

January 24, 2014



Excellence. Innovation. Service. Value.

Since 1954.

Submitted To:
Ms. Sharon Gelinis
Department of the Army
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-21880-007

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION.....	1
1.1 Scope of Services	1
1.2 Limitations	1
2.0 SITE AND PROJECT DESCRIPTION	2
3.0 SUBSURFACE EXPLORATIONS	2
3.1 Subsurface Exploration Summary.....	2
3.2 Substantial Product – Definition	3
3.3 Sediment Investigation Work Plan.....	4
3.4 Field Preparation	4
3.5 Overwater Activities	5
3.5.1 Vibracore Method	5
3.5.2 Air Monitoring.....	5
3.6 Onshore Activities.....	6
3.6.1 Core Logging	6
3.6.2 Photograph Documentation	6
3.6.3 Air Monitoring.....	6
3.7 Evaluation of Substantial Product.....	6
4.0 INVESTIGATION-DERIVED WASTE	7
4.1 Containers.....	7
4.2 Waste Characterization	8
4.2.1 Sampling Methodology.....	8
4.2.2 Analytical Testing.....	8
4.2.3 Sample Handling.....	9
4.3 Disposal.....	9
5.0 REFERENCES	11

TABLES

- 1 Sediment Core Summary
- 2 Summary of Substantial Product Relationship to Dredge Prism

FIGURES

- 1 Vicinity Map
- 2 Site and Exploration Plan

TABLE OF CONTENTS (cont.)

APPENDICES

- A Exploration Logs and Sample Photographs
- B Air Monitoring Data
- C Analytical Data and Investigation-derived Waste Disposal Documents
- D 1981 Maintenance Dredging Plan
- E Draft Sediment Investigation Report Comments and Responses
- F Important Information About Your Geotechnical/Environmental Report

DATA

Data CD of Report, Photographs, and gINT database file (to be included in final version of report)

**SEDIMENT INVESTIGATION REPORT
U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON**

1.0 INTRODUCTION

This report presents the results of our field exploration program for the U.S. Government Moorings project in Portland, Oregon. The subsurface information presented in this report includes our field observations together with subsequent review of the sediment cores. We understand that the U.S. Army Corps of Engineers (the Corps) plans to use data provided in this report to support planning for the removal of the existing overwater dock and design a new replacement dock.

1.1 Scope of Services

Our services were conducted under Contract W912DW-13-D-1011, Task Order No. 0001 which was authorized on September 11, 2013. Work elements of the Statement of Work and our scope of engineering services included the following tasks:

- Preparing an investigation work plan.
- Coordinating overwater activities including, collection of eight cores using vibracoring methods.
- Coordinating onshore activities including sediment core logging and photographing.
- Performing analytical testing for disposal of investigation-derived waste (IDW).
- Disposing of non-hazardous IDW.
- Preparing this report to present our findings.

1.2 Limitations

This report was prepared for the exclusive use of the Corps under a scope of services prepared by the Corps. This report presents the data from field explorations and field testing of subsurface conditions at the specific locations and depths indicated, using the means and methods described in this report. No other representation is made. It should be made available for information on factual data only and not as a warranty of subsurface conditions.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by merely taking soil samples from a limited number of borings. Depending on the scope of site

improvements, the design approach and means and methods of construction, collection of additional environmental data may be necessary.

Comments received to our Draft Sediment Investigation Report and our responses are included in Appendix E.

Shannon & Wilson, Inc. (Shannon & Wilson) has prepared Appendix F, “Important Information About Your Geotechnical/Environmental Report,” to assist you and others in understanding the use and limitations of this report.

The scope of our services included limited environmental screening of soil samples retrieved from the explorations completed for this project to support disposal of IDW. The intent was not to complete environmental assessments or evaluations regarding the presence or absence of hazardous or toxic materials in the soil, sediment, surface water, or air in the project area.

Natural processes or human activity may alter subsurface conditions. Because an environmental report is based on conditions that existed at the time of subsurface explorations, decisions, including those relating to construction, should not be based on a report whose adequacy may have been affected by time unless verified.

2.0 SITE AND PROJECT DESCRIPTION

The U.S. Government Moorings project site is located on the west bank of the Willamette River within the industrial harbor of Portland, Oregon, as shown in the Vicinity Map (Figure 1). The facility is owned and operated by the Corps Portland District. The site is bounded on the northeast by the Willamette River, on the northwest by Advanced American Construction, on the southwest by BNSF Railway Company and St. Helens Road, and on the southeast by the NW Natural property (formerly Gasco). The Gasco facility was a producer of manufactured gas products.

3.0 SUBSURFACE EXPLORATIONS

3.1 Subsurface Exploration Summary

The field subsurface exploration program consisted of collecting eight sediment cores to evaluate whether substantial product is present in site sediment. The approximate locations are shown on the Site and Exploration Plan (Figure 2). A summary of the cores including total depth advanced and recovered, elevation, and location is included in Table 1, Sediment Core Summary. The sediment cores were advanced on October 29 and 30, 2013, by Marine Sampling Systems, Inc.,

of Burley, Washington, under subcontract to Shannon & Wilson. The cores were advanced and sampled using the vibracore method in which pre-cleaned aluminum tube were driven into the sediment using a combination of vibration and the weight of the tube. A Geologist from Shannon & Wilson observed and logged the drilling operations and provided operational oversight. A Corps representative was periodically onsite during the field exploration program.

Core logging activities were completed on site between October 30 and November 1, 2013. A Geologist from Shannon & Wilson cut open the cores and logged the soil. Observing personnel included Corps-Seattle District, Corps-Portland District, CDM Smith (CDM) (on behalf of the U.S. Environmental Protection Agency [EPA]), and Anchor QEA (on behalf of NW Naturals, the adjacent property owner).

Boring logs and sample photographs are included in Appendix A. The following sections present discussions of the subsurface exploration program, including field preparation, the vibracore method, sample review and classification methods, soil sampling and analytical testing, and IDW disposal.

3.2 Substantial Product – Definition

Based on data from previous investigations, there is a potential for “substantial product” to be present in sediments in the vicinity of the dock. The primary purpose of sampling is to visually evaluate whether substantial product was present within each of the cores. The working definition of “substantial product” (EPA, 2009) is:

- Criterion 1: Bands of product, layers of product, “saturated” sediments, “stained” sediments, and/or seams of product that are greater than 2 inches thick.
- Criterion 2: Any layer or seam of product, regardless of thickness, that is clearly defined as liquid dense non-aqueous phase liquid (DNAPL) that is also mobile (i.e., “oozes” or “drips” out of the core during core observations).

Modifying factors are:

- If the top 5 feet of a core has no substantial product under Criterion 1, then deeper product should be judged as “not substantial,” even if relatively thick layers of product exist at greater depths.
- If there are any seams of mobile liquid DNAPL (not solid or semisolid tar) in accordance with Criterion 2, then this is substantial product regardless of depth and the characteristics of overlying sediments.

The following are not defined as “substantial product”:

- Any layers of non-mobile product (i.e., bands, layers, saturated sediments, stained sediments) that are less than 2 inches thick.
- Petroleum odors that are not associated with visual evidence of product beyond sheens and blebs.
- Sheens that are not associated with more substantial visuals of product.
- Isolated product blebs or spots not associated more substantial visuals of product.

An additional criterion (Criterion 3) will consider whether the 5 feet of overlying relatively clean material includes any sediment that would be expected to be removed as part of Corps maintenance dredging in the navigation channel. If so, the 5-foot depth requirement should be judged from the depth to which maintenance dredging would occur.

3.3 Sediment Investigation Work Plan

Prior to beginning fieldwork, Shannon & Wilson prepared a Sediment Investigation Work Plan for Shannon & Wilson personnel working at the site (2013). The work plan included descriptions of the overwater activities and onshore activities to be performed, the Statement of Work prepared by the Corps, a Site Specific Health and Safety Plan (SSHSP) developed by Shannon & Wilson, and an Accident Prevention Plan (APP). The overwater activities included locating the sampling points and collecting sediment cores. The onshore activities included core extracting, logging and evaluation, collecting photo documentation, and air monitoring.

The Shannon & Wilson SSHSP presented project organization and responsibilities, personal protective equipment, standard operating procedures, emergency response and accident prevention, training, and record keeping. The SSHSP also included a list of emergency contacts and hospital maps. The APP included an Activity Hazard Analyses, which provided an analysis of potential job hazards. The SSHSP and APP complied with EM-385-1-1 and Occupational Safety and Health Administration Regulations in 29 Code of Federal Regulations 1910. The Sediment Investigation Work Plan was required reading for all Shannon & Wilson personnel prior to being on the project site.

3.4 Field Preparation

The Corps provided exploration location targets. Prior to coring, a Shannon & Wilson representative called the 1-800 utility locate call service to have utilities marked in the field. In addition, we coordinated with on-site personnel to facilitate site access.

The sampling was performed by Marine Sampling Systems on the sampling vessel “M/V Nancy Anne,” using their owned and proprietary vibracore method. Prior to the start of coring, the coring vessel was maneuvered in to place using differential global positioning system. At each location, the corresponding water depths were recorded.

3.5 Overwater Activities

3.5.1 Vibracore Method

On October 29, 2013, low water levels were observed at several of the proposed coring locations, which would not allow for collection of originally proposed 20-foot cores. With the approval of Ms. Sharon Gelinias (Corps-Seattle District), 14-foot core tubes were used where 20-foot cores could not be accommodated. In addition, the initially proposed location of SD-105 could not be completed because it was located in riprap. The exploration was replaced with SD-109; Ms. Gelinias provided new coordinates.

Sediment coring was performed using the vibracore method. Using a guide/base assembly situated on the river bottom, beneath the vessel, 14- or 20-foot aluminum core tubes were lowered into the mudline and hydraulically vibrated to the desired depth through the sediments. The elevation of the mud line was determined by measuring the water depth at each boring location and correcting for the Columbia River Datum using the water level gauge on site. Upon completion of the core, each core was cut into 4-foot sections, sealed with foil, capped, and labeled with the exploration location and sampling interval. The cores were moved onshore at the dock and stored upright until they were cut open during logging activities.

SD-101, SD-102, SD-103, SD-106, and SD-109 were completed on October 29, 2013. SD-104, SD-107, and SD-108 were completed on October 30, 2013.

3.5.2 Air Monitoring

Air monitoring, including perimeter air and breathing zone monitoring, was conducted during core collection activities using a photoionization detector (PID) and hydrogen cyanide monitor. No air monitoring criteria were exceeded. Copies of field measurements are provided in Appendix B.

