.00	< 0.0600	U
1,2,3,4,6,7,8-HpCDF	1.46	0.88-1.20		1.00	0.0620	JEMPC
1,2,3,4,7,8,9-HpCDF		0.88-1.20	0.0960	1.00	< 0.0960	U
1,2,3,4,6,7,8-HpCDD	1.47	0.88-1.20		1.00	0.200	JEMPC
OCDF		0.76-1.02	0.176	2.00	< 0.176	U
OCDD	0.87	0.76-1.02		2.00	1.29	J

Homologue Group	EDL	RL	Result	
Total TCDF	0.0580	1.00	< 0.0580	U
Total TCDD	0.108	1.00	0.166	EMPC
Total PeCDF	0.0540	2.00	< 0.0540	U
Total PeCDD	0.0540	1.00	< 0.0540	U
Total HxCDF	0.0660	2.00	0.0472	
Total HxCDD	0.0600	2.00	0.0932	EMPC
Total HpCDF		2.00	0.317	EMPC
Total HpCDD		2.00	0.414	EMPC

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.00

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.12

Reported in pg/g

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: MB-051413**

Lab Sample ID: MB-051413
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized: MW
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 05/14/13
Date Analyzed: 05/17/13 13:43
Instrument/Analyst: AS1/PK

Sample Amount: 10.0 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00

Analyte	Ion Ratio	Ratio Limits	Result	Limits	Exceedance
13C-2,3,7,8-TCDF	0.78	0.65-0.89	87.2	24-169	
13C-2,3,7,8-TCDD	0.77	0.65-0.89	86.4	25-164	
13C-1,2,3,7,8-PeCDF	1.59	1.32-1.78	91.7	24-185	
13C-2,3,4,7,8-PeCDF	1.57	1.32-1.78	81.6	21-178	
13C-1,2,3,7,8-PeCDD	1.57	1.32-1.78	86.4	25-181	
13C-1,2,3,4,7,8-HxCDF	0.52	0.43-0.59	90.6	26-152	
13C-1,2,3,6,7,8-HxCDF	0.54	0.43-0.59	95.8	26-123	
13C-2,3,4,6,7,8-HxCDF	0.52	0.43-0.59	85.4	28-136	
13C-1,2,3,7,8,9-HxCDF	0.53	0.43-0.59	78.7	29-147	
13C-1,2,3,4,7,8-HxCDD	1.28	1.05-1.43	92.8	32-141	
13C-1,2,3,6,7,8-HxCDD	1.26	1.05-1.43	93.4	28-130	
13C-1,2,3,4,6,7,8-HpCDF	0.45	0.37-0.51	74.6	28-143	
13C-1,2,3,4,7,8,9-HpCDF	0.46	0.37-0.51	75.0	26-138	
13C-1,2,3,4,6,7,8-HpCDD	1.08	0.88-1.20	82.9	23-140	
13C-OCDD	0.90	0.76-1.02	67.4	17-157	
37Cl4-2,3,7,8-TCDD			92.6	35-197	

Reported in Percent Recovery

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: LSCE-SB-1-13-14**

Lab Sample ID: WP31B
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized: MW
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 05/14/13
Date Analyzed: 05/23/13 02:09
Instrument/Analyst: AS1/PK
Acid Cleanup: Yes
Silica-Carbon Cleanup: No

Sample Amount: 10.1 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00
Silica-Florisil Cleanup: Yes

Analyte	Ion Ratio	Ratio Limits	EDL	RL	Result	
2,3,7,8-TCDF		0.65-0.89	0.0716	0.994	< 0.0716	U
2,3,7,8-TCDD		0.65-0.89	0.123	0.994	< 0.123	U
1,2,3,7,8-PeCDF		1.32-1.78	0.0755	0.994	< 0.0755	U
2,3,4,7,8-PeCDF		1.32-1.78	0.0835	0.994	< 0.0835	U
1,2,3,7,8-PeCDD		1.32-1.78	0.105	0.994	< 0.105	U
1,2,3,4,7,8-HxCDF		1.05-1.43	0.0915	0.994	< 0.0915	U
1,2,3,6,7,8-HxCDF		1.05-1.43	0.0815	0.994	< 0.0815	U
2,3,4,6,7,8-HxCDF		1.05-1.43	0.0954	0.994	< 0.0954	U
1,2,3,7,8,9-HxCDF		1.05-1.43	0.129	0.994	< 0.129	U
1,2,3,4,7,8-HxCDD		1.05-1.43	0.187	0.994	< 0.187	U
1,2,3,6,7,8-HxCDD		1.05-1.43	0.199	0.994	< 0.199	U
1,2,3,7,8,9-HxCDD		1.05-1.43	0.199	0.994	< 0.199	U
1,2,3,4,6,7,8-HpCDF	1.03	0.88-1.20		0.994	0.523	BJ
1,2,3,4,7,8,9-HpCDF		0.88-1.20	0.195	0.994	< 0.195	U
1,2,3,4,6,7,8-HpCDD	0.81	0.88-1.20		0.994	1.96	BEMPC
OCDF	0.88	0.76-1.02		1.99	1.54	J
OCDD	0.84	0.76-1.02		1.99	16.0	

Homologue Group	EDL	RL	Result	
Total TCDF	0.0716	0.994	< 0.0716	U
Total TCDD	0.123	0.994	0.146	EMPC
Total PeCDF	0.0835	1.99	< 0.0835	U
Total PeCDD	0.105	0.994	< 0.105	U
Total HxCDF	0.129	1.99	0.431	EMPC
Total HxCDD	0.199	1.99	0.363	EMPC
Total HpCDF		1.99	1.57	
Total HpCDD		1.99	4.30	EMPC

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=0, Including EMPC): 0.03

Total 2,3,7,8-TCDD Equivalence (WHO2005, ND=1/2 EDL, Including EMPC): 0.21

Reported in pg/g

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: LSCE-SB-1-13-14**

Lab Sample ID: WP31B
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized: MW
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 05/14/13
Date Analyzed: 05/23/13 02:09
Instrument/Analyst: AS1/PK

Sample Amount: 10.1 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00

Analyte	Ion Ratio	Ratio Limits	Result	Limits	Exceedance
13C-2,3,7,8-TCDF	0.78	0.65-0.89	78.0	24-169	
13C-2,3,7,8-TCDD	0.79	0.65-0.89	77.8	25-164	
13C-1,2,3,7,8-PeCDF	1.57	1.32-1.78	81.6	24-185	
13C-2,3,4,7,8-PeCDF	1.59	1.32-1.78	73.4	21-178	
13C-1,2,3,7,8-PeCDD	1.59	1.32-1.78	73.4	25-181	
13C-1,2,3,4,7,8-HxCDF	0.53	0.43-0.59	92.5	26-152	
13C-1,2,3,6,7,8-HxCDF	0.54	0.43-0.59	96.1	26-123	
13C-2,3,4,6,7,8-HxCDF	0.52	0.43-0.59	87.9	28-136	
13C-1,2,3,7,8,9-HxCDF	0.52	0.43-0.59	78.2	29-147	
13C-1,2,3,4,7,8-HxCDD	1.28	1.05-1.43	88.4	32-141	
13C-1,2,3,6,7,8-HxCDD	1.23	1.05-1.43	86.9	28-130	
13C-1,2,3,4,6,7,8-HpCDF	0.46	0.37-0.51	74.7	28-143	
13C-1,2,3,4,7,8,9-HpCDF	0.45	0.37-0.51	67.4	26-138	
13C-1,2,3,4,6,7,8-HpCDD	1.05	0.88-1.20	76.0	23-140	
13C-OCDD	0.90	0.76-1.02	54.5	17-157	
37Cl4-2,3,7,8-TCDD			84.5	35-197	

Reported in Percent Recovery

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: OPR-051413**

Lab Sample ID: OPR-051413
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized:
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 05/14/13
Date Analyzed: 05/17/13 14:44
Instrument/Analyst: AS1/PK
Acid Cleanup: Yes
Silica-Carbon Cleanup: No

Sample Amount: 10.0 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00
Silica-Florisil Cleanup: Yes

Analyte	Ion Ratio	Ratio Limits	RL	Result
2,3,7,8-TCDF	0.78	0.65-0.89	1.00	21.6
2,3,7,8-TCDD	0.76	0.65-0.89	1.00	21.1
1,2,3,7,8-PeCDF	1.53	1.32-1.78	1.00	107
2,3,4,7,8-PeCDF	1.53	1.32-1.78	1.00	106
1,2,3,7,8-PeCDD	1.55	1.32-1.78	1.00	105
1,2,3,4,7,8-HxCDF	1.24	1.05-1.43	1.00	106
1,2,3,6,7,8-HxCDF	1.20	1.05-1.43	1.00	107
2,3,4,6,7,8-HxCDF	1.23	1.05-1.43	1.00	108
1,2,3,7,8,9-HxCDF	1.27	1.05-1.43	1.00	104
1,2,3,4,7,8-HxCDD	1.26	1.05-1.43	1.00	106
1,2,3,6,7,8-HxCDD	1.27	1.05-1.43	1.00	107
1,2,3,7,8,9-HxCDD	1.21	1.05-1.43	1.00	105
1,2,3,4,6,7,8-HpCDF	1.00	0.88-1.20	1.00	121
1,2,3,4,7,8,9-HpCDF	1.02	0.88-1.20	1.00	106
1,2,3,4,6,7,8-HpCDD	1.03	0.88-1.20	1.00	108
OCDF	0.91	0.76-1.02	2.00	216
OCDD	0.89	0.76-1.02	2.00	215

Homologue Group	EDL	RL	Result	
Total TCDF		1.00	23.4	
Total TCDD		1.00	21.9	EMPC
Total PeCDF		2.00	222	EMPC
Total PeCDD		1.00	105	
Total HxCDF		2.00	428	EMPC
Total HxCDD		2.00	318	EMPC
Total HpCDF		2.00	228	EMPC
Total HpCDD		2.00	110	

Reported in pg/g

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: OPR-051413**

Lab Sample ID: OPR-051413
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized: MW
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 05/14/13
Date Analyzed: 05/17/13 14:44
Instrument/Analyst: AS1/PK

