Sediment Characterization Report for Scappoose Bay Marine Park Dredging Project Project# POSH61134A

Prepared for:

Port of St. Helens

100 E Street Columbia City, Oregon 97018

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Revision A

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List of Acronyms / Key Terms

ARI	Analytical Resources Inc.
ASTM	American Society for Testing and Materials
COCs	Chemicals or Contaminants of Concern
CoC	Chain of Custody
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DGPS	Differential Global Positioning System
DMMU	Dredged Material Management Unit
EPA	U.S. Environmental Protection Agency
Ft.	feet
GBA	Gahagan & Bryant Associates, Inc.
GS	Grain Size
HPAH	High Density Polynuclear Aromatic Hydrocarbons
kg	kilogram
LPAH	Low Density Polynuclear Aromatic Hydrocarbons
MFR	Memorandum for the Record
mg	milligram
NGVD	National Geodetic Vertical Datum
NPDES	National Pollutant Discharge Elimination System
NRC	Northern Resource Consulting, Inc.
NSM	New Surface Material
NWTPH-DX	Northwest Total Petroleum Hydrocarbon Diesel Range
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated biphenyl
PSEP	Puget Sound Estuary Program (Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound)
PSFT	Portland Sediment Evaluation Team
	Quality Assurance / Quality Control
RM	River Mile
SAP	Sampling and Analysis Plan
SEE	Sediment Evaluation Framework
SL or SLs	Screening Level or Screening Levels
SVOCs	Semi-volatile Organic Compounds
TOC	Total Organic Carbon
TS	Total Solids
	microgram
РЭ	morogram

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EXECUTIVE SUMMARY

NRC conducted sediment sampling at the Port of Saint Helens Scappoose Bay Marina and Access Channel in anticipation of maintenance dredging for continued access to boathouses, access ramp, and moorage areas. The sampling completed conformed to Sampling and Analysis Plan for the Port of St. Helens [Port] Marina and Access Channel Maintenance Dredging Project (SAP) Revision C (May 3, 2013), and incorporates the MFR (Memorandum for the Record) prepared by the Portland Sediment Evaluation Team (PSET) dated May 31, 2013 into the sampling methods. The proposed dredging project is located in Scappoose Bay, near Columbia River Mile (RM) 88.5, St. Helens, in Columbia County, Oregon. Sediment sampling occurred June 19th and 20th, 2013, to acquire the required eight 3-inch-diameter core, with processing on the 20th. Overnight (June 19th) the collected cores were floated in the marina to maintain continuous temperature control. In addition to the required eight samples (a), eight additional samples (b) were collected in the field and stored for back-up sample sediment. The sampling scheme consisted of eight sample sites which were sampled, processes, logged, and containerized for current and future analysis. Discrete samples of NSM and dredge material were archived from each of the eight samples. Three composite samples were acquired to characterize dredge material and three composite of NSM two from the marina (DMMU 1 & 2), and one in the access Channel (DMMU 3), after processing these were sent to Apex Lab, LLC whom subcontracted some analytical to ARI Laboratories in Tukwila, Washington.

Apex Labs of Tigard, Oregon analyzed the six samples with testing methods NWTPH-Dx for oil and diesel, EPA 8081B for Organochlorine Pesticides, EPA 8082A for PCBs, EPA 6020 for Total Metals. The following includes a summary of these results: NWTPH-Dx, for oil ranged (C22-C40), with detections at 91.3 mg/kg(Table 3, Appendix A) for sample SB-C-Z1 (Channel DMMU 3). Organochlorine Pesticides (EPA 8081B) DDD, DDE, and DDT were not detected above the 2006 Interim Freshwater SLs. PCBs (EPA 8082A) were detected for Aroclors 1242, 1254, and 1260 and ranged between 3.4 and 17.8 µg/kg (Table 4, Appendix A), with no detections above the 2006 Interim Freshwater SLs. Total metals (EPA 6020) detected included antimony (1.19 to 8.55 mg/kg), arsenic (11.3 to 63 mg/kg), chromium (18.5 to 28.2mg/kg), copper (20.2 to 39.6mg/kg), lead (9.87 to 21.8 mg/kg), mercury (.068 to .198 mg/kg), nickel (16.4 to 20.2 mg/kg), and zinc (68.6 to 149 mg/kg). Arsenic and zinc levels exceeded the 2006 Interim Freshwater Screening levels in section SB-C-Z1 only (Table 5, Appendix A).

Analytical Resources Inc. (ARI) completed testing on particle analysis, ammonia, total organic carbon, total solid, sulfides, and low and high molecular weight for PAHs. The following includes a summary of these results: Particle analysis (ASTM D422M) on gravel/coarse-grained sand ranged from 3.3 to 27.9 percent and silt and clay (< 0.063 mm to <0.005 mm) ranged from 72.1 to 96.7 percent (Tables 6a and 6b, Appendix A). Ammonia ranged from 29.3 to 261 mg/kg (Table 7, Appendix A). PSEP Total organic carbon (TOC) ranged from 0.44% to 3.30% (Table 7, Appendix A). Sulfides ranged from 3.76 to 83.5 mg/kg (Table 7, Appendix A). Total solids ranged from 43.7 to 73.8 percent (Table 7, Appendix A). PAHs Low and High molecular weight (EPA 8270D) LPAHs ranged from 2.17 to 82.2 µg/kg, and HPAHs ranged from 1.9 to 130 µg/kg. All LPAHs and HPAHs were well below 2006 Interim Freshwater Screening levels (Table 9, Appendix A). Based on the PSET review this SCR this will determine if in-water disposal is a viable option for this Scappoose Bay Marina maintenance dredge project. SVOC results were all below the PSET 2006 Interim Freshwater Screening Levels (Table 8, Appendix A).

Introduction & Project Setting

The Port of Saint Helens (the Port) proposes to perform maintenance dredging within their marina and access channel in Scappoose Bay. The Port owns and operates the Marina throughout the year with many leased houseboats and moorages. The Port has commissioned the services of Northern Resource Consulting, Inc. (NRC) to create a sampling and analysis plan (SAP), perform sampling, and then prepare the sediment characterization report (SCR). The purpose of the SCR is to address all items identified in section 4.13 of the SAP.

Project Location

The Ports' maintenance dredging project will occur in Scappoose Bay along the northwest shoreline (Map 1). The physical address of the Scappoose Bay Marine Park is 57420 Old Portland Road, in Warren, Oregon 97053. Scappoose Bay Marine Park also operates under the name Scappoose Bay Marina. Columbia County tax records identify the legal description as Township 4 West, Range 1 North, in Section 17 (Map 1). The Columbia County tax assessor's map identifies the upland portions as within parcel no. 4117-000-200, and the marina is registered with Oregon Department of State Lands under aquatic lease no. ML-6266. Latitude: 45°49'38.21" North, Longitude: 122° 50'11.27" West. The entire project is within the FEMA-designated 100-year floodplain (Map 4).

Sampling Process and Laboratory Results

A. Type of Sampling Equipment Employed

Northern Resource Consulting, Inc. staff used a 3-inch SDI Vibra-core with sacrificial aluminum tubing 1/10-inch walls.

B. Protocols used during sampling and testing and an explanation of any deviations from the sampling plan protocols

Sediment sampling occurred over two consecutive days, June 19th and 20th 2013, with all processing completed on June 20th. Minor adjustments were made to sampling locations in the field as noted in Table 1. Sampling locations within the marina were changed due to vessels being located at the sampling point. Sampling locations within the access channel were changed because the original points were chosen based on Google Earth images in combination with the GBH bathymetric survey and were slightly outside of the channel. Points were moved approximately 20 feet in a given direction to recover a sample. One additional sample was taken at each location to ensure that there was enough sediment to be sent to the lab for analysis, DMMU compositing, and archiving. The deviations are as follows:

 Sample points SB-C-3 and SB-C-4 were moved further into the channel to better represent channel results. Original sampling points did not visually align with channel markers.

- 2) NRC was not aware that Apex Labs, LLC would sub-contract out N-Ammonia (Plumb 1981) and Sulfide (PSEP 376.2) testing analysis (Appendix B).
- 3) Processing of core samples was not completed at the end of each day. Core samples were stored vertically (in-water) in covered marina boat slip overnight (Photograph 4, Appendix F). Storage conditions mimicked natural sediment conditions so that no sediment decay would occur overnight.

C. Descriptions of each sample with sample log sheets

Sample log sheets are found in Appendix C and sample photographs are in Appendix F.

D. Methods used to locate the sampling positions within an accuracy of $\pm 2m$

Before sampling NRC staff uploaded the positions into the Trimble sub-meter GPS with accuracy of +/- 2 Ft. at each sample location with a minimum of six satellites (Table 1). NRC staff acquired lead line measurements at each of the core collection sites to calculate dredge prism maximum depth and z-sample profile. The mudline elevations were compared against tide tables to determine the boundary between the dredge material and z-sample horizon.

E. Locations where the sediment samples were collected reported in latitude and longitude to the nearest tenth of a second (NAD 83).

Sample	Latitude	Longitude	Elevation & Depth Profile
M1	45° 49'40.04" North	122° 50'12.02" West	-3 to -9 feet NVGD 29
M2	45° 49'37.85" North	122° 50'13.58" West	-4.5 to -9 feet NVGD 29
M3	45° 49'38.86" North	122° 50'11.63" West	-1.5 to -9 feet NVGD 29
M3B	45° 49'38.7" North	122° 50'09.5" West	-1.5 to -9 feet NVGD 29
M4	45° 49'40.15" North	122° 50'07.94" West	-2.5 to -9 feet NVGD 29
M4B	45° 49'40.5" North	122° 50'07.7" West	-2.5 to -9 feet NVGD 29
C1	45° 49'42.16" North	122° 50'05.00" West	-4.25 to -7 feet NVGD 29
C1B	45° 49'42.3" North	122° 50'05.3" West	-4.25 to -7 feet NVGD 29
C2	45° 49'44.89" North	122° 49'59.29" West	-2.5 to -7 feet NVGD 29
C3	45° 49'47.54" North	122° 49'49.33" West	-2.5 to -7 feet NVGD29
C3B	45° 49'46.8" North	122° 49'49.2" West	-4.25 to -7 feet NVGD 29
C4	45° 49'48.60" North	122° 49'40.51" West	-2.75 to -7 feet NVGD29
C4B	45° 49'48.2" North	122° 49'40.5" West	-2.75 to -7 feet NVGD29

Table 1. Sample Locations

Note: Locations correspond with Maps 9a, b, and c. Blue highlighted samples represent adjusted locations due to restricted accessibility.

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F. Diagram showing actual locations of sampling stations

The sampling locations are identified in Map 9a, 9b, 9c, 10a and 10b (Maps and Figures). Table 1 identifies the location of these samples points; Tables 2 identifies the core sampling depths for collection of samples.

					Target	Actual Dredge	Achieved
Sample #	Time	Date	Recovery	Mud Line	Elevation	Sample	Desired
SB-M-1A	11:04 AM	06/19/2013	4.0 Ft.	9.0 Ft.	-4 to -9 Ft.	-8 Ft. NGVD	Yes
SB-M-1B	11:32 AM	06/19/2013	6.5 Ft.	9.0 Ft.	-4 to -9 Ft.	-10.5 Ft. NGVD	Yes
SB-M-2A	12:10 PM	06/19/2013	4.5 Ft.	10.0 Ft.	-4 to -9 Ft.	-8.5 Ft. NGVD	Yes
SB-M-2B	12:26 PM	06/19/2013	5.0 Ft.	10.0 Ft.	-4 to -9 Ft.	-9 Ft. NGVD	Yes
SB-M-3A	1:15 PM	06/19/2013	8.5 Ft.	8.0 Ft.	-1 to -9 Ft.	-9.5 Ft. NGVD	Yes
SB-M-3B	1:53 PM	06/19/2013	7.5 Ft.	8.0 Ft.	-1 to -9 Ft.	-8.5 Ft. NGVD	Yes
SB-M-4A	2:15 PM	06/19/2013	6.0 Ft.	10 Ft.	-2 to -9 Ft.	-8 Ft. NGVD	Yes
SB-M-4B	3:47 PM	06/19/2013	5.0 Ft.	10 Ft.	-2 to -9 Ft.	-7 Ft. NGVD	Yes
SB-C-1A	4:00 PM	06/19/2013	3.0 Ft.	10.0 Ft.	-4 to -7 Ft.	-7 Ft. NGVD	Yes
SB-C-1B	4:15 PM	06/19/2013	5.5 Ft.	10.0 Ft.	-4 to -7 Ft.	-9.5 Ft. NGVD	Yes
SB-C-2A	8:20 AM	06/20/2013	7.5 Ft.	9.0 Ft.	-2 to -7 Ft.	-9.5 Ft. NGVD	Yes
SB-C-2B	8:40 AM	06/20/2013	4.5 Ft.	9.0 Ft.	-2 to -7 Ft.	-6.5 Ft. NGVD	Yes
SB-C-3A	9:00 AM	06/20/2013	3.0 Ft.	8.0 Ft.	-2 to -7 Ft.	-5 Ft. NGVD	No
SB-C-3B	9:47 AM	06/20/2013	6.0 Ft.	8.0 Ft.	-2 to -7 Ft.	-8 Ft. NGVD	Yes
SB-C-4A	11:00 AM	06/20/2013	5.0 Ft.	7.0 Ft.	-3 to -7 Ft.	-8 Ft. NGVD	Yes
SB-C-4B	11:30 AM	06/20/2013	5.5 Ft.	7.0 Ft	-3 to -7 Ft.	-8.5 Ft. NGVD	Yes

Table 2. Summ	arv Table o	f Data Sheets	(Appendix A)
		· Data directo	(,

Notes: Yellow highlights denote the samples used for processing.

G. Chain-of-Custody procedures used and explanation of any deviations from the sampling plan procedures

The Chain of Custody is found in Appendix D. We initially had some challenges in the sample numbers and these were corrected via e-mail between NRC and the contracted lab (Apex Labs, LLC).

H. Description of sampling and compositing procedures

The sampling completed conformed to *Sampling and Analysis Plan for the Port of St. Helens* [Port] *Marina and Access Channel Maintenance Dredging Project (SAP) Revision C (May 3, 2013),* and incorporates the MFR (Memorandum for the Record) prepared by the Portland Sediment Evaluation Team (PSET) dated May 31, 2013 into the sampling methods. The sampling scheme consisted of eight sample sites which were sampled, processes, logged, and containerized for current and future analysis. Discrete samples of NSM and dredge material were archived from each of the eight samples. Three composite samples were acquired to characterize dredge material and three composite of NSM two from the marina (DMMU 1 & 2), and one in the access Channel (DMMU 3), after processing these were sent to Apex Lab, LLC whom subcontracted some analytical to ARI Laboratories in Tukwila, Washington.

I. Final QA report (Section 4.11)

The final quality assurance lab report is included in Appendix B.

J. QA1 data required by PSET for entry into DAIS

NRC has agreed to provide a excel spreadsheet of lab data for any additional quality assurance checks or qualifications. This can be forwarded via e-mail upon request.

K. Sediment characterization report will summarize the entire laboratory report to compare the SL1 and SL2 of the 2006 freshwater sediment quality guidelines for the 8 samples (dredge material and NSM).

The original lab report is found in Appendix B. Apex Labs provided analytical services under a Chain of Custody (CoC) and sub-contracted to ARI Laboratory. Samples were submitted to Apex Labs on June 21, 2013 and draft results were provided to NRC on July 8, 2013, with final results acquired July 15th, 2013. Based on the two lab reports (Appendix B) NRC assembled Tables 3 through 9 to compare these values to the 2006 Freshwater Sediment Standards (Appendix A).

Physical Analytical

The sediment samples were collected by Northern Resource Consulting, Inc. and submitted to Apex Labs, LLC in Tigard, Oregon, on June 21, 2013. Analytical Resources, Inc. (ARI) in Tukwilla, Washington, received samples June 25, 2013. The samples were analyzed for the following parameters:

- Grain size (GS) by American Society for Testing and Materials (ASTM) D422
- Total solids (TS) by EPA method SM254B
- Total Organic Carbon (TOC; per Plumb method)

Physical analytical methods detection limits, storage requirements, and quality control (QC) criteria are summarized in the SAP for the Port of St. Helens Marina and Access Channel Maintenance Dredging Project (NRC 2013).

Physical analysis results are summarized below and in tables 6a, 6b, and 7.

- **Grain Size.** ARI, Inc. conducted particle analysis (ASTM D422M) on June 27, 2013 on six composite samples. Results ranged from 5 to 14 percent for gravel/coarse-grained sand with silt and clay composition of 85 to 96 percent (Tables 6a and 6b, Appendix A).
- Total Solids. Total solids ranged from 43.7 to 70.8 percent (Table 7, Appendix A).

• **Total Organic Carbon.** Using the PSEP method of analysis the TOC ranged from 0.44% to 3.30%. (Table 7, Appendix A).

See Appendix A (Tables 6a, 6b, and 7) and Appendix B (Lab Results).

Chemical and Analysis

Apex Laboratories and ARI performed the chemical analysis of the sediment samples. Samples were analyzed for the following SEF chemical parameters:

- SEF metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) using EPA method 6020.
- Semi-volatile Organic Compounds (SVOCs, EPA method 8270D).
- Chlorinated Pesticides (EPA Method 8081B).
- Polychlorinated Biphenols (PCBs, EPA Method 8082A).
- Diesel, and oil (NWTPH-Dx).
- TOC, Total Solids, Ammonia and Sulfide (PSEP Method).
- Grain Size (ASTM D422M).

See Appendix A (Tables 3-9) and Appendix B (Lab Results)

Diesel, Oil, and Gasoline Range Organics

NWTPH-Dx: Diesel and Oil Range Organics (EPA 3546)

Northwest total petroleum hydrocarbons diesel range organics (NWTPH-Dx) is the qualitative and quantitative method for semi-volatile petroleum products in soil. Examples of the petroleum products detected may include jet fuels, kerosene, diesel oils, hydraulic fluids, mineral oils, and lubricating and fuel oils. NWTPH-Dx produced no results for detection of diesel range organics, and oil range organics were detected in sample SB-C-Z1 at 91.3 mg/kg.

Units: mg/kg dry weight	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
MDL						
REPORTING LIMIT	36.5	28.3	25.0	39.9	39.8	37.7
Diesel Range Organics	36.5 U	28.3 U	25.0 U	39.9 U	39.8 U	37.7 U
MDL						
REPORTING LIMIT	73.1	56.6	50.0	79.8	79.5	75.4
Oil Range Organics	73.1 U	56.6 U	50.0 U	79.8 U	79.5 U	<mark>91.3</mark>
Notes:						

Table 3. Diesel and Oil Ranges (NWTPH-Dx)

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- 1. No screening levels were identified above the freshwater screening levels (SEF 2006).
- 2. Highlights in this table represent sample results that are higher than <u>Reporting Limit Range</u>.
- U = Compound analyzed, but not detected above indicated detection limit.
 --- = minimum detection levels not reported by labs.

Volatile Organic Compounds (EPA 8260B and 8260B SIM)

Volatile Organic Compound testing was not performed for this sampling.

Polychlorinated Biphenyls (EPA 8082A)

Analytical results from EPA 8082A of total PCBs per sample were below 2006 interim freshwater screening levels in all samples. Total PCBs ranged from 3.4 to 17.8 μ g/kg (dry weight), as identified in Table 4. The Aroclors detected were Aroclor 1242, Aroclor 1254, and Aroclor 1260 (Appendices A & B). See Appendix A (Table 4) and Appendix B (Lab Results).

Units: µg/kg dry weight	MDL	REPORTING LIMIT	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Aroclor 1016		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1221		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1232		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1242		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	6.42
Aroclor 1248		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1254		1.86-3.0	7.00	6.92	1.86 U	7.61	6.79	17.4
Aroclor 1260		1.86-3.0	3.78	3.40	1.86 U	4.53	3.81	10.4
Total PCBs	Screenii < <u>60.0 TO</u>	ng Level is <u>TAL</u> μg/kg	10.78	10.32	0.0	12.14	10.60	34.62

Table 4. Polychlorinated Biphenyls (PCB's) EPA 8082A

Notes 1. Highlights in this table represent sample readings that are over freshwater screening level standards.

2. Values not presented are still under consideration for freshwater standards.

3. U = Compound analyzed, but not detected above indicated detection limit.

4. --- = minimum detection levels not reported by labs.

Organochlorine Pesticides (EPA 8081B)

There were no pesticide (DDD, DDE, and DDT) levels detected from all sample results.

Total Metals (EPA 6020)

Total metals were evaluated using EPA method 6020 (ICPMS) for all priority metals. Table 5 shows the location and amount of exceedance for Arsenic and Zinc (Table 5, Appendices A). Sample analytical results from the six composite samples were compared against the SEF 2006 freshwater standards. All metal results were below 2006 SEF freshwater standards in all locations with the exception of SB-C-Z1. This location had results above the 2006 SEF screening

levels in Arsenic and Zinc. Arsenic levels ranged from 11.3 to 63 mg/kg (dry weight) exceeding the screening level of 20 by three times the maximum allowed at SB-C-Z1. Zinc levels ranged from 68.6 to 149 mg/kg (dry weight), exceeding the screening level of 130 mg/kg for sample SB-C-Z1. See Appendix A (Table 5), Appendix B (Lab Results).

Units: mg/kg dry weight	MDL	REPORTING LIMIT	SCREENING LEVEL	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Antimony		.683-1.17	150	.683 U	1.62	.683 U	1.19	.683 U	8.55
Arsenic		1.37-2.35	20	13.2	18.8	11.3	15.7	13.2	<mark>63.0</mark>
Cadmium		.683-1.17	1.1	.683 U	.683 U	.683 U	.683 U	.683 U	.683 U
Chromium		1.37-2.35	95	22.0	18.5	18.6	22.8	25.2	28.2
Copper		1.37-2.35	80	28.7	26.0	20.2	29.8	33.3	39.6
Lead		.683-1.17	340	15.0	13.5	9.87	16.0	16.7	21.8
Mercury		.027047	0.28	.083	.068	.027 U	.092	.094	.198
Nickel		1.37-2.35	60	16.5	17.1	17.7	16.4	18.1	20.2
Silver		.683-1.17	2	.683 U	.683 U	.683 U	.683 U	.683 U	.683 U
Zinc		2.73-4.70	130	96.6	85.4	68.6	105	112	<mark>149</mark>

Table 5. Total Metals (EPA 6020) Compared to 2006 Freshwater Screening Levels

Notes:

1. Highlights in this table represent sample readings that are over the freshwater screening level standards.

2. Values not presented are still under consideration for freshwater standards.

3. U = Compound analyzed, but not detected above indicated detection limit.

4. --- = minimum detection levels not reported by labs

Grain Size Analysis (ASTM D422-63)

ARI, Inc. conducted particle analysis (ASTM D422-63) on June 25, 2013. The six composite sample results ranged from 5 to 14 percent for gravel/coarse-grained sand with silt and clay composition of 86 to 95 percent (Tables 6a and 6b, Appendices A & B).

See Appendix A (Tables 6a and 6b) and Appendix B (Lab Results).

Table 6a. Grain Size Analysis (ASTM D422M)

SAMPLE LOCATION	PERCENT SAND/GRAVEL (2,000-62 microns)	PERCENT SILT/CLAY (62-1.0 microns)
SB-M-1	6.8%	93.2%
SB-M-Z1	17.8%	82.2%
SB-M-2	27.9%	72.1%
SB-M-2Z	8.0%	92.0%
SB-C-1	3.3%	96.7%
SB-C-Z1	4.1%	95.9%

Note: No physical analysis was completed based on pictures. Particle analysis results are displayed as a percentage of the total sample volume.

Sample No.	Sieve size (microns)	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
GRAVEL	4.75 mm (#4)	.05%	0.00%	.01%	.68%	0.00%	.04%
VERY COARSE SAND	2.00 mm (#10)	.02%	.03%	.01%	.04%	.09%	.01%
COARSE SAND	.85 mm (#20)	.39%	.22%	.11%	.32%	.32%	.11%
MEDIUM SAND	.425 mm (#40)	.07%	.10%	.38%	.21%	.12%	.10%
FINE SAND	.250 mm (#60)	.33%	.70%	2.44%	.41%	.26%	.34%
VERY FINE SAND	.150 mm (#100)	1.34%	3.65%	8.78%	.87%	.50%	.65%
COARSE SILT	.106 mm (#140)	1.57%	4.79%	7.78%	1.23%	.62%	.81%
MEDIUM SILT	.075 mm (#200)	2.93%	8.24%	8.39%	4.16%	1.43%	2.03%
FINE SILT	.063 mm (#230)	2.48%	4.92%	4.98%	3.96%	1.78%	1.86%
VERY FINE SILT	>.005 <.063 mm	69.60%	62.90%	51.00%	71.30%	71.30%	69.70%
CLAY	<.005 mm	23.60%	19.30%	21.10%	20.70%	25.40%	26.20%

Table 6b. Grain Size Distribution Summary (ASTM D422M)

Notes: Table data provided from Apex Analytical Report (Appendix B). Particle analysis results are displayed as a percentage of the total sample volume.

PSEP Total Organic Carbon, Ammonia, Sulfides, and Total Solids

The Apex and ARI lab reports identify TOC varied from 0.44 percent to 3.30 percent using the PSEP analysis method (Table 7, Appendices A & B). Ammonia ranged from 29.3 to 261 mg-N/kg

(Table 7). Total solids varied from 43.7 percent to 70.8 percent (Table 7, Appendices A & B). Sulfides ranged from 3.76 to 83.5 mg/kg (Table 7, Appendices A & B). See Appendix A (Table 7) and Appendix B (Lab Results).

Analysis	MDL	REPORTING LIMIT	SB-M-1	12-M-88	SB-M-2	SB-M-Z2	SB-C-1	SB-C-21		
N-AMMONIA (mg-N/kg)		.65 - 4.34	204.0	106.0	29.3	213.0	228.0	261.0		
TOTAL (%) SOLIDS		.01%	46.4	60.8	70.8	45.5	43.7	47.7		
TOTAL (%) ORGANIC CARBON		1.0%	2%	1.3%	.44%	2.3%	2.8%	3.3%		
Sulfides (mg/kg)		1.45 - 9.81	83.5	31.4	3.76	59.7	73.4	63.6		

Table 7. PSEP Total Organic Carbon, Ammonia, Sulfides, and Total Solids Compared
to 2006 Freshwater Screening Levels.

Notes:

No screening levels were identified in SL1 or SL2 (SEF 2006).
 U = Compound analyzed, but not detected above indicated detection limit.

3. J = Estimated Results (RPD outside 20% control limit)

4. --- = minimum detection levels not reported by labs.

5. Toc AND Total Solids reported in % by weight units.

PAHs/Semi-volatiles (EPA 8270)

PAHs and other semi-volatile organic compounds were analyzed by Apex Labs. No Polynuclear Aromatic Hydrocarbon exceeded the 2006 freshwater screening levels. See Appendix A (Table 8) and Appendix B (Lab Results).

Table 8. Semi-volatile Organic Compounds and TBT (EPA Method 8270D and Krome 1988) comparedto the 2006 Freshwater Screening Levels.

SVOCs Units: μg/kg (ppb) dry weight	MDL	REPORTING LIMIT	S'LS	1-M-8S	SB-M-Z1	2-M-82	SB-M-Z2	SB-C-1	SB-C-Z1
Acenaphthene	1.82-27.9	3.64-55.8	1100	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.2
Acenaphthylene	1.82-27.9	3.64-55.8	470	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Anthracene	1.82-27.9	3.64-55.8	1200	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	19.8
Benz(a)anthracene	1.82-27.9	3.64-55.8	4300	49.1	9.32	2.58	22.0	19.4	33.3
Benzo(a)pyrene	2.73-41.9	5.46-83.8	3300	89.6	17.1	4.15	36.2	36.9	52.5
Benzo(b)fluoranthene									
Benzo(k)fluoranthene									
Benzofluoranthenes (b+k)			600						
Benzo(g,h,i)perylene	1.82-27.9	3.64-55.8	4000	55.8	15.2	2.61	25.7	25.5	42.3
Chrysene	1.82-27.9	3.64-55.8	5900	3.64 U	13.0	1.90	49.5	24.7	45.3
Dibenz(a,h)anthracene	1.82-27.9	3.64-55.8	800	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Fluoranthene	1.82-27.9	3.64-55.8	11000	96.4	15.5	3.86	129	32.2	105
Fluorene	1.82-27.9	3.64-55.8	1000	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.4
Indeno(1,2,3-cd)pyrene	1.82-27.9	3.64-55.8	4100	49.4	12.2	2.09	20.7	20.6	34.1
2-Methylnaphthalene	3.64-55.8	7.28-112	470	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U
Naphthalene	3.64-55.8	7.28-112	500	7.28 U	5.43	7.28 U	7.28 U	7.28 U	30.2
Phenanthrene	1.82-27.9	3.64-55.8	6100	45.8	9.23	2.17	72.2	14.6	82.2
Pyrene	1.82-27.9	3.64-55.8	8800	130	25.0	5.48	114	38.8	109
1,2-Dichlorobenzene	1.82-27.9	3.64-55.8		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
1,4-Dichlorobenzene	1.82-27.9	3.64-55.8		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
1,2,4-Trichlorobenzene	1.82-27.9	3.64-55.8		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	42.4 U
Dimethylphthalate	21.2-279	42.4-558	46	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Diethylphthalate	21.2-279	42.4-558		42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Di-n-butyl phthalate	21.2-279	42.4-558		42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Butyl benzyl phthalate	21.2-279	42.4-558	260	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Bis(2-ethylhexyl) phthalate	21.2-279	42.4-558	220	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Di-n-octylphthalate	21.2-279	42.4-558	26	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Phenol	21.2-279	42.4-558		42.4 U	42.4 U	23.9	42.4 U	42.4 U	4.5 U
2-Methylphenol	2.25-23.4	4.5-46.8		4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	
3+4 Methylphenol(s)	2.25-23.4	4.5-46.8							4.5 U
2,4-Dimethylphenol	2.25-23.4	4.5-46.8		4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	91.0 U
Pentachlorophenol	45.5-292	91.0-1400		91.0 U	91.0 U	91.0 U	91.0 U	91.0 U	7.28 U
Benzyl alcohol	3.64-23.4	7.28-46.8		7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U
Benzoic acid	146-934	292-1868		292 U	7.28 U	7.28 U	7.28 U	7.28 U	1.82 U
Dibenzofuran	1.82-27.9	3.64-55.8	400	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U	7.28 U
N-Nitrosodiphenylamine	3.64-23.4	7.28-46.8		7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	3.64 U
Tributyltin (KROME1988)			75						

Notes:

1. Highlights in this table represent sample readings that are over the 2006 freshwater screening level standards.

2. --- = minimum detection levels not reported by labs, not standardized in 2006 Freshwater Screening Levels or chemical testing not required by PSET per MFR CENWP-EC-HR

3. Values not presented in 2006 Screening Levels are still under consideration for freshwater standards.

4. U = Compound analyzed, but not detected above indicated detection limit.

- 5. SL= "Screening Level", referring to the 2006 freshwater screening level standards.
- 6. TBT not required by PSET per MFR CENWP-EC-HR

Total LPAH and HPAH

The combined amounts of LPAH (Low Density Polynuclear Aromatic Hydrocarbons) and HPAH (High Density Polynuclear Aromatic Hydrocarbons) are in Table 9. The combined weight of LPAH per sample shall not exceed 6,600 μ g/kg per sample, while the combined weight of HPAH per sample shall not exceed 31,000 μ g/kg per sample. Table 9 shows that the LPAH, HPAH and Total PAH levels for all samples are below 2006 interim freshwater screening levels.