3.6 Onshore Activities

3.6.1 Core Logging

Upon completion of the overwater activities, the cores were taken to the garage located on the U.S. Government Moorings property for logging. Between October 30 and November 1, 2013, each length of core was longitudinally cut and split. A Shannon & Wilson representative logged the sediment cores following the classification procedures outlined in ASTM International (ASTM) D 2488, Standard Recommended Practice for Description of Soils (Visual-Manual Procedure) (ASTM, 2013). Observations of staining, odor, and/or product were noted in each log. Personnel from Corps-Seattle District, Corps-Portland District, CDM (on behalf of the EPA), and Anchor QEA (on behalf of NW Naturals, the adjacent property owner) were present during logging activities.

Table 1 summarizes the core location information, along with the total depths advanced and recovered. Percent recoveries ranged from about 63 to 99 percent. Sample recoveries varied due to core loss or sample compression from water loss.

3.6.2 Photograph Documentation

The Shannon & Wilson representative took photographs during core logging activities. Photographs are presented in Appendix A.

3.6.3 Air Monitoring

Air monitoring, including worker exposure monitoring and ambient air monitoring, was conducted during sediment core logging activities. Monitoring was conducted using a PID and 4-gas meter by EHS International, Bellevue, Washington, under subcontract to Shannon & Wilson. No air monitoring criteria were exceeded. The results of the monitoring are provided in Appendix B.

3.7 Evaluation of Substantial Product

After core logging, sediment core locations were compared to the dredge prism shown in the facility's maintenance dredging plan (Sheet WR-4-51, USACE, 1981; provided in Appendix D). Elevation of the dredged exposed face is -17 feet in the vicinity of SD-101, SD-102, SD-103, SD-107, and SD-109. The elevation of the dredged exposed face appears to be -30 feet in the vicinity of SD-108. Comparing the core depths to the dredge prism:

- Two cores extended 5 feet below the future dredge depth (SD-108 and SD-109).
- Two cores were advanced outside the dredge prism (SD-104 and SD-106).
- Four cores did not extend 5 feet below the future dredge depth (SD-101, SD-102, SD-103, and SD-107).

As noted in Section 3.5.1, low water levels were observed at several of the locations, which precluded collection of 20-foot-long cores.

For each exploration, Table 2 summarizes:

- Mudline elevation
- Dredged exposed face elevation
- Bottom of exposed face (as measured on recovered core)
- Depth of core attempted
- Depth of recovered core
- Depth of core below dredge prism
- An opinion whether Substantial Product is present
- Comments

One indication of “substantial product” was observed in SD-109.

4.0 INVESTIGATION-DERIVED WASTE

4.1 Containers

IDW generated during the coring process consisted of vibracore spoils, decontamination water, miscellaneous supplies, and personal protective equipment (PPE). IDW was collected in five U.S. Department of Transportation-approved drums and labeled with date, site location, core number, depth or depth interval, and contents (“core spoils,” “development/purge water,” etc.) clearly marked on each drum. The contents of each drum included:

- Sediment from SD-101, SD-102, SD-103, SD-106, and SD-109 (approximately 80 percent full)
- Sediment from SD-104, SD-107, and SD-108 (approximately 50 percent full)
- Decontamination water (approximately 67 percent full)
- PPE, plastic sheeting, and sampling supplies (contained in two drums)

4.2 Waste Characterization

To support disposal of IDW, two composite environmental samples were collected from the sediment cores for disposal characterization. Sample 10-29-CORES represented the material placed into one of the drums (containing sediment from SD-101, SD-102, SD-103, SD-106, and SD-109). Sample 10-30-CORES represented the material placed into another drum (containing sediment from SD-104, SD-107, and SD-108).

4.2.1 Sampling Methodology

After core logging, the exposed surface of the sediment core was lightly scraped off and a stainless steel spoon was used to collect soil from a “trough” along the entire length of recovered core. Subsamples were collected from each 4-foot-section of core and immediately placed into a disposable, aluminum pan and a separate Ziploc baggie; each subsample was approximately the same volume. The pan was covered with foil in between sample collection. The Ziploc baggie was immediately sealed after squeezing the air/headspace out of the bag. Both the pan and baggie were kept on ice until either collection of additional subsamples or until composition and placement in sample glassware.

After core logging was completed for the day, subsamples in the aluminum pan were composited using a stainless steel spoon and then placed into sampling jars. Samples for VOC analyses were collected from the Ziploc baggie after gently mixing the material while the bag was sealed. Sample was collected from the baggie using a disposable syringe and placed into glassware containing preservative.

4.2.2 Analytical Testing

Samples were submitted to OnSite Environmental, Inc. in Redmond, Washington, and tested by the following methods:

- Northwest Total Petroleum Hydrocarbon-Diesel Extended Method
- Volatile organic compounds by EPA Method 8260C
- Semivolatile organic compounds, including chlorinated phenols, by EPA Method 8270D/SIM

- Metals (Resource Conservation and Recovery Act [RCRA] 8) by EPA Method 6010C/7471B
- Organochlorine pesticides by EPA Method 8081B
- Polychlorinated biphenyls by EPA Method 8082A
- Cyanide by Method SW846 9012

Since sampling was for IDW disposal purposes only, no quality assurance/quality control sampling was completed, no laboratory reporting limits were established, and no data validation was completed. The analytical laboratory report is included in Appendix C.1. Data are summarized in Tables C.1-1 through C.1-6, which also include hazardous waste characterization trigger and Oregon clean fill criteria.

4.2.3 Sample Handling

The composite samples were collected using disposable sampling equipment. New latex or nitrile gloves were worn by the sample handler during collection of each sample. Samples were placed into laboratory-provided glassware. Samples were collected and containerized sequentially with the most volatile target analyte collected first: (a) volatile organics and petroleum, (b) semivolatile organics, and (c) metals. The sample container labels were completed using indelible ink. The samples were sealed in plastic bags, and then placed into a cooler and maintained at 4 degrees Celsius ($^{\circ}\text{C}$) ($\pm 2^{\circ}\text{C}$) with ice or “blue ice.” Sample information was recorded on chain-of-custody forms which accompanied the samples until delivery to the analytical laboratory.

4.3 Disposal

Analytical results indicate that IDW generated during the investigation is non-hazardous material. Shannon & Wilson has initiated the profiling, pickup, and transportation of the IDW

with WasteExpress Environmental (WasteXpress) out of Portland, Oregon. Disposal documentation provided by WasteXpress is provided in Appendix C.2.

SHANNON & WILSON, INC.

Agnes C. Tirao
Associate

Scott W. Gaulke, P.E.
Vice President

DJR:ACT:SWG/djr

with WasteExpress Environmental (WasteXpress) out of Portland, Oregon. Disposal documentation provided by WasteXpress is provided in Appendix C.2.

SHANNON & WILSON, INC.



Agnes C. Tirao
Associate



Scott W. Gaulke, P.E.
Vice President

DJR:ACT:SWG/djr

5.0 REFERENCES

ASTM International (ASTM), 2013, Annual book of standards, construction, v. 4.08, soil and rock (I): D 420 – D 5876: West Conshohocken, Penn., ASTM International, 1 v.

Shannon & Wilson, Inc., 2013, Sediment investigation work plan, geotechnical and sediment investigation, U.S. Government Moorings, Portland, Oregon: Plan prepared by Shannon & Wilson, Inc., Seattle, Wash., for U.S. Army Corps of Engineers, Seattle District, Seattle, Wash., USACE contract W912DW-13-D-1011, October 11.

U.S. Environmental Protection Agency (EPA), 2009, Administrative Settlement Agreement and Order on Consent for Removal Action between NW Natural/Siltronic Corporation and U.S. EPA, CERCLA Docket No. 10-2009-0255, Appendix A, Statement of Work.

**TABLE 1
SEDIMENT CORE SUMMARY**

Boring	Date Completed	Core Attempted (feet)	Core Recovered (feet)	Recovery (%)	Mudline Elevation (feet)	Northing	Easting
SD-101	10/29/2013	14.0	12.0	85.7	-5.9	706113	7623030
SD-102	10/29/2013	14.0	12.6	90.0	-4.1	706156	7623070
SD-103	10/29/2013	14.0	13.5	96.4	-5.7	706221	7623010
SD-104	10/30/2013	19.0	12.0	63.2	-30.7	706222	7623170
SD-105 ⁽¹⁾	--	--	--	--	--	--	--
SD-106	10/29/2013	14.0	13.5	96.4	-1.6	706123	7623150
SD-107	10/30/2013	13.0	10.5	80.8	-8.0	706105	7622948
SD-108	10/30/2013	18.5	14.3	77.3	-20.8	706395	7622890
SD-109 ⁽²⁾	10/29/2013	14.0	13.9	99.3	-8.6	706140	7622990

Notes:

Explorations were completed using vibarcoring drilling methods.

Vertical datum for mudline elevation is Columbia River Datum as measured at Moorings Gauge.

Horizontal datum for coordinates is State Plane Oregon North (3601) North American Datum 1983 (US Feet).

⁽¹⁾ Location not completed.

⁽²⁾ Location completed in place of SD-105.

TABLE 2
SUMMARY OF SUBSTANTIAL PRODUCT RELATIONSHIP TO DREDGE PRISM

Boring	Mudline Elevation (Feet)	Dredged Exposed Face Elevation (Feet) ¹	Bottom of Exposed Face As Measured on Core (Feet) ²	Depth of Core Attempted (Feet)	Depth of Recovered Core (Feet) ³	Depth of Core Below Dredge Prism (Feet) ⁴	Is Substantial Product Present After Dredging?	Comments ⁵
SD-101	-5.9	-17	11.1	14.0	12.0	0.9	Unknown	Five feet not observed.
SD-102	-4.1	-17	12.9	14.0	12.6	--	Unknown	Dredge prism was not sampled.
SD-103	-5.7	-17	11.3	14.0	13.5	2.2	Unknown	Five feet not observed.
SD-104	-30.7	--	--	19.0	12.0	--	No	Outside dredge prism.
SD-105	--	--	--	--	--	--	--	Not sampled.
SD-106	-1.6	--	--	14.0	13.5	--	No	Outside dredge prism.
SD-107	-8.0	-17	9.0	13.0	10.5	1.5	Unknown	Five feet not observed.
SD-108	-20.8	-30	9.2	18.5	14.3	5.1	No	--
SD-109	-8.6	-17	8.4	14.0	13.9	5.5	Yes	Substantial product observed at approximately 8.9 feet below mudline.