Sample Amount: 10.0 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00

Analyte	Ion Ratio	Ratio Limits	Result	Limits	Exceedance
13C-2,3,7,8-TCDF	0.78	0.65-0.89	108	22-152	
13C-2,3,7,8-TCDD	0.78	0.65-0.89	99.6	20-175	
13C-1,2,3,7,8-PeCDF	1.57	1.32-1.78	104	21-192	
13C-2,3,4,7,8-PeCDF	1.58	1.32-1.78	97.0	13-328	
13C-1,2,3,7,8-PeCDD	1.54	1.32-1.78	99.3	21-227	
13C-1,2,3,4,7,8-HxCDF	0.52	0.43-0.59	96.6	19-202	
13C-1,2,3,6,7,8-HxCDF	0.52	0.43-0.59	101	21-159	
13C-2,3,4,6,7,8-HxCDF	0.53	0.43-0.59	94.8	22-176	
13C-1,2,3,7,8,9-HxCDF	0.53	0.43-0.59	92.0	17-205	
13C-1,2,3,4,7,8-HxCDD	1.27	1.05-1.43	98.6	21-193	
13C-1,2,3,6,7,8-HxCDD	1.28	1.05-1.43	101	25-163	
13C-1,2,3,4,6,7,8-HpCDF	0.44	0.37-0.51	86.4	21-158	
13C-1,2,3,4,7,8,9-HpCDF	0.45	0.37-0.51	87.0	20-186	
13C-1,2,3,4,6,7,8-HpCDD	1.07	0.88-1.20	92.1	26-166	
13C-OCDD	0.88	0.76-1.02	76.7	13-198	
37Cl4-2,3,7,8-TCDD			105	31-191	

Reported in Percent Recovery

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Dioxins/Furans by EPA 1613B **Sample ID: OPR-051413**

Lab Sample ID: OPR-051413
LIMS ID: 13-10005
Matrix: Soil
Data Release Authorized: MW
Reported: 05/24/13

QC Report No: WP31-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 05/14/13
Date Analyzed: 05/17/13 14:44
Instrument/Analyst: AS1/PK

Sample Amount: 10.0 g-dry-wt
Final Extract Volume: 20 uL
Dilution Factor: 1.00

Analyte	OPR	Spiked	Recovery	Limits
2,3,7,8-TCDF	21.6	20.0	108	75-158
2,3,7,8-TCDD	21.1	20.0	106	67-158
1,2,3,7,8-PeCDF	107	100	107	80-134
2,3,4,7,8-PeCDF	106	100	106	68-160
1,2,3,7,8-PeCDD	105	100	105	70-142
1,2,3,4,7,8-HxCDF	106	100	106	72-134
1,2,3,6,7,8-HxCDF	107	100	107	84-130
2,3,4,6,7,8-HxCDF	108	100	108	70-156
1,2,3,7,8,9-HxCDF	104	100	104	78-130
1,2,3,4,7,8-HxCDD	106	100	106	70-164
1,2,3,6,7,8-HxCDD	107	100	107	76-134
1,2,3,7,8,9-HxCDD	105	100	105	64-162
1,2,3,4,6,7,8-HpCDF	121	100	121	82-132
1,2,3,4,7,8,9-HpCDF	106	100	106	78-138
1,2,3,4,6,7,8-HpCDD	108	100	108	70-140
OCDF	216	200	108	63-170
OCDD	215	200	108	78-144

Reported in pg/g

Analytical Resources, Incorporated
Analytical Chemists and Consultants

June 13, 2013

Mark Herrenkohl
Herrenkohl Consulting, LLC
321 Summerland Road
Bellingham, WA 98229

Client Project Name: Little Squaliam Creek
Client Project Number: HCC030
ARI ID: WR73

Dear Mr. Herrenkohl:

Please find enclosed the original Chain of Custody records, sample receipt documentation, and the final results for the project referenced above. Analytical Resources, Inc. (ARI) accepted several soil samples in good condition on May 9, 2013 at a cooler temperature of 1.2°C. For further details regarding sample receipt please refer to the enclosed Cooler Receipt Form. Several samples were placed on hold pending further instructions.

Select samples were originally analyzed for NWTPH-Dx, and Dioxins and Furans, as requested on the Chain of Custody.

At the request of Herrenkohl Consulting, LLC, select samples were removed from frozen hold and analyzed for SVOCs, PCBs, NWTPH-Dx and Total metals.

The SVOCs method blank contained bis2-(Ethylhexyl)phthalate. All associated samples that contain analyte have been flagged with a "B" qualifier.

The SVOCs CCAL is out of control low for all associated FORM III "Q" flagged analytes. All associated samples that contain analyte have been flagged with a "Q" qualifier.

The SVOCs surrogate PHL is out of control low in association with sample LSCE-SB-8-9-10. All other surrogate recoveries are in control and no further corrective action was taken.

There were no other irregularities with the samples.

A copy of this report and all associated ARI raw data will be kept on file with ARI. Should you have any questions or problems, please feel free to call me at any time.

Respectfully,

ANALYTICAL RESOURCES, INC.

Kelly Bottem
Client Services Manager
(206) 695-6211
kellyb@arilabs.com
www.arilabs.com

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: WP931	Turn-around Requested: Standard Turnaround	Page: 1 of 2	
ARI Client Company: HERRENKOHL CONSULTING LLC	Phone: 360-319-0721	Date: 5/8/13	Ice Present?
Client Contact: MARK HERRENKOHL		No. of Coolers:	Cooler Temps: 1.2
Client Project Name: Little Squalicum Creek Estuary			
Client Project #: HCL030	Samplers: Mark H. / Jeff N.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: NWTPH-Dx *	Archive (frozen)	Organics / Furans						Notes/Comments
LSCE-SB-1-3-4	5/8/13	0837	Soil	1		✓							* Silica Gel
LSCE-SB-1-6-7		0840		1		✓							cleanup
LSCE-SB-1-8-9.5		0845		1		✓							
LSCE-SB-1-11-12.5		0850		1	✓								Note: After
LSCE-SB-1-13-14		0855		2	✓		✓						analysis, remaining
LSCE-SB-2-2-3		0910		1		✓							sample should be
LSCE-SB-2-7-8		0915		1		✓							archived (frozen)
LSCE-SB-2-11.5-12.5		0925		1		✓							
LSCE-SB-2-12.5-13.2		0920		1		✓							

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Refer to SAP	Printed Name: MARK J HERRENKOHL	Printed Name: Taylor Streeter	Printed Name:	Printed Name:
	Company: HERRENKOHL CONSULTING	Company: ARI	Company:	Company:
	Date & Time: 5/8/13 1600	Date & Time: 5-9-13 720	Date & Time:	Date & Time:

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested: Standard turnaround	Page: 2 of 2	
ARI Client Company: HERRENKOHL CONSULTING LLC	Phone: 360-319-0721	Date: 5/8/13	Ice Present?
Client Contact: MARK HERRENKOHL		No. of Coolers:	Cooler Temps: 1.2
Client Project Name: Little Squalicum Creek Estuary			
Client Project #: HEL030	Samplers: Mark H. / Jeff N.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Archive (frozen)	Notes/Comments
~~LSCE-SB-3-4.5-7.5~~	5/8/13	0945	Soil	1	✓	Refer to SAP
~~LSCE-SB-3-7-8~~	"	0950	"	1	✓	
~~LSCE-SB-3-13-14~~	"	0955	"	1	✓	
LSCE-SB-4-4-5	"	1020	"	1	✓	
LSCE-SB-4-9-10	"	1025	"	1	✓	
LSCE-SB-4-13-14	"	1030	"	1	✓	
LSCE-SB-4-16-17	"	1050	"	1	✓	

Comments/Special Instructions	Relinquished by (Signature)	Received by (Signature)	Relinquished by (Signature)	Received by (Signature)
	Printed Name: MARK J. HERRENKOHL	Printed Name: Taylor Streeter	Printed Name:	Printed Name:
	Company: HERRENKOHL Consulting	Company: ARI	Company:	Company:
	Date & Time: 5/8/13 1600	Date & Time: 5-9-13 720	Date & Time:	Date & Time:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrenkohl

Project Name: Little Squalian Creek Estuary

COC No(s): _____ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: WP31

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? TS. YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc.) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 1.7

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 90877957

Cooler Accepted by: TS Date: 5-9-13 Time: 720

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI NA _____

Was Sample Split by ARI: NA YES Date/Time: _____ Equipment: _____ Split by: _____

TS

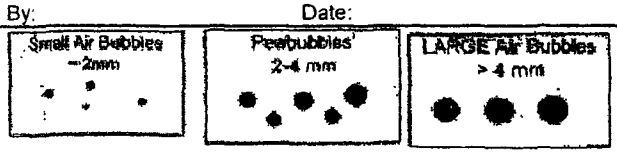
Samples Logged by: _____ Date: 5-9-13 Time: 1238

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:



Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"

WP31 00004

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: WF32	Turn-around Requested: Standard 2-week	Page: 1	of 2
ARI Client Company: HERRENKOHL CONSULTING LLC	Phone: 360-319-0721	Date: 5/8/13	Ice Present?
Client Contact: MARK HERRENKOHL		No. of Coolers:	Cooler Temps: 4.6
Client Project Name: Little Squalicum Creek Estuary			
Client Project #: HCC030	Samplers: Mark H. / Jeff N.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Archive (Frozen)								Notes/Comments
LSCE-SB-5-3.5-4.7	5/8/13	1110	Soil	1	✓								Refer
LSCE-SB-5-8-9	↓	1130	↓	1	✓								to SAP
LSCE-SB-5-11-12		1135		1	✓								
LSCE-SB-6-0-1.2		1240		1	✓								
LSCE-SB-6-9-10		1245		1	✓								
LSCE-SB-6-10.5-11.5		1250		1	✓								
LSCE-SB-7-4-5		1310		1	✓								
LSCE-SB-7-6.5-7.5		1315		1	✓								
LSCE-SB-7-13.5-15	↓	1320	↓	2	✓								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: MARK J. HERRENKOHL	Printed Name: Taylor Streeter	Printed Name:	Printed Name:
	Company: HERRENKOHL CONSULTING	Company: ARI	Company:	Company:
	Date & Time: 5/8/13 1600	Date & Time: 5-9-13 720	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

ARI Assigned Number: WY32	Turn-around Requested: Standard 2-weeks
ARI Client Company: HERRENKOHL CONSULTING LLC	Phone: 360-319-0721
Client Contact: MARK HERRENKOHL	
Client Project Name: Little Squalicum Creek Estuary	
Client Project #: HEC130	Samplers: Mark H / Jeff N.