See Appendix A (Table 9) and Appendix B (Lab Results).

Table 9. Total LPAH and HPAH Results Compared to Bulk Sediment ScreeningLevels for SEF

Total LPAH	Screening Level	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Naphthalene		7.28 U	5.43	7.28 U	7.28 U	7.28 U	30.2
Acenaphthylene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Acenaphthene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.2
Fluorene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.4
Phenanthrene		45.8	9.23	2.17	72.2	14.6	82.2
Anthracene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	19.8
2-Methylnaphtalene		7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U
Total LPAH	6,600	45.8	14.66	2.17	72.2	14.6	160.8

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Total HPAH	Screening Level	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Fluoranthene		96.4	15.5	3.86	129	32.2	105
Pyrene		130	25.0	5.48	114	38.8	109
Benzo(a)anthracene		49.1	9.32	2.58	22.0	19.4	33.3
Chrysene		3.64 U	13.0	1.90	49.5	24.7	45.3
Benzofluoranthenes (b+k)							
Benzo(a)pyrene		89.6	17.1	4.15	36.2	36.9	52.5
Indeno(1,2,3-c,d)pyrene		49.4	12.2	2.09	20.7	20.6	34.1
Dibenz(a,h)anthracene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Benzo(g,h,i)perylene		55.8	15.2	2.61	25.7	25.5	42.3
Total HPAH	31,000	470.3	170.14	22.67	396.8	198.1	421.5
Total PAH	37,600	516.1	184.74	24.84	469	212.6	582.3

Notes:

Highlights in this table represent sample readings that are over the 2006 freshwater screening level standards. 1.

---- = minimum detection levels not reported by labs, not standardized in 2006 Freshwater Screening Levels or chemical testing not 2. required by PSET per MFR CENWP-EC-HR

3. Values not presented in 2006 Screening Levels are still under consideration for freshwater standards.

U = Compound analyzed, but not detected above indicated detection limit.
 SL= "Screening Level", referring to the 2006 freshwater screening level standards.

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SEF 2009. U.S. Army Corps of Engineers, Portland District, Seattle District; U.S. Environmental Protection Agency, Region 10; Oregon Department of Environmental Quality; Washington State Department of Natural Resources; Washington Department of Ecology; Idaho Department of Environmental Quality; National Marine Fisheries Service; U.S. Fish & Wildlife Service. Sediment Evaluation Framework for the Pacific Northwest. May 2009. **Maps and Figures**

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239

Map 1. Vicinity Map



Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 1 of 13

Map 2. Satellite Image (Google Earth)



Map 3. National Wetland Inventory Map



Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 3 of 13	Northern Resource Consulting, Inc. ENVIRONMENTAL SERVICES 1339 Commerce Ave., Suite 309B Longview, Washington 98632 Phone: (360)414-5239 Fax: (360)414-4021
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Map 4. FEMA FIRMette Flood Map



Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 4 of 13

Map 5. USDA Soil Survey



Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 5 of 13	Northern Resource Consulting, Inc. ENVIRONMENTAL SERVICES 1339 Commerce Ave., Suite 309B Longview, Washington 98632 Phone: (360)414-5239 Fax: (360)414-4021
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Map 6. Tax Parcel



Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 6 of 13

Map 7. Action Area (Google Earth)



Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 7 of 13



Map 9a. Sediment Sampling Locations, DMMU 1





Cross Section of Sample

--- DMMU 1 Boundary

Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 9 of 13

Map 9b. Sediment Sampling Locations, DMMU 2





Cross Section of Sample

--- DMMU 1 Boundary

Reference Number: Applicant: Port or St. Helens Adjacent Property Owners: Carl Larson, Port of St. Helens, Oregon Parks and Rec., Proposed Project: Maintenance Dredging In: Scappoose Bay Near: Warren County: Columbia State: OR Date:03/21/2013 Sheet 10 of 13

Map 9c. Sediment Sampling Locations, DMMU 3



Map 10a. Sediment Sampling Locations, DMMU's 1 & 2



Map 10b. Sediment Sampling Locations, DMMU 3



Appendix A

Summary Tables and Testing Results

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Appendix A

Tables of Testing Results

The following tables (3-9) include the testing results using EPA methodologies to determine soil sample characteristics as well as soil contamination of the six composite samples taken from eight core samples for the Port of St. Helens dredging project.

Units: mg/kg dry weight	SB-M-1	SB-M-Z1	2-M-8S	SB-M-Z2	SB-C-1	SB-C-Z1
MDL						
REPORTING LIMIT	36.5	28.3	25.0	39.9	39.8	37.7
Diesel Range Organics	36.5 U	28.3 U	25.0 U	39.9 U	39.8 U	37.7 U
MDL						
REPORTING LIMIT	73.1	56.6	50.0	79.8	79.5	75.4
Oil Range Organics	73.1 U	56.6 U	50.0 U	79.8 U	79.5 U	<mark>91.3</mark>

Table 3. Diesel and Oil Ranges (NWTPH-Dx)

Notes:

1. No screening levels were identified above the freshwater screening levels (SEF 2006).

2. Highlights in this table represent sample results that are higher than <u>Reporting Limit Range</u>.

3. U = Compound analyzed, but not detected above indicated detection limit.

4. --- = minimum detection levels not reported by labs.

Units: μg/kg dry weight	MDL	REPORTING LIMIT	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Aroclor 1016		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1221		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1232		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1242		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	6.42
Aroclor 1248		1.86-3.0	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U	1.86 U
Aroclor 1254		1.86-3.0	7.00	6.92	1.86 U	7.61	6.79	17.4
Aroclor 1260		1.86-3.0	3.78	3.40	1.86 U	4.53	3.81	10.4
Total PCBs	Screenii < <u>60.0 TO</u>	ng Level is <u>TAL</u> μg/kg	10.78	10.32	0.0	12.14	10.60	34.62

Table 4. Polychlorinated Biphenyls (PCB's) EPA 8082A

Notes 1. Highlights in this table represent sample readings that are over freshwater screening level standards.

Values not presented are still under consideration for freshwater standards.
 U = Compound analyzed, but not detected above indicated detection limit.

4. --- = minimum detection levels not reported by labs.

Units: mg/kg dry weight	MDL	REPORTING LIMIT	SCREENING LEVEL	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Antimony		.683-1.17	150	.683 U	1.62	.683 U	1.19	.683 U	8.55
Arsenic		1.37-2.35	20	13.2	18.8	11.3	15.7	13.2	<mark>63.0</mark>
Cadmium		.683-1.17	1.1	.683 U	.683 U	.683 U	.683 U	.683 U	.683 U
Chromium		1.37-2.35	95	22.0	18.5	18.6	22.8	25.2	28.2
Copper		1.37-2.35	80	28.7	26.0	20.2	29.8	33.3	39.6
Lead		.683-1.17	340	15.0	13.5	9.87	16.0	16.7	21.8
Mercury		.027047	0.28	.083	.068	.027 U	.092	.094	.198
Nickel		1.37-2.35	60	16.5	17.1	17.7	16.4	18.1	20.2
Silver		.683-1.17	2	.683 U	.683 U	.683 U	.683 U	.683 U	.683 U
Zinc		2.73-4.70	130	96.6	85.4	68.6	105	112	<mark>149</mark>

Table 5. Total Metals (EPA 6020) Compared to 2006 Freshwater Screening Levels

Notes:

1. Highlights in this table represent sample readings that are over the freshwater screening level standards.

2. Values not presented are still under consideration for freshwater standards.

3. U = Compound analyzed, but not detected above indicated detection limit.

4. --- = minimum detection levels not reported by labs

Table 6a. Grain Size Analysis (ASTM D422M)

SAMPLE LOCATION	PERCENT SAND/GRAVEL (2,000-62 microns)	PERCENT SILT/CLAY (62-1.0 microns)
SB-M-1	6.8%	93.2%
SB-M-Z1	17.8%	82.2%
SB-M-2	27.9%	72.1%
SB-M-2Z	8.0%	92.0%
SB-C-1	3.3%	96.7%
SB-C-Z1	4.1%	95.9%

Notes: No physical analysis was completed based on pictures. Particle analysis results are displayed as a percentage of the total sample volume.
Sample No.	Sieve size (microns)	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
GRAVEL	4.75 mm (#4)	.05%	0.00%	.01%	.68%	0.00%	.04%
VERY COARSE SAND	2.00 mm (#10)	.02%	.03%	.01%	.04%	.09%	.01%
COARSE SAND	.85 mm (#20)	.39%	.22%	.11%	.32%	.32%	.11%
MEDIUM SAND	.425 mm (#40)	.07%	.10%	.38%	.21%	.12%	.10%
FINE SAND	.250 mm (#60)	.33%	.70%	2.44%	.41%	.26%	.34%
VERY FINE SAND	.150 mm (#100)	1.34%	3.65%	8.78%	.87%	.50%	.65%
COARSE SILT	.106 mm (#140)	1.57%	4.79%	7.78%	1.23%	.62%	.81%
MEDIUM SILT	.075 mm (#200)	2.93%	8.24%	8.39%	4.16%	1.43%	2.03%
FINE SILT	.063 mm (#230)	2.48%	4.92%	4.98%	3.96%	1.78%	1.86%
VERY FINE SILT	>.005<.063 mm	69.60%	62.90%	51.00%	71.30%	71.30%	69.70%
CLAY	<.005 mm	23.60%	19.30%	21.10%	20.70%	25.40%	26.20%

Table 6b. Grain Size Distribution Summary(ASTM D422M)

Notes: Table data provided from ARI Analytical Report (Appendix B). Values displayed as % of total.

Table 7. PSEP Total Organic Carbon, Ammonia, Sulfides, and Total Solids Comparedto 2006 Freshwater Screening Levels

Analysis	MDL	REPORTING LIMIT	SB-M-1	12-M-21	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
N-AMMONIA (mg-N/kg)		.65 - 4.34	204.0	106.0	29.3	213.0	228.0	261.0
TOTAL (%) SOLIDS		.01%	46.4	60.8	70.8	45.5	43.7	47.7
TOTAL (%) ORGANIC CARBON		1.0%	2%	1.3%	.44%	2.3%	2.8%	3.3%
Sulfides (mg/kg)		1.45 - 9.81	83.5	31.4	3.76	59.7	73.4	63.6

Notes:

1. No screening levels were identified in SL1 or SL2 (SEF 2006).

2. U = Compound analyzed, but not detected above indicated detection limit.

3. J = Estimated Results (RPD outside 20% control limit)

4. --- = minimum detection levels not reported by labs.

5. Toc AND Total Solids reported in % by weight units.

Table 8. Semi-volatile Organic Compounds and TBT (EPA Method 8270D and Krome 1988)compared to the 2006 Freshwater Screening Levels

SVOCs Units: μg/kg (ppb) dry weight	MDL	REPORTING LIMIT	SL'S	SB-M-1	SB-M-Z1	S-M-8S	SB-M-Z2	SB-C-1	SB-C-Z1
Acenaphthene	1.82-27.9	3.64-55.8	1100	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.2
Acenaphthylene	1.82-27.9	3.64-55.8	470	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Anthracene	1.82-27.9	3.64-55.8	1200	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	19.8
Benz(a)anthracene	1.82-27.9	3.64-55.8	4300	49.1	9.32	2.58	22.0	19.4	33.3
Benzo(a)pyrene	2.73-41.9	5.46-83.8	3300	89.6	17.1	4.15	36.2	36.9	52.5
Benzo(b)fluoranthene									
Benzo(k)fluoranthene									
Benzofluoranthenes (b+k)			600						
Benzo(g,h,i)perylene	1.82-27.9	3.64-55.8	4000	55.8	15.2	2.61	25.7	25.5	42.3
Chrysene	1.82-27.9	3.64-55.8	5900	3.64 U	13.0	1.90	49.5	24.7	45.3
Dibenz(a,h)anthracene	1.82-27.9	3.64-55.8	800	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Fluoranthene	1.82-27.9	3.64-55.8	11000	96.4	15.5	3.86	129	32.2	105
Fluorene	1.82-27.9	3.64-55.8	1000	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.4
Indeno(1,2,3-cd)pyrene	1.82-27.9	3.64-55.8	4100	49.4	12.2	2.09	20.7	20.6	34.1
2-Methylnaphthalene	3.64-55.8	7.28-112	470	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U
Naphthalene	3.64-55.8	7.28-112	500	7.28 U	5.43	7.28 U	7.28 U	7.28 U	30.2
Phenanthrene	1.82-27.9	3.64-55.8	6100	45.8	9.23	2.17	72.2	14.6	82.2
Pyrene	1.82-27.9	3.64-55.8	8800	130	25.0	5.48	114	38.8	109
1,2-Dichlorobenzene	1.82-27.9	3.64-55.8		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
1,4-Dichlorobenzene	1.82-27.9	3.64-55.8		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
1,2,4-Trichlorobenzene	1.82-27.9	3.64-55.8		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	42.4 U
Dimethylphthalate	21.2-279	42.4-558	46	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Diethylphthalate	21.2-279	42.4-558		42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Di-n-butyl phthalate	21.2-279	42.4-558		42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Butyl benzyl phthalate	21.2-279	42.4-558	260	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Bis(2-ethylhexyl) phthalate	21.2-279	42.4-558	220	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Di-n-octylphthalate	21.2-279	42.4-558	26	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U	42.4 U
Phenol	21.2-279	42.4-558		42.4 U	42.4 U	23.9	42.4 U	42.4 U	4.5 U
2-Methylphenol	2.25-23.4	4.5-46.8		4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	
3+4 Methylphenol(s)	2.25-23.4	4.5-46.8							4.5 U
2,4-Dimethylphenol	2.25-23.4	4.5-46.8		4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	91.0 U
Pentachlorophenol	45.5-292	91.0-1400		91.0 U	91.0 U	91.0 U	91.0 U	91.0 U	7.28 U
Benzyl alcohol	3.64-23.4	7.28-46.8		7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U
Benzoic acid	146-934	292-1868		292 U	7.28 U	7.28 U	7.28 U	7.28 U	1.82 U
Dibenzofuran	1.82-27.9	3.64-55.8	400	1.82 U	1.82 U	1.82 U	1.82 U	1.82 U	7.28 U
N-Nitrosodiphenylamine	3.64-23.4	7.28-46.8		7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	3.64 U
Tributyltin (KROME1988)			75						

Notes:

1. Highlights in this table represent sample readings that <u>are over the 2006 freshwater screening level standards</u>.

Appendix A. Summary Tables of Lab Results Port of St. Helens 07/17/13

- 2. --- = minimum detection levels not reported by labs, not standardized in 2006 Freshwater Screening Levels or chemical testing not required by PSET per MFR CENWP-EC-HR
- 3. Values not presented in 2006 Screening Levels are still under consideration for freshwater standards.
- U = Compound analyzed, but not detected above indicated detection limit.
 SL= "Screening Level", referring to the 2006 freshwater screening level standards.
 TBT not required by PSET per MFR CENWP-EC-HR

Table 9. Total LPAH and HPAH Results Compared to Bulk Sediment Screening Levels for SEF

Total LPAH	Screening Level	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Naphthalene		7.28 U	5.43	7.28 U	7.28 U	7.28 U	30.2
Acenaphthylene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Acenaphthene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.2
Fluorene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	14.4
Phenanthrene		45.8	9.23	2.17	72.2	14.6	82.2
Anthracene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	19.8
2-Methylnaphtalene		7.28 U	7.28 U	7.28 U	7.28 U	7.28 U	7.28 U
Total LPAH	6,600	45.8	14.66	2.17	72.2	14.6	160.8
Total HPAH	Screening Level	SB-M-1	SB-M-Z1	SB-M-2	SB-M-Z2	SB-C-1	SB-C-Z1
Fluoranthene		96.4	15.5	3.86	129	32.2	105
Pyrene		130	25.0	5.48	114	38.8	109
Benzo(a)anthracene		49.1	9.32	2.58	22.0	19.4	33.3
Chrysene		3.64 U	13.0	1.90	49.5	24.7	45.3
Benzofluoranthenes (b+k)							
Benzo(a)pyrene		89.6	17.1	4.15	36.2	36.9	52.5
Indeno(1,2,3-c,d)pyrene		49.4	12.2	2.09	20.7	20.6	34.1
Dibenz(a,h)anthracene		3.64 U	3.64 U	3.64 U	3.64 U	3.64 U	3.64 U
Benzo(g,h,i)perylene		55.8	15.2	2.61	25.7	25.5	42.3
Total HPAH	31,000	470.3	170.14	22.67	396.8	198.1	421.5
Total PAH	37,600	516.1	184.74	24.84	469	212.6	582.3

Notes:

Appendix A. Summary Tables of Lab Results Port of St. Helens 07/17/13

- 1. Highlights in this table represent sample readings that are **over** the 2006 freshwater screening levels.
- 2. Note: --- = No values or non-detect.

ANALYSIS FOR DREDGE SEDIMENT CHARACTERIZATION FOR PORT OF ST.HELENS (POSH61134A)

Potential Chemicals of Concern	Analytical Methods	2006 SEF Screening Levels	Results Sample SB- M-1	Results Sample SB- M-Z1	Results Sample SB- M-2	Results Sample SB- M-Z2	Results Sample SB- C-1	Results Sample SB- C-Z1
POLYNUCLEAR AROMATIC HYDROCARBONS (µg/kg)				-	-	_		-
Naphthalene	EPA Method 8270	500	0	5.43	0	0	0	30.2
Acenaphthylene	EPA Method 8270	470	0	0	0	0	0	0
Acenaphthene	EPA Method 8270	1,100	0	0	0	0	0	14.2
Fluorene	EPA Method 8270	1,000	0	0	0	0	0	14.4
Phenanthrene	EPA Method 8270	6,100	45.8	9.23	2.17	72.2	14.6	82.2
Anthracene	EPA Method 8270	1,200	0	0	0	0	0	19.8
2-Methylnaphthalene	EPA Method 8270	470	0	0	0	0	0	0
Total LPAH (d)	EPA Method 8270	6,600	45.8	14.66	2.17	72.2	14.6	160.8
Fluoranthene	EPA Method 8270	11,000	96.4	15.5	3.86	129	32.2	105
Pyrene	EPA Method 8270	8,800	130	25	5.48	114	38.8	109
Benz(a)anthracene	EPA Method 8270	4,300	49.1	9.32	2.58	22	19.4	33.3
Chrysene	EPA Method 8270	5,900	69	13	1.9	49.5	24.7	45.3
Benzofluoranthenes €	EPA Method 8270	600	0	0	0	0	0	0
Benzo(a)pyrene	EPA Method 8270	1,600	89.6	17.1	4.15	36.2	36.9	52.5
Indeno(1,2,3-cd)pyrene	EPA Method 8270	4,100	49.4	12.2	2.09	20.7	20.6	34.1
Dibenz(a,h)anthracene	EPA Method 8270	800	0	0	0	0	0	0
Benzo(g,h,i)perylene	EPA Method 8270	4,000	55.8	15.2	2.61	25.7	25.5	42.3
TOTAL HPAH	EPA Method 8270	31,000	539.3	107.32	22.67	397.1	198.1	421.5
TOTAL PAH	EPA Method 8270	37,600	585.1	121.98	24.84	469.3	212.7	582.3
CHLORINATED ORGANIC COMPOUNDS (µg/kg)								
1,4-Dichlorobenzene	EPA Method 8270	0	0	0	0	0	0	0
1,2-Dichlorobenzene	EPA Method 8270	0	0	0	0	0	0	0
1,2,4-Trichlorobenzene	EPA Method 8270	0	0	0	0	0	0	0
Hexachlorobenzene (HCB)	EPA Method 8270	0	0	0	0	0	0	0

1,4-Dichlorobenzene	EPA Method 8270	0	0	0	0	0	
1,2-Dichlorobenzene	EPA Method 8270	0	0	0	0	0	
1,2,4-Trichlorobenzene	EPA Method 8270	0	0	0	0	0	
Hexachlorobenzene (HCB)	EPA Method 8270	0	0	0	0	0	

Detection Limits are from 2009 Marine SL. Results are reported in µg/kg.

POLYCHLORONATED BIPHENYLS (PCBs)

(µg/kg)

Aroclor 1016	EPA Method 8082A	0	0	0	0	0	
Aroclor 1221	EPA Method 8082A	0	0	0	0	0	
Aroclor 1232	EPA Method 8082A	0	0	0	0	0	
Aroclor 1242	EPA Method 8082A	0	0	0	0	0	
Aroclor 1248	EPA Method 8082A	0	0	0	0	0	
Aroclor 1254	EPA Method 8082A	0	7	6.92	0	7.61	
Aroclor 1260	EPA Method 8082A	0	3.78	3.4	0	4.53	
TOTAL PCBs (not to exceed 60)		60	10.78	10.32	0	12.14	

PHTHALATES

(µg/kg)								
Dimethyl phthalate	EPA Method 8270D	46	0	0	0	0	0	0
Diethyl phthalate	EPA Method 8270D	200	0	0	0	0	0	0
Di-n-butyl phthalate	EPA Method 8270D	1,400	0	0	0	0	0	0
Butylbenzyl phthalate	EPA Method 8270D	260	0	0	0	0	0	0
Bis(2-ethylhexyl) phthalate	EPA Method 8270D	220	0	0	0	0	0	0
Di-n-octyl phthalate	EPA Method 8270D	26	0	0	0	0	0	0

Diethyl phthalate and Di-n-butyl phthalate screening levels from 2009 Marine SL.

PHENOLS

(µg/kg)

Phenol	EPA Method 8270D	420	0	0	23.9	0	
2-Methylphenol	EPA Method 8270D	63	0	0	0	0	
4-Methylphenol	EPA Method 8270D	670	0	0	0	0	
2,4-Dimethylphenol	EPA Method 8270D	29	0	0	0	0	
Pentachlorophenol	EPA Method 8270D	400	0	0	0	0	

All phenol screening levels from 2009 Marine SL.

MISCELLANEOUS EXTRACTA (µg/kg)	ABLES (PART 1)							
Benzyl alcohol	EPA Method 8270D	0	0	0	0	0	0	0
Benzoic acid	EPA Method 8270D	0	0	0	0	0	0	0
Carbozole	EPA Method 8270D	0	0	0	0	0	0	0
N-Ammonia	EPA 350.1M	0	204	106	29.3	213	228	261
Sulfide	EPA 376.2	0	83.5	31.4	3.76	59.7	73.4	63.6

0	0
0	0
0	0
0	6.42
0	0
6.79	17.8
3.81	10.4
10.6	34.62

0 0 0 0 0 0 0 0 0 0

MISCELLANEOUS EXTRACTABLES (PART 2) (µg/kg)

Dibenzofuran	EPA Method 8270D	540	0	0	0	0	
Hexachloroethane	EPA Method 8270D	***	***	***	***	***	
Hexachlorobutadiene	EPA Method 8270D	11	0	0	0	0	
N-Nitrosodiphenylamine	EPA Method 8270D	28	0	0	0	0	

VOLATILE OPCANICS (VOCS)

VOLATILE ORGANICS (VOCS)								
Trichloroethene	EPA Method 8260	***	***	***	***	***	***	***
Tetrachloroethene	EPA Method 8260	***	***	***	***	***	***	***
Benzene	EPA Method 8260	***	***	***	***	***	***	***
Toluene	EPA Method 8260	***	***	***	***	***	***	***
Ethylbenzene	EPA Method 8260	***	***	***	***	***	***	***
Total xylenes (sum of o-, m-, and p- isomers)	EPA Method 8260	***	***	***	***	***	***	***

PESTICIDES

(µg/kg)

p,p'-DDE	EPA Method 8081B	9	0	0	0	0	0	0
p,p'-DDD	EPA Method 8081B	16	0	0	0	0	0	0
p,p'-DDT	EPA Method 8081B	12	0	0	0	0	0	0
Total DDT (i)	EPA Method 8081B	37	0	0	0	0	0	0
Aldrin	EPA Method 8081B	9.5	0	0	0	0	0	0
Chlordane	EPA Method 8081B	2.8	0	0	0	0	0	0
Dieldrin	EPA Method 8081B	1.9	0	0	0	0	0	0
Heptachlor	EPA Method 8081B	1.5	0	0	0	0	0	0
Heptachlor Epoxide	EPA Method 8081B	***	0	0	0	0	0	0
Lindane (gamma-BHC)	EPA Method 8081B	***	0	0	0	0	0	0
Toxaphene	EPA Method 8081B	***	0	0	0	0	0	0
Endrin	EPA Method 8081B	***	0	0	0	0	0	0
Tributyltin (µg/L (ppb); interstitial water)	KRONE et al	0.15	***	***	***	***	***	***

METALS (mg/kg)

	6000/7000 or 200.8						
Antimony	(k)	150	0	1.62	0	1.19	

0	0
0	0
***	***
0	8 55
0	0.00

0	0
***	***
0	0
0	0

	6000/7000 or 200.8						
Arsenic	(k)	20	13.2	18.8	11.3	15.7	
	6000/7000 or 200.8						
Cadmium	(k)	1.1	0	0	0	0	
	6000/7000 or 200.8						
Chromium	(k)	95	22	18.5	18.6	22.8	
	6000/7000 or 200.8						
Copper	(k)	80	28.7	26	20.2	29.8	
	6000/7000 or 200.8						
Lead	(k)	340	15	13.5	9.87	16	
	6000/7000 or 200.8						
Manganese	(k)	100	0	0	0	0	
	6000/7000 or 200.8						
Mercury	(k)	0.28	0.083	0.068	0	0.092	
	6000/7000 or 200.8						
Nickel	(k)	60	16.5	17.1	17.7	16.4	
	6000/7000 or 200.8						
Silver	(k)	2	0	0	0	0	
	6000/7000 or 200.8						
Zinc	(k)	130	96.6	84.4	68.6	105	
Antimony screening levels taken from 2009	Marine SL, all other metal	screening levels	s taken from 2006	Interim Freshwa	ter SL.		

PETROLEUM HYDROCARBONS

(mg/kg)

Heavy OilNWTPH-Dx0000	Diesel	NWTPH-Dx	0	0	0	0	
	Heavy Oil	NWTPH-Dx	0	0	0	0	

Results are reported in mg/kg.

OTHER

Total Organic Carbon (TOC)	PSEP/SM5310B	2.00%	1.30%	0.44%	2.30%	
Total Solids	PSEP/SM5310B	46.40%	60.80%	70.80%	45.50%	4
Percent Retained 4.75mm sieve (#4)	ASTM D 422M	0.05%	0%	0.01%	0.68%	
Percent Retained 2.0mm sieve (#10)	ASTM D 422M	0.02%	0.03%	0.01%	0.04%	
Percent Retained .85mm sieve (#20)	ASTM D 422M	0.39%	0.22%	0.11%	0.32%	
Percent Retained .425mm sieve (#40)	ASTM D 422M	0.07%	0.10%	0.38%	0.21%	
Percent Retained .250mm sieve (#60)	ASTM D 422M	0.33%	0.70%	2.44%	0.41%	
Percent Retained .150mm sieve (#100)	ASTM D 422M	1.34%	3.65%	8.78%	0.87%	
Percent Retained .106mm sieve (#140)	ASTM D 422M	1.57%	4.79%	7.78%	1.23%	
Percent Retained .075mm sieve (#200)	ASTM D 422M	2.93%	8.24%	8.39%	4.16%	
Percent Retained .063mm sieve (#230)	ASTM D 422M	2.48%	4.92%	4.98%	3.96%	

13.2	63
0	0
25.2	28.2
33.3	39.6
16.7	21.8
0	0
0.094	0.198
18.1	20.2
0	0
112	149
0	0
0	01.3
0	91.5
2.80%	3.30%
43.70%	47.70%
0%	0.04%
0.09%	0.01%
0.32%	0.11%
0.12%	0.10%
0.26%	0.34%
0.50%	0.65%
0.62%	0.81%
1.43%	2.03%
1.78%	1.86%

Percent Retained Silt (>.005mm<.063mm)	ASTM D 422M	69.60%	62.90%	51.00%	71.30%	71.30%	69.70%
Percent Retained Clay (<.005mm)	ASTM D 422M	23.60%	19.30%	21.10%	20.70%	25.40%	26.20%

Appendix B

Apex and ARI Laboratory results

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239

Apex Labs

12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax

Sunday, July 14, 2013

Brian Perleberg Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632

RE: Port of St.Helens Sediment Sampling / POSH61134A

Enclosed are the results of analyses for work order <u>A3F0500</u>, which was received by the laboratory on 6/21/2013 at 11:39:00AM.

Thank you for using Apex Labs. We appreciate your business and strive to provide the highest quality services to the environmental industry.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: <u>dthomas@apex-labs.com</u>, or by phone at 503-718-2323.