Notes:

Elevations in Columbia River Datum as measured at Moorings gauge.

No correction for percent recovery. Measured directly off tape observed on coring photographs.

Dredged exposed face includes typical 2 feet of overdredging.

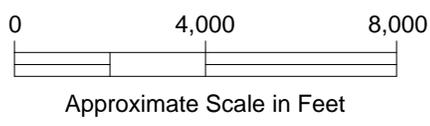
¹ Elevation from U.S. Government Moorings, Maintenance Dredging Plan, 1981 (USACE, Sheet WR-4-51).

² This value is "Mudline Elevation" minus "Dredge Exposed Face Elevation."

³ See Appendix A for exploration logs and core photographs.

⁴ This value is "Depth of Recovered Core" minus "Bottom of Exposed Face as Measured on Core" and should be greater than 5.

⁵ See Section 3.2 for definition of Substantial Product. In general, the visual evaluation is completed within the top five feet of sediment, below (dredged) mudline.



NOTE

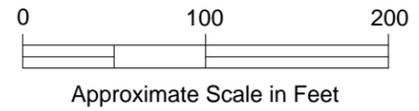
Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth™ Mapping Service.

Sediment Investigation Report U.S. Government Mooring Portland, Oregon	
VICINITY MAP	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. 1

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Site Plan.dwg Date: 01-09-2014 Login: lr



LEGEND
SD-101  Boring Designation and Approximate Location



NOTE
 Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth™ Mapping Service.

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
SITE AND EXPLORATION PLAN	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. 2

APPENDIX A
EXPLORATION LOGS AND SAMPLE PHOTOGRAPHS

APPENDIX A
EXPLORATION LOGS AND SAMPLE PHOTOGRAPHS

TABLE OF CONTENTS

SUB-APPENDICES

- A.1 Exploration Logs
- A.2 Sample Photographs

SUB-APPENDIX A.1
EXPLORATION LOGS

SUB-APPENDIX A.1

BORING LOGS

TABLE OF CONTENTS

FIGURES

A.1-1 Soil Description and Log Key (3 sheets)
A.1-2 Log of Boring SD-101 (3 sheets)
A.1-3 Log of Boring SD-102 (3 sheets)
A.1-4 Log of Boring SD-103 (3 sheets)
A.1-5 Log of Boring SD-104 (4 sheets)
A.1-6 Log of Boring SD-106 (3 sheets)
A.1-7 Log of Boring SD-107 (3 sheets)
A.1-8 Log of Boring SD-108 (4 sheets)
A.1-9 Log of Boring SD-109 (3 sheets)

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT ²	FINE-GRAINED SOILS (50% or more fines) ¹	COARSE-GRAINED SOILS (less than 50% fines) ¹
Major	Silt, Lean Clay, Elastic Silt, ³ or Fat Clay	Sand or Gravel ⁴
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: Sandy or Gravelly ⁴	More than 12% fine-grained: Silty or Clayey ³
Minor Follows major constituent	15% to 30% coarse-grained: with Sand or with Gravel ⁴ 30% or more total coarse-grained and lesser coarse-grained constituent is 15% or more: with Sand or with Gravel ⁵	5% to 12% fine-grained: with Silt or with Clay ³ 15% or more of a second coarse-grained constituent: with Sand or with Gravel ⁵

¹All percentages are by weight of total specimen passing a 3-inch sieve.
²The order of terms is: *Modifying Major with Minor*.
³Determined based on behavior.
⁴Determined based on which constituent comprises a larger percentage.
⁵Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm
	NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.
	NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND Fine Medium Coarse	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.) #40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.) #10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL Fine Coarse	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.) 3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS

	Bentonite Cement Grout		Surface Cement Seal
	Bentonite Grout		Asphalt or Cap
	Bentonite Chips		Slough
	Silica Sand		Inclinometer or Non-perforated Casing
	Perforated or Screened Casing		Vibrating Wire Piezometer

PERCENTAGES TERMS^{1,2}

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

¹Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

²Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

SOIL DESCRIPTION AND LOG KEY

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-1
Sheet 1 of 3

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
 (Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL	TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS <i>(more than 50% retained on No. 200 sieve)</i>	Gravels <i>(more than 50% of coarse fraction retained on No. 4 sieve)</i>	Gravel <i>(less than 5% fines)</i>	GW 	Well-Graded Gravel; Well-Graded Gravel with Sand
			GP 	Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel <i>(more than 12% fines)</i>	GM 	Silty Gravel; Silty Gravel with Sand
			GC 	Clayey Gravel; Clayey Gravel with Sand
	Sands <i>(50% or more of coarse fraction passes the No. 4 sieve)</i>	Sand <i>(less than 5% fines)</i>	SW 	Well-Graded Sand; Well-Graded Sand with Gravel
			SP 	Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand <i>(more than 12% fines)</i>	SM 	Silty Sand; Silty Sand with Gravel
			SC 	Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS <i>(50% or more passes the No. 200 sieve)</i>	Silt and Clays <i>(liquid limit less than 50)</i>	Inorganic	ML 	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL 	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL 	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silt and Clays <i>(liquid limit 50 or more)</i>	Inorganic	MH 	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH 	Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH 	Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor	PT 	Peat or other highly organic soils (see ASTM D4427)	

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

- Dual symbols (*symbols separated by a hyphen, i.e., SP-SM, Sand with Silt*) are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).
- Borderline symbols (*symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand*) indicate that the soil properties are close to the defining boundary between two groups.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

**SOIL DESCRIPTION
 AND LOG KEY**

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-1
 Sheet 2 of 3

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS¹

Weak	Crumbles or breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

PLASTICITY²

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASTICITY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS¹

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q _u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS¹

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

SOIL DESCRIPTION AND LOG KEY

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-1
Sheet 3 of 3

¹Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

²Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Total Depth: 14 ft. Northing: ~ 706,113 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -5.9 ft. Easting: ~ 7,623,030 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
Dark brown, <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; few to little organics including fine fibrous wood debris and rootlets; slight hydrogen sulfide odor.					0				
					1				
					2				
Dark brown, <i>Organic Silt (OH)</i> ; wet; less than 5 percent fine sand; few organics; no substantial odor. - Gradational contact at 2.5 feet	2.5				3				
					4				
- 1/4-inch-thick layer of fine, fibrous, woody debris at 4.2 feet									

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-101

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-2
 Sheet 1 of 3

MASTER LOG E 21-1-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,113 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -5.9 ft. Easting: ~ 7,623,030 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
Dark gray, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; few to little fine fibrous wood and organics; slight hydrogen sulfide odor.	6.7									
Dark brown, <i>Organic Silt (OH)</i> ; wet; less than 5 percent fine sand; few organics; no substantial odor. - 1-inch layer at 7.7 feet of wood chips and angular fragment of cemented gravel or "plunkard" with a slight hydrogen sulfide odor and no sheen.	7.3									
Black, dark gray and dark brown, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; little organics including wood fragments; slight hydrogen sulfide and wood preservative odor. - Black layer from 8.3 to 8.4 feet - Dark gray layer from 8.4 to 8.5 feet - Black layer from 8.5 to 8.8 feet - 3-inch wood fragment at 8.7 feet - Dark brown layer from 8.8 to 9.0 feet - Black color from 9.0 to 9.4 feet	8.3									
	9.4									
Dark brown, <i>Organic Silt (OH)</i> ; wet; less than 5 percent fine sand; few fine organics; slight	9.7									
CONTINUED NEXT SHEET										

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14
 Log: PVH Rev: AJC Typ: CLP

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
LOG OF SEDIMENT CORE SD-101	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.1-2 Sheet 2 of 3

Total Depth: 14 ft. Northing: ~ 706,113 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -5.9 ft. Easting: ~ 7,623,030 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
hydrogen sulfide odor. - 1/16-inch lamination of fine sand at 9.5 feet	10.7				11				
Dark gray, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; little to some fine organics; slight hydrogen sulfide odor.									
Dark gray, <i>Organic Silt with Sand (OH)</i> ; wet; fine to medium, subangular to subrounded sand; mostly fibrous, wood debris; moderate hydrogen sulfide and wood preservative odor. - Gap in the core between 11.0 to 11.6 feet	12.0				12				
Core Loss from 12 to 14 feet.									
BOTTOM OF SEDIMENT CORE COMPLETED 10/29/2013	14.0				14				

LEGEND
 * Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-101

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-2
 Sheet 3 of 3

MASTER LOG E 21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,156 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -4.1 ft. Easting: ~ 7,623,070 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION		Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.						
Dark brown, <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; few organics, fine rootlets and wood chips; slight hydrogen sulfide odor.		1.8				1
- 1/8-inch black seam at 0.9 feet						
Dark brown, <i>Organic Silt (OL)</i> ; wet; less than 5 percent fine sand; few organics, fine rootlets and wood chips; faint hydrogen sulfide odor.		2.5				2
- 1/8-inch-thick black seam at 2 feet						
Dark brown, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; few fine organics; few 1/16- to 1/4-inch black laminations; faint hydrogen sulfide odor.		3.5				3
- 1/8-inch black lamination at 3.4 feet						
Very dark brown, <i>Organic Silt (OH)</i> ; wet; less than 5 percent fine sand; few fine organics.						4

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-102

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-3
 Sheet 1 of 3

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,156 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -4.1 ft. Easting: ~ 7,623,070 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
- 3/4-inch plastic fragment at 5.7 feet	6.2	[Hatched Pattern]			6	[Grid]			
Dark brown, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand, little organics.						[Grid]			
- 1/16- to 1/8-inch black lamination from 7.1 to 7.4 feet	9.4	[Hatched Pattern]			7	[Grid]			
- 1/16- to 1/8-inch black lamination from 7.8 to 8.2 feet						[Grid]			
- Black layer at 8.8 to 8.9 feet	9.4	[Hatched Pattern]			8	[Grid]			
- 1/8-inch black laminations from 9.2 to 9.4 feet						[Grid]			
- 1.5-inch wood fragment at 9.3 feet	9.4	[Hatched Pattern]			9	[Grid]			
Dark brown, <i>Organic Silt (ML)</i> ; wet; less than 5 percent fine sand; few 1/16- to 1/8-inch black						[Grid]			

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-102

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-3
 Sheet 2 of 3

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,156 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -4.1 ft. Easting: ~ 7,623,070 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
laminations; few organics. - 1/8-inch sand lamination at 9.4 feet										
Dark brown, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; little organics; hydrocarbon odor. - Sheen at 12.1 feet	11.5				11					
Core Loss from 12.6 to 14 feet.	12.6				12					
BOTTOM OF SEDIMENT CORE COMPLETED 10/29/2013	14.0				13					
					14					