Page: 2	of 2
Date: 5/8/13	Ice Present?
No. of Coolers:	Cooler Temps:

Sample ID	Date	Time	Matrix	No. Containers	Archive (Frozen)								Notes/Comments
LSCE-SB-3-1.5-2.2	5/8/13	0945	Soil	1	✓								Refer
LSCE-SB-3-7-8	↓	0950	↓	1	✓								TO SAP
LSCE-SB-3-13-14		0955		1	✓								
LSCE-SB-8-4-5		1340		2	✓								
LSCE-SB-8-7.5-8.5		1350		2	✓								
LSCE-SB-8-9-10	✓	1345	↓	2	✓								

Comments/Special Instructions	Relinquished by:	Received by:	Relinquished by:	Received by:
	(Signature) [signature]	(Signature) [signature]	(Signature)	(Signature)
	Printed Name: MARK J. HERRENKOHL	Printed Name: Taylor Streeter	Printed Name:	Printed Name:
	Company: HERRENKOHL CONSULTING	Company: ARI	Company:	Company:
	Date & Time: 5/8/13 1600	Date & Time: 5-9-13 720	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Herrera Env | Project Name: Little Squalicum Creek Estuary

COC No(s): _____ NA | Delivered by Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: WP32 | Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES NO

Were custody papers included with the cooler? YES NO

Were custody papers properly filled out (ink, signed, etc) YES NO

Temperature of Cooler(s) (°C) (recommended 2.0-6 0 °C for chemistry): 4.6

If cooler temperature is out of compliance fill out form 00070F | Temp Gun ID# 90877957

Cooler Accepted by: TS Date: 5-9-13 Time: 1120

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA YES NO

Were all bottles sealed in individual plastic bags? YES NO

Did all bottles arrive in good condition (unbroken)? YES NO

Were all bottle labels complete and legible? YES NO

Did the number of containers listed on COC match with the number of containers received? YES NO

Did all bottle labels and tags agree with custody papers? YES NO

Were all bottles used correct for the requested analyses? YES NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs). NA YES NO

Were all VOC vials free of air bubbles? NA YES NO

Was sufficient amount of sample sent in each bottle? YES NO

Date VOC Trip Blank was made at ARI: NA _____

Was Sample Split by ARI: NA YES Date/Time: _____ Equipment: _____ Split by: _____

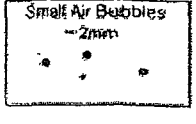
Samples Logged by: TS Date: 5-9-13 Time: 1237

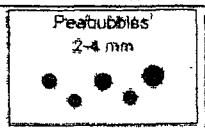
***** Notify Project Manager of discrepancies or concerns *****

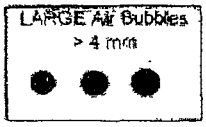
Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:







Small → "sm"

Peabubbles → "pb"

Large → "lg"

Headspace → "hs"

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: WR73
Client: Herrenkohl Consulting, LLC.
Project Event: HCL030
Project Name: Little Squalian Creek Estuary

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	LSCE-SB-4-16-17	WR73A	13-11430	Soil	05/08/13 10:50	05/09/13 07:20
2.	LSCE-SB-7-13.5-15	WR73B	13-11431	Soil	05/08/13 13:20	05/09/13 07:20
3.	LSCE-SB-3-13-14	WR73C	13-11432	Soil	05/08/13 09:55	05/09/13 07:20
4.	LSCE-SB-8-9-10	WR73D	13-11433	Soil	05/08/13 13:45	05/09/13 07:20

Subject: Re: WP31 Little Squal
From: Kelly Bottem <kellyb@arilabs.com>
Date: 5/29/2013 11:40 AM
To: Mark Herrenkohl <mherrenkohl@msn.com>, 'Login' <login@arilabs.com>, "samples@arilabs.com" <samples@arilabs.com>

Got it Mark. 10 working days from today.
K

On 5/29/2013 11:37 AM, Mark Herrenkohl wrote:

> Kelly - we would like to analyze the following samples from archive for NWTPH-Dx (with cleanup), SMS metals (not RCRA metals as stated in the SAP), SVOCs, and PCBs following methods in the SAP:
>
> - LSCE-SB-3-13-14 (WP32L)
> - LSCE-SB-4-16-17 (WP31M)
> - LSCE-SB-7-13.5-15 (WP32 I)
> - LSCE-SB-8-9-10 (WP32O)
>
> Please let me know when the results will be available (standard turnaround). Thanks!
>
> 10025 - 10031
>
> WP32 = I, L, O = 4 } 11
> WP31 = M = 4 }
>
> 13-10016
>
> Regards,
>
> Mark J. Herrenkohl, LEG
>
> Herrenkohl Consulting LLC
> 321 Summerland Road
> Bellingham, WA 98229
> 360-319-0721
> mherrenkohl@msn.com
>
> -----Original Message-----
> From: Kelly Bottem [mailto:kellyb@arilabs.com]
> Sent: Friday, May 24, 2013 1:22 PM
> To: Mark Herrenkohl
> Subject: WP31 Little Squal
>
> --
>
> Kelly Frances Bottem, Client Services Manager Analytical Resources, Inc.
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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 2/14/2011

Inorganic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Duplicate RPD is not within established control limits
B	Reported value is less than the CRDL but ≥ the Reporting Limit
N	Matrix Spike recovery not within established control limits
NA	Not Applicable, analyte not spiked
H	The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
L	Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Flagged value is not within established control limits
B	Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J	Estimated concentration when the value is less than ARI's established reporting limits
D	The spiked compound was not detected due to sample extract dilution
E	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
Q	Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NR Spiked compound recovery is not reported due to chromatographic interference

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

M2 The sample contains PCB congeners that do not match any standard Aroclor pattern. The PCBs are identified and quantified as the Aroclor whose pattern most closely matches that of the sample. The reported value is an estimate.

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F Samples were frozen prior to particle size determination

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: MB-060313**
Extraction Method: SW3546 **METHOD BLANK**

Lab Sample ID: MB-060313
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized: MW
Reported: 06/13/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 06/03/13
Date Analyzed: 06/06/13 13:04
Instrument/Analyst: NT10/YZ
GPC Cleanup: Yes

Sample Amount: 10.00 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: NA

CAS Number	Analyte	RL	Result
108-95-2	Phenol	20	< 20 U
111-44-4	Bis-(2-Chloroethyl) Ether	20	< 20 U
95-57-8	2-Chlorophenol	20	< 20 U
541-73-1	1,3-Dichlorobenzene	20	< 20 U
106-46-7	1,4-Dichlorobenzene	20	< 20 U
100-51-6	Benzyl Alcohol	20	< 20 U
95-50-1	1,2-Dichlorobenzene	20	< 20 U
95-48-7	2-Methylphenol	20	< 20 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	20	< 20 U
106-44-5	4-Methylphenol	20	< 20 U
621-64-7	N-Nitroso-Di-N-Propylamine	20	< 20 U
67-72-1	Hexachloroethane	20	< 20 U
98-95-3	Nitrobenzene	20	< 20 U
78-59-1	Isophorone	20	< 20 U
88-75-5	2-Nitrophenol	100	< 100 U
105-67-9	2,4-Dimethylphenol	40	< 40 U
65-85-0	Benzoic Acid	400	< 400 U
111-91-1	bis(2-Chloroethoxy) Methane	20	< 20 U
120-83-2	2,4-Dichlorophenol	200	< 200 U
120-82-1	1,2,4-Trichlorobenzene	20	< 20 U
91-20-3	Naphthalene	20	< 20 U
106-47-8	4-Chloroaniline	270	< 270 U
87-68-3	Hexachlorobutadiene	20	< 20 U
59-50-7	4-Chloro-3-methylphenol	100	< 100 U
91-57-6	2-Methylnaphthalene	20	< 20 U
77-47-4	Hexachlorocyclopentadiene	400	< 400 U
88-06-2	2,4,6-Trichlorophenol	100	< 100 U
95-95-4	2,4,5-Trichlorophenol	100	< 100 U
91-58-7	2-Chloronaphthalene	20	< 20 U
88-74-4	2-Nitroaniline	100	< 100 U
131-11-3	Dimethylphthalate	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
99-09-2	3-Nitroaniline	100	< 100 U
83-32-9	Acenaphthene	20	< 20 U
51-28-5	2,4-Dinitrophenol	850	< 850 U
100-02-7	4-Nitrophenol	100	< 100 U
132-64-9	Dibenzofuran	20	< 20 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: MB-060313**
Extraction Method: SW3546 **METHOD BLANK**

Lab Sample ID: MB-060313 QC Report No: WR73-Herrenkohl Consulting, LLC.
LIMS ID: 13-11430 Project: Little Squalian Creek Estuary
Matrix: Soil HCL030
Date Analyzed: 06/06/13 13:04