Apex Laboratories

Apex Labs

12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax

Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION						
Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received		
SB-M-1 Comp. DMMU1	A3F0500-01	Sediment	06/19/13 11:09	06/21/13 11:39		
SB-M-Z1 Comp DMMU1	A3F0500-02	Sediment	06/19/13 11:09	06/21/13 11:39		
SB-M-2 Comp DMMU2	A3F0500-03	Sediment	06/19/13 12:25	06/21/13 11:39		
SB-M-Z2 Comp DMMU2	A3F0500-04	Sediment	06/19/13 12:25	06/21/13 11:39		
SB-C-1 Comp DMMU3	A3F0500-05	Sediment	06/19/13 16:10	06/21/13 11:39		
SB-C-Z1 Comp DMMU3	A3F0500-06	Sediment	06/19/13 16:10	06/21/13 11:39		

Apex Laboratories

Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Diesel	and Oil Hyd	rocarbons by	NWTPH-Dx			
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-1 Comp. DMMU1 (A3F0500-01)		Matrix: Se	diment	Batch: 306058	80		
Diesel	ND		36.5	mg/kg dry	1	06/24/13 21:46	NWTPH-Dx	F-17
Oil	ND		73.1	"	"	"	"	F-17
Surrogate: o-Terphenyl (Surr)		i	Recovery: 90 %	Limits: 50-150 %	<i>6</i> "	"	"	
SB-M-Z1 Comp DMMU1 (A3F0500-02	2)		Matrix: Se	diment	Batch: 306058	B0		
Diesel	ND		28.3	mg/kg dry	1	06/24/13 23:42	NWTPH-Dx	F-17
Oil	ND		56.6	"	"	"	"	F-17
Surrogate: o-Terphenyl (Surr)		i	Recovery: 86 %	Limits: 50-150 %	ó "	н	"	
SB-M-2 Comp DMMU2 (A3F0500-03)			Matrix: Se	diment	Batch: 306058	80		
Diesel	ND		25.0	mg/kg dry	1	06/25/13 00:40	NWTPH-Dx	
Oil	ND		50.0	"	"	"	"	
Surrogate: o-Terphenyl (Surr)		i	Recovery: 88 %	Limits: 50-150 %	ó "	"	"	
SB-M-Z2 Comp DMMU2 (A3F0500-04	4)		Matrix: Se	diment	Batch: 306058	80		
Diesel	ND		39.9	mg/kg dry	1	06/25/13 01:08	NWTPH-Dx	F-17
Oil	ND		79.8	"	"	"	"	F-17
Surrogate: o-Terphenyl (Surr)		i	Recovery: 90 %	Limits: 50-150 %	ó "	"	"	
SB-C-1 Comp DMMU3 (A3F0500-05)			Matrix: Se	diment	Batch: 306058	80		
Diesel	ND		39.8	mg/kg dry	1	06/25/13 02:06	NWTPH-Dx	F-17
Oil	ND		79.5	"	"	"	"	F-17
Surrogate: o-Terphenyl (Surr)		i	Recovery: 87 %	Limits: 50-150 %	ó "	"	"	
SB-C-Z1 Comp DMMU3 (A3F0500-06	5)		Matrix: Se	diment	Batch: 306058	80		
Diesel	ND		37.7	mg/kg dry	1	06/25/13 03:04	NWTPH-Dx	F-17
Oil	91.3		75.4	"	"	"	"	F-17
Surrogate: o-Terphenyl (Surr)		i	Recovery: 94 %	Limits: 50-150 %	ó "	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Polyc	hlorinated E	Siphenyls EF	PA 8082A			
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-1 Comp. DMMU1 (A3F	0500-01)		Matrix: Sec	liment E	atch: 306058	34		C-07
Aroclor 1016	ND		2.85	ug/kg dry	1	06/25/13 13:52	EPA 8082A	
Aroclor 1221	ND		2.85	"	"	"	"	
Aroclor 1232	ND		2.85	"	"	"	"	
Aroclor 1242	ND		2.85	"	"	"	"	
Aroclor 1248	ND		2.85	"	"	"	"	
Aroclor 1254	7.00		2.85	"	"	"	"	EST
Aroclor 1260	3.78		2.85	"	"	"	"	EST
Surrogate: Decachlorobipheny	l (Surr)	Re	covery: 101 %	Limits: 60-125 %	"	"	"	
SB-M-Z1 Comp DMMU1 (A3	F0500-02)		Matrix: Sec	liment E	atch: 306058	34		C-07
Aroclor 1016	ND		2.16	ug/kg dry	1	06/25/13 14:28	EPA 8082A	
Aroclor 1221	ND		2.16	"	"	"	"	
Aroclor 1232	ND		2.16	"	"	"	"	
Aroclor 1242	ND		2.16	"	"	"	"	
Aroclor 1248	ND		2.16	"	"	"	"	
Aroclor 1254	6.92		2.16	"	"	"	"	EST
Aroclor 1260	3.40		2.16	"	"	"	"	EST
Surrogate: Decachlorobipheny	l (Surr)	R	ecovery: 97 %	Limits: 60-125 %	"	"	"	
SB-M-2 Comp DMMU2 (A3F	0500-03)		Matrix: Sec	liment E	atch: 306058	34		C-07
Aroclor 1016	ND		1.86	ug/kg dry	1	06/25/13 15:25	EPA 8082A	
Aroclor 1221	ND		1.86	"	"	"	"	
Aroclor 1232	ND		1.86	"	"	"	"	
Aroclor 1242	ND		1.86	"	"	"	"	
Aroclor 1248	ND		1.86	"	"	"	"	
Aroclor 1254	ND		1.86	"	"	"	"	
Aroclor 1260	ND		1.86	"	"	"	"	
Surrogate: Decachlorobipheny	l (Surr)	R	ecovery: 87 %	Limits: 60-125 %	"	"	"	
SB-M-Z2 Comp DMMU2 (A3	F0500-04)		Matrix: Sec	liment E	atch: 306058	34		C-07
Aroclor 1016	ND		2.89	ug/kg dry	1	06/25/13 15:43	EPA 8082A	
Aroclor 1221	ND		2.89	"	"	"	"	
Aroclor 1232	ND		2.89	"	"	"	"	
Aroclor 1242	ND		2.89	"	"	"	"	
Aroclor 1248	ND		2.89	"	"	"	"	
Aroclor 1254	7.61		2.89	"	"	"	"	EST
Araclar 1260	4 53		2.89	"	"	"	"	EST

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Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632

Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Polyc	hlorinated l	Biphenyls E	PA 8082A			
Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes
					Baten. 50005			<u> </u>
Surrogate: Decachlorobiphenyl (Surr))	R	ecovery: 96 %	Limits: 60-125 %	6 1	"	EPA 8082A	
SB-C-1 Comp DMMU3 (A3F0500-	05)		Matrix: Se	diment	Batch: 30605	84		C-07
Aroclor 1016	ND		3.00	ug/kg dry	1	06/25/13 16:01	EPA 8082A	
Aroclor 1221	ND		3.00	"	"	"	"	
Aroclor 1232	ND		3.00	"	"	"	"	
Aroclor 1242	ND		3.00	"	"	"	"	
Aroclor 1248	ND		3.00	"	"	"	"	
Aroclor 1254	6.79		3.00	"	"	"	"	EST
Aroclor 1260	3.81		3.00	"	"	"	"	EST
Surrogate: Decachlorobiphenyl (Surr))	R	ecovery: 94 %	Limits: 60-125 %	6 "	"	"	
SB-C-Z1 Comp DMMU3 (A3F0500	-06)		Matrix: Se	diment	Batch: 30605	84		C-07
Aroclor 1016	ND		2.78	ug/kg dry	1	06/25/13 16:19	EPA 8082A	
Aroclor 1221	ND		2.78	"	"	"	"	
Aroclor 1232	ND		2.78	"	"	"	"	
Aroclor 1242	6.42		2.78	"	"	"	"	EST
Aroclor 1248	ND		2.78	"	"	"	"	
Aroclor 1254	17.8		2.78	"	"	"	"	EST
Aroclor 1260	10.4		2.78	"	"	"	"	EST
Sumogata: Dagaghlanghinhanyl (Sum		D	02.0/	Limita, 60 125 0	/ "	"		

Surrogate: Decachlorobiphenyl (Surr)

Recovery: 93 % Limits: 60-125 %

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Organochlorine Pesticides by EPA 8081B								
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-1 Comp. DMMU1 (A3F05	00-01RE1)		Matrix: Se	diment	Batch: 30607	55		C-05
4,4'-DDD	ND	1.42	2.84	ug/kg dry	1	07/01/13 16:59	EPA 8081B	
4,4'-DDE	ND	1.42	2.84	"	"	"	"	
4,4'-DDT	ND	1.42	2.84	"	"	"	"	
Aldrin	ND	1.42	2.84	"	"	"	"	
cis-Chlordane	ND	1.42	2.84	"	"	"	"	
trans-Chlordane	ND	1.42	2.84	"	"	"	"	
cis-Nonachlor	ND	1.42	2.84	"	"	"	"	
trans-Nonachlor	ND	1.42	2.84	"	"	"	"	
Oxychlordane	ND	1.42	2.84	"	"	"	"	
Dieldrin	ND	1.42	2.84	"	"	"	"	
Heptachlor	ND	1.42	2.84	"	"	"	"	
gamma-BHC (Lindane)	ND	1.42	2.84	"	"	"	"	
2,4'-DDD	ND	1.42	2.84	"	"	"	"	
2,4'-DDE	ND	1.42	2.84	"	"	"	"	
2,4'-DDT	ND	1.42	2.84	"	"	"	"	
Surrogate: 2,4,5,6-TCMX (Surr)		Re	ecovery: 49 %	Limits: 50-125 %	6 "	"	"	S-03
Decachlorobiphenyl (Su	urr)		51%	Limits: 55-130 %	6 "	"	"	S-03
SB-M-Z1 Comp DMMU1 (A3F05	500-02RE1)		Matrix: Se	diment	Batch: 30607	55		C-05
4,4'-DDD	ND	1.05	2.11	ug/kg dry	1	07/01/13 17:34	EPA 8081B	
4,4'-DDE	ND	1.05	2.11	"	"	"	"	
4,4'-DDT	ND	2.11	2.11	"	"	"	"	
Aldrin	ND	1.05	2.11	"	"	"	"	
cis-Chlordane	ND	1.05	2.11	"	"	"	"	
trans-Chlordane	ND	1.05	2.11	"	"	"	"	
cis-Nonachlor	ND	1.05	2.11	"	"	"	"	
trans-Nonachlor	ND	1.05	2.11	"	"	"	"	
Oxychlordane	ND	1.05	2.11	"	"	"	"	
Dieldrin	ND	1.05	2.11	"	"	"	"	
Heptachlor	ND	1.05	2.11	"	"	"	"	
gamma-BHC (Lindane)	ND	1.05	2.11	"	"	"	"	
2,4'-DDD	ND	1.05	2.11	"	"	"	"	
2,4'-DDE	ND	1.05	2.11	"	"	"	"	
2,4'-DDT	ND	1.05	2.11	"	"	"	"	
Surrogate: 2,4,5,6-TCMX (Surr)		Re	ecovery: 75 %	Limits: 50-125 %	<i>6</i> "	"	"	
Decachlorobiphenyl (Su	urr)		70 %	Limits: 55-130 %	<i>6</i> "	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Organo	chlorine Pes	ticides by E	PA 8081B			
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Organochlorine Pesticides by EPA 8081B								
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-2 Comp DMMU2 (A3F0500-	03RE1)		Matrix: Sediment Batch: 3060755					C-05
4,4'-DDD	ND	0.908	1.82	ug/kg dry	1	07/01/13 17:52	EPA 8081B	
4,4'-DDE	ND	0.908	1.82	"	"	"	"	
4,4'-DDT	ND	0.908	1.82	"	"	"	"	
Aldrin	ND	0.908	1.82	"	"	"	"	
cis-Chlordane	ND	0.908	1.82	"	"	"	"	
trans-Chlordane	ND	0.908	1.82	"	"	"	"	
cis-Nonachlor	ND	0.908	1.82	"	"	"	"	
trans-Nonachlor	ND	0.908	1.82	"	"	"	"	
Oxychlordane	ND	0.908	1.82	"	"	"	"	
Dieldrin	ND	0.908	1.82	"	"	"	"	
Heptachlor	ND	0.908	1.82	"	"	"	"	
gamma-BHC (Lindane)	ND	0.908	1.82	"	"	"	"	
2,4'-DDD	ND	0.908	1.82	"	"	"	"	
2,4'-DDE	ND	0.908	1.82	"	"	"	"	
2,4'-DDT	ND	0.908	1.82	"	"	"	"	
Surrogate: 2,4,5,6-TCMX (Surr)		Re	ecovery: 75 %	Limits: 50-125 %	"	"	"	
Decachlorobiphenyl (Surr)			85 %	Limits: 55-130 %	"	"	"	
SB-M-Z2 Comp DMMU2 (A3F0500	-04RE1)		Matrix: See	diment Ba	atch: 30607	55		C-05
4,4'-DDD	ND	1.45	2.90	ug/kg dry	1	07/01/13 18:11	EPA 8081B	
4,4'-DDE	ND	1.45	2.90	"	"	"	"	
4,4'-DDT	ND	1.45	2.90	"	"	"	"	
Aldrin	ND	1.45	2.90	"	"	"	"	
cis-Chlordane	ND	1.45	2.90	"	"	"	"	
trans-Chlordane	ND	1.45	2.90	"	"	"	"	
cis-Nonachlor	ND	1.45	2.90	"	"	"	"	
trans-Nonachlor	ND	1.45	2.90	"	"	"	"	
Oxychlordane	ND	1.45	2.90	"	"	"	"	
Dieldrin	ND	1.45	2.90	"	"	"	"	
Heptachlor	ND	1.45	2.90	"	"	"	"	
gamma-BHC (Lindane)	ND	1.45	2.90	"	"	"	"	
2,4'-DDD	ND	1.45	2.90	"	"	"	"	
2,4'-DDE	ND	1.45	2.90	"	"	"	"	
2,4'-DDT	ND	1.45	2.90	"	"	"	"	
Surrogate: 2,4,5,6-TCMX (Surr)		Re	ecovery: 87 %	Limits: 50-125 %	"	"	"	
Decachlorobiphenyl (Surr)			72 %	Limits: 55-130 %		"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Organochlorine Pesticides by EPA 8081B									
Reporting									
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	

Apex Laboratories

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

	Organochlorine Pesticides by EPA 8081B								
			Reporting						
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	
SB-C-1 Comp DMMU3 (A3F0500-0	05RE1)		Matrix: See	diment E	Batch: 30607	55		C-05	
4,4'-DDD	ND	1.48	2.97	ug/kg dry	1	07/01/13 18:28	EPA 8081B		
4,4'-DDE	ND	1.48	2.97	"	"	"	"		
4,4'-DDT	ND	1.48	2.97	"	"	"	"		
Aldrin	ND	1.48	2.97	"	"	"	"		
cis-Chlordane	ND	1.48	2.97		"	"	"		
trans-Chlordane	ND	1.48	2.97	"	"	"	"		
cis-Nonachlor	ND	1.48	2.97	"	"	"	"		
trans-Nonachlor	ND	1.48	2.97	"	"	"	"		
Oxychlordane	ND	1.48	2.97	"	"	"	"		
Dieldrin	ND	1.48	2.97	"	"	"	"		
Heptachlor	ND	1.48	2.97	"	"	"	"		
gamma-BHC (Lindane)	ND	1.48	2.97	"	"	"	"		
2,4'-DDD	ND	1.48	2.97	"	"	"	"		
2,4'-DDE	ND	1.48	2.97	"	"	"	"		
2,4'-DDT	ND	1.48	2.97		"	"	"		
Surrogate: 2,4,5,6-TCMX (Surr)		Re	ecovery: 68 %	Limits: 50-125 %	"	"	"		
Decachlorobiphenyl (Surr)			62 %	Limits: 55-130 %	"	"	"		
SB-C-Z1 Comp DMMU3 (A3F0500	-06RE1)		Matrix: See	diment E	Batch: 30607	55		C-05	
4,4'-DDD	ND	1.36	2.72	ug/kg dry	1	07/01/13 18:46	EPA 8081B		
4,4'-DDE	ND	1.36	2.72	"	"	"	"		
4,4'-DDT	ND	1.36	2.72	"	"	"	"		
Aldrin	ND	1.36	2.72	"	"	"	"		
cis-Chlordane	ND	1.36	2.72	"	"	"	"		
trans-Chlordane	ND	1.36	2.72	"	"	"	"		
cis-Nonachlor	ND	1.36	2.72	"	"	"	"		
trans-Nonachlor	ND	1.36	2.72	"	"	"	"		
Oxychlordane	ND	1.36	2.72	"		"	"		
Dieldrin	ND	1.36	2.72	"	"	"	"		
Heptachlor	ND	1.36	2.72	"	"	"	"		
gamma-BHC (Lindane)	ND	1.36	2.72		"	"	"		
2,4'-DDD	ND	1.36	2.72	"	"	"	"		
2,4'-DDE	ND	1.36	2.72	"	"	"	"		
2,4'-DDT	ND	1.36	2.72	"	"	"	"		
Surrogate: 2,4,5,6-TCMX (Surr)		Re	ecovery: 53 %	Limits: 50-125 %	"	"	"		
Decachlorobiphenyl (Surr)			51 %	Limits: 55-130 %	"	u	"	S-06	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Organochlorine Pesticides by EPA 8081B									
Reporting									
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D								
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-1 Comp. DMMU1 (A3F050	00-01RE1)		Matrix: Sec	liment	Batch: 30606	54		
Acenaphthene	ND	27.9	55.8	ug/kg dry	10	06/26/13 15:23	EPA 8270D	
Acenaphthylene	ND	27.9	55.8			"	"	
Anthracene	ND	27.9	55.8		"	"	"	
Benz(a)anthracene	49.1	27.9	55.8			"	"	J
Benzo(a)pyrene	89.6	41.9	83.8			"	"	
Benzo(g,h,i)perylene	55.8	27.9	55.8			"	"	
Chrysene	69.0	27.9	55.8			"	"	
Dibenz(a,h)anthracene	ND	27.9	55.8			"	"	
Fluoranthene	96.4	27.9	55.8			"	"	
Fluorene	ND	27.9	55.8			"	"	
Indeno(1,2,3-cd)pyrene	49.4	27.9	55.8			"	"	J
2-Methylnaphthalene	ND	55.8	112			"	"	
Naphthalene	ND	55.8	112			"	"	
Phenanthrene	45.8	27.9	55.8			"	"	J
Pyrene	130	27.9	55.8			"	"	
1,2-Dichlorobenzene	ND	27.9	55.8			"	"	
1,4-Dichlorobenzene	ND	27.9	55.8			"	"	
1,2,4-Trichlorobenzene	ND	27.9	55.8			"	"	
Dimethylphthalate	ND	279	558			"	"	
Diethylphthalate	ND	279	558			"	"	
Di-n-butylphthalate	ND	279	558			"	"	
Butyl benzyl phthalate	ND	279	558			"	"	
Bis(2-ethylhexyl)phthalate	ND	279	558			"	"	
Di-n-octyl phthalate	ND	279	558			"	"	
Phenol	ND	279	558			"	"	
2-Methylphenol	ND	55.8	112			"	"	
2,4-Dimethylphenol	ND	55.8	112			"	"	
Pentachlorophenol (PCP)	ND	698	1400			"	"	
Benzyl alcohol	ND	55.8	112			"	"	
Benzoic acid	ND	2230	4470			"	"	
Dibenzofuran	ND	27.9	55.8			"	"	
N-Nitrosodiphenylamine	ND	55.8	112	"	"	"	"	
Hexachlorobenzene	ND	1740	3490	"	"	"	"	
Hexachlorobutadiene	ND	1740	3490	"	"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)		R	ecovery: 35 %	Limits: 35-120 %	% "	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D								
			Reporting	;				
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-1 Comp. DMMU1 (A3F050	0-01RE1)		Matrix: Se	diment Ba	tch: 30606	54		
Surrogate: 2-Fluorobiphenyl (Surr)		Re	ecovery: 50 %	Limits: 45-120 %	10	"	EPA 8270D	
Phenol-d6 (Surr)			11 %	Limits: 40-120 %	"	"	"	S-02
p-Terphenyl-d14 (Surr)			92 %	Limits: 30-125 %	"	"	"	
2-Fluorophenol (Surr)			42 %	Limits: 35-120 %	"	"	"	
2,4,6-Tribromophenol (Si	urr)		99 %	Limits: 40-125 %	"	"	"	
SB-M-Z1 Comp DMMU1 (A3F050	00-02RE1)		Matrix: Se	diment Ba	tch: 30606	54		
Acenaphthene	ND	2.12	4.25	ug/kg dry	1	06/27/13 11:41	EPA 8270D	
Acenaphthylene	ND	2.12	4.25	"	"	"	"	
Anthracene	ND	2.12	4.25	"	"	"	"	
Benz(a)anthracene	9.32	2.12	4.25	"	"	"	"	
Benzo(a)pyrene	17.1	3.19	6.37	"	"	"	"	
Benzo(g,h,i)perylene	15.2	2.12	4.25	"	"	"	"	
Chrysene	13.0	2.12	4.25	"	"	"	"	
Dibenz(a,h)anthracene	ND	2.12	4.25	"	"	"	"	
Fluoranthene	15.5	2.12	4.25	"	"	"	"	
Fluorene	ND	2.12	4.25	"	"	"	"	
Indeno(1,2,3-cd)pyrene	12.2	2.12	4.25	"	"	"	"	
2-Methylnaphthalene	ND	4.25	8.50	"	"	"	"	
Naphthalene	5.43	4.25	8.50	"	"	"	"	J
Phenanthrene	9.23	2.12	4.25	"	"	"	"	
Pyrene	25.0	2.12	4.25	"	"	"	"	
1,2-Dichlorobenzene	ND	2.12	4.25	"	"	"	"	
1,4-Dichlorobenzene	ND	2.12	4.25	"	"	"	"	
1,2,4-Trichlorobenzene	ND	2.12	4.25	"	"	"	"	
Dimethylphthalate	ND	21.2	42.5	"	"	"	"	
Diethylphthalate	ND	21.2	42.5	"	"	"	"	
Di-n-butylphthalate	ND	21.2	42.5	"	"	"	"	
Butyl benzyl phthalate	ND	21.2	42.5	"	"	"	"	
Bis(2-ethylhexyl)phthalate	ND	21.2	42.5	"	"	"	"	
Di-n-octyl phthalate	ND	21.2	42.5	"	"	"	"	
Phenol	ND	21.2	42.5	"	"	"	"	
2-Methylphenol	ND	4.25	8.50	"	"	"	"	
2,4-Dimethylphenol	ND	4.25	8.50	"	"	"	"	
Pentachlorophenol (PCP)	ND	53.1	106	"	"	"	"	
Benzyl alcohol	ND	4.25	8.50	"	"	"	"	
Benzoic acid	ND	170	340	"	"	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

	;	Semivolat	ile Organic	Compounds by	/ EPA 8270	D		
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-Z1 Comp DMMU1 (A3F0500-02F	E1)		Matrix: Se	diment Ba	atch: 30606	54		
Dibenzofuran	ND	2.12	4.25	ug/kg dry	1	"	EPA 8270D	
N-Nitrosodiphenylamine	ND	4.25	8.50	"	"	"	"	
Hexachlorobenzene	ND	133	266	"	"	"	"	
Hexachlorobutadiene	ND	133	266	"	"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)		Re	ecovery: 65 %	Limits: 35-120 %	"	"	"	
2-Fluorobiphenyl (Surr)			65 %	Limits: 45-120 %	"	"	"	
Phenol-d6 (Surr)			63 %	Limits: 40-120 %	"	"	"	
p-Terphenyl-d14 (Surr)			70 %	Limits: 30-125 %	"	"	"	
2-Fluorophenol (Surr)			76 %	Limits: 35-120 %	"	"	"	
2,4,6-Tribromophenol (Surr)			98 %	Limits: 40-125 %	"	"	"	
SB-M-2 Comp DMMU2 (A3F0500-03RE	1)		Matrix: Se	diment Ba	atch: 30606	54		
Dimethylphthalate	ND	18.3	36.7	ug/kg dry	1	06/27/13 11:04	EPA 8270D	
Diethylphthalate	ND	18.3	36.7	"	"	"	"	
Di-n-butylphthalate	ND	18.3	36.7	"	"	"	"	
Butyl benzyl phthalate	ND	18.3	36.7	"	"	"	"	
Bis(2-ethylhexyl)phthalate	ND	18.3	36.7	"	"	"	"	
Di-n-octyl phthalate	ND	18.3	36.7	"	"	"	"	
SB-M-2 Comp DMMU2 (A3F0500-03RE	2)		Matrix: Se	diment Ba	atch: 30700 ⁻	10		
Acenaphthene	ND	1.82	3.64	ug/kg dry	1	07/01/13 17:51	EPA 8270D	
Acenaphthylene	ND	1.82	3.64	"	"	"	"	
Anthracene	ND	1.82	3.64	"	"	"	"	
Benz(a)anthracene	2.58	1.82	3.64	"	"	"	"	J
Benzo(a)pyrene	4.15	2.73	5.46	"	"	"	"	J
Benzo(g,h,i)perylene	2.61	1.82	3.64	"	"	"	"	J
Chrysene	1.90	1.82	3.64	"	"	"	"	J
Dibenz(a,h)anthracene	ND	1.82	3.64	"	"	"	"	
Fluoranthene	3.86	1.82	3.64	"	"	"	"	
Fluorene	ND	1.82	3.64	"	"	"	"	
Indeno(1,2,3-cd)pyrene	2.09	1.82	3.64	"	"	"	"	J
2-Methylnaphthalene	ND	3.64	7.29	"	"	"	"	
Naphthalene	ND	3.64	7.29	"	"	"	"	
Phenanthrene	2.17	1.82	3.64	"	"	"	"	J
Pyrene	5.48	1.82	3.64	"	"	"		
1,2-Dichlorobenzene	ND	1.82	3.64	"	"	"	"	
1,4-Dichlorobenzene	ND	1.82	3.64		"	"		

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Semivolat	ile Organic	Compounds by	EPA 8270	D		
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-2 Comp DMMU2 (A3F0500-03	RE2)		Matrix: Se	diment Ba	atch: 307001	10		
1,2,4-Trichlorobenzene	ND	1.82	3.64	ug/kg dry	1	"	EPA 8270D	
Phenol	23.9	18.2	36.4	"	"	"	"	J
2-Methylphenol	ND	3.64	7.29	"	"	"	"	
2,4-Dimethylphenol	ND	3.64	7.29	"	"	"	"	
Pentachlorophenol (PCP)	ND	45.5	91.1	"	"	"	"	
Benzyl alcohol	ND	3.64	7.29	"	"	"	"	
Benzoic acid	ND	146	291	"	"	"	"	
Dibenzofuran	ND	1.82	3.64	"	"	"	"	
N-Nitrosodiphenylamine	ND	3.64	7.29	"	"	"	"	
Hexachlorobenzene	ND	114	228	"	"	"	"	
Hexachlorobutadiene	ND	114	228	"	"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)		Re	ecovery: 61 %	Limits: 35-120 %	"	"	"	
2-Fluorobiphenyl (Surr)			74 %	Limits: 45-120 %	"	"		
Phenol-d6 (Surr)			70 %	Limits: 40-120 %	"	"	"	
p-Terphenyl-d14 (Surr)			104 %	Limits: 30-125 %	"	"	"	
2-Fluorophenol (Surr)			68 %	Limits: 35-120 %	"	"		
2,4,6-Tribromophenol (Surr)			98 %	Limits: 40-125 %	"	"	"	
SB-M-Z2 Comp DMMU2 (A3F0500-0	4RE1)		Matrix: Se	diment Ba	atch: 306068	54		
Acenaphthene	ND	11.2	22.5	ug/kg dry	4	06/27/13 12:16	EPA 8270D	
Acenaphthylene	ND	11.2	22.5	"	"	"	"	
Anthracene	ND	11.2	22.5	"	"	"	"	
Benz(a)anthracene	22.0	11.2	22.5	"	"	"	"	J
Benzo(a)pyrene	36.2	16.8	33.7	"	"	"	"	
Benzo(g,h,i)perylene	25.7	11.2	22.5	"	"	"	"	
Chrysene	49.5	11.2	22.5	"	"	"	"	
Dibenz(a,h)anthracene	ND	11.2	22.5	"	"	"	"	
Fluoranthene	129	11.2	22.5	"	"	"	"	
Fluorene	ND	11.2	22.5	"	"	"	"	
Indeno(1,2,3-cd)pyrene	20.7	11.2	22.5	"	"	"	"	J
2-Methylnaphthalene	ND	22.5	44.9	"	"	"	"	
Naphthalene	ND	22.5	44.9	"	"	"	"	
Phenanthrene	72.2	11.2	22.5	"	"	"	"	
Pyrene	114	11.2	22.5	"	"	"	"	
1,2-Dichlorobenzene	ND	11.2	22.5	"	"	"	"	
1,4-Dichlorobenzene	ND	11.2	22.5	"	"	"		

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D								
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-M-Z2 Comp DMMU2 (A3F0500-04	IRE1)		Matrix: Se	diment	Batch: 306065	54		
1,2,4-Trichlorobenzene	ND	11.2	22.5	ug/kg dry	4	"	EPA 8270D	
Dimethylphthalate	ND	112	225	"	"	"	"	
Diethylphthalate	ND	112	225	"	"	"	"	
Di-n-butylphthalate	ND	112	225	"	"	"	"	
Butyl benzyl phthalate	ND	112	225	"	"	"	"	
Bis(2-ethylhexyl)phthalate	ND	112	225	"	"	"	"	
Di-n-octyl phthalate	ND	112	225	"	"	"	"	
Phenol	ND	112	225	"	"	"	"	
2-Methylphenol	ND	22.5	44.9	"	"	"	"	
2,4-Dimethylphenol	ND	22.5	44.9	"	"	"	"	
Pentachlorophenol (PCP)	ND	281	561	"	"	"	"	
Benzyl alcohol	ND	22.5	44.9	"	"	"	"	
Benzoic acid	ND	898	1800	"	"	"	"	
Dibenzofuran	ND	11.2	22.5	"	"	"	"	
N-Nitrosodiphenylamine	ND	22.5	44.9	"	"	"	"	
Hexachlorobenzene	ND	702	1400	"	"	"	"	
Hexachlorobutadiene	ND	702	1400	"	"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)		R	ecovery: 58 %	Limits: 35-120	% "	"	"	
2-Fluorobiphenyl (Surr)			59 %	Limits: 45-120	% "	"	"	
Phenol-d6 (Surr)			45 %	Limits: 40-120	% "	"	"	
p-Terphenyl-d14 (Surr)			75 %	Limits: 30-125	% "	"	"	
2-Fluorophenol (Surr)			64 %	Limits: 35-120	% "	"	"	
2,4,6-Tribromophenol (Surr)			101 %	Limits: 40-125	% "	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Semivolat	ile Organic	Compounds I	by EPA 8270	D		
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-C-1 Comp DMMU3 (A3F0500-	-05RE1)		Matrix: Se	diment	Batch: 30606	54		
Acenaphthene	ND	11.7	23.4	ug/kg dry	4	06/27/13 12:52	EPA 8270D	
Acenaphthylene	ND	11.7	23.4		"	"	"	
Anthracene	ND	11.7	23.4	"	"	"	"	
Benz(a)anthracene	19.4	11.7	23.4	"	"	"	"	J
Benzo(a)pyrene	36.9	17.5	35.0	"	"	"	"	
Benzo(g,h,i)perylene	25.5	11.7	23.4	"	"	"	"	
Chrysene	24.7	11.7	23.4	"	"	"	"	
Dibenz(a,h)anthracene	ND	11.7	23.4	"	"	"	"	
Fluoranthene	32.2	11.7	23.4	"	"	"	"	
Fluorene	ND	11.7	23.4			"	"	
Indeno(1,2,3-cd)pyrene	20.6	11.7	23.4	"	"	"	"	J
2-Methylnaphthalene	ND	23.4	46.7	"	"	"	"	
Naphthalene	ND	23.4	46.7	"	"	"	"	
Phenanthrene	14.6	11.7	23.4	"	"	"	"	J
Pyrene	38.8	11.7	23.4		"	"	"	
1,2-Dichlorobenzene	ND	11.7	23.4	"	"	"	"	
1,4-Dichlorobenzene	ND	11.7	23.4	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11.7	23.4	"	"	"	"	
Dimethylphthalate	ND	117	234		"	"	"	
Diethylphthalate	ND	117	234	"	"	"	"	
Di-n-butylphthalate	ND	117	234		"	"	"	
Butyl benzyl phthalate	ND	117	234		"	"	"	
Bis(2-ethylhexyl)phthalate	ND	117	234		"	"	"	
Di-n-octyl phthalate	ND	117	234		"	"	"	
Phenol	ND	117	234	"	"	"	"	
2-Methylphenol	ND	23.4	46.7		"	"	"	
2,4-Dimethylphenol	ND	23.4	46.7		"	"	"	
Pentachlorophenol (PCP)	ND	292	584		"	"	"	
Benzyl alcohol	ND	23.4	46.7		"	"	"	
Benzoic acid	ND	934	1870		"	"	"	
Dibenzofuran	ND	11.7	23.4	"	"	"	"	
N-Nitrosodiphenylamine	ND	23.4	46.7		"	"	"	
Hexachlorobenzene	ND	730	1460		"	"	"	
Hexachlorobutadiene	ND	730	1460	"	"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)		Re	ecovery: 39 %	Limits: 35-120 %	6 "	"	"	