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-102

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-3
 Sheet 3 of 3

MASTER LOG E 21-1-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,221 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -5.7 ft. Easting: ~ 7,623,010 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION		Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.						
Dark gray-brown, <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; few fine organics (rootlets, wood chips); faint hydrogen sulfide odor.		2.0				1
Dark gray-brown, <i>Organic Silt with Sand (OH)</i> ; wet; few fine sand; few to little fine organics (rootlets, wood chips); faint hydrogen sulfide odor.						2
						3
						4

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-103

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-4
 Sheet 1 of 3

MASTER LOG E 21-1-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,221 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -5.7 ft. Easting: ~ 7,623,010 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
- Transitions to very dark brown at 10.8 feet					11				
- Transitions to black at 11.3 feet									
Black, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand, trace sand pockets; faint hydrocarbon odor, no sheen.	11.6								
Dark gray-brown, <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; scattered black 1/8-inch laminations and pockets; few to little fine organics.	12.0				12				
- 1.5-inch black seam with slight hydrocarbon odor and no sheen at 13.1 feet									
- 1/16-inch fine to medium sand partings with wood fragments at 13.3 and 13.4 feet									
Core Loss from 13.5 to 14 feet.	13.5				13				
BOTTOM OF SEDIMENT CORE COMPLETED 10/29/2013	14.0				14				

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
LOG OF SEDIMENT CORE SD-103	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.1-4 Sheet 3 of 3

Total Depth: 19 ft. Northing: ~ 706,222 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-30.7 ft. Easting: ~ 7,623,170 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
Dark gray-brown, <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; few fine organics (rootlets, wood bits); hydrogen sulfide odor.					0					
Dark gray-brown <i>Organic Silt (OH)</i> ; wet; trace fine sand; few to little organics (rootlets, wood bits). - 1/4-inch black lamination with wood and slight hydrocarbon odor and broken sheen at 1.3 feet - 1/2-inch black interbed with no odor or sheen at 1.7 feet - 3/4-inch black interbed with hydrocarbon odor and broken sheen at 2.1 feet	1.3				1					
Dark gray, <i>Silty Sand (SM)</i> ; wet; intermixed with dark gray-brown <i>Organic Silt with Sand (OL)</i> ; wet; sand unit contains fine to medium sand; silt unit contains fine sand. CONTINUED NEXT SHEET	4.4				2					
					3					
					4					

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

LEGEND
 * Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
LOG OF SEDIMENT CORE SD-104	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.1-5 Sheet 1 of 4

Total Depth: 19 ft. Northing: ~ 706,222 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-30.7 ft. Easting: ~ 7,623,170 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
Dark gray, Poorly Graded Sand with Silt (SP-SM); wet; fine to medium, subangular to subrounded sand; no odor or sheen.	5.0								
- 1/8-inch silt lense at 7.1 feet									
- 1/8-inch silt lense at 7.6 feet									
					6				
					7				
					8				
					9				

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-104

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-5
 Sheet 2 of 4

MASTER LOG E 21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 19 ft. Northing: ~ 706,222 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-30.7 ft. Easting: ~ 7,623,170 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
					16				
BOTTOM OF SEDIMENT CORE COMPLETED 10/30/2013	19.0				19				

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

LOG OF SEDIMENT CORE SD-104

January 2014 21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-5
Sheet 4 of 4

MASTER LOG E 21-1-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,123 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -1.6 ft. Easting: ~ 7,623,150 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
Dark brown <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; nonplastic; few fine organics; hydrocarbon odor. - 3/4-inch black interbed with hydrocarbon odor and one angular 1-inch gravel at 0.4 foot					0	20	40	60	
					1				
					2				
- 1/16- to 1/8-inch black and brown laminations and 3/4- to 1-inch black interbed at 2.0 to 2.2 feet with hydrocarbon and sheen	2.2								
Dark brown, <i>Organic Silt (OH)</i> ; wet; trace fine sand; little fine organics. - 1/16- to 1/8-inch black laminations from 2.3 to 2.5 feet - Five 1/16-inch to 1/8-inch black laminations with spotty sheen from 2.8 to 3.2 feet					3				
					4				
- Four 1/8-inch black laminations from 3.7 to 3.9 feet	3.9								
Black and dark brown <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; few to some organics; hydrocarbon odor. - 1/16- to 1-inch black and dark brown laminations and interbeds with spotty sheen from 3.9 to 4.9 feet									

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

LOG OF SEDIMENT CORE SD-106

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-6
Sheet 1 of 3

MASTER LOG E_21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,123 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -1.6 ft. Easting: ~ 7,623,150 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
- Spotty sheen at 5 feet										
- 1/8-inch black lamination with spotty sheen at 5.4 feet										
- 1-3/4-inch black interbed with spotty sheen at 5.6 feet										
- Spotty sheen from 6.2 to 7.1 feet										
Black <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; few dark brown laminations; little fine organics.	6.5									
Dark brown <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; few to some organics.	6.9									
- 1/4-inch black lamination at 7.1 feet										
- 1-inch black layer interbed at 7.5 feet	7.6									
Dark brown <i>Peat (PT)</i> ; wet; few fine sand; some silt; mostly woody debris.	7.9									
Dark brown <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; few to some organics; hydrocarbon odor.										
- 1/8- to 1/4-inch black laminations with spotty sheen from 8.3 to 8.4 feet										
- Three 3/4- to 1-1/2-inch black and brown interbeds with spotty sheen from 8.9 to 9.2 feet										
- Four 1/8-inch-thick black laminations from 9.3 to 9.5 feet										
- 4-inch gap in core at 9.7 feet										

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

LOG OF SEDIMENT CORE SD-106

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-6
Sheet 2 of 3

MASTER LOG E_21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,123 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -1.6 ft. Easting: ~ 7,623,150 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
- 1-inch black interbed (mostly organics) at 9.7 feet	13.5	[Diagonal Hatching]			11	[Grid]			
- 1/4-inch black laminations at 10.3 feet						[Grid]			
- 1/4- to 1-inch-thick black interbeds with spotty sheen from 10.9 to 11.1 feet						[Grid]			
- 3/4-inch black interbed at 11.4 feet						[Grid]			
- 1/2-inch black, mostly organic interbed at 11.7 feet						[Grid]			
- 1/2-inch black interbed at 12.3 feet						[Grid]			
- 1/8-inch black laminations at 12.6 feet						[Grid]			
- 2-3/4-inch black interbed at 12.7 feet						[Grid]			
- 1/8-inch black lamination at 13.1 feet						[Grid]			
- 3/4-inch black interbed at 13.3 feet						[Grid]			
Core Loss from 13.5 to 14 feet.	13.5					[Grid]			
BOTTOM OF SEDIMENT CORE COMPLETED 10/29/2013	14.0				14	[Grid]			

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

LEGEND
 * Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
LOG OF SEDIMENT CORE SD-106	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.1-6 Sheet 3 of 3

Total Depth: 13 ft. Northing: ~ 706,095 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -8.0 ft. Easting: ~ 7,622,960 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
Dark brown, <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; few fine organics; hydrogen sulfide odor.	3.0				0	20	40	60		
1										
2										
Dark brown, <i>Organic Silt (OH)</i> ; wet; trace fine sand; trace pockets of silty, fine sand; few fine organics; hydrogen sulfide odor.					3					
					4					

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-107

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-7
 Sheet 1 of 3

MASTER LOG E 21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 13 ft. Northing: ~ 706,095 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -8.0 ft. Easting: ~ 7,622,960 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
- 1/4-inch black fine sand lamination inclined at approximately 10 degrees with no sheen at 4.8 feet - 1-inch black fine sand interbed at 5.4 feet - 1 1/2-inch angular gravel at 5.7 feet - Gray-brown organic silt with sand interbed from 6.1 to 6.3 feet					0	20	40	60	
Dark brown <i>Peat (PT)</i> ; wet; few fine to medium sand; little silt; mostly wood fragments; strong hydrogen sulfide odor, broken sheen.	6.4				6				
Dark brown and black, <i>Organic Silt (OH)</i> ; wet; trace fine sand; little to some fine organics; black interbeds and laminations; hydrogen sulfide odor, slight hydrocarbon odor below 7.7 feet.	7.4				7				
- 1/8-inch black lamination at 7.6 feet - 1-1/2-inch black interbed with no sheen at 7.7 feet	8.4				8				
Dark gray-brown <i>Organic Silt with Sand (OH)</i> ; wet; fine sand; finely laminated (1/16- to 1/8-inch) to interbedded (up to 1 inch) with black staining; little fine organics and wood debris; hydrocarbon odor. - Broken sheen and 1-1/2-inch rounded gravel at 8.6 feet - Sheen surfacing on core from 8.9 to 9.5 feet. - 1.4- to 3-inch pockets of fine to medium sand with broken sheen from 9 to 9.4 feet - 4-inch treated wood fragment at 9.2 feet.					9				

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-107

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-7
 Sheet 2 of 3

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 13 ft. Northing: ~ 706,095 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -8.0 ft. Easting: ~ 7,622,960 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
- 1/6- to 1/4-inch-thick black laminations and interbeds from 9.4 to 10.2 feet	10.2				0	20	40	60	
- Broken sheen at 9.9 feet									
Dark brown Peat (PT): wet; little fine sand; little to some silt; mostly woody material; hydrogen sulfide and hydrocarbon odor, slight sheen.	10.5				11				
Core Loss from 10.5 to 13 feet.					12				
					13				
BOTTOM OF SEDIMENT CORE COMPLETED 10/30/2013	13.0				14				

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-107

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-7
 Sheet 3 of 3

MASTER LOG E 21-1-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 18.5 ft. Northing: ~ 706,395 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-20.8 ft. Easting: ~ 7,622,890 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
Dark gray-brown <i>Organic Silt with Sand (OL)</i> ; wet; few fine sand; few organics; hydrogen sulfide odor.										
Dark gray-brown <i>Organic Silt (OH)</i> ; wet; trace fine sand; abundant laminations and interbeds inclined at approximately 20 degrees below 2.6 feet; hydrogen sulfide odor.	1.0				1					
- 1/2-inch black interbed with broken sheen and hydrocarbon odor at 2.6 feet					2					
- 1/8-inch black seam with broken sheen and hydrocarbon odor at 3.2 feet					3					
- 1/4-inch black, fine to medium sand lamination with broken sheen and hydrocarbon odor at 3.3 feet					4					
- 1/2-inch black interbed with no odor or sheen at 3.5 feet										
- 1-1/4-inch interbed of silty, fine sand with no sheen or odor at 3.8 feet										
- Five 1/8-inch black laminations between 4.2 and 4.4 feet										
- 1/2-inch black interbed with hydrogen sulfide odor and no sheen at 4.75 feet										