CAS Number	Analyte	RL	Result
606-20-2	2,6-Dinitrotoluene	100	< 100 U
121-14-2	2,4-Dinitrotoluene	100	< 100 U
84-66-2	Diethylphthalate	50	< 50 U
7005-72-3	4-Chlorophenyl-phenylether	20	< 20 U
86-73-7	Fluorene	20	< 20 U
100-01-6	4-Nitroaniline	100	< 100 U
534-52-1	4,6-Dinitro-2-Methylphenol	200	< 200 U
86-30-6	N-Nitrosodiphenylamine	20	< 20 U
101-55-3	4-Bromophenyl-phenylether	20	< 20 U
118-74-1	Hexachlorobenzene	20	< 20 U
87-86-5	Pentachlorophenol	200	< 200 U
85-01-8	Phenanthrene	20	< 20 U
86-74-8	Carbazole	20	< 20 U
120-12-7	Anthracene	20	< 20 U
84-74-2	Di-n-Butylphthalate	20	< 20 U
206-44-0	Fluoranthene	20	< 20 U
129-00-0	Pyrene	20	< 20 U
85-68-7	Butylbenzylphthalate	20	< 20 U
91-94-1	3,3'-Dichlorobenzidine	150	< 150 U
56-55-3	Benzo(a)anthracene	20	< 20 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**25**	**15 J**
218-01-9	Chrysene	20	< 20 U
117-84-0	Di-n-Octyl phthalate	20	< 20 U
50-32-8	Benzo(a)pyrene	20	< 20 U
193-39-5	Indeno(1,2,3-cd)pyrene	20	< 20 U
53-70-3	Dibenz(a,h)anthracene	20	< 20 U
191-24-2	Benzo(g,h,i)perylene	20	< 20 U
90-12-0	1-Methylnaphthalene	20	< 20 U
TOTBFA	Total Benzofluoranthenes	40	< 40 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	84.6%	2-Fluorobiphenyl	55.4%
d14-p-Terphenyl	108%	d4-1,2-Dichlorobenzene	71.8%
d5-Phenol	51.1%	2-Fluorophenol	67.5%
2,4,6-Tribromophenol	76.8%	d4-2-Chlorophenol	64.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-4-16-17**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73A
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/13/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/03/13
Date Analyzed: 06/06/13 18:35
Instrument/Analyst: NT10/YZ
GPC Cleanup: Yes

Sample Amount: 10.13 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 22.2%

CAS Number	Analyte	RL	Result
108-95-2	Phenol	20	< 20 U
111-44-4	Bis-(2-Chloroethyl) Ether	20	< 20 U
95-57-8	2-Chlorophenol	20	< 20 U
541-73-1	1,3-Dichlorobenzene	20	< 20 U
106-46-7	1,4-Dichlorobenzene	20	< 20 U
100-51-6	Benzyl Alcohol	20	< 20 U
95-50-1	1,2-Dichlorobenzene	20	< 20 U
95-48-7	2-Methylphenol	20	< 20 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	20	< 20 U
106-44-5	4-Methylphenol	20	< 20 U
621-64-7	N-Nitroso-Di-N-Propylamine	20	< 20 U
67-72-1	Hexachloroethane	20	< 20 U
98-95-3	Nitrobenzene	20	< 20 U
78-59-1	Isophorone	20	< 20 U
88-75-5	2-Nitrophenol	99	< 99 U
105-67-9	2,4-Dimethylphenol	40	< 40 U
65-85-0	Benzoic Acid	400	< 400 U
111-91-1	bis(2-Chloroethoxy) Methane	20	< 20 U
120-83-2	2,4-Dichlorophenol	200	< 200 U
120-82-1	1,2,4-Trichlorobenzene	20	< 20 U
91-20-3	Naphthalene	20	< 20 U
106-47-8	4-Chloroaniline	270	< 270 U
87-68-3	Hexachlorobutadiene	20	< 20 U
59-50-7	4-Chloro-3-methylphenol	99	< 99 U
91-57-6	2-Methylnaphthalene	20	< 20 U
77-47-4	Hexachlorocyclopentadiene	400	< 400 U
88-06-2	2,4,6-Trichlorophenol	99	< 99 U
95-95-4	2,4,5-Trichlorophenol	99	< 99 U
91-58-7	2-Chloronaphthalene	20	< 20 U
88-74-4	2-Nitroaniline	99	< 99 U
131-11-3	Dimethylphthalate	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
99-09-2	3-Nitroaniline	99	< 99 U
83-32-9	Acenaphthene	20	< 20 U
51-28-5	2,4-Dinitrophenol	840	< 840 U
100-02-7	4-Nitrophenol	99	< 99 U
132-64-9	Dibenzofuran	20	< 20 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-4-16-17**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73A QC Report No: WR73-Herrenkohl Consulting, LLC.
LIMS ID: 13-11430 Project: Little Squalian Creek Estuary
Matrix: Soil HCL030
Date Analyzed: 06/06/13 18:35

CAS Number	Analyte	RL	Result
606-20-2	2,6-Dinitrotoluene	99	< 99 U
121-14-2	2,4-Dinitrotoluene	99	< 99 U
84-66-2	Diethylphthalate	49	< 49 U
7005-72-3	4-Chlorophenyl-phenylether	20	< 20 U
86-73-7	Fluorene	20	< 20 U
100-01-6	4-Nitroaniline	99	< 99 U
534-52-1	4,6-Dinitro-2-Methylphenol	200	< 200 U
86-30-6	N-Nitrosodiphenylamine	20	< 20 U
101-55-3	4-Bromophenyl-phenylether	20	< 20 U
118-74-1	Hexachlorobenzene	20	< 20 U
87-86-5	Pentachlorophenol	200	< 200 U
85-01-8	**Phenanthrene**	**20**	**12 J**
86-74-8	Carbazole	20	< 20 U
120-12-7	Anthracene	20	< 20 U
84-74-2	Di-n-Butylphthalate	20	< 20 U
206-44-0	Fluoranthene	20	< 20 U
129-00-0	Pyrene	20	< 20 U
85-68-7	Butylbenzylphthalate	20	< 20 U
91-94-1	3,3'-Dichlorobenzidine	150	< 150 U
56-55-3	Benzo(a)anthracene	20	< 20 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**25**	**17 JB**
218-01-9	Chrysene	20	< 20 U
117-84-0	Di-n-Octyl phthalate	20	< 20 U
50-32-8	Benzo(a)pyrene	20	< 20 U
193-39-5	Indeno(1,2,3-cd)pyrene	20	< 20 U
53-70-3	Dibenz(a,h)anthracene	20	< 20 U
191-24-2	Benzo(g,h,i)perylene	20	< 20 U
90-12-0	**1-Methylnaphthalene**	**20**	**9.9 J**
TOTBFA	Total Benzofluoranthenes	40	< 40 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	59.4%	2-Fluorobiphenyl	53.6%
d14-p-Terphenyl	77.8%	d4-1,2-Dichlorobenzene	57.6%
d5-Phenol	45.7%	2-Fluorophenol	56.8%
2,4,6-Tribromophenol	66.7%	d4-2-Chlorophenol	54.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-7-13.5-15**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73B
LIMS ID: 13-11431
Matrix: Soil
Data Release Authorized:
Reported: 06/13/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/03/13
Date Analyzed: 06/06/13 19:11
Instrument/Analyst: NT10/YZ
GPC Cleanup: Yes

Sample Amount: 10.63 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 11.8%

CAS Number	Analyte	RL	Result
108-95-2	Phenol	19	< 19 U
111-44-4	Bis-(2-Chloroethyl) Ether	19	< 19 U
95-57-8	2-Chlorophenol	19	< 19 U
541-73-1	1,3-Dichlorobenzene	19	< 19 U
106-46-7	1,4-Dichlorobenzene	19	< 19 U
100-51-6	Benzyl Alcohol	19	< 19 U
95-50-1	1,2-Dichlorobenzene	19	< 19 U
95-48-7	2-Methylphenol	19	< 19 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	19	< 19 U
106-44-5	4-Methylphenol	19	< 19 U
621-64-7	N-Nitroso-Di-N-Propylamine	19	< 19 U
67-72-1	Hexachloroethane	19	< 19 U
98-95-3	Nitrobenzene	19	< 19 U
78-59-1	Isophorone	19	< 19 U
88-75-5	2-Nitrophenol	94	< 94 U
105-67-9	2,4-Dimethylphenol	38	< 38 U
65-85-0	Benzoic Acid	380	< 380 U
111-91-1	bis(2-Chloroethoxy) Methane	19	< 19 U
120-83-2	2,4-Dichlorophenol	190	< 190 U
120-82-1	1,2,4-Trichlorobenzene	19	< 19 U
91-20-3	Naphthalene	19	< 19 U
106-47-8	4-Chloroaniline	250	< 250 U
87-68-3	Hexachlorobutadiene	19	< 19 U
59-50-7	4-Chloro-3-methylphenol	94	< 94 U
91-57-6	2-Methylnaphthalene	19	< 19 U
77-47-4	Hexachlorocyclopentadiene	380	< 380 U
88-06-2	2,4,6-Trichlorophenol	94	< 94 U
95-95-4	2,4,5-Trichlorophenol	94	< 94 U
91-58-7	2-Chloronaphthalene	19	< 19 U
88-74-4	2-Nitroaniline	94	< 94 U
131-11-3	Dimethylphthalate	19	< 19 U
208-96-8	Acenaphthylene	19	< 19 U
99-09-2	3-Nitroaniline	94	< 94 U
83-32-9	Acenaphthene	19	< 19 U
51-28-5	2,4-Dinitrophenol	800	< 800 U
100-02-7	4-Nitrophenol	94	< 94 U
132-64-9	Dibenzofuran	19	< 19 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-7-13.5-15**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73B QC Report No: WR73-Herrenkohl Consulting, LLC.
LIMS ID: 13-11431 Project: Little Squalian Creek Estuary
Matrix: Soil HCL030
Date Analyzed: 06/06/13 19:11