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1339 Commerce Ave. Suite 309B Project Number: POSH61134A Report	
	1:
Longview, WA 98632 Project Manager: Brian Perleberg 0//14/13 0	5:14

ANALYTICAL SAMPLE RESULTS

		Semivolat	ile Organic	Compounds by	/ EPA 8270	D		
			Reporting					
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-C-1 Comp DMMU3 (A3F0500	-05RE1)		Matrix: Se	diment Ba	atch: 30606	54		
Surrogate: 2-Fluorobiphenyl (Surr)		Re	ecovery: 46 %	Limits: 45-120 %	4	"	EPA 8270D	
Phenol-d6 (Surr)			34 %	Limits: 40-120 %	"	"	"	S-06
p-Terphenyl-d14 (Surr)			72 %	Limits: 30-125 %	"	"	"	
2-Fluorophenol (Surr)			48 %	Limits: 35-120 %	"	"	"	
2,4,6-Tribromophenol (Su	urr)		92 %	Limits: 40-125 %	"	"	"	
SB-C-Z1 Comp DMMU3 (A3F050	00-06RE1)		Matrix: Se	diment Ba	atch: 30606	54		
Acenaphthene	14.2	10.6	21.3	ug/kg dry	4	06/27/13 13:29	EPA 8270D	J
Acenaphthylene	ND	10.6	21.3	"	"	"	"	
Anthracene	19.8	10.6	21.3	"	"	"	"	J
Benz(a)anthracene	33.3	10.6	21.3	"	"	"	"	
Benzo(a)pyrene	52.5	15.9	31.9	"	"	"	"	
Benzo(g,h,i)perylene	42.3	10.6	21.3	"	"	"	"	
Chrysene	45.3	10.6	21.3	"	"	"	"	
Dibenz(a,h)anthracene	ND	10.6	21.3	"	"	"	"	
Fluoranthene	105	10.6	21.3	"	"	"	"	
Fluorene	14.4	10.6	21.3	"	"	"	"	J
Indeno(1,2,3-cd)pyrene	34.1	10.6	21.3	"	"	"	"	
2-Methylnaphthalene	ND	21.3	42.5	"	"	"	"	
Naphthalene	30.2	21.3	42.5	"	"	"	"	J
Phenanthrene	82.2	10.6	21.3	"	"	"	"	
Pyrene	109	10.6	21.3	"	"	"	"	
1,2-Dichlorobenzene	ND	10.6	21.3	"	"	"	"	
1,4-Dichlorobenzene	ND	10.6	21.3	"	"	"	"	
1,2,4-Trichlorobenzene	ND	10.6	21.3	"	"	"	"	
Dimethylphthalate	ND	106	213	"	"	"	"	
Diethylphthalate	ND	106	213	"	"	"	"	
Di-n-butylphthalate	ND	106	213	"	"	"	"	
Butyl benzyl phthalate	ND	106	213	"	"	"	"	
Bis(2-ethylhexyl)phthalate	ND	106	213	"	"	"	"	
Di-n-octyl phthalate	ND	106	213	"	"	"	"	
Phenol	ND	106	213	"	"	"	"	
2-Methylphenol	ND	21.3	42.5	"	"	"	"	
2,4-Dimethylphenol	ND	21.3	42.5	"	"	"	"	
Pentachlorophenol (PCP)	ND	266	531	"	"	"	"	
Benzyl alcohol	ND	21.3	42.5	"	"	"	"	
Benzoic acid	ND	850	1700	"	"	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

		Semivolat	ile Organic	Compounds b	y EPA 8270	D		
			Reporting	5				
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes
SB-C-Z1 Comp DMMU3 (A3F0500-	06RE1)		Matrix: Se	diment B	Batch: 306065	54		
Dibenzofuran	ND	10.6	21.3	ug/kg dry	4	"	EPA 8270D	
N-Nitrosodiphenylamine	ND	21.3	42.5	"	"	"	"	
Hexachlorobenzene	ND	664	1330	"	"	"	"	
Hexachlorobutadiene	ND	664	1330		"	"	"	
Surrogate: Nitrobenzene-d5 (Surr)		Re	covery: 48 %	Limits: 35-120 %	"	"	"	
2-Fluorobiphenyl (Surr)			52 %	Limits: 45-120 %	"	"	"	
Phenol-d6 (Surr)			35 %	Limits: 40-120 %	"	"	"	S-06
p-Terphenyl-d14 (Surr)			83 %	Limits: 30-125 %	"	"	"	
2-Fluorophenol (Surr)			58 %	Limits: 35-120 %	"	"	"	
2,4,6-Tribromophenol (Surr)		103 %	Limits: 40-125 %	"	"	"	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)										
Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes		
SB-M-1 Comp. DMMU1 (A3F050	D-01)		Matrix: Sedir	nent						
Batch: 3070028										
Antimony	ND		1.17	mg/kg dry	5	07/02/13 16:35	EPA 6020A			
Arsenic	13.2		2.35	"	"	"	"			
Cadmium	ND		1.17	"	"	"	"			
Chromium	22.0		2.35	"	"	"	"			
Copper	28.7		2.35	"	"	"	"			
Lead	15.0		1.17	"	"	"	"			
Mercury	0.0832		0.0470	"	"	"	"			
Nickel	16.5		2.35	"	"	"	"			
Silver	ND		1.17	"	"	"	"			
Zinc	96.6		4.70	"	"	"	"			
SB-M-Z1 Comp DMMU1 (A3F050	0-02)		Matrix: Sedir	nent						
Batch: 3070028										
Antimony	1.62		0.896	mg/kg dry	5	07/02/13 16:38	EPA 6020A			
Arsenic	18.8		1.79	"	"	"	"			
Cadmium	ND		0.896	"	"	"	"			
Chromium	18.5		1.79	"	"	"	"			
Copper	26.0		1.79	"	"	"	"			
Lead	13.5		0.896	"	"	"	"			
Mercury	0.0678		0.0358	"	"	"	"			
Nickel	17.1		1.79	"	"	"	"			
Silver	ND		0.896	"	"	"	"			
Zinc	85.4		3.58	"	"	"	"			
SB-M-2 Comp DMMU2 (A3F0500	-03)		Matrix: Sedir	ment						
Batch: 3070028										
Antimony	ND		0.683	mg/kg dry	5	07/02/13 16:40	EPA 6020A			
Arsenic	11.3		1.37	"	"	"	"			
Cadmium	ND		0.683	"	"	"	"			
Chromium	18.6		1.37	"	"	"	"			
Copper	20.2		1.37		"	"	"			
Lead	9.87		0.683		"	"	"			
Mercury	ND		0.0273	"	"	"	"			
Nickel	17.7		1.37	"	"	"	"			
Silver	ND		0.683	"	"	"	"			
Zinc	68.6		2.73	"	"	"	"			

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Total Metals by EPA 6020 (ICPMS)									
Analyte	Result	MDL	Reporting Limit	Units	Dilution	Date Analyzed	Method	Notes	
SB-M-Z2 Comp DMMU2 (A3F050	0-04)		Matrix: Sedir	nent					
Batch: 3070028									
Antimony	1.19		1.15	mg/kg dry	5	07/02/13 16:43	EPA 6020A		
Arsenic	15.7		2.30	"	"	"	"		
Cadmium	ND		1.15	"	"	"	"		
Chromium	22.8		2.30	"	"	"	"		
Copper	29.8		2.30	"	"	"	"		
Lead	16.0		1.15	"	"	"	"		
Mercury	0.0919		0.0461	"	"	"	"		
Nickel	16.4		2.30	"	"	"	"		
Silver	ND		1.15	"	"	"	"		
Zinc	105		4.61		"	"	"		
SB-C-1 Comp DMMU3 (A3F0500-	-05)		Matrix: Sedir	nent					
Batch: 3070028									
Antimony	ND		1.15	mg/kg dry	5	07/02/13 16:52	EPA 6020A		
Arsenic	13.2		2.31	"	"	"	"		
Cadmium	ND		1.15	"	"	"	"		
Chromium	25.2		2.31	"	"	"	"		
Copper	33.3		2.31	"	"	"	"		
Lead	16.7		1.15	"	"	"	"		
Mercury	0.0940		0.0461	"	"	"	"		
Nickel	18.1		2.31	"	"	"	"		
Silver	ND		1.15	"	"	"	"		
Zinc	112		4.61	"	"	"	"		
SB-C-Z1 Comp DMMU3 (A3F050	0-06)		Matrix: Sedir	nent					
Batch: 3070028									
Antimony	8.55		1.15	mg/kg dry	5	07/02/13 16:55	EPA 6020A		
Arsenic	63.0		2.31	"	"	"	"		
Cadmium	ND		1.15	"	"	"	"		
Chromium	28.2		2.31	"	"	"	"		
Copper	39.6		2.31		"	"	"		
Lead	21.8		1.15		"	"	"		
Mercury	0.198		0.0462		"	"	"		
Nickel	20.2		2.31	"	"	"	"		
Silver	ND		1.15		"	"	"		
Zinc	149		4.62	"	"	"	"		

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Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Project Number: POSH61134A Longview, WA 98632

Project: Port of St.Helens Sediment Sampling

Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Conventional Chemistry Parameters									
			Reporting						
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	
SB-M-1 Comp. DMMU1 (A3F0)500-01)		Matrix: Sedi	iment					
Batch: 3060604									
Total Organic Carbon	2.0		0.020	% by Weight	1	07/01/13 18:35	PSEP/SM 5310B MOD		
Batch: 3060627									
Total Solids	46.4		1.00	"	"	06/26/13 11:56	SM 2540 G		
SB-M-Z1 Comp DMMU1 (A3F	0500-02)		Matrix: Sedi	iment					
Batch: 3060604									
Total Organic Carbon	1.3		0.020	% by Weight	1	07/01/13 18:35	PSEP/SM 5310B MOD		
Batch: 3060627									
Total Solids	60.8		1.00	"	"	06/26/13 11:56	SM 2540 G		
SB-M-2 Comp DMMU2 (A3F0	500-03)		Matrix: Sedi	iment					
Batch: 3060604									
Total Organic Carbon	0.44		0.020	% by Weight	1	07/01/13 18:35	PSEP/SM 5310B MOD		
Batch: 3060627									
Total Solids	70.8		1.00	"	"	06/26/13 11:56	SM 2540 G		
SB-M-Z2 Comp DMMU2 (A3F	0500-04)		Matrix: Sedi	iment					
Batch: 3060604									
Total Organic Carbon	2.3		0.020	% by Weight	1	07/01/13 18:35	PSEP/SM 5310B MOD		
Batch: 3060627									
Total Solids	45.5		1.00	"	"	06/26/13 11:56	SM 2540 G		
SB-C-1 Comp DMMU3 (A3F0	500-05)		Matrix: Sedi	iment					
Batch: 3060604									
Total Organic Carbon	2.8		0.020	% by Weight	1	07/01/13 18:35	PSEP/SM 5310B MOD		
Batch: 3060627									
Total Solids	43.7		1.00		"	06/26/13 11:56	SM 2540 G		
SB-C-Z1 Comp DMMU3 (A3F	0500-06)		Matrix: Sedi	iment					
Batch: 3060604									
Total Organic Carbon	3.3		0.020	% by Weight	1	07/01/13 18:35	PSEP/SM 5310B MOD		
Batch: 3060627									
Total Solids	47.7		1.00	"	"	06/26/13 11:56	SM 2540 G		

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422									
			Reporting						
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	
SB-M-1 Comp. DMMU1 (A3F0500-0	1)		Matrix: Sedin	nent	Batch: 306062	29			
Percent Retained 4.75 mm sieve	0.05			% of Total	1	06/27/13 20:41	ASTM D 422m	GS-01	
(#4)	0.02				"			CS 01	
Percent Retained 2.00 mm sieve	0.02							03-01	
Percent Retained 0.85 mm sieve	0.39			"	"	"	"	GS-01	
(#20)									
Percent Retained 0.425 mm sieve	0.07			"	"	"	"	GS-01	
(#40) Baraant Batainad 0 250 mm siava	0 33				"	"	"	GS-01	
(#60)	0.00								
Percent Retained 0.150 mm sieve	1.34			"	"	"	"	GS-01	
(#100)								CC 01	
Percent Retained 0.106 mm sieve	1.57				"		"	GS-01	
(#140) Percent Retained 0.075 mm sieve	2.93				"	"	"	GS-01	
(#200)									
Percent Retained 0.063 mm sieve	2.48			"	"	"	"	GS-01	
(#230) Silt (> 0.005 mm < 0.063 mm)	(0 (0				"			CS 01	
Silt ($> 0.005 \text{ mm} < 0.005 \text{ mm}$) Clay ($< 0.005 \text{ mm}$)	09.00 23.60				"	"		GS-01	
	25.00				D. (.)	~		65 01	
SB-M-21 Comp DMMU1 (A3F0500-0	12)		Matrix: Sedin	nent	Batch: 306062	29		~~ ~ ~	
Percent Retained 4.75 mm sieve (#4)	0.00			% of Total	1	06/27/13 20:41	ASTM D 422m	GS-01	
Percent Retained 2.00 mm sieve	0.03				"	"	"	GS-01	
(#10) Percent Retained 0.85 mm sieve	0.22				"	"	"	GS-01	
(#20)									
Percent Retained 0.425 mm sieve	0.10			"	"	"	"	GS-01	
(#40)	0.70				"			CS 01	
Percent Retained 0.250 mm sieve	0.70							03-01	
Percent Retained 0.150 mm sieve	3.65			"	"	"	"	GS-01	
(#100)									
Percent Retained 0.106 mm sieve	4.79			"	"	"	"	GS-01	
(#140) Researct Datained 0.075 mm sieve	8 74				"	"	"	GS-01	
(#200)	0.24							00 01	
Percent Retained 0.063 mm sieve	4.92			"	"	"	"	GS-01	
(#230)	(a a a							C2 41	
Silt (> 0.005 mm < 0.063 mm)	62.90						"	GS-01	
Clay (< 0.005 mm)	19.30					.,	"	GS-01	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422									
			Reporting						
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	
SB-M-2 Comp DMMU2 (A3F0500-0	3)		Matrix: Sedim	nent	Batch: 306062	29			
Percent Retained 4.75 mm sieve	0.01			% of Total	1	06/27/13 20:41	ASTM D 422m	GS-01	
(#4) Percent Retained 2.00 mm sieve	0.01			"	"	"	"	GS-01	
(#10) Percent Retained 0.85 mm sieve	0.11			"	"	"	"	GS-01	
(#20) Percent Retained 0.425 mm sieve	0.38			"	"	"	'n	GS-01	
(#40) Percent Retained 0.250 mm sieve	2.44			"	"	"	"	GS-01	
(#00) Percent Retained 0.150 mm sieve (#100)	8.78			"	"	"	"	GS-01	
Percent Retained 0.106 mm sieve	7.78			"	"	"	"	GS-01	
Percent Retained 0.075 mm sieve	8.39			"	"	"	"	GS-01	
Percent Retained 0.063 mm sieve	4.98			"	"	"	"	GS-01	
Silt (> 0.005 mm < 0.063 mm)	51.00			"	"	"	"	GS-01	
Clay (< 0.005 mm)	21.10			"	"	"	"	GS-01	
SB-M-Z2 Comp DMMU2 (A3F0500-	04)		Matrix: Sedim	nent	Batch: 306062	29			
Percent Retained 4.75 mm sieve	0.68			% of Total	1	06/27/13 20:41	ASTM D 422m	GS-01	
Percent Retained 2.00 mm sieve	0.04			"	"	"	"	GS-01	
Percent Retained 0.85 mm sieve (#20)	0.32			"	"	"	"	GS-01	
Percent Retained 0.425 mm sieve	0.21			"	"	"	"	GS-01	
Percent Retained 0.250 mm sieve	0.41			"	"	"	"	GS-01	
Percent Retained 0.150 mm sieve (#100)	0.87			"	"	"	"	GS-01	
Percent Retained 0.106 mm sieve	1.23			"	"	"	"	GS-01	
Percent Retained 0.075 mm sieve	4.16			"	"	"	"	GS-01	
Percent Retained 0.063 mm sieve	3.96			"	"	"	"	GS-01	
Silt (> 0.005 mm < 0.063 mm)	71.30			"	"		"	GS-01	
Clay (< 0.005 mm)	20.70			"	"	"	"	GS-01	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14
Longview, WA 98632	Project Manager:	Brian Perleberg	0//14/13 06:14

ANALYTICAL SAMPLE RESULTS

Grain Size by ASTM D 422									
			Reporting						
Analyte	Result	MDL	Limit	Units	Dilution	Date Analyzed	Method	Notes	
SB-C-1 Comp DMMU3 (A3F0500-05)	1		Matrix: Sedin	nent B	atch: 306062	29			
Percent Retained 4.75 mm sieve (#4)	0.00			% of Total	1	06/27/13 20:41	ASTM D 422m	GS-01	
Percent Retained 2.00 mm sieve	0.09			"	"	"	"	GS-01	
Percent Retained 0.85 mm sieve	0.32			"	"	"	"	GS-01	
(#20) Percent Retained 0.425 mm sieve (#40)	0.12			"	"	"	"	GS-01	
(#40) Percent Retained 0.250 mm sieve (#60)	0.26			"	"	"	"	GS-01	
Percent Retained 0.150 mm sieve (#100)	0.50			"	"	"	"	GS-01	
Percent Retained 0.106 mm sieve (#140)	0.62			"	"	"	"	GS-01	
Percent Retained 0.075 mm sieve (#200)	1.43			"	"	"	"	GS-01	
Percent Retained 0.063 mm sieve (#230)	1.78			"	"	"	"	GS-01	
Silt (> 0.005 mm < 0.063 mm)	71.30			"	"	"	"	GS-01	
Clay (< 0.005 mm)	25.40			"	"	"	"	GS-01	
SB-C-Z1 Comp DMMU3 (A3F0500-0	6)		Matrix: Sedin	nent B	atch: 306062	29			
Percent Retained 4.75 mm sieve	0.04			% of Total	1	06/27/13 20:41	ASTM D 422m	GS-01	
Percent Retained 2.00 mm sieve (#10)	0.01			"	"	"	"	GS-01	
Percent Retained 0.85 mm sieve	0.11			"	"	"	"	GS-01	
Percent Retained 0.425 mm sieve	0.10			"	"	"	"	GS-01	
Percent Retained 0.250 mm sieve	0.34			"	"	"	"	GS-01	
Percent Retained 0.150 mm sieve	0.65			"	"	"	"	GS-01	
Percent Retained 0.106 mm sieve	0.81			"	"	"	"	GS-01	
Percent Retained 0.075 mm sieve	2.03			"	"	"	"	GS-01	
Percent Retained 0.063 mm sieve	1.86			"	"	"	"	GS-01	
Silt (> 0.005 mm < 0.063 mm)	69.70			"	"	"	"	GS-01	
Clay (< 0.005 mm)	26.20			"	"	"	"	GS-01	

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Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg cument Sumpring

Reported: 07/14/13 06:14

ANALYTICAL SAMPLE RESULTS

			Per	cent Dry Weight				
			Repor	ting				
Analyte	Result	MDL	Lin	nit Units	Dilution	Date Analyzed	Method	Notes
SB-M-1 Comp. DMMU1 (A3F0500-01)			Matrix:	Sediment	Batch: 3060	627		
% Solids	46.4		1.00	% by Weigh	nt 1	06/26/13 11:56	Apex SOP	
SB-M-Z1 Comp DMMU1 (A3F0500-02)	1		Matrix:	Sediment	Batch: 3060	627		
% Solids	60.8		1.00	% by Weigh	nt 1	06/26/13 11:56	Apex SOP	
SB-M-2 Comp DMMU2 (A3F0500-03)			Matrix:	Sediment	Batch: 3060	627		
% Solids	70.8		1.00	% by Weigh	nt 1	06/26/13 11:56	Apex SOP	
SB-M-Z2 Comp DMMU2 (A3F0500-04)	1		Matrix:	Sediment	Batch: 3060	627		
% Solids	45.5		1.00	% by Weigh	nt 1	06/26/13 11:56	Apex SOP	
SB-C-1 Comp DMMU3 (A3F0500-05)			Matrix:	Sediment	Batch: 3060	627		
% Solids	43.7		1.00	% by Weigh	nt 1	06/26/13 11:56	Apex SOP	
SB-C-Z1 Comp DMMU3 (A3F0500-06)			Matrix:	Sediment	Batch: 3060	627		
% Solids	47.7		1.00	% by Weigh	nt 1	06/26/13 11:56	Apex SOP	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Diesel and Oil Hydrocarbons by NWTPH-Dx												
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060580 - EPA 354	6 (Fuels)						Sed	liment				
Blank (3060580-BLK1)				Prepa	ared: 06/	24/13 07:19	Analyzed:	06/24/13 20	:48			
NWTPH-Dx												
Diesel	ND		25.0	mg/kg wet	1							
Oil	ND		50.0	"	"							
Surr: o-Terphenyl (Surr)		Rec	overy: 93 %	Limits: 50-1	50 %	Dilu	tion: 1x					
LCS (3060580-BS1)				Prepa	ared: 06/	24/13 07:19	Analyzed:	06/24/13 21	:17			
NWTPH-Dx												
Diesel	109		25.0	mg/kg wet	1	125		87	70-130%			
Surr: o-Terphenyl (Surr)		Rec	overy: 95 %	Limits: 50-1	50 %	Dilu	tion: 1x					
Duplicate (3060580-DUP1)				Prepa	ared: 06/	24/13 07:19	Analyzed:	06/24/13 22	:44			
QC Source Sample: SB-M-1 Com	p. DMMU1 (A.	3F0500-01)										
NWTPH-Dx												
Diesel	ND		37.4	mg/kg dry	1		ND				30%	F-17
Oil	ND		74.8	"	"		71.5			***	30%	F-17
Surr: o-Terphenyl (Surr)		Rec	overy: 85 %	Limits: 50-1	50 %	Dilu	tion: 1x					

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

			Polychlo	rinated Bip	henyls	EPA 80	82A					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060584 - EPA 3546							Sed	liment				
Blank (3060584-BLK1)				Prepa	ared: 06/2	24/13 08:34	Analyzed:	06/25/13 1	3:16			C-07
EPA 8082A												
Aroclor 1016	ND		1.29	ug/kg wet	1							
Aroclor 1221	ND		1.29	"	"							
Aroclor 1232	ND		1.29	"	"							
Aroclor 1242	ND		1.29	"	"							
Aroclor 1248	ND		1.29	"	"							
Aroclor 1254	ND		1.29	"	"							
Aroclor 1260	ND		1.29	"	"							
Surr: Decachlorobiphenyl (Surr)		Rec	overy: 90 %	Limits: 60-1	25 %	Dilı	ution: 1x					
LCS (3060584-BS1)				Prepa	ared: 06/2	24/13 08:34	Analyzed:	06/25/13 1	3:34			C-07
EPA 8082A												
Aroclor 1016	39.4		1.33	ug/kg wet	1	41.7		95	40-140%			
Aroclor 1260	35.2		1.33	"	"	"		84	60-130%			
Surr: Decachlorobiphenyl (Surr)		Rec	overy: 97 %	Limits: 60-1	25 %	Dilı	ution: 1x					
Duplicate (3060584-DUP1)				Prepa	ared: 06/2	24/13 08:34	Analyzed:	06/25/13 1	4:10			C-07
QC Source Sample: SB-M-Z1 Com	DMMU1 (A	A3F0500-02)										
EPA 8082A												
Aroclor 1016	ND		2.18	ug/kg dry	1		ND				30%	
Aroclor 1221	ND		2.18	"	"		ND				30%	
Aroclor 1232	ND		2.18	"	"		ND				30%	
Aroclor 1242	ND		2.18	"	"		2.04			***	30%	
Aroclor 1248	ND		2.18	"	"		ND				30%	
Aroclor 1254	6.72		2.18	"	"		6.92			3	30%	EST
Aroclor 1260	3.39		2.18	"	"		3.40			0.4	30%	EST
Surr: Decachlorobiphenyl (Surr)		Rec	overy: 96 %	Limits: 60-1	25 %	Dilı	ution: 1x					
Matrix Spike (3060584-MS1)				Prepa	ared: 06/2	24/13 08:34	Analyzed:	06/25/13 1	6:37			C-07
QC Source Sample: SB-C-Z1 Comp EPA 8082A	DMMU3 (A	3F0500-06)										
Aroclor 1016	64.8		2.78	ug/kg dry	1	87.2	ND	74	40-140%			
Aroclor 1260	81.6		2.78	"	"	"	10.4	82	60-130%			
Apex Laboratories				Т	he results	in this report a	apply to the so	amples anai	yzed in accor	dance wit	h the chain	of

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Polychlorinated Biphenyls EPA 8082A												
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060584 - EPA 3546							Sed	liment				
Matrix Spike (3060584-MS1)				Pr	epared: 06	/24/13 08:34	Analyzed:	06/25/13 16	:37			C-07
QC Source Sample: SB-C-Z1 Comp	DMMU3 (A	3F0500-06)										
Surr: Decachlorobiphenyl (Surr)		Re	ecovery: 98 %	Limits: 6	0-125 %	Dilı	ution: 1x					

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Analyte	Result	MDL	Reporting Limit	Units	Dil	Spike Amount	Source Result	%REC	%REC	RPD	RPD Limit	Notes
Potob 2000755 EDA 2540			Liint	Cints	DII.	Tinount	Cod	imont	Linits		Linit	10003
Balch 3060755 BLV1)	/3640A (G	50)		D	1.064	26/12/12/12	Seu		C 0.4			
EPA 8081B				Prep	ared: 06/.	26/13 12:45	Analyzed:	0//01/13 10	5:04			C-05
4.4'-DDD	ND	0.625	1.25	ug/kg wet	1							
4.4'-DDE	ND	0.625	1.25	"	"							
4,4'-DDT	ND	0.625	1.25	"	"							
Aldrin	ND	0.625	1.25	"	"							
cis-Chlordane	ND	0.625	1.25	"	"							
trans-Chlordane	ND	0.625	1.25	"	"							
cis-Nonachlor	ND	0.625	1.25	"	"							
trans-Nonachlor	ND	0.625	1.25	"	"							
Oxychlordane	ND	0.625	1.25	"	"							
Dieldrin	ND	0.625	1.25	"	"							
Heptachlor	ND	0.625	1.25	"	"							
gamma-BHC (Lindane)	ND	0.625	1.25	"	"							
2,4'-DDD	ND	0.625	1.25	"	"							
2,4'-DDE	ND	0.625	1.25	"	"							
2,4'-DDT	ND	0.625	1.25	"	"							
Surr: 2,4,5,6-TCMX (Surr)		Re	covery: 95 %	Limits: 50-1	25 %	Dilı	ution: 1x					
Decachlorobiphenyl (Surr)			95 %	55-1	30 %		"					
LCS (3060755-BS1)				Prep	ared: 06/.	26/13 12:45	Analyzed:	07/01/13 10	5:22			C-05
EPA 8081B												
4,4'-DDD	55.0	1.00	2.00	ug/kg wet	1	50.0		110	30-135%			
4,4'-DDE	56.5	1.00	2.00	"	"	"		113	70-125%			
4,4'-DDT	58.0	1.00	2.00	"	"	"		116	45-140%			
Aldrin	49.4	1.00	2.00	"	"	"		99	"			
cis-Chlordane	48.7	1.00	2.00	"	"	"		97	60-120%			
trans-Chlordane	48.8	1.00	2.00	"	"	"		98	65-125%			
Dieldrin	53.1	1.00	2.00	"	"	"		106	"			
Heptachlor	51.9	1.00	2.00	"	"	"		104	50-140%			
gamma-BHC (Lindane)	51.1	1.00	2.00	"	"	"		102	60-125%			
Surr: 2,4,5,6-TCMX (Surr)		Re	covery: 90 %	Limits: 50-1	25 %	Dilı	ution: 1x					

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

			Organoch	nlorine Pes	ticides	by EPA 80	81B					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060755 - EPA 3546/	3640A (GI	PC)					Sed	iment				
LCS (3060755-BS2)				Prep	ared: 06/2	26/13 12:45	Analyzed:	07/01/13 16	5:40			C-05
EPA 8081B												
cis-Nonachlor	69.0	1.00	2.00	ug/kg wet	1	50.0		138	50-150%			
trans-Nonachlor	65.0	1.00	2.00	"	"	"		130	"			
Oxychlordane	64.1	1.00	2.00	"	"	"		128	"			
2,4'-DDD	69.0	1.00	2.00	"	"	"		138	30-135%			Q-29
2,4'-DDE	70.2	1.00	2.00	"	"	"		140	50-140%			
2,4'-DDT	79.1	1.00	2.00	"	"	"		158	45-140%			Q-29
Hexachlorobenzene	74.6	2.50	5.00	"	"	"		149	50-150%			
Hexachlorobutadiene	44.9	1.00	2.00	"	"	"		90	"			
Surr: 2,4,5,6-TCMX (Surr) Decachlorobiphenyl (Surr)		Re	covery: 99 % 102 %	Limits: 50-1 55-1	25 % 30 %	Dilı	ution: 1x "					
Duplicate (3060755-DUP1)				Prep	ared: 06/2	26/13 12:45	Analyzed:	07/01/13 17	/:16			C-05
QC Source Sample: SB-M-1 Comp.	DMMU1 (A3	3F0500-01R	E1)									
EPA 8081B		1.40	2.05				ND				200/	
4,4'-DDD	ND	1.42	2.85	ug/kg dry	1		ND				30%	
4,4'-DDE	ND	1.42	2.85				ND				30%	
4,4'-DDT	ND	1.42	2.85	"			ND				30%	
Aldrin	ND	1.42	2.85	"			ND				30%	
cis-Chlordane	ND	1.42	2.85	"	"		ND				30%	
trans-Chlordane	ND	1.42	2.85	"	"		ND				30%	
cis-Nonachlor	ND	1.42	2.85	"	"		ND				30%	
trans-Nonachlor	ND	1.42	2.85	"	"		ND				30%	
Oxychlordane	ND	1.42	2.85	"	"		ND				30%	
Dieldrin	ND	1.42	2.85	"	"		ND				30%	
Heptachlor	ND	1.42	2.85	"	"		ND				30%	
gamma-BHC (Lindane)	ND	1.42	2.85	"	"		ND				30%	
2,4'-DDD	ND	1.42	2.85	"	"		ND				30%	
2,4'-DDE	ND	1.42	2.85	"	"		ND				30%	
2,4'-DDT	ND	1.42	2.85	"	"		ND				30%	
Surr: 2,4,5,6-TCMX (Surr)		Re	covery: 53 %	Limits: 50-1	25 %	Dilı	ution: 1x					S-03