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-108

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-8
 Sheet 1 of 4

MASTER LOG E 21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 18.5 ft. Northing: ~ 706,395 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-20.8 ft. Easting: ~ 7,622,890 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
- 1/2-inch silty, fine sand interbed at 5.2 feet										
- 1/2-inch black interbed at 5.8 feet										
- 3/4-inch black interbed with broken sheen and hydrocarbon odor at 6.1 feet										
- 1/2-inch silty, fine sand interbed at 6.7 feet										
- 1-1/4-inch black interbed with broken sheen and hydrocarbon odor at 7.3 feet										
- Numerous 1/16- to 1/8-inch black laminations between 7.4 to 7.6 feet										
Dark gray <i>Silty Sand (SM)</i> ; wet; fine to medium, subrounded to subangular sand; intermixed with pockets of organic silt.	8.2									
Dark gray <i>Poorly Graded Sand with Silt (SP-SM)</i> ; wet; fine to medium sand.	9.2									

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

LOG OF SEDIMENT CORE SD-108

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-8
Sheet 2 of 4

MASTER LOG E 21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 18.5 ft. Northing: ~ 706,395 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-20.8 ft. Easting: ~ 7,622,890 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60				
						0 20 40 60				
					11					
					12					
Gray-brown <i>Silt (ML)</i> ; wet; trace fine sand; low plasticity fines; few 1/16-inch organic laminations from 12.2 to 12.5 feet.	12.2									
Dark gray <i>Poorly Graded Sand with Silt (SP-SM)</i> ; wet; fine to medium sand.	12.7									
Dark brown <i>Peat (PT)</i> ; wet; some fine sand; mostly fine woody material; no sheen.	13.2									
Dark gray <i>Poorly Graded Sand with Silt (SP-SM)</i> ; wet; fine to medium sand. - 1/4-inch woody lamination at 13.5 feet - Pockets of silt from 13.6 to 14 feet	13.4									
Core Loss from 14.3 to 18.5 feet.	14.3				14					

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

LOG OF SEDIMENT CORE SD-108

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-8
Sheet 3 of 4

MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 18.5 ft. Northing: ~ 706,395 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~-20.8 ft. Easting: ~ 7,622,890 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						[Grid area for soil description data]			
BOTTOM OF SEDIMENT CORE COMPLETED 10/30/2013	18.5				16	[Grid area]			
					17	[Grid area]			
					18	[Grid area]			
					19	[Grid area]			

LEGEND
 * Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-108

January 2014 21-1-21880-007

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.1-8 Sheet 4 of 4
---	-----------------------------------

MASTER LOG E 21-1-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,140 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -8.6 ft. Easting: ~ 7,622,990 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
Dark gray-brown <i>Organic Silt with Sand (OL)</i> ; wet; fine sand; few fine organics; faint hydrogen sulfide odor.	2.0				1				
Dark gray-brown, <i>Organic Silt (OH)</i> ; wet; trace fine sand; few fine organics; hydrogen sulfide odor.						2			
- 1/8-inch black, fine to medium sand lamination inclined at approximately 10 degrees at 3.7 feet					3				
						4			
CONTINUED NEXT SHEET							0 20 40 60		

LEGEND
 * Sample Not Recovered

◇ % Fines (<0.075mm)
 ● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-109

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.1-9
 Sheet 1 of 3

MASTER LOG E 21-1-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,140 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -8.6 ft. Easting: ~ 7,622,990 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____

SOIL DESCRIPTION <i>Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.</i>	Depth, ft.	Symbol	Samples	Ground Water	Depth, ft.	0 20 40 60			
						0 20 40 60			
- 1/8-inch black, fine to medium sand lamination inclined at approximately 10 degrees at 7.5 feet	8.7				6	[Grid area]			
Dark gray-brown and black <i>Organic Silt (OH)</i> ; wet; trace fine sand; little fine organics; abundant black laminations and interbeds inclined at approximately 10 degrees; hydrocarbon odor. - 1-inch black interbed at 8.7 feet - 2-inch black interbed with broken sheen at 8.9 feet (qualifies as "substantial product")						7	[Grid area]		
					8		[Grid area]		
					9	[Grid area]			

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

LOG OF SEDIMENT CORE SD-109

January 2014

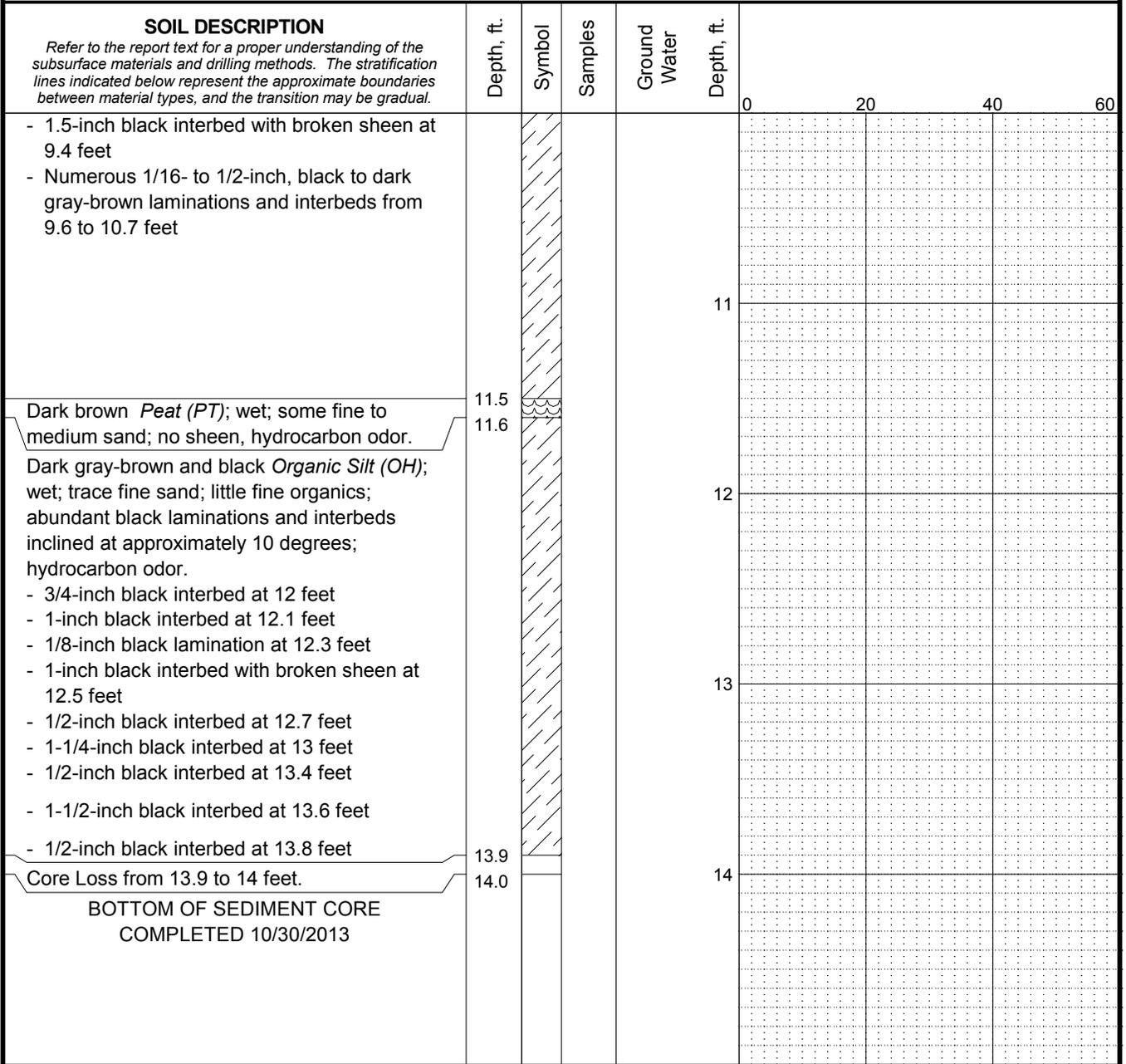
21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.1-9
Sheet 2 of 3

MASTER LOG E 21-21880-004.GPJ SHAN_WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

Total Depth: 14 ft. Northing: ~ 706,140 ft. Drilling Method: Direct Push Hole Diam.: 4 in.
 Top Elevation: ~ -8.6 ft. Easting: ~ 7,622,990 ft. Drilling Company: Marine Sampling Service Rod Diam.: _____
 Vert. Datum: CRD Station: ~ Drill Rig Equipment: Catamaran with A-frame Hammer Type: _____
 Horiz. Datum: 3601 NAD 83 Offset: ~ Other Comments: _____



MASTER LOG E 21-21880-004.GPJ SHAN WIL.GDT 1/10/14 Log: PVH Rev: AJC Typ: CLP

LEGEND

* Sample Not Recovered

◇ % Fines (<0.075mm)
● % Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. USCS designation is based on visual-manual classification and selected lab testing.
4. The hole location was measured from existing site features and should be considered approximate.

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

LOG OF SEDIMENT CORE SD-109

January 2014 21-1-21880-007

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.1-9 Sheet 3 of 3
---	-----------------------------------

SUB-APPENDIX A.2
SAMPLE PHOTOGRAPHS

SUB-APPENDIX A.2
SAMPLE PHOTOGRAPHS

TABLE OF CONTENTS

PHOTOGRAPHS

A.2-1	Boring SD-101 Photos (2 sheets)
A.2-2	Boring SD-102 Photos (3 sheets)
A.2-3	Boring SD-103 Photos (4 sheets)
A.2-4	Boring SD-104 Photos (4 sheets)
A.2-5	Boring SD-106 Photos (4 sheets)
A.2-6	Boring SD-107 Photos (4 sheets)
A.2-7	Boring SD-108 Photos (5 sheets)
A.2-8	Boring SD-109 Photos (5 sheets)



SD-101 (0 to 2.5 ft.)



SD-101 (2.5 to 4.5 ft.)



SD-101 (4.5 to 6.8 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-101 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-1
Sheet 1 of 2



SD-101 (6.8 to 9.0 ft.)



SD-101 (9.0 to 11.0 ft.)



SD-101 (11.0 to 12.0 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-101 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-1
Sheet 2 of 2



SD-102 (0 to 2.5 ft.)