CAS Number	Analyte	RL	Result
606-20-2	2,6-Dinitrotoluene	94	< 94 U
121-14-2	2,4-Dinitrotoluene	94	< 94 U
84-66-2	Diethylphthalate	47	< 47 U
7005-72-3	4-Chlorophenyl-phenylether	19	< 19 U
86-73-7	Fluorene	19	< 19 U
100-01-6	4-Nitroaniline	94	< 94 U
534-52-1	4,6-Dinitro-2-Methylphenol	190	< 190 U
86-30-6	N-Nitrosodiphenylamine	19	< 19 U
101-55-3	4-Bromophenyl-phenylether	19	< 19 U
118-74-1	Hexachlorobenzene	19	< 19 U
87-86-5	Pentachlorophenol	190	< 190 U
85-01-8	Phenanthrene	19	< 19 U
86-74-8	Carbazole	19	< 19 U
120-12-7	Anthracene	19	< 19 U
84-74-2	Di-n-Butylphthalate	19	< 19 U
206-44-0	Fluoranthene	19	< 19 U
129-00-0	Pyrene	19	< 19 U
85-68-7	Butylbenzylphthalate	19	< 19 U
91-94-1	3,3'-Dichlorobenzidine	140	< 140 U
56-55-3	Benzo(a)anthracene	19	< 19 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**24**	**68 B**
218-01-9	Chrysene	19	< 19 U
117-84-0	Di-n-Octyl phthalate	19	< 19 U
50-32-8	Benzo(a)pyrene	19	< 19 U
193-39-5	Indeno(1,2,3-cd)pyrene	19	< 19 U
53-70-3	Dibenz(a,h)anthracene	19	< 19 U
191-24-2	Benzo(g,h,i)perylene	19	< 19 U
90-12-0	1-Methylnaphthalene	19	< 19 U
TOTBFA	Total Benzofluoranthenes	38	< 38 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	59.8%	2-Fluorobiphenyl	50.0%
d14-p-Terphenyl	76.2%	d4-1,2-Dichlorobenzene	58.6%
d5-Phenol	42.1%	2-Fluorophenol	57.5%
2,4,6-Tribromophenol	61.2%	d4-2-Chlorophenol	54.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-3-13-14**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73C
LIMS ID: 13-11432
Matrix: Soil
Data Release Authorized:
Reported: 06/13/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/03/13
Date Analyzed: 06/06/13 19:48
Instrument/Analyst: NT10/YZ
GPC Cleanup: Yes

Sample Amount: 10.34 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 20.5%

CAS Number	Analyte	RL	Result
108-95-2	Phenol	19	< 19 U
111-44-4	Bis-(2-Chloroethyl) Ether	19	< 19 U
95-57-8	2-Chlorophenol	19	< 19 U
541-73-1	1,3-Dichlorobenzene	19	< 19 U
106-46-7	1,4-Dichlorobenzene	19	< 19 U
100-51-6	Benzyl Alcohol	19	< 19 U
95-50-1	1,2-Dichlorobenzene	19	< 19 U
95-48-7	2-Methylphenol	19	< 19 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	19	< 19 U
106-44-5	4-Methylphenol	19	< 19 U
621-64-7	N-Nitroso-Di-N-Propylamine	19	< 19 U
67-72-1	Hexachloroethane	19	< 19 U
98-95-3	Nitrobenzene	19	< 19 U
78-59-1	Isophorone	19	< 19 U
88-75-5	2-Nitrophenol	97	< 97 U
105-67-9	2,4-Dimethylphenol	39	< 39 U
65-85-0	Benzoic Acid	390	< 390 U
111-91-1	bis(2-Chloroethoxy) Methane	19	< 19 U
120-83-2	2,4-Dichlorophenol	190	< 190 U
120-82-1	1,2,4-Trichlorobenzene	19	< 19 U
91-20-3	Naphthalene	19	< 19 U
106-47-8	4-Chloroaniline	260	< 260 U
87-68-3	Hexachlorobutadiene	19	< 19 U
59-50-7	4-Chloro-3-methylphenol	97	< 97 U
91-57-6	2-Methylnaphthalene	19	< 19 U
77-47-4	Hexachlorocyclopentadiene	390	< 390 U
88-06-2	2,4,6-Trichlorophenol	97	< 97 U
95-95-4	2,4,5-Trichlorophenol	97	< 97 U
91-58-7	2-Chloronaphthalene	19	< 19 U
88-74-4	2-Nitroaniline	97	< 97 U
131-11-3	Dimethylphthalate	19	< 19 U
208-96-8	Acenaphthylene	19	< 19 U
99-09-2	3-Nitroaniline	97	< 97 U
83-32-9	Acenaphthene	19	< 19 U
51-28-5	2,4-Dinitrophenol	820	< 820 U
100-02-7	4-Nitrophenol	97	< 97 U
132-64-9	Dibenzofuran	19	< 19 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-3-13-14**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73C
LIMS ID: 13-11432
Matrix: Soil
Date Analyzed: 06/06/13 19:48

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030

CAS Number	Analyte	RL	Result
606-20-2	2,6-Dinitrotoluene	97	< 97 U
121-14-2	2,4-Dinitrotoluene	97	< 97 U
84-66-2	Diethylphthalate	48	< 48 U
7005-72-3	4-Chlorophenyl-phenylether	19	< 19 U
86-73-7	Fluorene	19	< 19 U
100-01-6	4-Nitroaniline	97	< 97 U
534-52-1	4,6-Dinitro-2-Methylphenol	190	< 190 U
86-30-6	N-Nitrosodiphenylamine	19	< 19 U
101-55-3	4-Bromophenyl-phenylether	19	< 19 U
118-74-1	Hexachlorobenzene	19	< 19 U
87-86-5	Pentachlorophenol	190	< 190 U
85-01-8	**Phenanthrene**	**19**	**11 J**
86-74-8	Carbazole	19	< 19 U
120-12-7	Anthracene	19	< 19 U
84-74-2	Di-n-Butylphthalate	19	< 19 U
206-44-0	Fluoranthene	19	< 19 U
129-00-0	Pyrene	19	< 19 U
85-68-7	Butylbenzylphthalate	19	< 19 U
91-94-1	3,3'-Dichlorobenzidine	140	< 140 U
56-55-3	Benzo(a)anthracene	19	< 19 U
117-81-7	bis(2-Ethylhexyl)phthalate	24	< 24 U
218-01-9	Chrysene	19	< 19 U
117-84-0	Di-n-Octyl phthalate	19	< 19 U
50-32-8	Benzo(a)pyrene	19	< 19 U
193-39-5	Indeno(1,2,3-cd)pyrene	19	< 19 U
53-70-3	Dibenz(a,h)anthracene	19	< 19 U
191-24-2	Benzo(g,h,i)perylene	19	< 19 U
90-12-0	1-Methylnaphthalene	19	< 19 U
TOTBFA	Total Benzofluoranthenes	39	< 39 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	64.4%	2-Fluorobiphenyl	55.2%
d14-p-Terphenyl	83.4%	d4-1,2-Dichlorobenzene	61.0%
d5-Phenol	45.2%	2-Fluorophenol	58.9%
2,4,6-Tribromophenol	63.3%	d4-2-Chlorophenol	56.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-8-9-10**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73D
LIMS ID: 13-11433
Matrix: Soil
Data Release Authorized: MW
Reported: 06/13/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/03/13
Date Analyzed: 06/06/13 20:25
Instrument/Analyst: NT10/YZ
GPC Cleanup: Yes

Sample Amount: 10.35 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 26.3%

CAS Number	Analyte	RL	Result
108-95-2	Phenol	19	< 19 U
111-44-4	Bis-(2-Chloroethyl) Ether	19	< 19 U
95-57-8	2-Chlorophenol	19	< 19 U
541-73-1	1,3-Dichlorobenzene	19	< 19 U
106-46-7	1,4-Dichlorobenzene	19	< 19 U
100-51-6	Benzyl Alcohol	19	< 19 U
95-50-1	1,2-Dichlorobenzene	19	< 19 U
95-48-7	2-Methylphenol	19	< 19 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	19	< 19 U
106-44-5	4-Methylphenol	19	< 19 U
621-64-7	N-Nitroso-Di-N-Propylamine	19	< 19 U
67-72-1	Hexachloroethane	19	< 19 U
98-95-3	Nitrobenzene	19	< 19 U
78-59-1	Isophorone	19	< 19 U
88-75-5	2-Nitrophenol	97	< 97 U
105-67-9	2,4-Dimethylphenol	39	< 39 U
65-85-0	Benzoic Acid	390	< 390 U
111-91-1	bis(2-Chloroethoxy) Methane	19	< 19 U
120-83-2	2,4-Dichlorophenol	190	< 190 U
120-82-1	1,2,4-Trichlorobenzene	19	< 19 U
91-20-3	Naphthalene	19	< 19 U
106-47-8	4-Chloroaniline	260	< 260 U
87-68-3	Hexachlorobutadiene	19	< 19 U
59-50-7	4-Chloro-3-methylphenol	97	< 97 U
91-57-6	2-Methylnaphthalene	19	< 19 U
77-47-4	Hexachlorocyclopentadiene	390	< 390 U
88-06-2	2,4,6-Trichlorophenol	97	< 97 U
95-95-4	2,4,5-Trichlorophenol	97	< 97 U
91-58-7	2-Chloronaphthalene	19	< 19 U
88-74-4	2-Nitroaniline	97	< 97 U
131-11-3	Dimethylphthalate	19	< 19 U
208-96-8	Acenaphthylene	19	< 19 U
99-09-2	3-Nitroaniline	97	< 97 U
83-32-9	Acenaphthene	19	< 19 U
51-28-5	2,4-Dinitrophenol	820	< 820 U
100-02-7	4-Nitrophenol	97	< 97 U
132-64-9	Dibenzofuran	19	< 19 U

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LSCE-SB-8-9-10**
Extraction Method: SW3546 **SAMPLE**

Lab Sample ID: WR73D
LIMS ID: 13-11433
Matrix: Soil
Date Analyzed: 06/06/13 20:25