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Organochlorine Pesticides by EPA 8081B Reporting Spike Source %REC RPD Analyte Result MDL Limit Units Dil Amount Result %REC Limit Notes													
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch 3060755 - EPA 3546	6/3640A (G	PC)					Sec	liment					
Duplicate (3060755-DUP1)				Prepa	ured: 06/	26/13 12:45	Analyzed:	07/01/13 1	7:16			C-05	
QC Source Sample: SB-M-1 Comp	. DMMU1 (A	3F0500-01RE	1)										
Surr: Decachlorobiphenyl (Surr)		Reco	overy: 44 %	Limits: 55-1.	30 %	Dil	ution: 1x					S-03	
Matrix Spike (3060755-MS1)				Prepa	ured: 06/	26/13 12:45	Analyzed:	07/01/13 1	9:04			C-05	
QC Source Sample: SB-C-Z1 Com	np DMMU3 (A	A3F0500-06RE	1)										
4 4'-DDD	59.0	1 38	2 77	ug/kg dry	1	69.2	ND	85	30-135%				
4 4'-DDE	60.6	1.38	2.77	"		"	ND	88	70-125%				
4.4'-DDT	61.1	1.38	2.77	"			ND	88	45-140%				
Aldrin	50.8	1.38	2.77	"	"		ND	73	"				
cis-Chlordane	51.8	1.38	2.77	"		"	ND	75	60-120%				
trans-Chlordane	51.5	1.38	2.77	"	"	"	ND	74	65-125%				
Dieldrin	55.5	1.38	2.77	"	"	"	ND	80	"				
Heptachlor	56.7	1.38	2.77	"	"	"	ND	82	50-140%				
gamma-BHC (Lindane)	61.8	1.38	2.77	"	"	"	ND	89	60-125%				
Surr: 2,4,5,6-TCMX (Surr)		Reco	overy: 71 %	Limits: 50-1.	25 %	Dil	ution: 1x						
Decachlorobiphenyl (Surr)			62 %	55-13	30 %		"						
Matrix Spike (3060755-MS2)				Prepa	ured: 06/	26/13 12:45	Analyzed:	07/01/13 1	9:22			C-05	
QC Source Sample: SB-C-Z1 Com EPA 8081B	np DMMU3 (A	A3F0500-06RE	1)										
cis-Nonachlor	88.6	1.34	2.68	ug/kg dry	1	67.1	ND	132	50-150%				
trans-Nonachlor	85.3	1.34	2.68	"	"	"	ND	127	"				
Oxychlordane	80.4	1.34	2.68	"	"	"	ND	120	"				
2,4'-DDD	91.5	1.34	2.68	"	"	"	ND	136	30-135%			Q-29	
2,4'-DDE	90.8	1.34	2.68	"	"	"	1.45	133	50-140%				
2,4'-DDT	103	1.34	2.68	"	"	"	ND	154	45-140%			Q-29	
Surr: 2,4,5,6-TCMX (Surr) Decachlorobiphenyl (Surr)		Reco	overy: 91 % 92 %	Limits: 50-1. 55-13	25 % 30 %	Dil	ution: 1x "						

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Reported:

07/14/13 06:14

Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134ALongview, WA 98632Project Manager:Brian Perleberg

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D Reporting Spike Source %REC RPD Analyte Result MDL Limit Units Dil Amount Result %REC RPD Limit Notes													
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch 3060654 - EPA 3546							Sed	iment					
Blank (3060654-BLK1)				Prep	oared: 06/2	26/13 08:35	Analyzed:	06/26/13 13	:34				
EPA 8270D													
Acenaphthene	ND	1.25	2.50	ug/kg wet	1								
Acenaphthylene	ND	1.25	2.50	"	"								
Anthracene	ND	1.25	2.50	"	"								
Benz(a)anthracene	ND	1.25	2.50	"	"								
Benzo(a)pyrene	ND	1.88	3.75	"	"								
Benzo(b)fluoranthene	ND	1.88	3.75	"	"								
Benzo(k)fluoranthene	ND	1.88	3.75	"	"								
Benzo(b+k)fluoranthene(s)	ND	3.75	7.50	"	"								
Benzo(g,h,i)perylene	ND	1.25	2.50	"	"								
Chrysene	ND	1.25	2.50	"	"								
Dibenz(a,h)anthracene	ND	1.25	2.50	"	"								
Fluoranthene	ND	1.25	2.50	"	"								
Fluorene	ND	1.25	2.50	"	"								
Indeno(1,2,3-cd)pyrene	ND	1.25	2.50	"	"								
2-Methylnaphthalene	ND	2.50	5.00	"	"								
Naphthalene	ND	2.50	5.00	"	"								
Phenanthrene	ND	1.25	2.50	"	"								
Pyrene	ND	1.25	2.50	"	"								
1,2-Dichlorobenzene	ND	1.25	2.50	"	"								
1,4-Dichlorobenzene	ND	1.25	2.50	"	"								
1,2,4-Trichlorobenzene	ND	1.25	2.50	"									
Dimethylphthalate	ND	12.5	25.0	"									
Diethylphthalate	ND	12.5	25.0	"									
Di-n-butylphthalate	ND	12.5	25.0	"									
Butyl benzyl phthalate	ND	12.5	25.0	"									
Bis(2-ethylhexyl)phthalate	ND	12.5	25.0	"	"								
Di-n-octyl phthalate	ND	12.5	25.0	"	"								
Phenol	ND	12.5	25.0	"	"								
2-Methylphenol	ND	2.50	5.00	"	"								
3+4-Methylphenol(s)	ND	2.50	5.00	"	"								

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	mivolatile	Organic Co	mpou	nds by EPA	8270D					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060654 - EPA 3546							Sed	iment				
Blank (3060654-BLK1)				Prepa	red: 06/2	26/13 08:35	Analyzed:	06/26/13 1	3:34			
2,4-Dimethylphenol	ND	2.50	5.00	ug/kg wet	"							
Pentachlorophenol (PCP)	ND	31.2	62.5	"	"							
Benzyl alcohol	ND	2.50	5.00	"	"							
Benzoic acid	ND	100	200	"	"							
Dibenzofuran	ND	1.25	2.50	"	"							
N-Nitrosodiphenylamine	ND	2.50	5.00	"	"							
Hexachlorobenzene	ND	78.1	156	"	"							
Hexachlorobutadiene	ND	78.1	156	"	"							
Surr: Nitrobenzene-d5 (Surr)		Reco	overy: 79 %	Limits: 35-12	20 %	Dilu	tion: 1x					
2-Fluorobiphenyl (Surr)			87 %	45-12	20 %		"					
Phenol-d6 (Surr)			71 %	40-12	20 %		"					
p-Terphenyl-d14 (Surr)			99 %	30-12	25 %		"					
2-Fluorophenol (Surr)			90 %	35-12	20 %		"					
2,4,0-1ribromophenoi (Surr)			93 %	40-12	3 %							
LCS (3060654-BS1)				Prepa	red: 06/2	26/13 08:35	Analyzed:	06/26/13 1	4:10			
EPA 8270D												
Acenaphthene	780	2.00	4.00	ug/kg wet	1	800		97	45-120%			
Acenaphthylene	839	2.00	4.00	"	"	"		105	"			
Anthracene	813	2.00	4.00	"	"	"		102	55-120%			
Benz(a)anthracene	846	2.00	4.00	"	"	"		106	50-120%			
Benzo(a)pyrene	843	3.00	6.00	"	"	"		105	"			
Benzo(b)fluoranthene	945	3.00	6.00	"	"	"		118	45-120%			
Benzo(k)fluoranthene	887	3.00	6.00	"	"	"		111	45-125%			
Benzo(b+k)fluoranthene(s)	1830	6.00	12.0	"	"	1600		114	"			
Benzo(g,h,i)perylene	814	2.00	4.00	"	"	800		102	40-125%			
Chrysene	822	2.00	4.00	"	"	"		103	55-120%			
Dibenz(a,h)anthracene	838	2.00	4.00	"	"	"		105	40-125%			
Fluoranthene	876	2.00	4.00	"	"	"		109	55-120%			
Fluorene	797	2.00	4.00	"	"	"		100	50-120%			
Indeno(1,2,3-cd)pyrene	818	2.00	4.00	"	"	"		102	40-120%			
2-Methylnaphthalene	804	4.00	8.00	"	"	"		101	45-120%			

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Reported: 07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Satch 3060654 - EPA 3546			-		-		Sod	iment				
CS (3060654-BS1)				Drop	arad: 06/	26/12 08.25	Analyzadi		4.10			
Nanhthalene	765	4 00	8 00	ug/kg wet	"	"	Analyzeu.	96	40-120%			
Phenanthrene	771	2.00	4 00	"	"	"		96	50-120%			
Pyrene	855	2.00	4.00	"	"	"		107	45-120%			
1 2-Dichlorobenzene	755	2.00	4.00	"	"	"		9/	"			
1.4 Dichlorobenzene	735	2.00	4.00	"	"	"		02	25 1200/			
1,4-Diciliolobelizelle	240 244	2.00	4.00		"	"		95 105	45 12070			
Dimethylahthalata	044	2.00	4.00		"	"		103	43-12070			
	015	20.0	40.0					102	30-120%			
	847	20.0	40.0					106	55 1200/			
Di-n-butyiphtnalate	924	20.0	40.0					115	55-120%			
Butyl benzyl phthalate	871	20.0	40.0					109	50-125%			
Bis(2-ethylhexyl)phthalate	846	20.0	40.0		"	"		106	45-125%			
Di-n-octyl phthalate	871	20.0	40.0	"	"	"		109	40-130%			
Phenol	724	20.0	40.0	"	"	"		90	40-120%			
2-Methylphenol	716	4.00	8.00	"	"	"		89	"			
3+4-Methylphenol(s)	709	4.00	8.00	"	"	"		89	"			
2,4-Dimethylphenol	797	4.00	8.00	"	"	"		100	30-120%			
Pentachlorophenol (PCP)	799	50.0	100	"	"	"		100	25-120%			
Benzyl alcohol	700	4.00	8.00	"	"	"		88	20-125%			
Benzoic acid	1000	160	320	"	"	1600		63	10-120%			
Dibenzofuran	806	2.00	4.00	"	"	800		101	50-120%			
N-Nitrosodiphenylamine	797	4.00	8.00	"	"	"		100	"			
Hexachlorobenzene	848	125	250	"	"	"		106	45-120%			
Hexachlorobutadiene	908	125	250	"	"	"		114	40-120%			
Surr: Nitrobenzene-d5 (Surr)		Re	covery: 84 %	Limits: 35-1	20 %	Dilı	ution: 1x					
2-Fluorobiphenyl (Surr)			101 %	45-1	20 %		"					
Phenol-d6 (Surr)			91 %	40-1	20 %		"					
p-Terphenyl-d14 (Surr)			101 %	30-1	25 %		"					
2-Fluorophenol (Surr)			98 %	35-1	20 %		"					
2,4,6-Tribromophenol (Surr)			112 %	40-1	25 %		"					
Duplicate (3060654-DUP1)				Pren	ared: 06/	26/13 08:35	Analyzed (06/26/13 1	5.59			

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

	Semivolatile Organic Compounds by EPA 8270D Reporting Spike Source %REC RPD Analyte Result MDL Limit Units Dil. Amount Result %REC Limit Notes													
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes		
Batch 3060654 - EPA 354	6						Sed	iment						
Duplicate (3060654-DUP1)				Prep	ared: 06/2	26/13 08:35	Analyzed:	06/26/13 15	:59					
QC Source Sample: SB-M-1 Com	p. DMMU1 (A3	3F0500-01)												
EPA 8270D														
Acenaphthene	ND	28.1	56.3	ug/kg dry	10		ND				30%			
Acenaphthylene	ND	28.1	56.3	"	"		ND				30%			
Anthracene	ND	28.1	56.3	"	"		ND				30%			
Benz(a)anthracene	ND	28.1	56.3	"	"		ND				30%			
Benzo(a)pyrene	43.8	42.2	84.4	"	"		ND				30%	J		
Benzo(b)fluoranthene	ND	42.2	84.4	"	"		ND				30%			
Benzo(k)fluoranthene	ND	42.2	84.4	"	"		ND				30%			
Benzo(b+k)fluoranthene(s)	ND	84.4	169	"	"		ND				30%			
Benzo(g,h,i)perylene	ND	28.1	56.3	"	"		ND				30%			
Chrysene	ND	28.1	56.3	"	"		ND				30%			
Dibenz(a,h)anthracene	ND	28.1	56.3	"	"		ND				30%			
Fluoranthene	ND	28.1	56.3	"	"		ND				30%			
Fluorene	ND	28.1	56.3	"	"		ND				30%			
Indeno(1,2,3-cd)pyrene	ND	28.1	56.3	"	"		ND				30%			
2-Methylnaphthalene	ND	56.3	113	"	"		ND				30%			
Naphthalene	ND	56.3	113	"	"		ND				30%			
Phenanthrene	ND	28.1	56.3	"	"		ND				30%			
Pyrene	35.3	28.1	56.3	"	"		128			113	30%	Q-05, J		
1,2-Dichlorobenzene	ND	28.1	56.3	"	"		ND				30%			
1,4-Dichlorobenzene	ND	28.1	56.3	"	"		ND				30%			
1,2,4-Trichlorobenzene	ND	28.1	56.3	"	"		ND				30%			
Dimethylphthalate	ND	281	563	"	"		ND				30%			
Diethylphthalate	ND	281	563	"	"		ND				30%			
Di-n-butylphthalate	ND	281	563	"	"		ND				30%			
Butyl benzyl phthalate	ND	281	563	"	"		ND				30%			
Bis(2-ethylhexyl)phthalate	ND	281	563	"	"		ND				30%			
Di-n-octyl phthalate	ND	281	563		"		ND				30%			
Phenol	ND	281	563		"		ND				30%			
2-Methylphenol	ND	56.3	113		"		ND				30%			

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QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	emivolatile	Organic Co	ompou	nds by EP/	A 8270D					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060654 - EPA 3546							Sed	iment				
Duplicate (3060654-DUP1)				Prepa	ared: 06/	26/13 08:35	Analyzed:	06/26/13 1	5:59			
QC Source Sample: SB-M-1 Comp.	DMMU1 (A	3F0500-01)										
3+4-Methylphenol(s)	ND	56.3	113	ug/kg dry	"		ND				30%	
2,4-Dimethylphenol	ND	56.3	113	"	"		ND				30%	
Pentachlorophenol (PCP)	ND	703	1410	"	"		ND				30%	
Benzyl alcohol	ND	56.3	113	"	"		ND				30%	
Benzoic acid	ND	2250	4500	"	"		ND				30%	
Dibenzofuran	ND	28.1	56.3	"	"		ND				30%	
N-Nitrosodiphenylamine	ND	56.3	113	"	"		ND				30%	
Hexachlorobenzene	ND	1760	3520	"	"		ND				30%	
Hexachlorobutadiene	ND	1760	3520	"	"		ND				30%	
Surr: Nitrobenzene-d5 (Surr)		Rec	overy: 49 %	Limits: 35-1.	20 %	Dilı	ution: 10x					
2-Fluorobiphenyl (Surr)			54 %	45-12	20 %		"					
Phenol-d6 (Surr)			26 %	40-12	20 %		"					S-02
p-Terphenyl-d14 (Surr)			68 %	30-12	25 %		"					
2-Fluorophenol (Surr)			58 %	35-12	20 %		"					
2,4,6-Tribromophenol (Surr)			91 %	40-12	25 %		"					
Matrix Spike (3060654-MS2)				Prepa	ared: 06/	26/13 08:35	Analyzed:	06/27/13 1	4:05			
QC Source Sample: SB-C-Z1 Comp EPA 8270D	DMMU3 (A	3F0500-06)										
Acenaphthene	769	10.5	21.1	ug/kg dry	4	1050	ND	73	45-120%			
Acenaphthylene	790	10.5	21.1	"	"	"	ND	75	"			
Anthracene	974	10.5	21.1	"	"	"	ND	92	55-120%			
Benz(a)anthracene	1000	10.5	21.1	"	"	"	45.5	90	50-120%			
Benzo(a)pyrene	1080	15.8	31.6	"	"	"	69.0	96	"			
Benzo(b)fluoranthene	1100	15.8	31.6	"	"	"	46.7	100	45-120%			
Benzo(k)fluoranthene	1040	15.8	31.6	"	"	"	ND	99	45-125%			
Benzo(b+k)fluoranthene(s)	2160	31.6	63.3	"	"	2110	ND	102	"			
Benzo(g,h,i)perylene	1010	10.5	21.1	"	"	1050	39.7	92	40-125%			
Chrysene	998	10.5	21.1	"	"	"	47.0	90	55-120%			
Dibenz(a h)anthracene	925	10.5	21.1	"	"	"	ND	88	40-125%			
Fluoranthene	1140	10.5	21.1	"	"	"	101	98	55_120%	-		
i iuoraliulielle	1140	10.5	21.1				101	20	55-120/0			

Apex Laboratories

Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	emivolatile	Organic C	ompou	nds by EP/	A 8270D					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060654 - EPA 3546							Sec	liment				
Matrix Spike (3060654-MS2)				Prej	pared: 06/	26/13 08:35	Analyzed:	06/27/13 1	4:05			
QC Source Sample: SB-C-Z1 Com	DMMU3 (A	3F0500-06)										
Fluorene	846	10.5	21.1	ug/kg dry	"	"	ND	80	50-120%			
Indeno(1,2,3-cd)pyrene	979	10.5	21.1	"	"	"	33.6	90	40-120%			
2-Methylnaphthalene	649	21.1	42.2	"	"	"	ND	62	45-120%			
Naphthalene	613	21.1	42.2	"	"	"	ND	58	40-120%			
Phenanthrene	992	10.5	21.1	"	"	"	88.2	86	50-120%			
Pyrene	1140	10.5	21.1	"	"	"	118	97	45-120%			
1,2-Dichlorobenzene	528	10.5	21.1	"	"	"	ND	50	"			
1,4-Dichlorobenzene	530	10.5	21.1	"	"	"	ND	50	35-120%			
1,2,4-Trichlorobenzene	630	10.5	21.1	"	"	"	ND	60	45-120%			
Dimethylphthalate	827	105	211	"	"	"	ND	78	50-120%			
Diethylphthalate	962	105	211	"	"	"	ND	91	"			
Di-n-butylphthalate	1170	105	211	"	"	"	ND	110	55-120%			
Butyl benzyl phthalate	1120	105	211	"	"	"	ND	106	50-125%			
Bis(2-ethylhexyl)phthalate	1130	105	211	"	"	"	ND	107	45-125%			
Di-n-octyl phthalate	1200	105	211	"	"	"	ND	114	40-130%			
Phenol	492	105	211	"	"	"	ND	47	40-120%			
2-Methylphenol	480	21.1	42.2	"	"	"	ND	45	"			
3+4-Methylphenol(s)	593	21.1	42.2	"	"	"	ND	56	"			
2,4-Dimethylphenol	577	21.1	42.2	"	"	"	ND	55	30-120%			
Pentachlorophenol (PCP)	990	264	527	"	"	"	ND	94	25-120%			
Benzyl alcohol	481	21.1	42.2	"	"	"	ND	46	20-125%			
Benzoic acid	1550	844	1690	"	"	2110	ND	73	10-120%			J
Dibenzofuran	814	10.5	21.1	"	"	1050	ND	77	50-120%			
N-Nitrosodiphenylamine	953	21.1	42.2	"	"	"	ND	90	"			
Hexachlorobenzene	956	659	1320	"	"	"	ND	91	45-120%			J
Hexachlorobutadiene	692	659	1320	"	"	"	ND	66	40-120%			J
Surr: Nitrobenzene-d5 (Surr)		Rec	overy: 44 %	Limits: 35-	120 %	Dilı	ution: 4x					
2-Fluorobiphenyl (Surr)			60 %	45-	120 %		"					
Phenol-d6 (Surr)			45 %	40-	120 %		"					
p-ierpnenyi-a14 (Surr)			80 %	30-	123 70							

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Semivolatile Organic Compounds by EPA 8270D												
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060654 - EPA 3546							Sed	iment				
Matrix Spike (3060654-MS2)				Pr	epared: 06	/26/13 08:35	Analyzed:	06/27/13 14	:05			
QC Source Sample: SB-C-Z1 Comp	DMMU3 (A	3F0500-06)										
Surr: 2-Fluorophenol (Surr)		Re	covery: 48 %	Limits: 3	5-120 %	Dili	ution: 4x					
2,4,6-Tribromophenol (Surr)			106 %	4	0-125 %		"					

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134ALongview, WA 98632Project Manager:Brian Perleberg

Reported: 07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

	Semivolatile Organic Compounds by EPA 8270D Reporting Spike Source %REC RPD nalyte Result MDL Limit Units Dil Amount Result %REC Limit Notes													
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes		
Batch 3070010 - EPA 3546							Sed	iment						
Blank (3070010-BLK1)				Prep	ared: 07/0	01/13 09:13	Analyzed:	07/01/13 16	:35					
EPA 8270D														
Acenaphthene	ND	1.25	2.50	ug/kg wet	1									
Acenaphthylene	ND	1.25	2.50	"	"									
Anthracene	ND	1.25	2.50	"	"									
Benz(a)anthracene	ND	1.25	2.50	"	"									
Benzo(a)pyrene	ND	1.88	3.75	"	"									
Benzo(b)fluoranthene	ND	1.88	3.75	"	"									
Benzo(k)fluoranthene	ND	1.88	3.75	"	"									
Benzo(b+k)fluoranthene(s)	ND	3.75	7.50	"	"									
Benzo(g,h,i)perylene	ND	1.25	2.50	"	"									
Chrysene	ND	1.25	2.50	"	"									
Dibenz(a,h)anthracene	ND	1.25	2.50	"	"									
Fluoranthene	ND	1.25	2.50	"	"									
Fluorene	ND	1.25	2.50	"	"									
Indeno(1,2,3-cd)pyrene	ND	1.25	2.50	"	"									
2-Methylnaphthalene	ND	2.50	5.00	"	"									
Naphthalene	ND	2.50	5.00	"	"									
Phenanthrene	ND	1.25	2.50	"	"									
Pyrene	ND	1.25	2.50	"	"									
1,2-Dichlorobenzene	ND	1.25	2.50	"	"									
1,4-Dichlorobenzene	ND	1.25	2.50	"	"									
1,2,4-Trichlorobenzene	ND	1.25	2.50	"	"									
Dimethylphthalate	ND	12.5	25.0	"	"									
Diethylphthalate	ND	12.5	25.0	"	"									
Di-n-butylphthalate	ND	12.5	25.0	"	"									
Butyl benzyl phthalate	23.6	12.5	25.0	"	"							B-02, J		
Bis(2-ethylhexyl)phthalate	21.6	12.5	25.0	"	"							B-02, J		
Di-n-octyl phthalate	ND	12.5	25.0	"	"									
Phenol	ND	12.5	25.0	"	"									
2-Methylphenol	ND	2.50	5.00	"	"									
3+4-Methylphenol(s)	ND	2.50	5.00	"	"									

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	mivolatile	Organic Co	mpou	nds by EPA	A 8270D					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070010 - EPA 3546							Sed	iment				
Blank (3070010-BLK1)				Prepa	ared: 07/	01/13 09:13	Analyzed:	07/01/13 1	6:35			
2,4-Dimethylphenol	ND	2.50	5.00	ug/kg wet	"							
Pentachlorophenol (PCP)	ND	31.2	62.5	"	"							
Benzyl alcohol	ND	2.50	5.00	"	"							
Benzoic acid	ND	100	200	"	"							
Dibenzofuran	ND	1.25	2.50	"	"							
N-Nitrosodiphenylamine	ND	2.50	5.00	"	"							
Hexachlorobenzene	ND	78.1	156	"	"							
Hexachlorobutadiene	ND	78.1	156	"	"							
Surr: Nitrobenzene-d5 (Surr)		Reco	overy: 88 %	Limits: 35-1	20 %	Dilu	tion: 1x					
2-Fluorobiphenyl (Surr)			101 %	45-1.	20 %		"					
Phenol-d6 (Surr)			96 %	40-1.	20 %		"					
p-Terphenyl-d14 (Surr)			114 %	30-1.	25 %		"					
2-Fluorophenol (Surr)			97 %	35-1.	20 %		"					
2,4,6-Tribromophenol (Surr)			112 %	40-1.	25 %		"					
LCS (3070010-BS1)				Prepa	ared: 07/	01/13 09:13	Analyzed:	07/01/13 1	7:13			
EPA 8270D												
Acenaphthene	736	2.00	4.00	ug/kg wet	1	800		92	45-120%			
Acenaphthylene	788	2.00	4.00	"	"	"		98	"			
Anthracene	787	2.00	4.00	"	"	"		98	55-120%			
Benz(a)anthracene	808	2.00	4.00	"	"	"		101	50-120%			
Benzo(a)pyrene	834	3.00	6.00	"	"	"		104	"			
Benzo(b)fluoranthene	923	3.00	6.00	"	"	"		115	45-120%			
Benzo(k)fluoranthene	892	3.00	6.00	"	"	"		112	45-125%			
Benzo(b+k)fluoranthene(s)	1800	6.00	12.0	"	"	1600		113	"			
Benzo(g,h,i)perylene	800	2.00	4.00	"	"	800		100	40-125%			
Chrysene	790	2.00	4.00	"	"	"		99	55-120%			
Dibenz(a,h)anthracene	794	2.00	4.00	"	"	"		99	40-125%			
Fluoranthene	869	2.00	4.00	"	"	"		109	55-120%			
Fluorene	742	2.00	4.00	"	"	"		93	50-120%			
Indeno(1,2,3-cd)pyrene	781	2.00	4.00	"	"	"		98	40-120%			
2-Methylnaphthalene	754	4.00	8.00	"	"	"		94	45-120%			

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Reported:

07/14/13 06:14

Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134ALongview, WA 98632Project Manager:Brian Perleberg

QUALITY CONTROL (QC) SAMPLE RESULTS

Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070010 - EPA 3546							Sed	iment				
LCS (3070010-BS1)				Р	repared: 07/	01/13 09:13	Analvzed.	07/01/13 1	7:13			
Naphthalene	721	4.00	8.00	ug/kg w	ret "	"		90	40-120%			
Phenanthrene	760	2.00	4.00	"	"	"		95	50-120%			
Pyrene	854	2.00	4.00	"	"	"		107	45-120%			
1,2-Dichlorobenzene	717	2.00	4.00	"	"	"		90	"			
1,4-Dichlorobenzene	706	2.00	4.00		"	"		88	35-120%			
1,2,4-Trichlorobenzene	805	2.00	4.00		"	"		101	45-120%			
Dimethylphthalate	775	20.0	40.0	"	"	"		97	50-120%			
Diethylphthalate	801	20.0	40.0		"	"		100	"			
Di-n-butylphthalate	928	20.0	40.0	"	"	"		116	55-120%			
Butyl benzyl phthalate	876	20.0	40.0		"	"		109	50-125%			B-02
Bis(2-ethylhexyl)phthalate	862	20.0	40.0		"	"		108	45-125%			B-02
Di-n-octyl phthalate	873	20.0	40.0		"	"		109	40-130%			
Phenol	750	20.0	40.0		"	"		94	40-120%			
2-Methylphenol	739	4.00	8.00		"	"		92	"			
3+4-Methylphenol(s)	732	4.00	8.00		"	"		92	"			
2,4-Dimethylphenol	780	4.00	8.00		"	"		97	30-120%			
Pentachlorophenol (PCP)	785	50.0	100		"	"		98	25-120%			
Benzyl alcohol	750	4.00	8.00			"		94	20-125%			
Benzoic acid	1480	160	320			1600		93	10-120%			Q-31
Dibenzofuran	753	2.00	4.00		"	800		94	50-120%			
N-Nitrosodiphenvlamine	791	4.00	8.00		"	"		99	"			
Hexachlorobenzene	826	125	250		"	"		103	45-120%			
Hexachlorobutadiene	824	125	250	"	"	"		103	40-120%			
Surr: Nitrobenzene-d5 (Surr)		Re	covery: 86 %	Limits:	35-120 %	Dilı	ution: 1x					
2-Fluorobiphenyl (Surr)			100 %	4	45-120 %		"					
Phenol-d6 (Surr)			97 %	4	40-120 %		"					
p-Terphenyl-d14 (Surr)			107 %	ŝ	30-125 %		"					
2-Fluorophenol (Surr)			98 %	ŝ	35-120 %		"					
2,4,6-Tribromophenol (Surr)			118 %	4	40-125 %		"					
Duplicate (3070010-DUP1)				Р	repared: 07/	01/13 09:13	Analyzed:	07/01/13 1	8:29			