SD-102 (2.5 to 4.0 ft.)



SD-102 (4.0 to 6.0 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-102 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-2
Sheet 1 of 3



SD-102 (6.0 to 8.0 ft.)



SD-102 (8.0 to 10.0 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-102 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-2
Sheet 2 of 3



SD-102 (10.0 to 12.0 ft.)



SD-102 (11.0 to 12.6 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-102 PHOTOS

January 2014

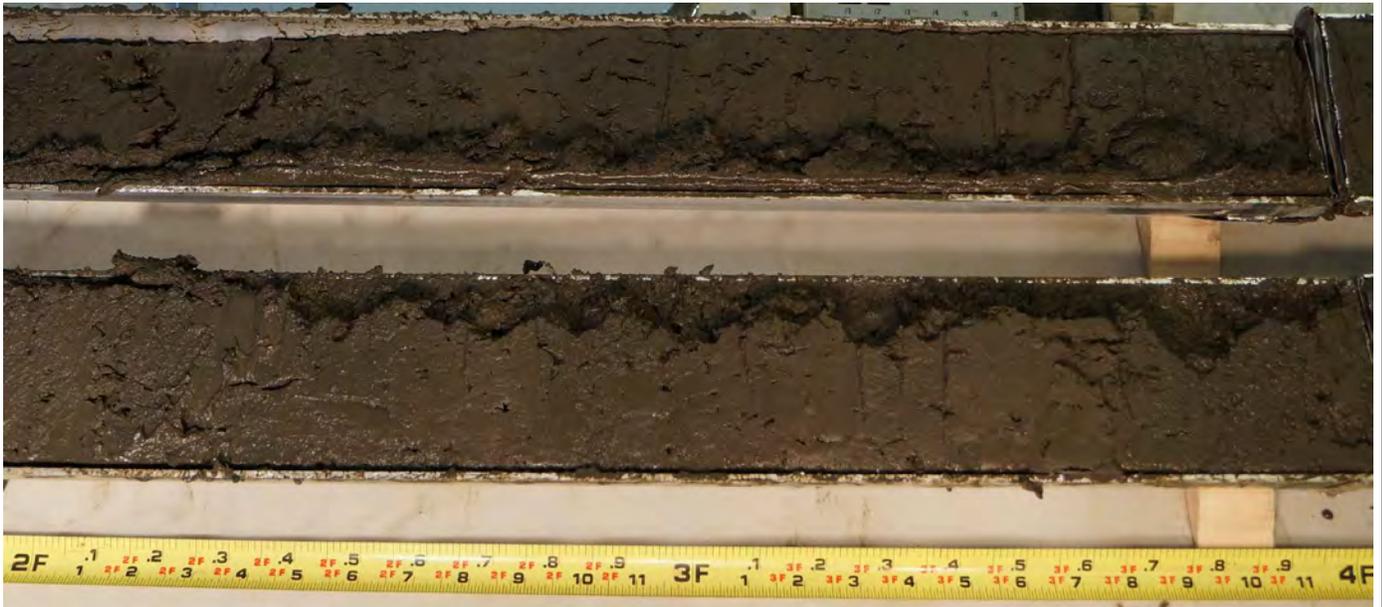
21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-2
Sheet 3 of 3



SD-103 (0 to 2.0 ft.)



SD-103 (2.0 to 4.0 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos 101-104.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

BORING SD-103 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-3
 Sheet 1 of 4



SD-103 (4.0 to 6.0 ft.)



SD-103 (6.0 to 8.0 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

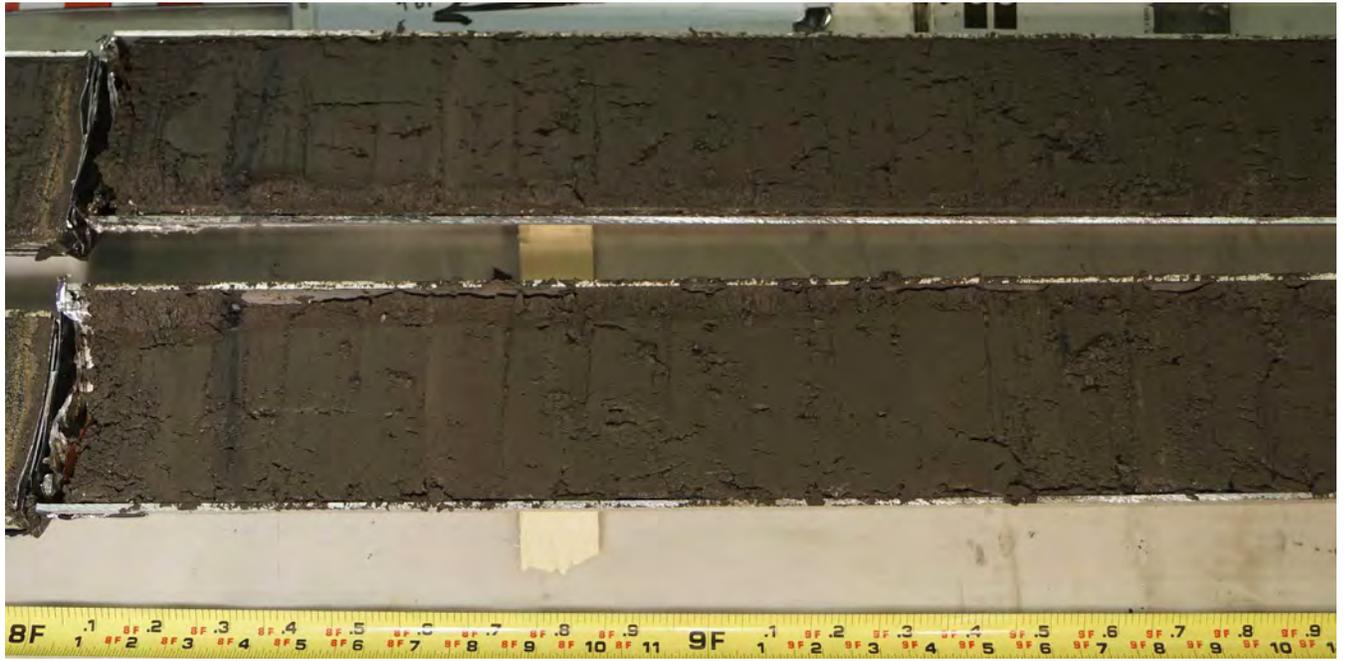
BORING SD-103 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-3
Sheet 2 of 4



SD-103 (8.0 to 10.0 ft.)



SD-103 (10.0 to 11.7 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos 101-104.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
BORING SD-103 PHOTOS	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.2-3 Sheet 3 of 4



SD-103 (11.7 to 13.0 ft.)



SD-103 (13.0 to 14.0 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-103 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-3
Sheet 4 of 4



SD-104 (0 to 2.0 ft.)



SD-104 (2.0 to 3.6 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos 101-104.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

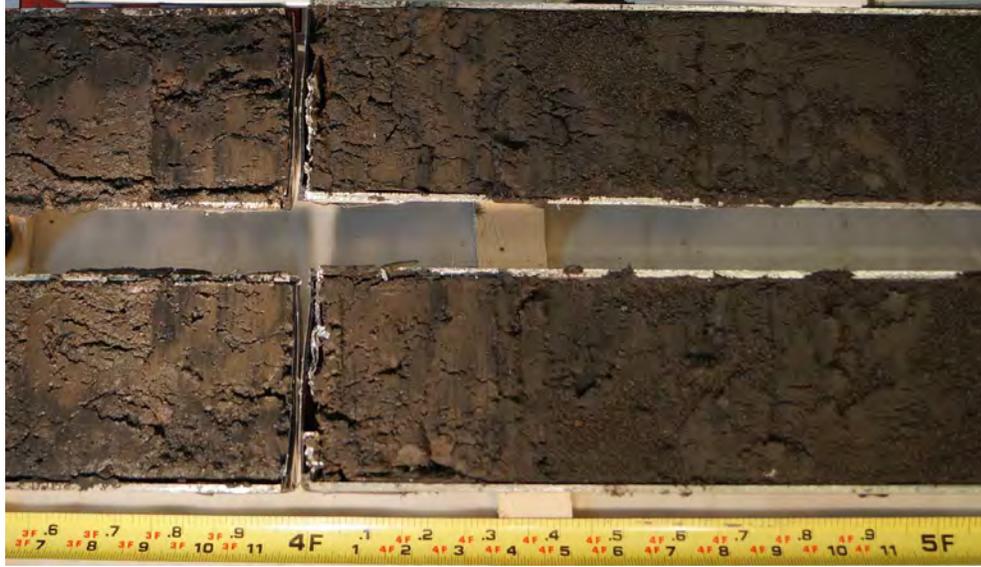
BORING SD-104 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-4
 Sheet 1 of 4



SD-104 (3.6 to 5.0 ft.)



SD-104 (5.0 to 6.5 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos 101-104.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