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030

CAS Number	Analyte	RL	Result
606-20-2	2,6-Dinitrotoluene	97	< 97 U
121-14-2	2,4-Dinitrotoluene	97	< 97 U
84-66-2	Diethylphthalate	48	< 48 U
7005-72-3	4-Chlorophenyl-phenylether	19	< 19 U
86-73-7	Fluorene	19	< 19 U
100-01-6	4-Nitroaniline	97	< 97 U
534-52-1	4,6-Dinitro-2-Methylphenol	190	< 190 U
86-30-6	N-Nitrosodiphenylamine	19	< 19 U
101-55-3	4-Bromophenyl-phenylether	19	< 19 U
118-74-1	Hexachlorobenzene	19	< 19 U
87-86-5	Pentachlorophenol	190	< 190 U
85-01-8	Phenanthrene	19	< 19 U
86-74-8	Carbazole	19	< 19 U
120-12-7	Anthracene	19	< 19 U
84-74-2	Di-n-Butylphthalate	19	< 19 U
206-44-0	Fluoranthene	19	< 19 U
129-00-0	Pyrene	19	< 19 U
85-68-7	Butylbenzylphthalate	19	< 19 U
91-94-1	3,3'-Dichlorobenzidine	140	< 140 U
56-55-3	Benzo(a)anthracene	19	< 19 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**24**	**16 JB**
218-01-9	Chrysene	19	< 19 U
117-84-0	Di-n-Octyl phthalate	19	< 19 U
50-32-8	Benzo(a)pyrene	19	< 19 U
193-39-5	Indeno(1,2,3-cd)pyrene	19	< 19 U
53-70-3	Dibenz(a,h)anthracene	19	< 19 U
191-24-2	Benzo(g,h,i)perylene	19	< 19 U
90-12-0	1-Methylnaphthalene	19	< 19 U
TOTBFA	Total Benzofluoranthenes	39	< 39 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d5-Nitrobenzene	41.2%	2-Fluorobiphenyl	38.0%
d14-p-Terphenyl	50.0%	d4-1,2-Dichlorobenzene	39.0%
d5-Phenol	28.9%	2-Fluorophenol	38.9%
2,4,6-Tribromophenol	44.5%	d4-2-Chlorophenol	35.7%

ANALYTICAL RESOURCES INCORPORATED

SW8270 SEMIVOLATILES SOIL/SEDIMENT SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030

Client ID	NBZ	FBP	TPH	DCB	PHL	2FP	TBP	2CP	TOT OUT
MB-060313	84.6%	55.4%	108%	71.8%	51.1%	67.5%	76.8%	64.0%	0
LCS-060313	70.6%	70.6%	87.4%	66.4%	64.4%	68.1%	82.3%	66.0%	0
LSCE-SB-4-16-17	59.4%	53.6%	77.8%	57.6%	45.7%	56.8%	66.7%	54.0%	0
LSCE-SB-7-13.5-15	59.8%	50.0%	76.2%	58.6%	42.1%	57.5%	61.2%	54.4%	0
LSCE-SB-3-13-14	64.4%	55.2%	83.4%	61.0%	45.2%	58.9%	63.3%	56.3%	0
LSCE-SB-8-9-10	41.2%	38.0%	50.0%	39.0%	28.9%*	38.9%	44.5%	35.7%	1

	LCS/MB LIMITS	QC LIMITS
(NBZ) = d5-Nitrobenzene	(33-120)	(30-120)
(FBP) = 2-Fluorobiphenyl	(35-120)	(35-120)
(TPH) = d14-p-Terphenyl	(42-124)	(37-120)
(DCB) = d4-1,2-Dichlorobenzene	(37-120)	(32-120)
(PHL) = d5-Phenol	(32-120)	(29-120)
(2FP) = 2-Fluorophenol	(32-120)	(27-120)
(TBP) = 2,4,6-Tribromophenol	(23-133)	(24-134)
(2CP) = d4-2-Chlorophenol	(36-120)	(31-120)

Prep Method: SW3546
Log Number Range: 13-11430 to 13-11433

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LCS-060313**
 LAB CONTROL

Lab Sample ID: LCS-060313
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized: MW
Reported: 06/13/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/03/13
Date Analyzed: 06/06/13 13:40
Instrument/Analyst: NT10/YZ
GPC Cleanup: Yes

Sample Amount: 10.00 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Phenol	340	500	68.0%
Bis-(2-Chloroethyl) Ether	384	500	76.8%
2-Chlorophenol	296	500	59.2%
1,3-Dichlorobenzene	336	500	67.2%
1,4-Dichlorobenzene	336	500	67.2%
Benzyl Alcohol	179 Q	500	35.8%
1,2-Dichlorobenzene	350	500	70.0%
2-Methylphenol	248	500	49.6%
2,2'-Oxybis(1-Chloropropane)	365	500	73.0%
4-Methylphenol	494	1000	49.4%
N-Nitroso-Di-N-Propylamine	365	500	73.0%
Hexachloroethane	349	500	69.8%
Nitrobenzene	366	500	73.2%
Isophorone	372	500	74.4%
2-Nitrophenol	386	500	77.2%
2,4-Dimethylphenol	798	1500	53.2%
Benzoic Acid	1600	2750	58.2%
bis(2-Chloroethoxy) Methane	387	500	77.4%
2,4-Dichlorophenol	779 Q	1500	51.9%
1,2,4-Trichlorobenzene	347	500	69.4%
Naphthalene	329	500	65.8%
4-Chloroaniline	553 Q	1500	36.9%
Hexachlorobutadiene	363	500	72.6%
4-Chloro-3-methylphenol	1170	1500	78.0%
2-Methylnaphthalene	351	500	70.2%
Hexachlorocyclopentadiene	919	1500	61.3%
2,4,6-Trichlorophenol	1060	1500	70.7%
2,4,5-Trichlorophenol	1060	1500	70.7%
2-Chloronaphthalene	376	500	75.2%
2-Nitroaniline	1400	1500	93.3%
Dimethylphthalate	438	500	87.6%
Acenaphthylene	344	500	68.8%
3-Nitroaniline	1160	1500	77.3%
Acenaphthene	360	500	72.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA Semivolatiles by SW8270D GC/MS **Sample ID: LCS-060313**
 LAB CONTROL

Lab Sample ID: LCS-060313 QC Report No: WR73-Herrenkohl Consulting, LLC.
LIMS ID: 13-11430 Project: Little Squalian Creek Estuary
Matrix: Soil HCL030
Date Analyzed: 06/06/13 13:40

Analyte	Lab Control	Spike Added	Recovery
2,4-Dinitrophenol	1520 Q	2750	55.3%
4-Nitrophenol	630 Q	1500	42.0%
Dibenzofuran	385	500	77.0%
2,6-Dinitrotoluene	1330	1500	88.7%
2,4-Dinitrotoluene	1330	1500	88.7%
Diethylphthalate	499	500	99.8%
4-Chlorophenyl-phenylether	373	500	74.6%
Fluorene	357	500	71.4%
4-Nitroaniline	974 Q	1500	64.9%
4,6-Dinitro-2-Methylphenol	2000	2750	72.7%
N-Nitrosodiphenylamine	435	500	87.0%
4-Bromophenyl-phenylether	418	500	83.6%
Hexachlorobenzene	436	500	87.2%
Pentachlorophenol	1210	1500	80.7%
Phenanthrene	400	500	80.0%
Carbazole	528	500	106%
Anthracene	375	500	75.0%
Di-n-Butylphthalate	499	500	99.8%
Fluoranthene	407	500	81.4%
Pyrene	447	500	89.4%
Butylbenzylphthalate	550	500	110%
3,3'-Dichlorobenzidine	623	1500	41.5%
Benzo(a)anthracene	402	500	80.4%
bis(2-Ethylhexyl)phthalate	467 B	500	93.4%
Chrysene	415	500	83.0%
Di-n-Octyl phthalate	468	500	93.6%
Benzo(a)pyrene	405	500	81.0%
Indeno(1,2,3-cd)pyrene	435	500	87.0%
Dibenz(a,h)anthracene	392	500	78.4%
Benzo(g,h,i)perylene	392	500	78.4%
1-Methylnaphthalene	378	500	75.6%
Total Benzofluoranthenes	838	1000	83.8%

Semivolatile Surrogate Recovery

d5-Nitrobenzene	70.6%
2-Fluorobiphenyl	70.6%
d14-p-Terphenyl	87.4%
d4-1,2-Dichlorobenzene	66.4%
d5-Phenol	64.4%
2-Fluorophenol	68.1%
2,4,6-Tribromophenol	82.3%
d4-2-Chlorophenol	66.0%

Reported in µg/kg (ppb)

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Extraction Method: SW3546
Page 1 of 1

Sample ID: MB-060413
METHOD BLANK

Lab Sample ID: MB-060413
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/10/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 06/04/13
Date Analyzed: 06/06/13 13:16
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 12.5 g
Final Extract Volume: 2.50 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: NA

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	Aroclor 1248	4.0	< 4.0 U
11097-69-1	Aroclor 1254	4.0	< 4.0 U
11096-82-5	Aroclor 1260	4.0	< 4.0 U
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U
37324-23-5	Aroclor 1262	4.0	< 4.0 U
11100-14-4	Aroclor 1268	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	83.0%
Tetrachlorometaxylene	71.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Extraction Method: SW3546
Page 1 of 1

Sample ID: LSCE-SB-4-16-17
SAMPLE

Lab Sample ID: WR73A
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/10/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/04/13
Date Analyzed: 06/06/13 14:17
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 13.3 g-dry-wt
Final Extract Volume: 2.50 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: 22.2%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	3.8	< 3.8 U
11097-69-1	Aroclor 1254	3.8	< 3.8 U
11096-82-5	Aroclor 1260	3.8	< 3.8 U
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U
37324-23-5	Aroclor 1262	3.8	< 3.8 U
11100-14-4	Aroclor 1268	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	77.2%
Tetrachlorometaxylene	68.8%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Extraction Method: SW3546

Sample ID: LSCE-SB-7-13.5-15
SAMPLE

Lab Sample ID: WR73B
LIMS ID: 13-11431
Matrix: Soil
Data Release Authorized:
Reported: 06/10/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/04/13
Date Analyzed: 06/06/13 14:37
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 13.4 g-dry-wt
Final Extract Volume: 2.50 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: 11.8%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.7	< 3.7 U
53469-21-9	Aroclor 1242	3.7	< 3.7 U
12672-29-6	Aroclor 1248	3.7	< 3.7 U
11097-69-1	Aroclor 1254	3.7	< 3.7 U
11096-82-5	Aroclor 1260	3.7	< 3.7 U
11104-28-2	Aroclor 1221	3.7	< 3.7 U
11141-16-5	Aroclor 1232	3.7	< 3.7 U
37324-23-5	Aroclor 1262	3.7	< 3.7 U
11100-14-4	Aroclor 1268	3.7	< 3.7 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	78.8%
Tetrachlorometaxylene	67.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Extraction Method: SW3546
Page 1 of 1