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Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	emivolatile	Organic Co	ompou	nds by EP	A 8270D								
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes			
Batch 3070010 - EPA 3546	5						Sediment								
Duplicate (3070010-DUP1)				Prepa	ared: 07/	01/13 09:13	Analyzed:	07/01/13 18	:29						
QC Source Sample: SB-M-2 Comp	DMMU2 (A3	F0500-03RE	2)												
EPA 8270D															
Acenaphthene	ND	1.82	3.64	ug/kg dry	1		ND				30%				
Acenaphthylene	ND	1.82	3.64	"	"		ND				30%				
Anthracene	ND	1.82	3.64	"	"		ND				30%				
Benz(a)anthracene	ND	1.82	3.64	"	"		2.58			***	30%				
Benzo(a)pyrene	3.28	2.73	5.46	"	"		4.15			23	30%	J			
Benzo(b)fluoranthene	ND	2.73	5.46	"	"		ND				30%				
Benzo(k)fluoranthene	ND	2.73	5.46	"	"		ND				30%				
Benzo(b+k)fluoranthene(s)	ND	5.46	10.9	"	"		ND				30%				
Benzo(g,h,i)perylene	ND	1.82	3.64	"	"		2.61			***	30%				
Chrysene	ND	1.82	3.64	"	"		1.90			***	30%				
Dibenz(a,h)anthracene	ND	1.82	3.64	"	"		ND				30%				
Fluoranthene	2.60	1.82	3.64	"	"		3.86			39	30%	Q-05, J			
Fluorene	ND	1.82	3.64	"	"		ND				30%				
Indeno(1,2,3-cd)pyrene	ND	1.82	3.64	"	"		2.09			***	30%				
2-Methylnaphthalene	ND	3.64	7.29	"	"		ND				30%				
Naphthalene	ND	3.64	7.29	"	"		ND				30%				
Phenanthrene	1.85	1.82	3.64	"	"		2.17			16	30%	J			
Pyrene	3.23	1.82	3.64	"	"		5.48			52	30%	Q-05, J			
1,2-Dichlorobenzene	ND	1.82	3.64	"	"		ND				30%				
1,4-Dichlorobenzene	ND	1.82	3.64	"	"		ND				30%				
1,2,4-Trichlorobenzene	ND	1.82	3.64	"	"		ND				30%				
Dimethylphthalate	ND	18.2	36.4	"	"		ND				30%				
Diethylphthalate	ND	18.2	36.4	"	"		ND				30%				
Di-n-butylphthalate	ND	18.2	36.4	"	"		ND				30%				
Butyl benzyl phthalate	19.5	18.2	36.4	"	"		35.5			58	30%	B-02, Q-05,			
Bis(2-ethylhexyl)phthalate	18.9	18.2	36.4	"	"		31.6			50	30%	B-02, Q-05,			
Di-n-octyl phthalate	ND	18.2	36.4	"	"		ND				30%				
Phenol	22.7	18.2	36.4	"	"		23.9			5	30%	J			
2-Methylphenol	ND	3.64	7.29	"	"		ND				30%				
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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	emivolatile	Organic Co	mpou	nds by EP/	A 8270D								
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes			
Batch 3070010 - EPA 3546							Sediment								
Duplicate (3070010-DUP1)				Prepa	ared: 07/	01/13 09:13	Analyzed: 07/01/13 18:29								
QC Source Sample: SB-M-2 Comp	DMMU2 (A3	3F0500-03RE	2)												
3+4-Methylphenol(s)	ND	3.64	7.29	ug/kg dry	"		ND				30%				
2,4-Dimethylphenol	ND	3.64	7.29	"	"		ND				30%				
Pentachlorophenol (PCP)	ND	45.5	91.1	"	"		ND				30%				
Benzyl alcohol	ND	3.64	7.29	"	"		ND				30%				
Benzoic acid	ND	146	291	"	"		ND				30%				
Dibenzofuran	ND	1.82	3.64	"	"		ND				30%				
N-Nitrosodiphenylamine	ND	3.64	7.29	"	"		ND				30%				
Hexachlorobenzene	ND	114	228	"	"		ND				30%				
Hexachlorobutadiene	ND	114	228	"	"		ND				30%				
Surr: Nitrobenzene-d5 (Surr)		Rec	covery: 54 %	Limits: 35-1.	20 %	Dilı	ution: 1x								
2-Fluorobiphenyl (Surr)			59 %	45-12	20 %		"								
Phenol-d6 (Surr)			60 %	40-12	20 %		"								
p-Terphenyl-d14 (Surr)			86 %	30-12	25 %		"								
2-Fluorophenol (Surr)			59 %	35-12	20 %		"								
2,4,6-Tribromophenol (Surr)			80 %	40-12	25 %		"								
Matrix Spike (3070010-MS1)				Prepa	ared: 07/	01/13 09:13	Analyzed:	07/01/13 1	9:06						
QC Source Sample: SB-M-2 Comp EPA 8270D	DMMU2 (A3	3F0500-03RE	2)												
Acenaphthene	440	1.81	3.62	ug/kg dry	1	724	ND	61	45-120%						
Acenaphthylene	471	1.81	3.62	"	"	"	ND	65	"						
Anthracene	599	1.81	3.62	"	"	"	ND	83	55-120%						
Benz(a)anthracene	693	1.81	3.62	"	"	"	2.58	95	50-120%						
Benzo(a)pyrene	711	2.71	5.43	"	"	"	4.15	98	"						
Benzo(b)fluoranthene	789	2.71	5.43	"	"	"	ND	109	45-120%						
Benzo(k)fluoranthene	753	2.71	5.43	"	"	"	ND	104	45-125%						
Benzo(b+k)fluoranthene(s)	1530	5.43	10.9	"	"	1450	ND	106	"						
Benzo(g,h,i)perylene	695	1.81	3.62	"	"	724	2.61	96	40-125%						
Chrysene	678	1.81	3.62	"	"	"	1.90	93	55-120%						
Dibenz(a,h)anthracene	674	1.81	3.62	"	"	"	ND	93	40-125%						
Fluoranthene	709	1.81	3.62	"		"	3.86	97	55-120%						

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Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		Se	emivolatile	Organic	Compou	nds by EP	A 8270D					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070010 - EPA 3546	6						Sec	liment				
Matrix Spike (3070010-MS1)				Pro	epared: 07/	01/13 09:13	Analyzed:	07/01/13 1	9:06			
QC Source Sample: SB-M-2 Comp	DMMU2 (A3	F0500-03RE	2)									
Fluorene	474	1.81	3.62	ug/kg dry	y "	"	ND	66	50-120%			
Indeno(1,2,3-cd)pyrene	672	1.81	3.62	"	"	"	2.09	93	40-120%			
2-Methylnaphthalene	431	3.62	7.24	"	"	"	ND	59	45-120%			
Naphthalene	408	3.62	7.24	"	"	"	ND	56	40-120%			
Phenanthrene	570	1.81	3.62	"	"	"	2.17	78	50-120%			
Pyrene	700	1.81	3.62	"	"	"	5.48	96	45-120%			
1,2-Dichlorobenzene	399	1.81	3.62	"	"	"	ND	55	"			
1,4-Dichlorobenzene	389	1.81	3.62	"	"	"	ND	54	35-120%			
1,2,4-Trichlorobenzene	438	1.81	3.62	"	"	"	ND	60	45-120%			
Dimethylphthalate	513	18.1	36.2	"	"	"	ND	71	50-120%			
Diethylphthalate	576	18.1	36.2	"	"	"	ND	80	"			
Di-n-butylphthalate	780	18.1	36.2	"	"	"	ND	108	55-120%			
Butyl benzyl phthalate	775	18.1	36.2	"	"	"	35.5	102	50-125%			B-02
Bis(2-ethylhexyl)phthalate	751	18.1	36.2	"	"	"	31.6	99	45-125%			B-02
Di-n-octyl phthalate	771	18.1	36.2	"	"	"	ND	106	40-130%			
Phenol	448	18.1	36.2	"	"	"	23.9	59	40-120%			
2-Methylphenol	424	3.62	7.24	"	"	"	ND	59	"			
3+4-Methylphenol(s)	430	3.62	7.24	"	"	"	ND	59	"			
2,4-Dimethylphenol	483	3.62	7.24	"	"	"	ND	67	30-120%			
Pentachlorophenol (PCP)	633	45.2	90.5	"	"		ND	87	25-120%			
Benzyl alcohol	431	3.62	7.24	"	"	"	ND	60	20-125%			
Benzoic acid	814	145	290	"	"	1450	ND	56	10-120%			Q-31
Dibenzofuran	465	1.81	3.62	"	"	724	ND	64	50-120%			
N-Nitrosodiphenylamine	567	3.62	7.24	"	"	"	ND	78	"			
Hexachlorobenzene	591	113	226		"		ND	82	45-120%			
Hexachlorobutadiene	438	113	226	"	"	"	ND	61	40-120%			
Surr: Nitrobenzene-d5 (Surr)		Rec	overy: 53 %	Limits: 35	5-120 %	Dil	ution: 1x					
2-Fluorobiphenyl (Surr)			61 %	45	5-120 %		"					
Phenol-d6 (Surr)			60 %	40)-120 %		"					
p-Terphenyl-d14 (Surr)			97 %	30)-125 %		"					

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

		S	emivolatile	Organic	Compou	nds by EP/	A 8270D					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits F	F RPD L	PD .imit	Notes
Batch 3070010 - EPA 3546 Sediment												
Matrix Spike (3070010-MS1)				Pr	epared: 07	/01/13 09:13	Analyzed:	07/01/13 19	:06			
QC Source Sample: SB-M-2 Comp D	MMU2 (A3	F0500-03RI	E2)								-	
Surr: 2-Fluorophenol (Surr)		Re	covery: 60 %	Limits: 3.	5-120 %	Dilı	ution: 1x					
2,4,6-Tribromophenol (Surr)			94 %	40	0-125 %		"					

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

			Total	Metals by E	EPA 60	20 (ICPMS)							
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes		
Batch 3070028 - EPA 30	51A						Sediment							
Blank (3070028-BLK1)				Prepa	ared: 07/	01/13 15:43	Analyzed:	07/02/13 16	:18					
EPA 6020A														
Antimony	ND		0.500	mg/kg wet	5									
Arsenic	ND		1.00	"	"									
Cadmium	ND		0.500	"	"									
Chromium	ND		1.00	"	"									
Copper	ND		1.00	"	"									
Lead	ND		0.500	"	"									
Mercury	ND		0.0200	"	"									
Nickel	ND		1.00	"	"									
Silver	ND		0.500	"	"									
Zinc	ND		2.00	"	"									
LCS (3070028-BS1)				Prepa	ared: 07/	01/13 15:43	Analyzed:	07/02/13 16	:21					
EPA 6020A														
Antimony	12.2		0.500	mg/kg wet	5	12.5		98	80-120%					
Arsenic	24.9		1.00	"	"	25.0		99	"					
Cadmium	24.6		0.500	"	"	"		98	"					
Chromium	25.1		1.00	"	"			100	"					
Copper	26.1		1.00	"	"			104	"					
Lead	24.3		0.500	"	"			97	"					
Mercury	0.477		0.0200	"	"	0.500		95	"					
Nickel	25.7		1.00	"	"	25.0		103	"					
Silver	12.4		0.500	"	"	12.5		99	"					
Zinc	24.7		2.00	"	"	25.0		99	"					
Duplicate (3070028-DUP1)				Prepa	ared: 07/	01/13 15:43	Analyzed:	07/02/13 16	:46					
QC Source Sample: SB-M-Z2 Co	omp DMMU2 (A	A3F0500-04))											
EPA 6020A														
Antimony	1.53		1.14	mg/kg dry	5		1.19			26	40%			
Arsenic	15.1		2.29	"	"		15.7			4	40%			
Cadmium	ND		1.14	"	"		0.772			***	40%			
Chromium	21.9		2.29	"	"		22.8			4	40%			

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

			Total	Metals by E	PA 60	20 (ICPMS))					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3070028 - EPA 3051	A						Sed	iment				
Duplicate (3070028-DUP1)				Prepa	red: 07/	01/13 15:43	Analyzed:	07/02/13 1	6:46			
QC Source Sample: SB-M-Z2 Com	np DMMU2 (A	3F0500-04)										
Copper	28.9		2.29	mg/kg dry	"		29.8			3	40%	
Lead	16.3		1.14	"	"		16.0			2	40%	
Mercury	0.0907		0.0458	"	"		0.0919			1	40%	
Nickel	15.7		2.29	"	"		16.4			5	40%	
Silver	ND		1.14	"	"		ND				40%	
Zinc	105		4.58	"	"		105			0.08	40%	
Matrix Spike (3070028-MS1)				Prepa	red: 07/	01/13 15:43	Analyzed:	07/02/13 1	6:49			
QC Source Sample: SB-M-Z2 Com	np DMMU2 (A	3F0500-04)										
EPA 6020A												
Antimony	23.7		1.09	mg/kg dry	5	27.1	1.19	83	75-125%			
Arsenic	71.7		2.17	"	"	54.3	15.7	103	"			
Cadmium	54.5		1.09	"	"	"	0.772	99	"			
Chromium	77.0		2.17	"	"	"	22.8	100	"			
Copper	86.0		2.17	"	"	"	29.8	103				
Lead	70.5		1.09	"	"	"	16.0	100				
Mercury	1.14		0.0434	"	"	1.09	0.0919	97	"			
Nickel	71.9		2.17	"	"	54.3	16.4	102	"			
Silver	26.7		1.09	"	"	27.1	ND	98	"			
Zinc	162		4.34	"	"	54.3	105	105	"			

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

			Conve	ntional Ch	emistry	Paramete	ers					
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060604 - PSEP TO	C						Sec	liment				
Blank (3060604-BLK1)				Prej	pared: 06/	24/13 15:22	Analyzed:	07/01/13 18	:35			
PSEP/SM 5310B MOD												
Total Organic Carbon	ND		0.020	% by Weight	1							
LCS (3060604-BS1)				Pre	pared: 06/	24/13 15:22	Analyzed:	07/01/13 18	:35			
PSEP/SM 5310B MOD					-							
Total Organic Carbon	9800			mg/kg	1	10000		98	85-115%			
Duplicate (3060604-DUP1)			Prepared: 06/24/13 15:22 Analyzed: 07/01/13 18:35									
QC Source Sample: SB-M-1 Comp	. DMMU1 (A	3F0500-01)										
PSEP/SM 5310B MOD												
Total Organic Carbon	2.1		0.020	% by Weight	1		2.0			3	20%	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Conventional Chemistry Parameters												
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 3060627 - Total Solids (SM2540G/PSEP) Sediment												
Duplicate (3060627-DUP1)				Prej	oared: 06/	25/13 10:45	Analyzed:	06/26/13 11	:56			
QC Source Sample: SB-M-1 Comp	. DMMU1 (A	3F0500-01)										
SM 2540 G												
Total Solids	45.8		1.00	% by Weight	1		46.4			1	20%	

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

QUALITY CONTROL (QC) SAMPLE RESULTS

Percent Dry Weight												
Analyte	Result	MDL	Reporting Limit	Units	Dil.	Spike Amount	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
3atch 3060627 - Total Solids (SM2540G/PSEP) Sediment												
Duplicate (3060627-DUP1)				Prej	oared: 06/	25/13 10:45	Analyzed:	06/26/13 11	:56			
QC Source Sample: SB-M-1 Comp	o. DMMU1 (A	3F0500-01)										
Apex SOP												
% Solids	45.8		1.00	% by Weight	"		46.4			1	20%	

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Northern Resource Consulting, Inc.Project:Port of St.Helens Sediment Sampling1339 Commerce Ave. Suite 309BProject Number:POSH61134AReported:Longview, WA 98632Project Manager:Brian Perleberg07/14/13 06:14

SAMPLE PREPARATION INFORMATION

Diesel and Oil Hydrocarbons by NWTPH-Dx										
Prep: EPA 3546 (F	uels)				Sample	Default	RL Prep			
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor			
Batch: 3060580										
A3F0500-01	Sediment	NWTPH-Dx	06/19/13 11:09	06/24/13 07:19	11.8g/5mL	10g/5mL	0.85			
A3F0500-02	Sediment	NWTPH-Dx	06/19/13 11:09	06/24/13 07:19	11.62g/5mL	10g/5mL	0.86			
A3F0500-03	Sediment	NWTPH-Dx	06/19/13 12:25	06/24/13 07:19	11.8g/5mL	10g/5mL	0.85			
A3F0500-04	Sediment	NWTPH-Dx	06/19/13 12:25	06/24/13 07:19	11.02g/5mL	10g/5mL	0.91			
A3F0500-05	Sediment	NWTPH-Dx	06/19/13 16:10	06/24/13 07:19	11.51g/5mL	10g/5mL	0.87			
A3F0500-06	Sediment	NWTPH-Dx	06/19/13 16:10	06/24/13 07:19	11.12g/5mL	10g/5mL	0.90			

Polychlorinated Biphenyls EPA 8082A										
Prep: EPA 3546					Sample	Default	RL Prep			
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor			
Batch: 3060584										
A3F0500-01	Sediment	EPA 8082A	06/19/13 11:09	06/24/13 08:34	30.2g/2mL	30g/2mL	0.99			
A3F0500-02	Sediment	EPA 8082A	06/19/13 11:09	06/24/13 08:34	30.36g/2mL	30g/2mL	0.99			
A3F0500-03	Sediment	EPA 8082A	06/19/13 12:25	06/24/13 08:34	30.27g/2mL	30g/2mL	0.99			
A3F0500-04	Sediment	EPA 8082A	06/19/13 12:25	06/24/13 08:34	30.39g/2mL	30g/2mL	0.99			
A3F0500-05	Sediment	EPA 8082A	06/19/13 16:10	06/24/13 08:34	30.42g/2mL	30g/2mL	0.99			
A3F0500-06	Sediment	EPA 8082A	06/19/13 16:10	06/24/13 08:34	30.08g/2mL	30g/2mL	1.00			

			-	-			
Prep: EPA 3546/36	40A (GPC)			Sample	Default	RL Prep	
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 3060755							
A3F0500-01RE1	Sediment	EPA 8081B	06/19/13 11:09	06/26/13 12:45	15.19g/10mL	10g/5mL	1.32
A3F0500-02RE1	Sediment	EPA 8081B	06/19/13 11:09	06/26/13 12:45	15.62g/10mL	10g/5mL	1.28
A3F0500-03RE1	Sediment	EPA 8081B	06/19/13 12:25	06/26/13 12:45	15.56g/10mL	10g/5mL	1.29
A3F0500-04RE1	Sediment	EPA 8081B	06/19/13 12:25	06/26/13 12:45	15.17g/10mL	10g/5mL	1.32
A3F0500-05RE1	Sediment	EPA 8081B	06/19/13 16:10	06/26/13 12:45	15.43g/10mL	10g/5mL	1.30
A3F0500-06RE1	Sediment	EPA 8081B	06/19/13 16:10	06/26/13 12:45	15.42g/10mL	10g/5mL	1.30

Semivolatile Organic Compounds by EPA 8270D										
Prep: EPA 3546					Sample	Default	RL Prep			
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor			

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Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A

Reported: 07/14/13 06:14

SAMPLE PREPARATION INFORMATION

Project Manager: Brian Perleberg

Semivolatile Organic Compounds by EPA 8270D										
Prep: EPA 3546					Sample	Default	RL Prep			
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor			
Batch: 3060654										
A3F0500-01RE1	Sediment	EPA 8270D	06/19/13 11:09	06/26/13 08:35	15.44g/2mL	10g/2mL	0.65			
A3F0500-02RE1	Sediment	EPA 8270D	06/19/13 11:09	06/26/13 08:35	15.48g/2mL	10g/2mL	0.65			
A3F0500-03RE1	Sediment	EPA 8270D	06/19/13 12:25	06/26/13 08:35	15.41g/2mL	10g/2mL	0.65			
A3F0500-04RE1	Sediment	EPA 8270D	06/19/13 12:25	06/26/13 08:35	15.66g/2mL	10g/2mL	0.64			
A3F0500-05RE1	Sediment	EPA 8270D	06/19/13 16:10	06/26/13 08:35	15.68g/2mL	10g/2mL	0.64			
A3F0500-06RE1	Sediment	EPA 8270D	06/19/13 16:10	06/26/13 08:35	15.78g/2mL	10g/2mL	0.63			
Batch: 3070010										
A3F0500-03RE2	Sediment	EPA 8270D	06/19/13 12:25	07/01/13 09:13	15.51g/2mL	10g/2mL	0.65			

Total Metals by EPA 6020 (ICPMS)

Prep: EPA 3051A					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 3070028							
A3F0500-01	Sediment	EPA 6020A	06/19/13 11:09	07/01/13 15:43	0.459g/50mL	0.5g/50mL	1.09
A3F0500-02	Sediment	EPA 6020A	06/19/13 11:09	07/01/13 15:43	0.459g/50mL	0.5g/50mL	1.09
A3F0500-03	Sediment	EPA 6020A	06/19/13 12:25	07/01/13 15:43	0.517g/50mL	0.5g/50mL	0.97
A3F0500-04	Sediment	EPA 6020A	06/19/13 12:25	07/01/13 15:43	0.477g/50mL	0.5g/50mL	1.05
A3F0500-05	Sediment	EPA 6020A	06/19/13 16:10	07/01/13 15:43	0.496g/50mL	0.5g/50mL	1.01
A3F0500-06	Sediment	EPA 6020A	06/19/13 16:10	07/01/13 15:43	0.454g/50mL	0.5g/50mL	1.10

Prep: PSEP TOC					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
Batch: 3060604							
A3F0500-01	Sediment	PSEP/SM 5310B MOD	06/19/13 11:09	06/24/13 15:22	5g/5g	5g/5g	NA
A3F0500-02	Sediment	PSEP/SM 5310B MOD	06/19/13 11:09	06/24/13 15:22	5g/5g	5g/5g	NA
A3F0500-03	Sediment	PSEP/SM 5310B MOD	06/19/13 12:25	06/24/13 15:22	5g/5g	5g/5g	NA
A3F0500-04	Sediment	PSEP/SM 5310B MOD	06/19/13 12:25	06/24/13 15:22	5g/5g	5g/5g	NA
A3F0500-05	Sediment	PSEP/SM 5310B MOD	06/19/13 16:10	06/24/13 15:22	5g/5g	5g/5g	NA

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Northern Resource Consulting, Inc.

1339 Commerce Ave. Suite 309B

Longview, WA 98632

Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

SAMPLE PREPARATION INFORMATION

Conventional Chemistry Parameters								
Prep: PSEP TOC					Sample	Default	RL Prep	
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
A3F0500-06	Sediment	PSEP/SM 5310B	06/19/13 16:10	06/24/13 15:22	5g/5g	5g/5g	NA	
		MOD						
Prep: Total Solids (SM2540G/PSEP)					Sample	Default	RL Prep	
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
Batch: 3060627								
A3F0500-01	Sediment	SM 2540 G	06/19/13 11:09	06/25/13 10:45	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-02	Sediment	SM 2540 G	06/19/13 11:09	06/25/13 10:45	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-03	Sediment	SM 2540 G	06/19/13 12:25	06/25/13 10:45	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-04	Sediment	SM 2540 G	06/19/13 12:25	06/25/13 10:45	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-05	Sediment	SM 2540 G	06/19/13 16:10	06/25/13 10:45	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-06	Sediment	SM 2540 G	06/19/13 16:10	06/25/13 10:45	1N/A/1N/A	1N/A/1N/A	NA	

	Grain Size by ASTM D 422							
Prep: ASTM D 421					Sample	Default	RL Prep	
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor	
Batch: 3060629								
A3F0500-01	Sediment	ASTM D 422m	06/19/13 11:09	06/25/13 10:56	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-02	Sediment	ASTM D 422m	06/19/13 11:09	06/25/13 11:14	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-03	Sediment	ASTM D 422m	06/19/13 12:25	06/25/13 11:40	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-04	Sediment	ASTM D 422m	06/19/13 12:25	06/25/13 11:54	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-05	Sediment	ASTM D 422m	06/19/13 16:10	06/25/13 12:12	1N/A/1N/A	1N/A/1N/A	NA	
A3F0500-06	Sediment	ASTM D 422m	06/19/13 16:10	06/25/13 12:46	1N/A/1N/A	1N/A/1N/A	NA	

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Northern Resource Consulting, Inc.	Project:	Port of St.Helens Sediment Sampling	
1339 Commerce Ave. Suite 309B	Project Number:	POSH61134A	Reported:
Longview, WA 98632	Project Manager:	Brian Perleberg	07/14/13 06:14

Notes and Definitions

Qualifiers:

- B-02 Analyte detected in an associated blank at a level between one-half the MRL and the MRL. (See Notes and Conventions below.)
- C-05 Extract has undergone a GPC (Gel-Permeation Chromotography) cleanup per EPA 3640A. Reporting levels may be raised due to dilution necessary for cleanup. Sample Final Volume includes the GPC dilution factor, see the Prep page for details.
- C-07 Extract has undergone Sulfuric Acid Cleanup by EPA 3665A, Sulfur Cleanup by EPA 3660B, and Florisil Cleanup by EPA 3620B in order to minimize matrix interference.
- EST Result reported as an Estimated Value. Multiple aroclors present and matrix interference
- F-17 No fuel pattern detected. The Diesel result represents carbon range C12 to C24, and the Oil result represents >C24 to C40.
- GS-01 See detailed Particle Size Analysis results, accumulation curves, and Case Narratives at the end of this report.
- J Estimated Result . Result detected below the lowest point of the calibration curve, but above the specified MDL.
- Q-05 Analyses are not controlled on RPD values from sample or duplicate concentrations below 5 times the reporting level.
- Q-29 Recovery for Lab Control Spike (LCS) is above the upper control limit. Data may be biased high.
- Q-31 Estimated Results. Recovery of Continuing Calibration Verification sample below lower control limit for this analyte. Results are likely biased low.
- S-02 Surrogate recovery cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.
- S-03 Reextraction and analysis, or analysis of laboratory duplicate, confirms surrogate failure due to sample matrix effect.
- S-06 Surrogate recovery is outside of established control limits.

Notes and Conventions:

Γ	DET	Analyte DETECTED
N	ND	Analyte NOT DETECTED at or above the reporting limit
N	١R	Not Reported
d	lry	Sample results reported on a dry weight basis. Results listed as 'wet' or without 'dry'designation are not dry weight corrected.
F	RPD	Relative Percent Difference
N	A DL	If MDL is not listed, data has been evaluated to the Method Reporting Limit only.
V	WMSC	Water Miscible Solvent Correction has been applied to Results and MRLs for volatiles soil samples per EPA 8000C.
F	Ratch	

- Batch QC Unless specifically requested, this report contains only results for Batch QC derived from client samples included in this report. All analyses were performed with the appropriate Batch QC (including Sample Duplicates, Matrix Spikes and/or Matrix Spike Duplicates) in order to meet or exceed method and regulatory requirements. Any exceptions to this will be qualified in this report. Complete Batch QC results are available upon request. In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) is analyzed to demonstrate accuracy and precision of the extraction and analysis.
- BlankApex assesses blank data for potential high bias down to a level equal to ½ the method reporting limit (MRL), except for conventionalPolicychemistry and HCID analyses which are assessed only to the MRL. Sample results flagged with a B or B-02 qualifier are potentially
biased high if they are less than ten times the level found in the blank for inorganic analyses or less than five times the level found in the
blank for organic analyses.

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Northern 1339 Com Longview	Resource Consulting, Inc. Imerce Ave. Suite 309B , WA 98632	Project: Project Number: Project Manager:	Port of St.Helens Sediment Sampling POSH61134A Brian Perleberg	Reported: 07/14/13 06:14
	For accurate comparison of volatile results to and soil sample results should be divided by 1.	the level found in the blank; /50 of the sample dilution to	water sample results should be divided by the dilution factor, account for the sample prep factor.	
	Results qualified as reported below the MRL r qualifications are not applied to J qualified res	nay include a potential high sults reported below the MR	bias if associated with a B or B-02 qualified blank. B and B-0 L.	2
	QC results are not applicable. For example, % Spikes, etc.	Recoveries for Blanks and	Duplicates, % RPD for Blanks, Blank Spikes and Matrix	
***	Used to indicate a possible discrepency with the	he Sample and Sample Dun'	licate results when the %RPD is not available. In this case	

*** Used to indicate a possible discrepency with the Sample and Sample Duplicate results when the %RPD is not available. In this c either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

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				Apex Labo	oratories, LLC					
0			Particle	Size Analysi	s of Soil by	ASTM D 422		Datab Muset	2000000	
Sample ID:		A3F0500-01		Client Sam	ple ID; SB-M-1 Comp. DMMU1		mp. DMMU1	Batch Number:	3060629	
Data Entere	ed by:	JSJ	Date:	06/27/13	Data Review	wed by:	JPW	Date:	07/01/13	
Sample De	scription:	Clayey SILT	with trace sa	ind	Max Particle Size: Gravel					
Particle Sh	ape:	N/A			Hardness N/A					
Whole Sample				Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.		
					11.410	331.866	320.46	6.06	302.1	
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Re	tained	% Pas	sing	
4	4.75	1.331	1.480	0.15	0.15	0	0.0	100.	0	
10	2.00	1.339	1.409	0.07	0.22	0	0.0	99.9)	
Pan		10.744	329.829	319.09	319.30	99	9.2	1 ····································		
			H	/groscopic M	loisture Corre	ection				
		Hygroscopic Co	prrection Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture	
		0.94	429	oven cample	F50001	1.337 21.623		20.464	6.06	
				Hvdrome	eter Analysis					
Start Date/Tin	ne	1.1.1.1	6/25/2013	10:56	Dispersing Ag	ient		NaP	D,	
Air Dry Sampl	e Wt. for Hydrom	neter Test (g)	55.276		G. Correction Factor (a)			1.000		
Percent Pass	ng No.10 Sieve		99	9.9	Specific Gravi	ty (G,)		2.65		
Dry Weight of	Soil Tested (g)		52	52.12 Corrected Dry Weight of Soil		rected Dry Weight of Soil Tested (g) (W)		52.1	6	
Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	к	Particle Diameter (mm)	Percent Passing		
1	48	22	41.44	79.5	8.3	0.01332	0.038	79.40		
2	45	22	38.44	73.7	8.8	0.01332	0.028	73.66		
4	40	22	33.44	64.1	9.6	0.01332	0.021	64.08		
8	35	21.9	28.41	54.5	10.4	0.01332	0.015	54.43		
15	30	21.8	23.38	44.8	11.2	0.01332	0.012	44.79		
30	25.5	21.8	18.88	36.2	11.9	0.01332	0.008	36.16		
60	21	21.7	14.34	27.5	12.7	0.01332	0.006	27.48		
90	19	21.7	12.34	23.7	13	0.01332	0.005	23.64		
120	18	21.7	11.34	21.7	13.2	0.01332	0.004	21.73		
240	15	22.1	8.48	16.3	13.7	0.01332	0.003	16.24		
		22.3	7.55	14.5	13.8	0.01332	0.003	14.46		
360	14	22.0	1.00	11.0	10.0	0.01552	1 1. CALL ST. 1. 1.	and the second se		

Sieve Analysis of Portion Finer Than No. 10 Sieve							
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.334	1.540	0.21	1.41	0.4	99.5
40	0.425	1.341	1.376	0.03	1.61	0.1	99.5
60	0.250	1.343	1.516	0.17	2.61	0.3	99.1
100	0.150	1.337	2.038	0.70	6.66	1.3	97.8
140	0.105	1.349	2.170	0.82	11.39	1.6	96.2
200	0.075	1.372	2.900	1.53	20.22	2.9	93.3
230	0.063	1.343	2.636	1.29	27.68	2.5	90.8
			Sum	4.76	230 Minus	47.36	

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Apex Laboratories, LLC Particle Size Analysis of Soil by ASTM D 422 Modified

Sample ID: SB-M-1 Comp. DMMU1 (A3F0500-01)

Grain Size	e Analysis Summary from Sieving and Hydrometer Testing		Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel					0.05
1.5	Retained on No. 4 sieve		4.75	99.95	0.05
Sand					6,66
	Coarse sand, passing No. 4 sieve and retained on No. 10 sieve		2.00	99.93	0.02
	Coarse sand, passing No.10 sieve and retained on No. 20 sieve		0.8500	99.53	0.39
1	Medium sand, passing No.20 sieve and retained on No. 40 sieve		0.4250	99.47	0.07
	Medium sand, passing No.40 sieve and retained on No. 60 sieve		0.2500	99.13	0.33
	Medium sand, passing No. 60 sieve and retained on No.100 sieve		0.1500	97.79	1.34
	Fine sand, passing No. 100 sieve and retained on No.140 sieve		0.1060	96.22	1.57
	Fine sand passing No. 140 sieve and retained on No. 200 sieve		0.0750	93.29	2.93
Silt and Cl	lay (Measurements in the Clay fraction are noted)		1		93.29
	Silt passing No. 200 sieve and retained on No. 230 sieve		0.0630	90.81	2.48
	Hydrometer Test		0.0384	79.4	11.4
	Hydrometer Test		0.0279	73.66	5.75
	Hydrometer Test		0.0206	64.08	9.58
	Hydrometer Test	1	0.0152	54.43	9.65
	Hydrometer Test		0.0115	44.79	9.65
	Hydrometer Test	-	0.0084	36.16	8.62
	Hydrometer Test		0.0061	27.48	8.69
	Hydrometer Test		0.0051	23.64	3.83
	Hydrometer Test	Clay	0.0044	21.73	1.92
1	Hydrometer Test	Clay	0.0032	16.24	5,49
	Hydrometer Test	Clay	0.0026	14.46	1.78
	Hydrometer Test	Clay	0.0013	9.21	5.25

Grain Size Summary	Percent of Total Sample
Gravel	0.0
Sand	6.7
Coarse sand	0,4
Medium sand	1.7
Fine sand	4.5
Silt	69.6
Clay	23.6

Case Narrative for Sample ID: SI	3-M-1 Comp. DMMU1	(A3F0500-01)
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No difficulty dispersing the fraction passing the No. 10 sieve.

Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.

+4 and +10 fractions consist entirely of organic material (plant material, wood fragments).

+20 fraction consists entirely of organic and anthropogenic material (plant, metal).



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		_	Dentials	Apex Labo	o of Sell Lu	ACTM D 400			
Sample ID:		A3E0500-03		Client Sam	s of soil by a	SB-M-21 Co	mp. DMMU1	Batch Number	3060629
Data Entere	ed by:	JS.I	Date:	06/27/13	7/13 Data Reviewed by:		JPW	Date:	07/01/13
Sample Des	scription:	Clayey SILT	with some sa	and	Max Particle	e Size:	Coarse Sar	nd	
Particle Sh	ape:	N/A			Hardness	N/A			
Whole Sample					Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
					17.446	495.560	478.11	4.46	457.7
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Re	tained	% Pas	sing
4	4.75	0.000	0.000	0.00	0.00	0	.0	100.	0
10	2.00	1.342	1.495	0.15	0.15	0	.0	100.	0
Pan		10.877	487.519	476.64	476.80	476.80 99.5			
			Hy	/groscopic M	loisture Corre	ection			
		Hygroscopic Co	prrection Factor	Over Servet	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.9	573	Oven Sample	F50002	1.352	30.157	28.927	4.46
				Hydrome	eter Analvsis				
Start Date/Tin	ne		6/25/2013	11:14	Dispersing Ag	ent	- (A	NaPi	D ₃
Air Dry Sampl	e Wt. for Hydrom	eter Test (g)	56.227		G Correction Factor (a)			1.000	
Percent Pass	ing No.10 Sieve		100.0		Specific Gravity (G _s)			2.65	
Dry Weight of	Soil Tested (g)		53.83		Corrected Dry Weight of Soil Tested (g)		ested (g) (W)	√) 53.84	
Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	к	Particle Diameter (mm)	Percent Passing	
1	42	22.1	35.48	65.9	9.2	0.01332	0.040	65.87	
2	37	22.1	30.48	56.6	10.1	0.01332	0.030	56.59	
4	32	22.1	25.48	47.3	10.9	0.01332	0.022	47.30	
8	28	22	21.44	39.8	11.5	0.01332	0.016	39.81	
15	24	22	17.44	32.4	12.2	0.01332	0.012	32.39	
30	21	22	14.44	26.8	12.7	0.01332	0.009	26.82	
60	18	22	11.44	21.3	13.2	0.01332	0.006	21.25	
90	17	21.9	10.41	19.3	13.3	0.01332	0.005	19.33	
120	16	22	9.44	17.5	13.5	0.01332	0.004	17.53	
240	14	22.1	7.48	13.9	13.8	0.01332	0.003	13,88	
360	13.5	22.3	7.05	13.1	13.8	0.01332	0.003	13.08	
1440	11.5	21.6	4,81	8.9	14.2	0.01332	0.001	8.92	

		Sieve Anal	ysis of Portion	Finer Than	No. 10 Sieve		
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.366	1.487	0.12	1.18	0.2	99.7
40	0.425	1.339	1.393	0.05	1.64	0.1	99.6
60	0.250	1.372	1.747	0.38	4.82	0.7	98.9
100	0.150	1.346	3.309	1.96	21.46	3.6	95.3
140	0.105	1.366	3.945	2.58	43.32	4.8	90.5
200	0.075	1.346	5.781	4.44	80.91	8.2	82.3
230	0.063	1.363	4.010	2.65	103.35	4.9	77.4
			Sum	12 17	230 Minus	41.65	_

 Sum
 12.17
 230 Minus
 41.65

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Apex Laboratories, LLC Particle Size Analysis of Soil by ASTM D 422 Modified

Grain Size	Analysis Summary from Sieving and Hydrometer Testing		Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel				0.0	0
	Retained on No. 4 sieve	-	4.75	100	D
Sand		314			17.73
	Coarse sand, passing No. 4 sieve and retained on No. 10 sieve		2.00	99.97	0.03
	Coarse sand, passing No.10 sieve and retained on No. 20 sieve		0.8500	99.74	0.22
	Medium sand, passing No.20 sieve and retained on No. 40 sieve		0.4250	99.64	0.1
	Medium sand, passing No.40 sieve and retained on No. 60 sieve	- 1	0.2500	98.95	0.7
	Medium sand, passing No. 60 sieve and retained on No.100 sieve	- 1	0.1500	95.3	3.65
	Fine sand, passing No. 100 sieve and retained on No.140 sieve		0.1060	90.51	4.79
1	Fine sand passing No. 140 sieve and retained on No. 200 sieve		0.0750	82.27	8.24
Silt and Cl	ay (Measurements in the Clay fraction are noted)	-11		1.	82.27
	Sill passing No. 200 sieve and retained on No. 230 sieve		0.0630	77.36	4.92
	Hydrometer Test		0.0404	65.87	11.49
1	Hydrometer Test		0.0299	56.59	9.28
	Hydrometer Test		0.0220	47.3	9.28
	Hydrometer Test		0.0160	39.81	7.49
	Hydrometer Test		0.0120	32.39	7.43
	Hydrometer Test		0.0087	26.82	5.57
	Hydrometer Test	=	0.0062	21.25	5.57
	Hydrometer Test		0.0051	19.33	1.92
	Hydrometer Test	Clay	0.0045	17.53	1.79
1	Hydrometer Test	Clay	0.0032	13.88	3,65
1	Hydrometer Test	Clay	0.0026	13.08	0.8
	Hydrometer Test	Clay	0.0013	8.92	4.16

Sample ID: SB-M-21 Comp. DMMU1 (A3F0500-02)

Grain Size Summary	Percent of Total Sample
Gravel	0.0
Sand	17.7
Coarse sand	0.3
Medium sand	4.4
Fine sand	13.0
Silt	62.9
Clav	19.3

Case Narrative for Sample ID: SB-M-21 Comp. DMMU1 (A3F0500-02)

No difficulty dispersing the fraction passing the No. 10 sieve.

Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.

+10 fraction consists mainly of organic material.

+20 fraction consists entirely of organic and anthropogenic material (plant, metal).





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				Apex Labo	ratories, LLC	ACTH D 400			
0		1250500 00	Particle S	lize Analysis	of Soil by	SB-M-2 Cor	nn DMMU2	Batch Number	3060629
Sample ID:	يدينا لت	A3F0500-03	Date:	06/27/12	Data Reviewed by		JPW	Date:	07/01/13
Sample Description: Clayey SILT with some sa		with some sa	nd	Max Particle Size:		Gravel	perer		
Particle Sh	ape:	N/A			Hardness	N/A			
Whole Sample					Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
					17.304	625.610	608.31	3.79	586.1
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Re	tained	% Pas	sing
4	4.75	1.335	1.402	0.07	0.07	0	.0	100	0
10	2.00	1.342	1.391	0.05	0.12	0	.0	100	0
Pan		16.323	623.146	606.82	606.94	99	9.6		
			Ну	groscopic M	oisture Corre	ection			
		Hygroscopic Co	prrection Factor		Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.96	534	Oven Sample	F50003	1.348	28.406	27.417	3.79
				Hvdrome	ter Analysis				
Start Date/Tir	ne	21-23	6/25/2013	11:40	Dispersing Ag	gent		NaP	0,
Air Dry Samp	le Wt. for Hydrom	neter Test (a)	56.513		G Correction Factor (a)			1.000	
Percent Pass	ing No 10 Sieve	(d) (d) (d)	100.0		Specific Gravity (G ₂)			2.65	
Dry Weight o	f Soil Tested (g)		54	.45	Corrected Dry	y Weight of Soil 7	rested (g) (W)	54.4	6
Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	Ļ	к	Particle Diameter (mm)	Percent Passing	
1	37.5	22.1	30.98	56.9	9.9	0.01332	0.042	56.87	
2	33	22.1	26.48	48.6	10.7	0.01332	0.031	48.61	
	30	22.1	23.48	43.1	11.2	0.01332	0.022	43.10	
4		22	20.44	37.5	11.7	0.01332	0.016	37.53	
4	27		 And the second se				0.012	32.03	
4 8 15	27	22	17.44	32.0	12.2	0.01332	0.012	32.03	
4 8 15 30	27 24 21.5	22 22	17.44 14.94	32.0 27.4	12.2 12.5	0.01332	0.009	27.44	
4 8 15 30 60	27 24 21.5 19	22 22 21.9	17.44 14.94 12.41	32.0 27.4 22.8	12.2 12.5 13	0.01332 0.01332 0.01332	0.009	27.44 22.78	
4 8 15 30 60 90	27 24 21.5 19 18	22 22 21.9 22.1	17.44 14.94 12.41 11.48	32.0 27.4 22.8 21.1	12.2 12.5 13 13.2	0.01332 0.01332 0.01332 0.01332	0.009 0.006 0.005	27.44 22.78 21.07	
4 8 15 30 60 90 120	27 24 21.5 19 18 17	22 22 21.9 22.1 21.9	17.44 14.94 12.41 11.48 10.41	32.0 27.4 22.8 21.1 19.1	12.2 12.5 13 13.2 13.3	0.01332 0.01332 0.01332 0.01332 0.01332	0.009 0.006 0.005 0.004	27.44 22.78 21.07 19.11	
4 8 15 30 60 90 120 240	27 24 21.5 19 18 17 16	22 22 21.9 22.1 21.9 21.9 22.2	17.44 14.94 12.41 11.48 10.41 9.51	32.0 27.4 22.8 21.1 19.1 17.5	12.2 12.5 13 13.2 13.3 13.5	0.01332 0.01332 0.01332 0.01332 0.01332 0.01332	0.009 0.006 0.005 0.004 0.003	27.44 22.78 21.07 19.11 17.46	
4 8 15 30 60 90 120 240 360	27 24 21.5 19 18 17 16 15	22 22 21.9 22.1 21.9 22.2 22.2 22.4	17.44 14.94 12.41 11.48 10.41 9.51 8.58	32.0 27.4 22.8 21.1 19.1 17.5 15.8	12.2 12.5 13 13.2 13.3 13.5 13.7	0.01332 0.01332 0.01332 0.01332 0.01332 0.01332 0.01332	0.009 0.006 0.005 0.004 0.003 0.003	27.44 22.78 21.07 19.11 17.46 15.75	

		Sieve Anal	ysis of Portion	Finer Than	No. 10 Sieve	1	
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.337	1.399	0.06	0.78	0.1	99.9
40	0.425	1.335	1.543	0.21	3.02	0.4	99.5
60	0.250	1.335	2.663	1.33	17.27	2.4	97.0
100	0.150	1.352	6.133	4.78	68.61	8.8	88.3
140	0.105	1.350	5.585	4.24	114.09	7.8	80.5
200	0.075	1.351	5.922	4.57	163.17	8.4	72.1
230	0.063	1.346	4.059	2.71	192.30	5.0	67.1
			Sum	17.90	230 Minus	36.55	

Apex Laboratories, LLC Particle Size Analysis of Soil by ASTM D 422 Modified

Grain Size	Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel	March 1		1	0.01
	Retained on No. 4 sieve	4.75	99.99	0.01
Sand			1 and	27.89
	Coarse sand, passing No. 4 sieve and retained on No. 10 sieve	2.00	99.98	0.01
-	Coarse sand, passing No.10 sieve and retained on No. 20 sleve	0.8500	99.87	0.11
1	Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	99.48	0.38
	Medium sand, passing No.40 sieve and retained on No. 60 sieve	0.2500	97.05	2.44
	Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	88.27	8.78
	Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	80.49	7.78
	Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	72.1	8.39
Silt and Cl	lay (Measurements in the Clay fraction are noted)		12	72.1
	Silt passing No. 200 sieve and retained on No. 230 sieve	0.0630	67.11	4.98
	Hydrometer Test	0.0419	56.87	10.24
	Hydrometer Test	0.0308	48.61	8.26
	Hydrometer Test	0.0223	43.1	5.51
1	Hydrometer Test	0.0161	37.53	5.57
-	Hydrometer Test	0.0120	32.03	5.51
	Hydrometer Test	0.0086	27.44	4,59
	Hydrometer Test	0.0062	2 22.78	4.65
	Hydrometer Test	0.0051	21.07	1.71
	Hydrometer Test Cla	iy 0.0044	19.11	1.96
	Hydrometer Test - Cla	iy 0.0032	2 17.46	1.65
	Hydrometer Test Cla	iy 0.0026	5 15.75	1.71
	Hydrometer Test Cli	y 0.0013	11.64	4.11

Grain Size Summary	Percent of Total Sample
Gravel	0.0
Sand	27.9
Coarse sand	0.1
Medium sand	11.6
Fine sand	16.2
Silt	51.0
Clay	21.1

Case Narrative for Sample ID: SB-M-2 Comp. DMMU2 (A3F0500-03)

No difficulty dispersing the fraction passing the No. 10 sieve.

Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.

+4 and +10 fractions consist entirely of organic and anthropogenic material (plant material, metal).

+20 fraction consists entirely of organic and anthropogenic material (plant, metal).



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Page 2 of 2 100.0 Clay Clayey SILT with some sand 010.0 SOIL DESCRIPTION Silt Particle Size Analysis of Soil by ASTM D 422 Modified No.200 001.0 Apex Laboratories, LLC Fine Sand Particle Size (mm) Coarse Sand Medium Sand F No. 4 No. 10 No. 40 HARDNESS 000.1 NIA **GRAVEL & SAND** SB-M-2 Comp. DMMU2 (A3F0500-03 PARTICLE SHAPE NIA 10.000 Grain Size Accumulation Curve MAXIMUM PARTICLE SIZE Gravel Sample ID: Specific Gravity 100.000 2.65 40 30 20 10 0 20 60 22 100 06 80 Percent of Particles Smaller Than Size Shown

				Apex Labo	ratories, LLC				
			Particle S	Size Analysi	s of Soil by /	ASTM D 422	10 Star 17		
Sample ID:		A3F0500-04		Client Samp	le ID: SB-M-22 Cor		mp. DMMU2	Batch Number:	3060629
Data Entere	d by:	JSJ	Date:	06/27/13	Data Review	wed by:	JPW	Date:	07/01/13
Sample Description: Clayey SIL		Clayey SILT	with trace sa	nd	Max Particle	e Size:	Gravel		
Particle Sha	ape:	N/A			Hardness	N/A			
		Whole Sample			Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
					10.012	337.794	327.78	5.45	310.8
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Re	tained	% Pas	sing
4	4.75	1.354	3.461	2.11	2.11	0	.7	99.	3
10	2.00	1.332	1.444	0.11	2.22	0	.0 •	99.	3
Pan		10.629	334.986	324.36	326.58	98	8.7		
			Hy	/groscopic N	oisture Corre	ection			
		Hygroscopic Co	prrection Factor	Oven Sample	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.94	483	Oven Sample	F50004	1.367	21.561	20.517	5.45
				Hydrome	eter Analysis				
Start Date/Tin	10		6/25/2013	11:54	Dispersing Ag	jent	1.1	NaP	0,
Air Dry Sampl	e Wt. for Hydron	eter Test (a)	55.010		G Correction Factor (a)			1.00	0
Percent Pass	na No 10 Sieve		99	9.3	Specific Gravi	ity (G_)		2.6	5
Dry Weight of	Soil Tested (a)		52.17		Corrected Dry Weight of Soil Tested (g) (W)		52.54		
Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	к	Particle Diameter (mm)	Percent Passing	
1	47	22.2	40.51	77.1	8.4	0.01332	0.039	76.56	
2	40	22.2	33.51	63.8	9.6	0.01332	0.029	63.33	
4	35	22.2	28.51	54.3	10.4	0.01332	0.021	53.88	
8	29.5	22.2	23.01	43.8	11.2	0.01332	0.016	43.49	
15	26	22.2	19.51	37.1	11.9	0.01332	0.012	36.87	
30	22.5	22.1	15.98	30.4	12.4	0.01332	0.009	30.19	
60	19	22.1	12.48	23.7	13	0.01332	0.006	23.58	
90	17.5	22.1	10.98	20.9	13.2	0.01332	0.005	20.75	
120	16.5	22	9.94	18.9	13.3	0.01332	0.004	18.79	
240	14.5	22.3	8.05	15.3	13.7	0.01332	0.003	15.21	
360	13.5	22.5	7.12	13.5	13.8	0.01317	0.003	13.45	
	4.0			0.0	110		0.001	8 20	

		Sieve Anal	ysis of Portion	Finer Than	No. 10 Sieve		
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.343	1.511	0.17	3.21	0.3	99.0
40	0.425	1.343	1.455	0.11	3.87	0.2	98.8
60	0.250	1.333	1.550	0.22	5.15	0.4	98.3
100	0.150	1.346	1.802	0.46	7.84	0.9	97.5
140	0.105	1.342	1.988	0.65	11.65	1.2	96.2
200	0.075	1.341	3.525	2.18	24.52	4.2	92.1
230	0.063	1.358	3.440	2.08	36.80	4.0	88.1
			Sum	5.87	230 Minus	46.30	

Apex Laboratories, LLC Particle Size Analysis of Soil by ASTM D 422 Modified

Grain Size	e Analysis Summary from Sieving and Hydrometer Testing		Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel				0.68	
	Retained on No. 4 sieve		4.75	99.32	0.68
Sand					7.24
	Coarse sand, passing No. 4 sieve and retained on No. 10 sieve		2.00	99.29	0.04
a design of the second s	Coarse sand, passing No.10 sieve and retained on No. 20 sieve		0.8500	98.97	0.32
	Medium sand, passing No.20 sieve and retained on No. 40 sieve		0.4250	98,75	0.21
	Medium sand, passing No.40 sieve and retained on No. 60 sieve		0.2500	98.34	0.41
	Medium sand, passing No. 60 sieve and retained on No.100 sieve		0.1500	97.47	0.87
1	Fine sand, passing No. 100 sieve and retained on No.140 sieve		0.1060	96.24	1.23
	Fine sand passing No. 140 sieve and retained on No. 200 sieve		0.0750	92.09	4.16
Silt and C	lay (Measurements in the Clay fraction are noted)		1		92.09
	Silt passing No. 200 sieve and retained on No. 230 sieve		0.0630	88.12	3.96
1	Hydrometer Test	<u> </u>	0.0386	76.56	11.57
	Hydrometer Test		0.0292	63,33	13.23
	Hydrometer Test		0.0215	53.88	9,45
	Hydrometer Test		0.0158	43.49	10.39
	Hydrometer Test		0.0119	36.87	6.61
	Hydrometer Test		0.0086	30.19	6.68
	Hydrometer Test	_	0.0062	23.58	6.61
	Hydrometer Test		0.0051	20.75	2.83
	Hydrometer Test	Clay	0.0044	18.79	1.95
	Hydrometer Test	Clay	0.0032	15.21	3,58
	Hydrometer Test	Clay	0.0026	13.45	1.76
	Hydrometer Test	Clay	0.0013	8.2	5.24

Grain Size Summary	Percent of Total Sample
Gravel	0.7
Sand	7.2
Coarse sand	0.4
Medium sand	1.5
Fine sand	5.4
Silt	71.3
Clay	20.7

Case Narrative for Sample ID: SB-M-22 Comp. DMMU2 (A3F0500-04)

No difficulty dispersing the fraction passing the No. 10 sieve.

Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.

+4 fraction consists entirely of anthropogenic material (shingle).

+10 fraction consists entirely of organic and anthropogenic material (plant, shingle).

+20 fraction consists entirely of organic and anthropogenic material (plant, metal).





		_		Apex Labo	ratories, LLC				_
Complet ID:		1250500.05	Particle S	Size Analysis	s of Soil by	SB-C-1 Cor	mp DMMU3	Batch Number	3060629
Sample ID:	al huu	ASE0500-05	Date:	06/27/12	Data Povice	wed by:		Date:	07/01/13
Data Entere	a by:	121	Date:	00/2//13	Data Reviel	weu by.	JE VV	Date.	01/01/13
Sample Des	cription:	Clayey SILT			Max Particle	e Size:	Coarse Sar	nd	
Particle Sh	ape:	N/A			Hardness	N/A			
		Whole Sample			Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.
					10.212	311.074	300.86	5.68	284.7
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Re	tained	% Pas	sing
4	4.75	0.000	0.000	0.00	0.00	C	0.0	100	0
10	2.00	1.342	1,606	0.26	0.26	0	0.1	99.	9
Pan		10.878	310.691	299.81	300.08	99	9.3		
			H	groscopic M	oisture Corre	ection			
		Hygroscopic Co	prrection Factor	Quan Sampla	Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.9	462	_ Oven Sample	F50005	1.364	20.076	19.070	5.68
				Hydrome	ter Analysis				
Start Date/Tin	10		6/25/2013	12:12	Dispersing Ag	jent		NaP	о,
Air Dry Sampl	e Wt. for Hydrom	neter Test (g)	55.686		G Correction Factor (a)			1.000	
Percent Pass	ng No.10 Sieve		99.9		Specific Gravity (G,)		2.6	5	
Dry Weight of	Soil Tested (g)		52.69		Corrected Dry Weight of Soil Tested (g) (W)		52.74		
Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	к	Particle Diameter (mm)	Percent Passing	
1	52	22.2	45.51	86.3	7.6	0.01332	0.037	86.21	
2	47.5	22.2	41.01	77.8	8.3	0.01332	0.027	77.69	
4	42	22.2	35.51	67.3	9.2	0.01332	0.020	67.27	
8	36.5	22.2	30.01	56.9	10.1	0.01332	0.015	56.85	
15	31.5	22.1	24.98	47.4	10.9	0.01332	0.011	47.32	
30	27	22.1	20.48	38.8	11.7	0.01332	0.008	38.79	
60	23	22.1	16.48	31.2	12.4	0.01332	0.006	31.21	
90	20	21.9	13.41	25.4	12.9	0.01332	0.005	25.40	
120	19	22	12.44	23.6	13	0.01332	0.004	23.57	
240	16	22.5	9.62	18.2	13.5	0.01317	0.003	18.21	
360	15	22.6	8.65	16.4	13.7	0.01317	0.003	16.38	
			1	10000		THE REAL AST	and and an a	10.05	

		Sieve Anal	ysis of Portion	Finer Than	No. 10 Sieve		
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.345	1.513	0.17	1.17	0.3	99.6
40	0.425	1.362	1.423	0.06	1.50	0.1	99.5
60	0.250	1.351	1.490	0.14	2.25	0.3	99.2
100	0.150	1.358	1.620	0.26	3.66	0.5	98.7
140	0.105	1.347	1.674	0.33	5.42	0.6	98.1
200	0.075	1.365	2.117	0.75	9.47	1.4	96.7
230	0.063	1.353	2.294	0.94	14.53	1.8	94.9
			Sum	2.65	230 Minus	50.04	

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Apex Laboratories, LLC Particle Size Analysis of Soil by ASTM D 422 Modified

Grain Size	Analysis Summary from Sieving and Hydrometer Testing	Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel				0
	Retained on No. 4 sieve	4.75	100	
Sand				3.33
	Coarse sand, passing No. 4 sieve and retained on No. 10 sieve	2.00	99.91	0.09
1	Coarse sand, passing No.10 sieve and retained on No. 20 sieve	0.8500	99.59	0,32
	Medium sand, passing No.20 sieve and retained on No. 40 sieve	0.4250	99.47	0,12
	Medium sand, passing No.40 sieve and relained on No. 60 sieve	0.2500	99.21	0.26
	Medium sand, passing No. 60 sieve and retained on No.100 sieve	0.1500	98.71	0.5
	Fine sand, passing No. 100 sieve and retained on No.140 sieve	0.1060	98.09	0.62
	Fine sand passing No. 140 sieve and retained on No. 200 sieve	0.0750	96.67	1.43
Silt and Cla	ay (Measurements in the Clay fraction are noted)	15 - 4		96.67
	Silt passing No. 200 sieve and retained on No. 230 sieve	0.0630	94.88	1.78
1	Hydrometer Test	0.0367	86.21	8.67
	Hydrometer Test	0.0271	77.69	8.52
	Hydrometer Test	0.0202	67.27	10.42
	Hydrometer Test	0.0150	56.85	10.42
1	Hydrometer Test	0.0114	47.32	9.54
	Hydrometer Test	0.0083	38.79	8.52
	Hydrometer Test	0.0061	31.21	7,58
	Hydrometer Test	0.0050	25.4	5.81
	Hydrometer Test Clay	0.0044	23.57	1.83
	Hydrometer Test Clay	0.0031	18.21	5.36
	Hydrometer Test Clay	0.0026	16.38	1.83
	Hydrometer Test Clay	0.0013	10.25	6.14

Grain Size Summary	Percent of Total Sample
Gravel	0.0
Sand	3.3
Coarse sand	0.4
Medium sand	0.9
Fine sand	2.0
Silt	71.3
Clay	25.4

Case Narrative for Sample ID: SB-C-1 Comp. DMMU3 (A3F0500-05)

No difficulty dispersing the fraction passing the No. 10 sieve.

Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.

+10 fraction consists mainly of organic and anthropogenic material (plant, metal).

+20 fraction consists entirely of organic and anthropogenic material (plant, metal).



Page 1 of 2

Page 2 of 2 100.0 Clay 010.0 SOIL DESCRIPTION Clayey SILT Silt Particle Size Analysis of Soil by ASTM D 422 Modified No.200 ---0.100 Apex Laboratories, LLC Fine Sand Particle Size (mm) Coarse Sand Medium Sand F No. 4 No. 10 No. 40 HARDNESS 1.000 NIA **GRAVEL & SAND** SB-C-1 Comp. DMMU3 (A3F0500-05) PARTICLE SHAPE N/A 10.000 Grain Size Accumulation Curve MAXIMUM PARTICLE SIZE Coarse Sand Sample ID: Specific Gravity 100.000 2.65 9 0 40 30 20 100 8 80 22 60 20

Percent of Particles Smaller Than Size Shown

				Apex Labo	oratories, LLC				
			Particle S	Size Analysi	s of Soil by	ASTM D 422		1010-10-10-10-10-10-10-10-10-10-10-10-10	
Sample ID:		A3F0500-06	6	Client Samp	ple ID:	SB-C-21 Co	mp. DMMU3	Batch Number:	3060629
Data Entere	d by:	JSJ	Date:	06/27/13	Data Review	wed by:	JPW	Date:	07/01/13
Sample Des	cription:	Clayey SILT	5		Max Particle	e Size:	Gravel		
Particle Sh	ape:	N/A			Hardness	N/A			
Whole Sample				Tare	Air Dry + Tare	Air Dry	Moisture	Dry Wt.	
					10.525	342.766	332.24	5.47	315.0
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Wt. Retained	% Re	tained	% Pas	sing
4	4.75	1.360	1.493	0.13	0.13	0	.0	100	.0
10	2.00	1.335	1.364	0.03	0.16	0	.0	99.	9
Pan		11.080	342.321	331.24	331.40	99	9.4		
			Hy	groscopic N	loisture Corre	ection			
		Hygroscopic Co	prrection Factor		Pan No.	Tare	Air Dry + Tare	Oven Dry + Tare	Moisture
		0.9	481	Uven Sample	F50006	1.341	20.276	19.294	5.47
				Hydrome	eter Analysis				
Start Date/Tin	10		6/25/2013	12:46	Dispersing Ac	ient	1	NaP	0,
Air Dry Samp	e Wt. for Hydrom	neter Test (a)	54.025	12.10	G. Correction Factor (a)			1.000	
Percent Pass	ing No 10 Sieve		99.9		Specific Gravi	ity (G_)	151	2.6	5
Dry Weight of	Soil Tested (q)		51.22		Corrected Dry Weight of Soil Tested (g) (W)		51.2	25	
Elapsed Time (min)	Hydrometer Reading	Temperature (°C)	Corrected Hydrometer Reading [R]	% Finer of Hydrometer Sample	L	K	Particle Diameter (mm)	Percent Passing	
1	50	22.2	43.51	84.9	7.9	0.01332	0.037	84.86	
2	45	22.2	38.51	75.1	8.8	0.01332	0.028	75.11	
4	40.5	22.2	34.01	66.4	9.4	0.01332	0.020	66.33	
8	36	22.2	29.51	57.6	10.2	0.01332	0.015	57.56	
15	30.5	22.2	24.01	46.9	11.1	0.01332	0.011	46.83	
30	27	22.1	20.48	40.0	11.7	0.01332	0.008	39.94	
60	22.5	22	15.94	31.1	12.4	0.01332	0.006	31.09	
90	20	22	13.44	26.2	12.9	0.01332	0.005	26.22	
120	19.5	22	12.94	25.3	12.9	0.01332	0.004	25.24	
240	16.5	22.4	10.08	19.7	13.3	0.01332	0.003	19.66	
360	15	22.4	8.58	16.7	13.7	0.01332	0.003	16.73	
000	· · · · · · · · · · · · · · · · · · ·								

		Sieve Anal	ysis of Portion	Finer Than	No. 10 Sieve		
Sieve Number	Opening (mm)	Tare	Dry + Tare	Weight Retained	Cumulative Retained	% Retained	% Passing
20	0.850	1.354	1.410	0.06	0.51	0.1	99.8
40	0.425	1.336	1.389	0.05	0.83	0.1	99.7
60	0.250	1.350	1.522	0.17	1.88	0.3	99.4
100	0.150	1.363	1.697	0.33	3.93	0.7	98.7
140	0.105	1.346	1.760	0.41	6.47	0.8	97.9
200	0.075	1.339	2.380	1.04	12.85	2.0	95.9
230	0.063	1.363	2.314	0.95	18.68	1.9	94.1
			Sum	3.02	230 Minus	48.20	

7/15/13 A3F0500 FINAL 07 14 13 0614 Brian NRC Port of St.Helens Sediment Sampling with Grain Size 75 of 77

Apex Laboratories, LLC Particle Size Analysis of Soil by ASTM D 422 Modified

Grain Size	Analysis Summary from Sieving and Hydrometer Testing		Particle Size (mm)	Percent Finer	Total Percent of Sample
Gravel				1	0.04
	Retained on No. 4 sieve		4.75	99.96	0.04
Sand					4.05
	Coarse sand, passing No. 4 sieve and retained on No. 10 sieve		2.00	99.95	0.01
	Coarse sand, passing No.10 sieve and retained on No. 20 sieve	1	0.8500	99.84	0.11
	Medium sand, passing No.20 sieve and retained on No. 40 sieve		0.4250	99.74	0.1
	Medlum sand, passing No.40 sieve and retained on No. 60 sieve		0.2500	99.4	0.34
	Medium sand, passing No. 60 sieve and retained on No.100 sieve		0.1500	98.75	0.65
	Fine sand, passing No. 100 sieve and retained on No.140 sieve		0.1060	97.94	0.81
	Fine sand passing No. 140 sieve and retained on No. 200 sieve		0.0750	95.91	2.03
Silt and CI	ay (Measurements in the Clay fraction are noted)				95.91
	Silt passing No. 200 sieve and retained on No. 230 sieve		0.0630	94.05	1.86
	Hydrometer Test		0.0374	84.86	9.19
	Hydrometer Test		0.0279	75.11	9.75
	Hydrometer Test		0.0204	66.33	8.78
	Hydrometer Test	_	0.0150	57.56	8.78
	Hydrometer Test		0.0115	46.83	10.73
	Hydrometer Test		0,0083	39.94	6.89
	Hydrometer Test		0.0061	31.09	8.84
	Hydrometer Test		0.0050	26.22	4.88
	Hydrometer Test	Clay	0.0044	25.24	0.98
	Hydrometer Test	Clay	0.0031	19.66	5.58
	Hydrometer Test	Clay	0.0026	16.73	2.93
	Hydrometer Test	Clav	0.0013	10.62	6,12

Grain Size Summary	Percent of Total Sample
Gravel	0.0
Sand	4.0
Coarse sand	0,1
Medium sand	1.1
Fine sand	2.8
Silt	69.7
Clay	26.2

Case Narrative for Sample ID: SB-C-21 Comp. DMMU3 (A3F0500-06)

No difficulty dispersing the fraction passing the No. 10 sieve.