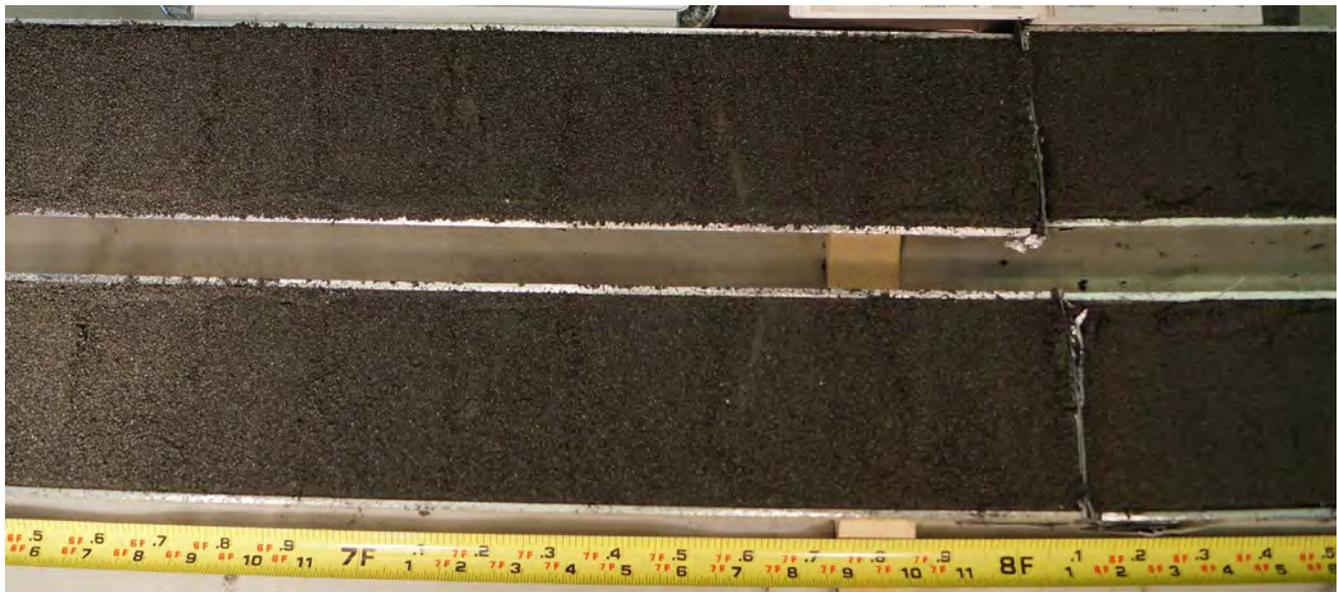
BORING SD-104 PHOTOS

January 2014

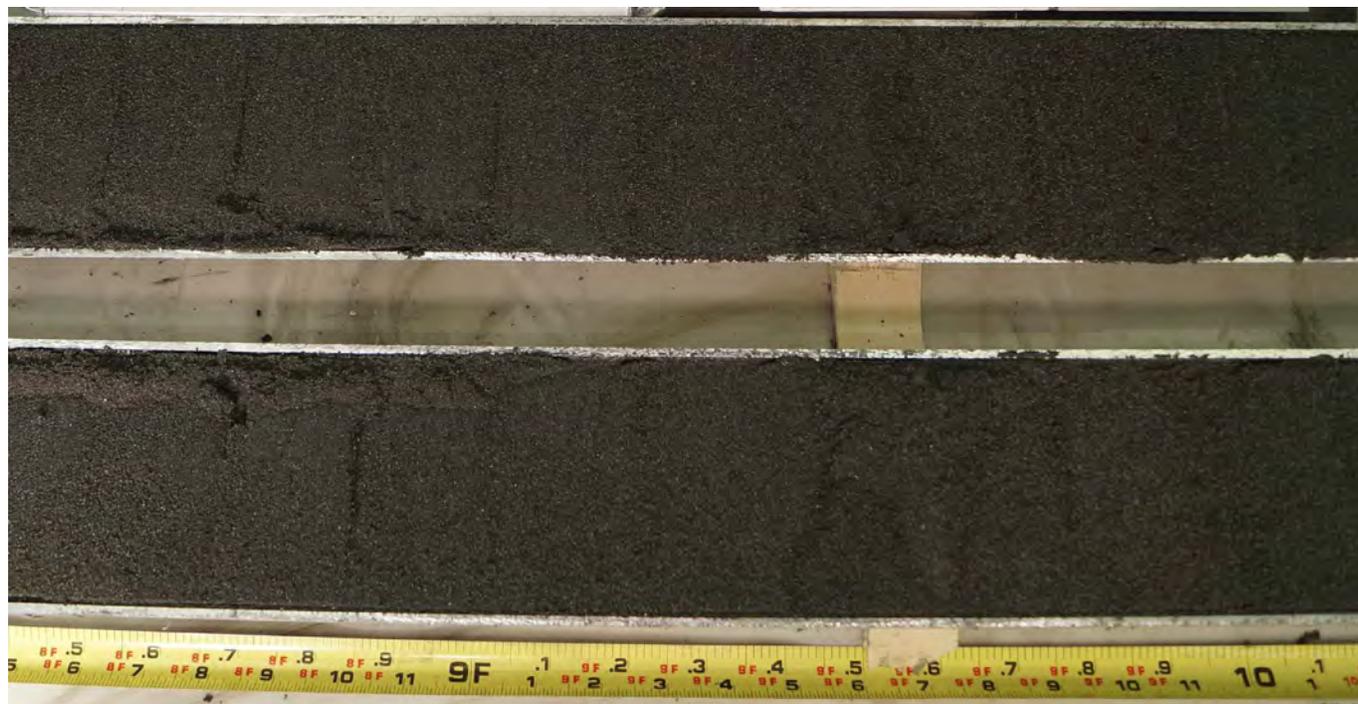
21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-4
 Sheet 2 of 4



SD-104 (6.5 to 8.5 ft.)



SD-104 (8.5 to 10.0 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos 101-104.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

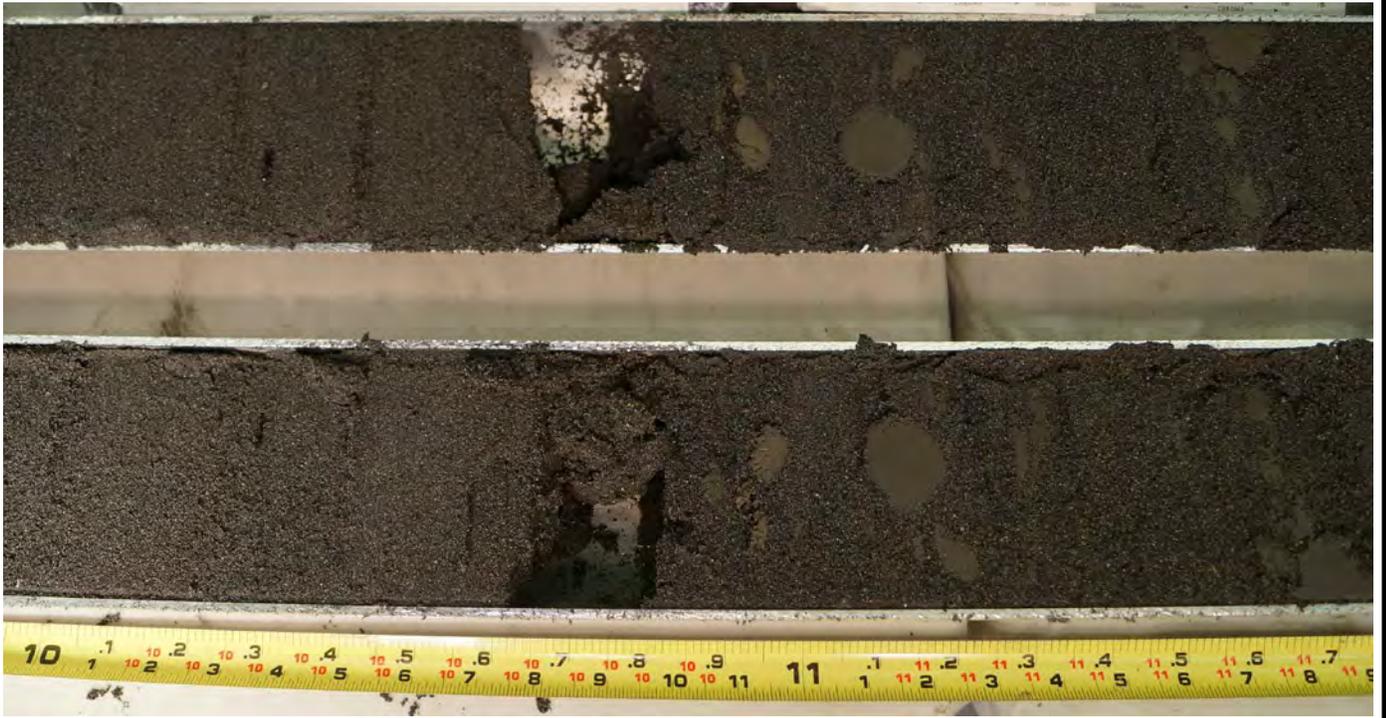
BORING SD-104 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-4
 Sheet 3 of 4



SD-104 (10.0 to 11.7 ft.)



SD-104 (11.1 to 12.2 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-104 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-4
Sheet 4 of 4



SD-106 (0 to 2 ft.)



SD-106 (2 to 4 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos_106 to 109.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

BORING SD-106 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-5
 Sheet 1 of 4



SD-106 (4 to 6 ft.)



SD-106 (6 to 8 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos_106 to 109.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

BORING SD-106 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-5
 Sheet 2 of 4



SD-106 (8 to 10 ft.)



SD-106 (10 to 12 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-106 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-5
Sheet 3 of 4



SD-106 (12 to 13.5 ft.)



SD-106 (12.5 to 14 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-106 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-5
Sheet 4 of 4



SD-107 (0 to 2 ft.)



SD-107 (1.5 to 3.5 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-107 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-6
Sheet 1 of 4



SD-107 (3 to 5 ft.)



SD-107 (4.5 to 6.5 ft.)

Sediment Investigation Report
 U.S. Government Moorings
 Portland, Oregon

BORING SD-107 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
 Geotechnical and Environmental Consultants

FIG. A.2-6
 Sheet 2 of 4



SD-107 (6 to 8 ft.)



SD-107 (7 to 9 ft.)

Filename: J:\21121880-007\Sediment Cores\21-1-21880-007 Sediment Core Photos_106 to 109.dwg Date: 01-09-2014 Login: Leslie Regier

Sediment Investigation Report U.S. Government Moorings Portland, Oregon	
BORING SD-107 PHOTOS	
January 2014	21-1-21880-007
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	FIG. A.2-6 Sheet 3 of 4



SD-107 (8.5 to 10.5 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-107 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-6
Sheet 4 of 4



SD-108 (0 to 1.5 ft.)



SD-108 (1.5 to 3.3 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-108 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-7
Sheet 1 of 5



SD-108 (3.1 to 5 ft.)



SD-108 (4.7 to 6.5 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-108 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-7
Sheet 2 of 5



SD-108 (5.8 to 7.8 ft.)



SD-108 (7.3 to 9.2 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-108 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-7
Sheet 3 of 5



SD-108 (8.8 to 10.6 ft.)



SD-108 (10.1 to 12 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-108 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-7
Sheet 4 of 5



SD-108 (11.5 to 13.5 ft.)



SD-108 (12.6 to 14.5 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-108 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-7
Sheet 5 of 5



SD-109 (0 to 1.7 ft.)



SD-109 (1.6 to 3.7 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-109 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-8
Sheet 1 of 5



SD-109 (3.1 to 5.2 ft.)



SD-109 (4.8 to 6.9 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-109 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-8
Sheet 2 of 5



SD-109 (6.5 to 8.5 ft.)