Sample ID: LSCE-SB-3-13-14
SAMPLE

Lab Sample ID: WR73C
LIMS ID: 13-11432
Matrix: Soil
Data Release Authorized:
Reported: 06/10/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/04/13
Date Analyzed: 06/06/13 14:56
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 12.9 g-dry-wt
Final Extract Volume: 2.50 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: 20.5%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	3.9	< 3.9 U
11097-69-1	Aroclor 1254	3.9	< 3.9 U
11096-82-5	Aroclor 1260	3.9	< 3.9 U
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U
37324-23-5	Aroclor 1262	3.9	< 3.9 U
11100-14-4	Aroclor 1268	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	82.0%
Tetrachlorometaxylene	76.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Extraction Method: SW3546
Page 1 of 1

Sample ID: LSCE-SB-8-9-10
SAMPLE

Lab Sample ID: WR73D
LIMS ID: 13-11433
Matrix: Soil
Data Release Authorized:
Reported: 06/10/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Date Extracted: 06/04/13
Date Analyzed: 06/06/13 15:16
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 12.7 g-dry-wt
Final Extract Volume: 2.50 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: 26.3%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	3.9	< 3.9 U
11097-69-1	Aroclor 1254	3.9	< 3.9 U
11096-82-5	Aroclor 1260	3.9	< 3.9 U
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U
37324-23-5	Aroclor 1262	3.9	< 3.9 U
11100-14-4	Aroclor 1268	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	74.8%
Tetrachlorometaxylene	65.8%

FORM I

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB SOIL/SEDIMENT SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030

Client ID	DCBP % REC	DCBP LCL-UCL	TCMX % REC	TCMX LCL-UCL	TOT OUT
MB-060413	83.0%	64-105	71.2%	54-100	0
LCS-060413	88.5%	64-105	71.5%	54-100	0
LSCE-SB-4-16-17	77.2%	37-128	68.8%	45-102	0
LSCE-SB-7-13.5-15	78.8%	37-128	67.2%	45-102	0
LSCE-SB-3-13-14	82.0%	37-128	76.2%	45-102	0
LSCE-SB-8-9-10	74.8%	37-128	65.8%	45-102	0

Microwave (MARS) Control Limits PCBSMM
Prep Method: SW3546
Log Number Range: 13-11430 to 13-11433

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: LCS-060413
LAB CONTROL

Lab Sample ID: LCS-060413
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/10/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

Date Extracted: 06/04/13
Date Analyzed: 06/06/13 13:36
Instrument/Analyst: ECD5/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes
Florisil Cleanup: No

Sample Amount: 12.5 g-dry-wt
Final Extract Volume: 2.50 mL
Dilution Factor: 1.00
Silica Gel: Yes

Percent Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Aroclor 1016	76.2	101	75.4%
Aroclor 1260	82.6	101	81.8%

PCB Surrogate Recovery

Decachlorobiphenyl	88.5%
Tetrachlorometaxylene	71.5%

Results reported in µg/kg (ppb)

FORM III

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TOTAL DIESEL RANGE HYDROCARBONS

NWTPHD by GC/FID-Silica and Acid Cleaned
Extraction Method: SW3546

QC Report No: WR73-Herrenkohl Consulting, LLC
Project: Little Squalian Creek Estuary
HCL030

Matrix: Soil
Data Release Authorized: MW
Reported: 06/10/13

ARI ID	Sample ID	Extraction Date	Analysis Date	EFV DF	Range/Surrogate	RL	Result
MB-060313	Method Blank	06/03/13	06/05/13	1.00	Diesel Range	5.0	< 5.0 U
13-11430	HC ID: ---		FID3B	1.0	Motor Oil Range	10	< 10 U
					o-Terphenyl		76.9%
WR73A	LSCE-SB-4-16-17	06/03/13	06/05/13	1.00	Diesel Range	6.4	< 6.4 U
13-11430	HC ID: ---		FID3B	1.0	Motor Oil Range	13	< 13 U
					o-Terphenyl		74.1%
WR73B	LSCE-SB-7-13.5-15	06/03/13	06/05/13	1.00	Diesel Range	5.6	< 5.6 U
13-11431	HC ID: ---		FID3B	1.0	Motor Oil Range	11	< 11 U
					o-Terphenyl		79.5%
WR73C	LSCE-SB-3-13-14	06/03/13	06/05/13	1.00	Diesel Range	6.3	< 6.3 U
13-11432	HC ID: ---		FID3B	1.0	Motor Oil Range	13	< 13 U
					o-Terphenyl		82.0%
WR73D	LSCE-SB-8-9-10	06/03/13	06/05/13	1.00	Diesel Range	6.8	< 6.8 U
13-11433	HC ID: ---		FID3B	1.0	Motor Oil Range	14	< 14 U
					o-Terphenyl		69.0%

Reported in mg/kg (ppm)

EFV-Effective Final Volume in mL.
DL-Dilution of extract prior to analysis.
RL-Reporting limit.

Diesel range quantitation on total peaks in the range from C12 to C24.
Motor Oil range quantitation on total peaks in the range from C24 to C38.
HC ID: DRO/RRO indicate results of organics or additional hydrocarbons in ranges are not identifiable.

ANALYTICAL RESOURCES INCORPORATED

CLEANED TPHD SURROGATE RECOVERY SUMMARY

Matrix: Soil

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030

Client ID	OTER	TOT OUT
MB-060313	76.9%	0
LCS-060313	54.6%	0
LCSD-060313	79.7%	0
LSCE-SB-4-16-17	74.1%	0
LSCE-SB-7-13.5-15	79.5%	0
LSCE-SB-3-13-14	82.0%	0
LSCE-SB-8-9-10	69.0%	0

	LCS/MB LIMITS	QC LIMITS
(OTER) = o-Terphenyl	(50-150)	(50-150)

Prep Method: SW3546
Log Number Range: 13-11430 to 13-11433

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
NWTPHD by GC/FID-Silica and Acid Cleaned **Sample ID: LCS-060313**
Page 1 of 1 **LCS/LCSD**

Lab Sample ID: LCS-060313 QC Report No: WR73-Herrenkohl Consulting, LLC.
LIMS ID: 13-11430 Project: Little Squalian Creek Estuary
Matrix: Soil HCL030
Data Release Authorized: Date Sampled: 05/08/13
Reported: 06/10/13 Date Received: 05/09/13

Date Extracted LCS/LCSD: 06/03/13 Sample Amount LCS: 10.0 g
LCSD: 10.0 g
Date Analyzed LCS: 06/05/13 15:45 Final Extract Volume LCS: 1.0 mL
LCSD: 06/05/13 16:03 LCSD: 1.0 mL
Instrument/Analyst LCS: FID/JLW Dilution Factor LCS: 1.0
LCSD: FID/JLW LCSD: 1.0

Range	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Diesel	94.0	150	62.7%	111	150	74.0%	16.6%

TPHD Surrogate Recovery

	LCS	LCSD
o-Terphenyl	54.6%	79.7%

Results reported in mg/kg
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

TOTAL DIESEL RANGE HYDROCARBONS-EXTRACTION REPORT

Matrix: Soil
Date Received: 05/09/13

ARI Job: WR73
Project: Little Squalian Creek Estuary
HCL030

ARI ID	Client ID	Client Amt	Final Vol	Basis	Prep Date
13-11430-060313MB1	Method Blank	10.0 g	1.00 mL	-	06/03/13
13-11430-060313LCS1	Lab Control	10.0 g	1.00 mL	-	06/03/13
13-11430-060313LCSD1	Lab Control Dup	10.0 g	1.00 mL	-	06/03/13
13-11430-WR73A	LSCE-SB-4-16-17	7.80 g	1.00 mL	D	06/03/13
13-11431-WR73B	LSCE-SB-7-13.5-15	8.87 g	1.00 mL	D	06/03/13
13-11432-WR73C	LSCE-SB-3-13-14	7.96 g	1.00 mL	D	06/03/13
13-11433-WR73D	LSCE-SB-8-9-10	7.39 g	1.00 mL	D	06/03/13

Basis: D=Dry Weight W=As Received

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LSCE-SB-4-16-17
SAMPLE

Lab Sample ID: WR73A
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Percent Total Solids: 78.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	mg/kg-dry	Q
3050B	05/30/13	200.8	06/03/13	**7440-38-2**	**Arsenic**	0.2	**2.9**	
3050B	05/30/13	6010C	06/03/13	**7440-43-9**	**Cadmium**	0.2	**0.5**	
3050B	05/30/13	6010C	06/03/13	**7440-47-3**	**Chromium**	0.6	**35.6**	
3050B	05/30/13	6010C	06/03/13	**7440-50-8**	**Copper**	0.2	**25.0**	
3050B	05/30/13	200.8	06/03/13	**7439-92-1**	**Lead**	0.1	**2.5**	
CLP	05/30/13	7471A	06/03/13	7439-97-6	Mercury	0.03	0.03	U
3050B	05/30/13	6010C	06/03/13	7440-22-4	Silver	0.4	0.4	U
3050B	05/30/13	6010C	06/03/13	**7440-66-6**	**Zinc**	1	**48**	

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LSCE-SB-4-16-17
DUPLICATE

Lab Sample ID: WR73A
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Arsenic	200.8	2.9	3.3	12.9%	+/- 20%	
Cadmium	6010C	0.5	0.5	0.0%	+/- 0.2	L
Chromium	6010C	35.6	43.2	19.3%	+/- 20%	
Copper	6010C	25.0	27.9	11.0%	+/- 20%	
Lead	200.8	2.5	2.7	7.7%	+/- 20%	
Mercury	7471A	0.03 U	0.03 U	0.0%	+/- 0.03	L
Silver	6010C	0.4 U	0.4 U	0.0%	+/- 0.4	L
Zinc	6010C	48	51	6.1%	+/- 20%	

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: LSCE-SB-4-16-17
MATRIX SPIKE

Lab Sample ID: WR73A
LIMS ID: 13-11430
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Arsenic	200.8	2.9	34.6	30.8	103%	
Cadmium	6010C	0.5	62.9	60.9	102%	
Chromium	6010C	35.6	96.0	60.9	99.2%	
Copper	6010C	25.0	85.0	60.9	98.5%	
Lead	200.8	2.5	32.0	30.8	95.8%	
Mercury	7471A	0.03 U	0.30	0.251	120%	
Silver	6010C	0.4 U	58.1	60.9	95.4%	
Zinc	6010C	48	105	60.9	93.6%	