Dispersion device used: Commercial drink mixer operating at least 10,000 rpm for one minute.

The assumed specific gravity used in the calculations was 2.65.

+4 fraction consists entirely of anthropogenic material (metal).

+4 and +10 fractions consist entirely of organic and anthropogenic material (plant material, metal).

+20 fraction consists entirely of organic and anthropogenic material (plant, metal).

Hydrometer reading at 1 minute is estimated due to the presence of foam.







June 28, 2013

Darwin Thomas Apex Laboratories 12232 SW Garden Place Tigard, OR 97223

Client Project: A3F0500 ARI Job No.: WV44

Dear Mr. Thomas:

Please find enclosed the original Chain of Custody records (COCs), sample receipt documentation, and the final data for the samples from the project referenced above.

Sample receipt information and analytical details are addressed in the Case Narrative.

An electronic copy of this report and all supporting raw data will be kept on file at ARI. Should you have any questions or concerns, please feel free to call me at your convenience.

Respectfully,

ANALYTICAL RESOURCES, INC.

Cheronne Oreiro Project Manager (206) 695-6214 <u>cheronneo@arilabs.com</u> <u>www.arilabs.com</u>

cc: eFile: WV44

Enclosures

Page 1 of

SUBCONTRACT ORDER

Apex Laboratories

A3F0500

WV44

SENDING LABORATORY:

Apex Laboratories 12232 S.W. Garden Place Tigard, OR 97223 Phone: (503) 718-2323 Fax: (503) 718-0333 Project Manager: Darwin Thomas

RECEIVING LABORATORY:

Analytical Resources, INC 4611 S. 134th Place Tukwila, WA 98168 Phone :(206) 695-6200 Fax: (206) 695-6201

Sample Name: SB-M-1 Comp. DMMU1		Sedimen Sampled:	IDs/times vary 06/19/13 11:09 (A3F0500-01)
Analysis	Due	Expires	Comments
Ammonia (Plumb 1981)	07/02/13 17:00	06/26/13 11:09	sub to ARI; RL 0.1 mg/kg
Sulfide, Total by PSEP (376.2) (SUB)	07/02/13 17:00	07/03/13 11:09	if need subsmpl 2oz jar ZHE: ARI; RL of 1.0 mg/kg
Containers Supplied:			
(A)2 oz Glass Jar			
(G)4 oz Glass Jar			
<u> </u>			IDs/times vary
Sample Name: SB-M-21 Comp DMMU1		Sedimen Sampled:	06/19/13 11:09 (A3F0500-02)
Analysis	Due	Expires	Comments
Ammonia (Plumb 1981)	07/02/13 17:00	06/26/13 11:09	sub to ARI; RL 0.1 mg/kg
Sulfide, Total by PSEP (376.2) (SUB)	07/02/13 17:00	07/03/13 11:09	if need subsmpl 2oz jar ZHE: ARI; RL of 1.0 mg/kg
Containers Supplied:			
(A)2 oz Glass Jar			
(G)4 oz Glass Jar	a <u></u>		•

		IDs/times vary					
Sample Name: SB-M-2 Comp DMMU2		Sedimen Sample	ed: 06/19/13 12:25 (A3F0500-03)				
Analysis	Due	Expires	Comments				
Ammonia (Plumb 1981)	07/02/13 17:00	06/26/13 12:25	sub to ARI; RL 0.1 mg/kg				
Sulfide, Total by PSEP (376.2) (SUB)	P (376.2) (SUB) 07/02/13 17:00 07/03/13 12:25		if need subsmpl 2oz jar ZHE: ARI; RL of 1.0 mg/kg				
Containers Supplied:							
(A)2 oz Glass Jar							

(G)4 oz Glass Jar

Angh	10/24/13	1430 [UPS (Shipper)	
Released By	Date	Received By	Dat	e
UPS (Shipper)			- 4/25/13	1030
Released By	Date	Received By	Dat	e

SUBCONTRACT ORDER

Apex Laboratories

A3F0500

Sample Name: SB-M-22 Comp DMMU2		Sedimen Sampled:	IDs/times vary 06/19/13 12:25 (A3F0500-04)
Analysis	Due	Expires	Comments
Ammonia (Plumb 1981)	07/02/13 17:00	06/26/13 12:25	sub to ARI; RL 0.1 mg/kg
Sulfide, Total by PSEP (376.2) (SUB)	07/02/13 17:00	07/03/13 12:25	if need subsmpl 2oz jar ZHE: ARI; RL of 1.0 mg/kg
Containers Supplied: (A)2 oz Glass Jar			
(G)4 oz Glass Jar			
Sample Name: SB-C-1 Comp DMMU3		Sedimen Sampled:	IDs/times vary 06/19/13 16:10 (A3F0500-05)
Analysis	Due	Expires	Comments
Ammonia (Plumb 1981)	07/02/13 17:00	06/26/13 16:10	sub to ARI; RL 0.1 mg/kg
Sulfide, Total by PSEP (376.2) (SUB)	07/02/13 17:00	07/03/13 16:10	if need subsmpl 20z jar ZHE: ARI; RL of 1.0 mg/kg
Containers Supplied:			
(A)2 oz Glass Jar			
(G)4 oz Glass Jar			IDs/times vary
Sample Name: SB-C-21 Comp DMMU3		Sedimen Sampled:	06/19/13 16:10 (A3F0500-06
Analysis	Due	Expires	Comments
Ammonia (Plumb 1981)	07/02/13 17:00	06/26/13 16:10	sub to ARI; RL 0.1 mg/kg
Sulfide, Total by PSEP (376.2) (SUB)	07/02/13 17:00	07/03/13 16:10	if need subsmpl 2oz jar ZHE: ARI; RL of 1.0 mg/kg
Containers Supplied:			
(A)2 oz Glass Jar			·
(U)4 oz Glass Jar			

Kulph	- 6/24/13	1430 UPS	5 (Shipper)	
Released By	Date	Received By	Date	
UPS (Shipp	per)		4/25/13 103C	>
Released By	Date	Received By	Date	
				D 2 -62

Analytical Resources, Incorporated	
Analytical Chemists and Consultants	

Cooler Receipt Form

ARI Client APEX	Project Name: <u>A3 F0500</u>	с С	
COC No(s)	Delivered by Fed-ExUPS Courier Ha	and Delivered Oth ϵ	er
Assigned ARI Job No:	Tracking No. 12X4720R13	90061258	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 c	hemistry)		
If cooler temperature is out of compliance fill out form 00070F	Tem	p Gun ID#	17952
Cooler Accepted by:	Date 0/25/13Time	1030	
Complete custody form	ns and attach all shipping documents		_
Log-In Phase:			
Was a temperature blank included in the cooler? What kind of packing material was used?	Wet De Gel Packs Baggies Foam Block	Paper Other:	Ø
Was sufficient ice used (if appropriate)?		NA (ES	NO
Were all bottles sealed in individual plastic bags?		YES	N
Did all bottles arrive in good condition (unbroken)?		Ē	NO
Were all bottle labels complete and legible?	······································	E	NO
Did the number of containers listed on COC match with the nu	umber of containers received?	E	NO
Did all bottle labels and tags agree with custody papers?	· ··· · · · · · · · · · · · · · · · ·	Ē	NO
Were all bottles used correct for the requested analyses?		Ē	NO
Do any of the analyses (bottles) require preservation? (attach	preservation sheet, excluding VOCs)	YES	NO

	** Notify Proje	ct Manager of disci	epancies or conc	ems **			
Samples Logged by:	AV	Date 0	13	_ Time:	1053	3	
Was Sample Split by ARI M	YES Date/	Time	Equipment:			Split by:	
Date VOC Trip Blank was made at A	RI			.,	NA		
Was sufficient amount of sample sen	t in each bottle?		· · · · · · · · · · · · · · ·			(E)s	NO
Were all VOC vials free of air bubbles	s?	···· · ··· <i>··</i> ··· ·			(NA)	YEŞ	NO

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
Additional Notes, Discrepanc	ies, & Resolutions:		
<u>By:</u> D	ate:		
Small Air Bubbles Peabut	bles LARGE Air Bubbles	Small → "sm"	
All and a second s	> 4 m/a	Peabubbles → "pb"	
•		Large \rightarrow "lg"	
Instruction account of the		Headspace → "hs"	·····





Case Narrative

Client: Apex Laboratories Project: A3F0500 ARI Job No.: WV44

Sample Receipt

Analytical Resources, Inc. (ARI) accepted six soil samples on June 25, 2013 under ARI job WV44. The cooler temperature measured by IR thermometer following ARI SOP was 4.1° C. For further details regarding sample receipt, please refer to the Cooler Receipt Form.

Ammonia by EPA 350.1M and Sulfide by EPA 376.2

All samples were preserved with zinc acetate upon receipt.

Sample ID Cross Reference Report



ARI Job No: WV44 Client: Apex Laboratories Project Event: A3F0500 Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	SB-M-1 COMP. DMMU1	WV44A	13-13548	Sediment	06/19/13 11:09	06/25/13 10:30
2.	SB-M-21 COMP DMMU1	WV44B	13-13549	Sediment	06/19/13 11:09	06/25/13 10:30
з.	SB-M-2 COMP DMMU2	WV44C	13-13550	Sediment	06/19/13 12:25	06/25/13 10:30
4.	SB-M-22 COMP DMMU2	WV44D	13-13551	Sediment	06/19/13 12:25	06/25/13 10:30
5.	SB-C-1 COMP DMMU3	WV44E	13-13552	Sediment	06/19/13 16:10	06/25/13 10:30
6.	SB-C-21 COMP DMMU3	WV44F	13-13553	Sediment	06/19/13 16:10	06/25/13 10:30

- --- -



Matrix: Sediment Data Release Authorized W Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Client ID: SB-M-21 COMP DMMU1 ARI ID: 13-13549 WV44B

Analyte	Date	Method	Units	RL	Sample
Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	59.45
Preserved Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	59.00
N-Ammonia	06/25/13 062513#1	EPA 350.1M	mg-N/kg	3.06	106
Sulfide	06/25/13 062513#1	EPA 376.2	mg/kg	1.69	31.4

- - ---

RL Analytical reporting limit
U Undetected at reported detection limit

-





Matrix: Sediment Data Release Authorized Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Client ID: SB-M-2 COMP DMMU2 ARI ID: 13-13550 WV44C

Analyte	Date	Method	Units	RL	Sample
Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	69.52
Preserved Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	68.21
N-Ammonia	06/25/13 062513#1	EPA 350.1M	mg-N/kg	0.65	29.3
Sulfide	06/25/13 062513#1	EPA 376.2	mg/kg	1.45	3.76

RL Analytical reporting limit

U Undetected at reported detection limit



Matrix: Sediment Data Release Authorized: Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Client ID: SB-M-22 COMP DMMU2 ARI ID: 13-13551 WV44D

Analyte	Date	Method	Units	RL	Sample
Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	47.16
Preserved Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	49.60
N-Ammonia	06/25/13 062513#1	EPA 350.1M	mg-N/kg	3.90	213
Sulfide	06/25/13 062513#1	EPA 376.2	mg/kg	3.90	59.7

RL Analytical reporting limit
U Undetected at reported detection limit



Matrix: Sediment Data Release Authorized: MG Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Client ID: SB-C-1 COMP DMMU3 ARI ID: 13-13552 WV44E

Analyte	Date	Method	Units	RL	Sample
Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	43.87
Preserved Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	49.57
N-Ammonia	06/25/13 062513#1	EPA 350.1M	mg-N/kg	4.34	228
Sulfide	06/25/13 062513#1	EPA 376.2	mg/kg	9.81	73.4

RL Analytical reporting limit
U Undetected at reported detection limit



Matrix: Sediment Data Release Authorized W Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Client ID: SB-C-21 COMP DMMU3 ARI ID: 13-13553 WV44F

Analyte	Date	Method	Units	RL	Sample
Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	49.10
Preserved Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	45.97
N-Ammonia	06/25/13 062513#1	EPA 350.1M	mg-N/kg	3.93	261
Sulfide	06/25/13 062513#1	EPA 376.2	mg/kg	4.33	63.6

RL Analytical reporting limit
U Undetected at reported detection limit



Matrix: S	Sediment	Δ
Data Rele	ease Authorized:	K
Reported	: 06/27/13	0

Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Analyte	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: WV44A	Client ID: SB-M-1 COM	P. DMMU1				
N-Ammonia	06/25/13	mg-N/kg	204	374	199	85.5%
Sulfide	06/25/13	mg/kg	83.5	347	305	86.4%

- -----



Matrix: Sediment Data Release Authorized WR Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Analyte		Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: WV44A	Client ID	: SB-M-1 COMP.	DMMU1			
Total Solids		06/25/13	Percent	46.90	46.97	0.1%
Preserved Total	Solids	06/25/13	Percent	44.99	44.91	0.2%
N-Ammonia		06/25/13	mg-N/kg	204	206 211	1.7%
Sulfide		06/25/13	mg/kg	83.5	74.9	10.9%



Matrix: Sediment Data Release Authorized: Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: NA Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Sulfide EPA 376.2	PREP	06/25/13	mg/kg	147	141	104.4%

- -- -



Matrix: Sediment Data Release Authorized NK Reported: 06/27/13 Project: NA Event: A3F0500 Date Sampled: NA Date Received: NA

Analyte	Date	Units	Blank	QC ID	
Total Solids	06/25/13	Percent	< 0.01 U	ICB	
Preserved Total Solids	06/25/13	Percent	< 0.01 U	ICB	
N-Ammonia	06/25/13	mg-N/kg	< 0.10 U	PREP	
Sulfide	06/25/13	mg/kg	< 1.00 U	PREP	



Matrix: Sediment Data Release Authorized A Reported: 06/27/13

_ . _ _ .

Project: NA Event: A3F0500 Date Sampled: NA Date Received: NA

Analyte/SRM ID	Date	Units	SRM	True Value	Recovery
N-Ammonia ERA #040912	06/25/13	mg-N/kg	103	100	103.0%

Matrix: Sediment Data Release Authorized: Reported: 06/27/13





Project: NA Event: A3F0500 Date Sampled: 06/19/13 Date Received: 06/25/13

Client ID: SB-M-1 COMP. DMMU1 ARI ID: 13-13548 WV44A

Analyte	Date	Method	Units	RL	Sample
Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	46.90
Preserved Total Solids	06/25/13 062513#1	SM2540B	Percent	0.01	44.99
N-Ammonia	06/25/13 062513#1	EPA 350.1M	mg-N/kg	3.96	204
Sulfide	06/25/13 062513#1	EPA 376.2	mg/kg	4.36	83.5

RLAnalytical reporting limit Undetected at reported detection limit U

Appendix C

Core Logs

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239

INSERT FIELD DATA LOGS

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239 **Appendix D**

Chain of Custody

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239
Apex Labs

12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax

Sunday, July 14, 2013

Brian Perleberg Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632

RE: Port of St.Helens Sediment Sampling / POSH61134A

Enclosed are the results of analyses for work order <u>A3F0500</u>, which was received by the laboratory on 6/21/2013 at 11:39:00AM.

Thank you for using Apex Labs. We appreciate your business and strive to provide the highest quality services to the environmental industry.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: <u>dthomas@apex-labs.com</u>, or by phone at 503-718-2323.

Apex Laboratories

Apex Labs

12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax

Northern Resource Consulting, Inc. 1339 Commerce Ave. Suite 309B Longview, WA 98632 Project: Port of St.Helens Sediment Sampling

Project Number: POSH61134A Project Manager: Brian Perleberg

Reported: 07/14/13 06:14

ANALYTICAL REPORT FOR SAMPLES

SAMPLE INFORMATION				
Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SB-M-1 Comp. DMMU1	A3F0500-01	Sediment	06/19/13 11:09	06/21/13 11:39
SB-M-Z1 Comp DMMU1	A3F0500-02	Sediment	06/19/13 11:09	06/21/13 11:39
SB-M-2 Comp DMMU2	A3F0500-03	Sediment	06/19/13 12:25	06/21/13 11:39
SB-M-Z2 Comp DMMU2	A3F0500-04	Sediment	06/19/13 12:25	06/21/13 11:39
SB-C-1 Comp DMMU3	A3F0500-05	Sediment	06/19/13 16:10	06/21/13 11:39
SB-C-Z1 Comp DMMU3	A3F0500-06	Sediment	06/19/13 16:10	06/21/13 11:39

Apex Laboratories



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax

Northern Resource Consulting, Inc. Project: Port of St.Helens Sediment Sampling 1339 Commerce Ave. Suite 309B Project Number: POSH61134A Reported: Longview, WA 98632 Project Manager: Brian Perleberg 07/14/13 06:14 SILL LUNDINW × × × × × × 1414 A3F0500 000 1.4.2 WI'DSE EHN Project PDSH61134A × Perleberg Concern. × × × × \star 59141 5 1491 × × × ¥ × × part 5/2:105 1"401 × × × × × × ž Ĵ, 7,400 61.17 × × × to laperleberg @ Nrcenvinet × × × ζ. 1308 × × X × х × sn nf 2215 MIDUG × × χ × × × RECEIVED BY 11.518 2000 × × × × × × Printed Nem draft report Signature 1310-COF2 eP St. Helens 360,414,4021 × × × × × × 흋 Â (8) बच्चमह **a**.101 (8) alcools ASDR Servel Ξŝ. SPECIAL INSTRUCTIONS O.L.I. 009 CHAIN OF CUSTODY 8085 LCB² $\times \times$ XX $\times \times$ roject Name: 360.444.5239 format Please SHA9 5612 6718 Q 30AS 0428 XX × × × × 8360 BLEX 8360 BBDW AOC* R. 20928 DOA 1988 × × × × × x - OW - 19-HJLAN 嬔 365 丞 婱 答惑 Pertche 97632 [2232 S.W. Garden Place, Tigard, OR 97223 Phi: 503-718-2323 Fax: 503-718-0333 AWTPH-Da × x × х x × Trine Name KOVIN TTO CON OLDH-HALANN (n) ş Erien 3 Day SIGNIVINOD 40 # μ W w 5 γ М m 94 m m Gengy view. XINTERX ON3 Spine (No Project Mgr. MPLES ARE HELD FOR 30 DAY 5 DAY 12125 12:25 50:11 91:10 4:10 2 Day 11:09 awit 0 06/19 26/19 06/19 205 96/190 06/19 91/90 61/90 61/90 60/100 6/19 Couselling 3LVQ Suile 4 DAY 1 Day # CI 8V1 DAMMU Dalumid Z Carp DMA Comps DMAM Lamp DMMU Commerce Ave. AMD BWA Z (19) Archive Arshive RESLING Anchive Anchive WA 33 TAT Requested (circle) Comp motor BP, DN B Comp (TAT) APEX LABS SAMPLE ID -2A (8) - 22 Northern N-22 41 -58-M-1 58-M-21 NZ-5 1339 έ m-2 ٤ Ś **CELINOMISIUSI** 5.8- M Other ? ł S B lomol 1 3 S8 S8 ŝ 3 29 ā

Apex Laboratories



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax



Apex Laboratories



12232 S.W. Garden Place Tigard, OR 97223 503-718-2323 Phone 503-718-0333 Fax



Apex Laboratories

Analytical Chemists and Consultants	Cooler Receipt For	m
ARI ClientAPex	Project Name: A3 F0.500	
COC No(s) NA	Delivered by Fed-Ex UP Courier Hand Delivered	Other
Assigned ARI Job No: WN444	Tracking No. 17. X4720R139086125	8
Preliminary Examination Phase:		
Were intact, properly signed and dated custody seals attached to the o	utside of to cooler? YES	NO
Were custody papers included with the cooler?	(YES)	NO
	(VEG	NO
Temperature of Cooler(s) (°C) (recommended 2.0-6.0.°C for chemistry)		NŬ
If eacher temperature is out of compliance fill out form 000705	Tamp Cup ID# 9	1022020
A /		2017/20
Cooler Accepted by:Dat	e <u>42515</u> Time. <u>030</u>	<u>(</u>
Complete custody forms and a	tach all shipping documents	
Log-in Phase:		
Was a temperature blank included in the cooler?		in worth
Was a temperature blank included in the cooler?	De Gel Packs Baggies Foam Block Paper Other:	i son
Was a temperature blank included in the cooler? What kind of packing material was used? Was sufficient ice used (if appropriate)?	De Gel Packs Baggies Foam Block Paper Other:	De portu
Was a temperature blank included in the cooler?	De Gel Packs Baggies Foam Block Paper Other: NA	
Was a temperature blank included in the cooler? What kind of packing material was used? Was sufficient ice used (if appropriate)? Were all bottles sealed in individual plastic bags? Did all bottles arrive in good condition (unbroken)?	De Gel Packs Baggies Foam Block Paper Other: NA	NO NO NO
Was a temperature blank included in the cooler?	De Gel Packs Baggies Foam Block Paper Other: NA	
Was a temperature blank included in the cooler? What kind of packing material was used? Was sufficient ice used (if appropriate)? Were all bottles sealed in individual plastic bags? Did all bottles arrive in good condition (unbroken)? Were all bottle labels complete and legible? Did the number of containers listed on COC match with the number of	De Gel Packs Baggies Foam Block Paper Other: NA	
Was a temperature blank included in the cooler?	De Gel Packs Baggies Foam Block Paper Other: NA	
Was a temperature blank included in the cooler?	De Gel Packs Baggies Foam Block Paper Other: NA	
Was a temperature blank included in the cooler? What kind of packing material was used? Was sufficient ice used (if appropriate)? Were all bottles sealed in individual plastic bags? Did all bottles arrive in good condition (unbroken)? Were all bottle labels complete and legible? Did the number of containers listed on COC match with the number of Did all bottle labels and tags agree with custody papers? Were all bottles used correct for the requested analyses? Do any of the analyses (bottles) require preservation? (attach preservation?	The Gel Packs Baggies Foam Block Paper Other:	
Was a temperature blank included in the cooler?	tion sheet, excluding VOCs)	
Was a temperature blank included in the cooler?	The Gel Packs Baggies Foam Block Paper Other: NA YE containers received? tion sheet, excluding VOCs) 	
Was a temperature blank included in the cooler?	tion sheet, excluding VOCs)	
Was a temperature blank included in the cooler?	tion sheet, excluding VOCs)	

eanipie in en	Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
ditional Notes, I	Discrepancies, & F	Resolutions:		
y:	Date:			
y: Small Air Bubbles	Date:	LARGE Air Bubbles	Small → "sm"	
y: Small Air Bubbles 2mm	Date: Peatrubbles' 2-4 mm	LARGE Air Subbles	Small → "sm"	
y: Şmalf Air Bubbles 2mm	Date: Peatrubbiss' 2-4 mm	LARGE Air Bubbles > 4 mm	Small→"sm" Peabubbles→ "pb"	
y: Şanəlf Air Bubbles —2man •	Date: Peaipubbles' 2-4 mm	LARGE Air Bubbles > 4 mm	Small \rightarrow "sm" Peabubbles \rightarrow "pb" Large \rightarrow "lg"	

Revision 014





Case Narrative

Client: Apex Laboratories Project: A3F0500 ARI Job No.: WV44

Sample Receipt

Analytical Resources, Inc. (ARI) accepted six soil samples on June 25, 2013 under ARI job WV44. The cooler temperature measured by IR thermometer following ARI SOP was 4.1° C. For further details regarding sample receipt, please refer to the Cooler Receipt Form.

Ammonia by EPA 350.1M and Sulfide by EPA 376.2

All samples were preserved with zinc acetate upon receipt.

Sample ID Cross Reference Report



ARI Job No: WV44 Client: Apex Laboratories Project Event: A3F0500 Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	SB-M-1 COMP. DMMU1	WV44A	13-13548	Sediment	06/19/13 11:09	06/25/13 10:30
2.	SB-M-21 COMP DMMU1	WV44B	13-13549	Sediment	06/19/13 11:09	06/25/13 10:30
3.	SB-M-2 COMP DMMU2	WV44C	13-13550	Sediment	06/19/13 12:25	06/25/13 10:30
4.	SB-M-22 COMP DMMU2	WV44D	13-13551	Sediment	06/19/13 12:25	06/25/13 10:30
5.	SB-C-1 COMP DMMU3	WV44E	13-13552	Sediment	06/19/13 16:10	06/25/13 10:30
6.	SB-C-21 COMP DMMU3	WV44F	13-13553	Sediment	06/19/13 16:10	06/25/13 10:30

WV44:00006

Appendix E

Data Validation Report

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239

INSERT DATA VALIDATION REPORT

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239 Appendix F

Annotated Photos

Northern Resource Consulting, Inc. Environmental Services 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone (360) 414-5239

Scappoose Bay Core Sampling Annotated Photos



Photograph 1. NRC team member David Niehenke guiding the core into the sediment at sample location SB-M-1



Photograph 2. NRC team member David Niehenke working in adverse weather conditions guiding the core into the sediment along the D dock at sample point SB-M-3.

Client: Port of St. Helens Project: Marina Dredging Date: 06/21/2013 Location: Scappoose Bay and Access Channel	Northern Resource Consulting, Inc. 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone: (360) 414-5239 Fax: (360) 414-4021
--	--

Scappoose Bay Core Sampling Annotated Photos



Photograph 3. NRC team members David Niehenke and Bill Boyle working to cap the bottom of the sample and remove excess material from the outside of the core.



Photograph 4. Core sample taken on Wednesday June 19th were stored in the water to maintain the sediment temperature.

Client: Port of St. Helens	Northern Resource Consulting, Inc.
Project: Marina Dredging	1339 Commerce Avenue, Suite 309B
Location: Scappoose Bay and Access Channel	Phone: (360) 414-5239 Fax: (360) 414-4021

Sample SB-M-1A



Sample SB-M-1A (Z Sample)



Client: Port of St. Helens Project: Marina Dredging Date: 06/21/2013 Location: Scappoose Bay and Access Channel



Sample SB-M-2A and Z Sample

Sample SB-M-3A and Z Sample



Client: Port of St. Helens Project: Marina Dredging Date: 06/21/2013 Location: Scappoose Bay and Access Channel



Sample SB-M-4A and Z Sample

Sample SB-C-1A and Z Sample



Client: Port of St. Helens Project: Marina Dredging Date: 06/21/2013 Location: Scappoose Bay and Access Channel



Sample SB-C-3B and Z Sample



Client: Port of St. Helens Project: Marina Dredging Date: 06/21/2013 Location: Scappoose Bay and Access Channel Northern Resource Consulting, Inc. 1339 Commerce Avenue, Suite 309B Longview, Washington 98632 Phone: (360) 414-5239 Fax: (360) 414-4021

SB-C-3A had an insufficient amount of material for a Z Sample once processing began. Notes from collection stated that the core length was 5 feet 3 inches, while processing the length was only 3 feet.

DMMU No. 3 DMMU No. 3 MU No. 3 Sample Point No. SB-C-4A Sample Point No. SB-C-4A DMMU No. 3 ample Point No. SB-C-4A MMM No. 3 Sample Point No. SB-C-Z (4A) Collection Time: 11:00 AM, 06/20/13 Collection Time: 11:00 AM, 06/20/13 ample Rom+ No. 58-C-Z(4A) 11ection Time: 11:00 AM, 06/20/13 Collection Time: 11:00 AM, 6/201 Process Time: 5:35 PM, 06/20/13 Collection Time: 11:00 AM, 6/20/13 Process Time: 5:35 PM, 06/20/13 ALESS TIME : 5:35 PM, 06/20/13 Process Time: 5:35 PM, 6/20/ 55 Time: 5:35 PM, 6/20/13 Z-loger Z-lagor 2 Feat 2 Feet SAME PLACE and the second 1.1.5

Sample SB-C-4A and Z Sample

Composite samples for DMMU 3 dredge material and "z" layer (New Surface Material), made up of samples SB-C-1A, SB-C-2A, SB-C-3B, and SB-C-4A in decontaminated Stainless Steel trays.





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