Reported in mg/kg-dry

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LSCE-SB-7-13.5-15
SAMPLE

Lab Sample ID: WR73B
LIMS ID: 13-11431
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Percent Total Solids: 86.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	mg/kg-dry	Q
3050B	05/30/13	200.8	06/03/13	**7440-38-2**	**Arsenic**	0.2	**2.4**	
3050B	05/30/13	6010C	06/03/13	**7440-43-9**	**Cadmium**	0.2	**0.4**	
3050B	05/30/13	6010C	06/03/13	**7440-47-3**	**Chromium**	0.5	**29.5**	
3050B	05/30/13	6010C	06/03/13	**7440-50-8**	**Copper**	0.2	**16.0**	
3050B	05/30/13	200.8	06/03/13	**7439-92-1**	**Lead**	0.1	**1.8**	
CLP	05/30/13	7471A	06/03/13	7439-97-6	Mercury	0.03	0.03	U
3050B	05/30/13	6010C	06/03/13	7440-22-4	Silver	0.3	0.3	U
3050B	05/30/13	6010C	06/03/13	**7440-66-6**	**Zinc**	1	**34**	

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LSCE-SB-3-13-14
SAMPLE

Lab Sample ID: WR73C
LIMS ID: 13-11432
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Percent Total Solids: 78.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	mg/kg-dry	Q
3050B	05/30/13	200.8	06/03/13	**7440-38-2**	**Arsenic**	0.6	**3.4**	
3050B	05/30/13	6010C	06/03/13	**7440-43-9**	**Cadmium**	0.2	**0.7**	
3050B	05/30/13	6010C	06/03/13	**7440-47-3**	**Chromium**	0.6	**31.6**	
3050B	05/30/13	6010C	06/03/13	**7440-50-8**	**Copper**	0.2	**28.5**	
3050B	05/30/13	200.8	06/03/13	**7439-92-1**	**Lead**	0.1	**2.8**	
CLP	05/30/13	7471A	06/03/13	**7439-97-6**	**Mercury**	0.02	**0.03**	
3050B	05/30/13	6010C	06/03/13	7440-22-4	Silver	0.4	0.4	U
3050B	05/30/13	6010C	06/03/13	**7440-66-6**	**Zinc**	1	**63**	

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LSCE-SB-8-9-10
SAMPLE

Lab Sample ID: WR73D
LIMS ID: 13-11433
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: 05/08/13
Date Received: 05/09/13

Percent Total Solids: 74.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	mg/kg-dry	Q
3050B	05/30/13	200.8	06/03/13	**7440-38-2**	**Arsenic**	0.3	**4.2**	
3050B	05/30/13	6010C	06/03/13	**7440-43-9**	**Cadmium**	0.7	**0.9**	
3050B	05/30/13	6010C	06/03/13	**7440-47-3**	**Chromium**	2	**60**	
3050B	05/30/13	6010C	06/03/13	**7440-50-8**	**Copper**	0.7	**55.0**	
3050B	05/30/13	200.8	06/03/13	**7439-92-1**	**Lead**	0.1	**5.8**	
CLP	05/30/13	7471A	06/03/13	**7439-97-6**	**Mercury**	0.02	**0.06**	
3050B	05/30/13	6010C	06/03/13	7440-22-4	Silver	1	1	U
3050B	05/30/13	6010C	06/03/13	**7440-66-6**	**Zinc**	3	**93**	

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS **Sample ID: METHOD BLANK**

Lab Sample ID: WR73MB
LIMS ID: 13-11431
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	LOQ	mg/kg-dry	Q
3050B	05/30/13	200.8	06/03/13	7440-38-2	Arsenic	0.2	0.2	U
3050B	05/30/13	6010C	06/03/13	7440-43-9	Cadmium	0.2	0.2	U
3050B	05/30/13	6010C	06/03/13	7440-47-3	Chromium	0.5	0.5	U
3050B	05/30/13	6010C	06/03/13	7440-50-8	Copper	0.2	0.2	U
3050B	05/30/13	200.8	06/03/13	7439-92-1	Lead	0.1	0.1	U
CLP	05/30/13	7471A	06/03/13	7439-97-6	Mercury	0.02	0.02	U
3050B	05/30/13	6010C	06/03/13	7440-22-4	Silver	0.3	0.3	U
3050B	05/30/13	6010C	06/03/13	7440-66-6	Zinc	1	1	U

U-Analyte undetected at given LOQ
LOQ-Limit of Quantitation

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS **Sample ID: LAB CONTROL**

Lab Sample ID: WR73LCS
LIMS ID: 13-11431
Matrix: Soil
Data Release Authorized:
Reported: 06/04/13

QC Report No: WR73-Herrenkohl Consulting, LLC.
Project: Little Squalian Creek Estuary
HCL030
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	200.8	27.6	25.0	110%	
Cadmium	6010C	49.9	50.0	99.8%	
Chromium	6010C	50.6	50.0	101%	
Copper	6010C	47.4	50.0	94.8%	
Lead	200.8	24.4	25.0	97.6%	
Mercury	7471A	0.52	0.50	104%	
Silver	6010C	47.9	50.0	95.8%	
Zinc	6010C	48	50	96.0%	

Reported in mg/kg-dry

N-Control limit not met
NA-Not Applicable, Analyte Not Spiked
Control Limits: 80-120%

APPENDIX D

LANDFILL LIMITS

GUIDELINES FOR ANALYTICAL METHODS AND MAXIMUM ALLOWABLE LEVELS

PARAMETER	WASTE CODE	MAX. ALLOWABLE LEVELS		ANALYTICAL METHODS**
		TCLP (mg/L)	TOTAL* (mg/kg)	
TCLP METALS				
Arsenic	D004	<5.0	100	SW-846-1311/SW-846-6010
Barium	D005	<100.00	2000	SW-846-1311/SW-846-6010
Cadmium	D006	<1.0	20	SW-846-1311/SW-846-6010
Chromium	D007	<5.0	100	SW-846-1311/SW-846-6010
Lead	D008	<5.0	100	SW-846-1311/SW-846-6010
Mercury	D009	<0.2	4	SW-846-1311/SW-846-7470
Selenium	D010	<1.0	20	SW-846-1311/SW-846-7740
Silver	D011	<5.0	100	SW-846-1311/SW-846-6010
TCLP VOLATILES				
Benzene	D018	<0.5	10	SW-846-1311/SW-846-8260
Carbon Tetrachloride	D019	<0.5	10	SW-846-1311/SW-846-8260
Chlorobenzene	D021	<100.0	2000	SW-846-1311/SW-846-8260
Chloroform	D022	<6.0	120	SW-846-1311/SW-846-8260
1,2-Dichloroethane	D028	<0.5	10	SW-846-1311/SW-846-8260
1,1-Dichloroethylene	D029	<0.7	14	SW-846-1311/SW-846-8260
Methyl Ethyl Ketone	D035	<200.0	4000	SW-846-1311/SW-846-8260
Tetrachloroethylene	D039	<0.7	14	SW-846-1311/SW-846-8260
Trichloroethylene	D040	<0.5	10	SW-846-1311/SW-846-8260
Vinyl Chloride	D043	<0.2	4	SW-846-1311/SW-846-8260
TCLP SEMI-VOLATILES (Base Neutrals)				
1,4 Dichlorobenzene	D027	<7.5	150	SW-846-1311/SW-846-8270
Hexachlorobenzene	D032	<0.13	2.6	SW-846-1311/SW-846-8270
Hexachlorobutadiene	D033	<0.5	10	SW-846-1311/SW-846-8270
Hexachloroethane	D034	<3.0	60	SW-846-1311/SW-846-8270
Nitrobenzene	D036	<2.0	40	SW-846-1311/SW-846-8270
Pyridine	D038	<5.0	100	SW-846-1311/SW-846-8270
2,4-Dinitrotoluene	D030	<0.13	2.6	SW-846-1311/SW-846-8270
TCLP SEMI-VOLATILES (Acid Compounds)				
o-Cresol	D023	<200.0	4000	SW-846-1311/SW-846-8270
m-Cresol	D024	<200.0	4000	SW-846-1311/SW-846-8270
p-Cresol	D025	<200.0	4000	SW-846-1311/SW-846-8270
Cresol, Total	D026	<200.0	4000	SW-846-1311/SW-846-8270
Pentachlorophenol	D037	<100.0	2000	SW-846-1311/SW-846-8270
2,4,5-Trichlorophenol	D041	<400.0	8000	SW-846-1311/SW-846-8270
2,4,6-Trichlorophenol	D042	<2.0	40	SW-846-1311/SW-846-8270
TCLP HERBICIDES				
2,4-D	D016	<10.0	200	SW-846-1311/SW-846-8080
2,4,5-TP (Silvex)	D017	<1.0	20	SW-846-1311/SW-846-8080
TCLP PESTICIDES				
Chlorodane	D020	<0.03	0.6	SW-846-1311/SW-846-8080
Endrin	D012	<0.02	0.4	SW-846-1311/SW-846-8080
Heptachlor	D031	<0.008	0.16	SW-846-1311/SW-846-8080
Lindane	D013	<0.4	8	SW-846-1311/SW-846-8080
Methyoxychlor	D014	<10.0	200	SW-846-1311/SW-846-8080
Toxaphene	D015	<0.5	10	SW-846-1311/SW-846/8080
GENERAL				
pH	D002	2.0 < x <12.5		SW-846-9045
Ignitability (Liquids Only)	D001	>140° F (60° C)		SW-846-C7
Free Liquids		NO FREE LIQUIDS		SW-846-9095
PCB's		<50 mg/kg or ppm		SW-846-8080
TPH		Varies by landfill		SW-846-8015, EPA 418.1 API-(GC/FID), ASTM-D3987-85/SW-846-

* If the TOTAL results are greater than 20 times the TCLP levels, than TCLP must be performed.

** These analytical methods are only suggested methods, other methods may be utilized.