SD-109 (8.2 to 10.3 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

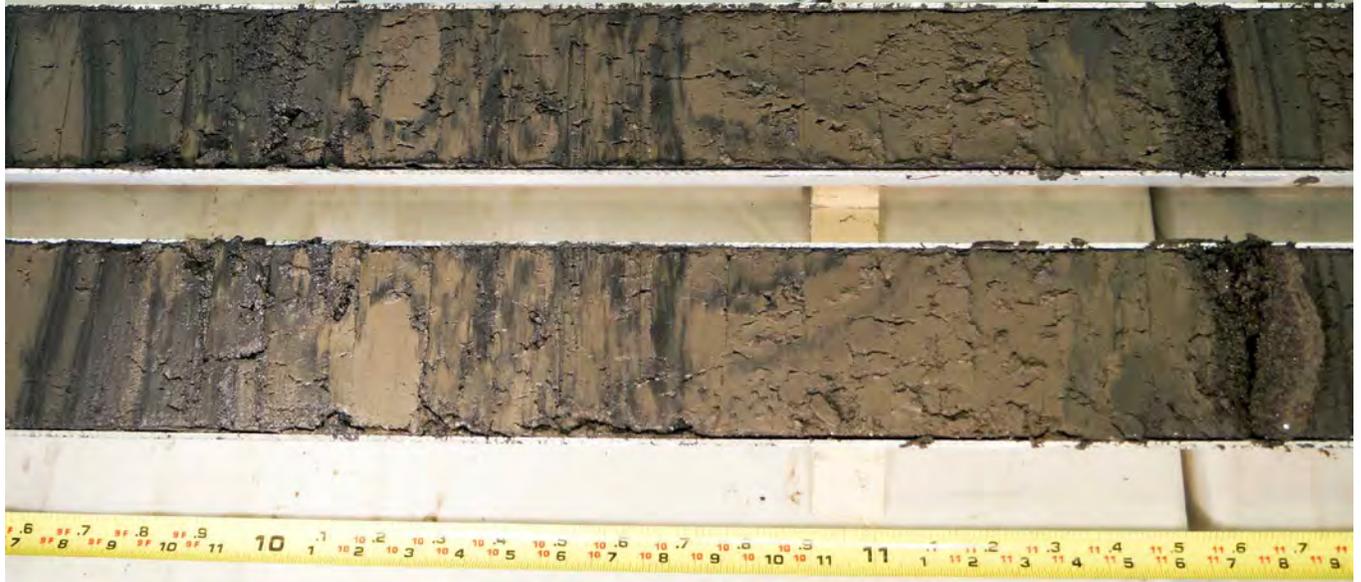
BORING SD-109 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-8
Sheet 3 of 5



SD-109 (9.6 to 11.6 ft.)



SD-109 (11.2 to 13.3 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-109 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-8
Sheet 4 of 5



SD-109 (12.5 to 14 ft.)

Sediment Investigation Report
U.S. Government Moorings
Portland, Oregon

BORING SD-109 PHOTOS

January 2014

21-1-21880-007

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A.2-8
Sheet 5 of 5

APPENDIX B
AIR MONITORING DATA

APPENDIX B

AIR MONITORING DATA

TABLE OF CONTENTS

SUB-APPENDICES

- B.1 Overwater Monitoring Data
- B.2 Onshore Monitoring Data

SUB-APPENDIX B.1
OVERWATER MONITORING DATA

6

Breathing Zone Monitoring

Monitoring Log

Date	Time	Reading Cyanide Meter	PID	Comments
10-29-13	1022	1	0	Background
10-29-13	1027	0-1	0	SD-101 1st
10-29-13	1049	0-1	0	SD-101 2nd
10-29-13	1125	0-1	0	SD-102
"	1139	0-1	0	SD-102 in take top
"	1254	0	0	SD-109
"	1319	0	0	SD-106

See CKS' notebook for 10-30-13
readings

PUH
10.29.13

Equipment: Cal. by CKS. 10/28/13, 10/29/13 7

Tox: Rae II

PGM-1100 Series

Model: PGM-1170

Serial No: 027-905261

Calibrated: 10/28/2013 and 10/29/13

Ion Science

PhoCheck TIGER

Serial No: T-105558

Calibrated: 10/28/2013

Bump Tested 10/29/13

See CKS' notebook for 10/30/13 cal. notes

PUH

10/29/13

Boat
 Air Monitoring 10/30/12

ToxiRae II

PGM-1100 Series

Model: PGM-1170

Serial No: 027-90526

Bump Tested: 10/30/12

Ion Filter

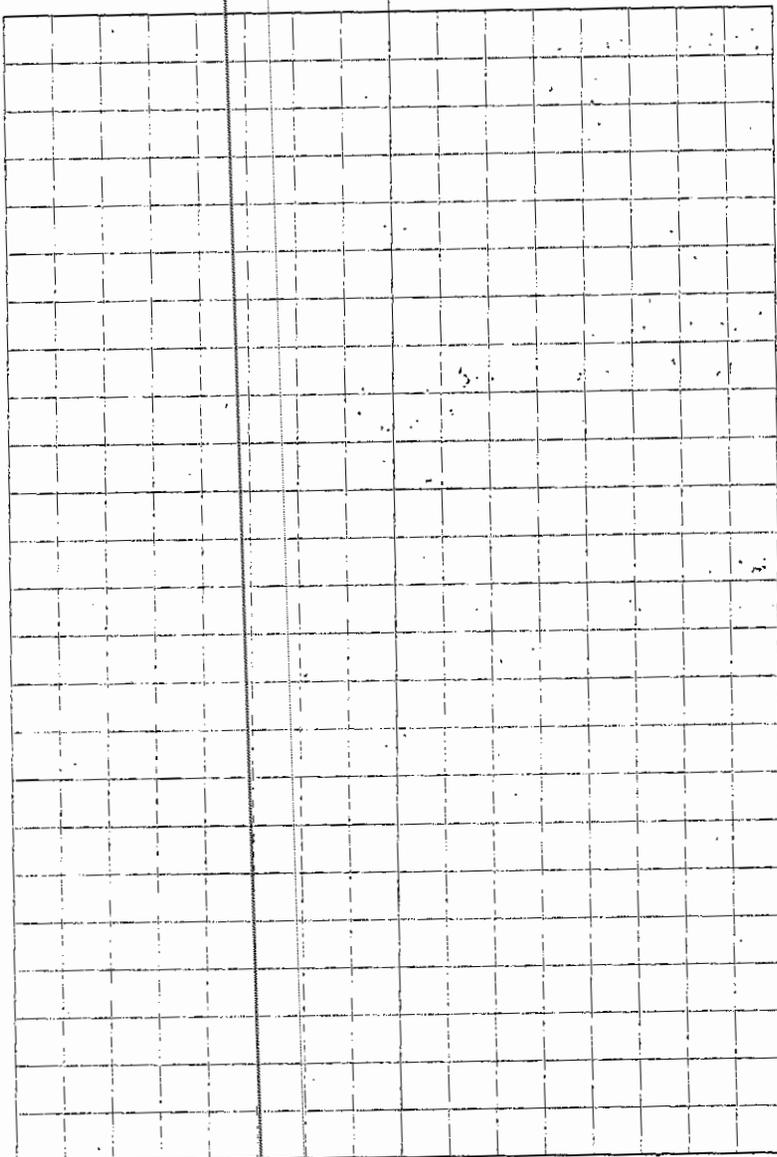
Photo Check TIGER

Serial No: T-10558

Bump Tested: 10/30/12

Date	Time	Gas ID meter	PID	Comments
10/30	0850	0.1	0.0	SD-107
"	0905	0	0.0	SD-107
"	0926	0	0.0	SD-107
"	0940	0	0.0	SD-107
"	1000	0	0.0	SD-107
"	1053	0	0.0	Dock
"	1400	0	0.0	SD-106
"	1450	0	0.0	SD-106
"	1536	0	0.0	SD-104
"	1615	0	0.0	SD-108

Monitoring 10/30 completed by Cody
 Sorrento
 signed *[Signature]*



Ret in the Rain

SUB-APPENDIX B.2
ONSHORE MONITORING DATA



EHS-International, Inc.

13228 NE 20th Street, Suite 100
Bellevue, Washington 989005-2049
Phone 425-455-2959
Toll Free 800-666-2959
Fax 425-646-7247

November 15, 2013

Mr. Scott Gaulke
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, WA 98103

**Subject: Air Monitoring Results During Willamette River Sediment Vibracore Examination
U.S. Government Moorings, Portland, Oregon
EHSI Project 10576-01**

Dear Mr. Gaulke:

At your request, EHS-International, Inc. (EHSI), an environmental health and safety consulting firm, conducted air monitoring and worker exposure monitoring during examination of vibracores collected from Willamette River sediments on October 30th through November 1st, 2013. The results of the air testing and monitoring are included in the attached report.

EHSI is pleased to provide our professional industrial hygiene services. If you have any questions concerning this report or if EHSI can provide further services to you, please call me at (425) 455-2959.

Sincerely,

EHS-International, Inc.

A handwritten signature in black ink, appearing to read "Clinton Holzauer", with a stylized flourish at the end.

Clinton Holzauer, LEED AP, CMC
Manager, IAQ and IH Services

- Environmental Engineering
- Earth Sciences and Mapping
- Industrial Hygiene Services
- Construction Management

U.S. GOVERNMENT MOORINGS PORTLAND, OREGON

AIR MONITORING RESULTS DURING WILLAMETTE RIVER SEDIMENT VIBRCORE EXAMINATION



Examination Shed
U.S. Government Moorings
8010 NW St. Helens Road
Portland, Oregon

Prepared for:

Mr. Scott Gaulke
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

November 15, 2013
EHSI Project 10576-01



13228 NE 20th Street, Ste. 100
Bellevue, Washington 98005
Telephone: (425) 455-2959 • Toll Free: (800) 666-2959 • Fax: (425) 646-7247



AIR MONITORING DURING VIBRACORE EXAMINATION

U.S. GOVERNMENT MOORINGS PORTLAND, OREGON

EXECUTIVE SUMMARY

On October 30th, 31st and November 1st, 2013, EHS-International, Inc. (EHSI), an environmental health and safety consulting firm, supported Shannon & Wilson's (S&W) sediment investigation by conducting worker exposure monitoring as well as ambient area air monitoring for volatile organic compounds (VOCs) that could be present in vibracore sediments being examined in a shed on the U.S. Government Moorings property located at 8010 NW St. Helens Road, Portland, Oregon.

EHSI conducted worker exposure monitoring by attaching sampling media into the breathing zone of the S&W employee most likely to be exposed to airborne contaminants based on their work activities. Ambient area monitoring was conducted using a photo-ionization detector (PID) to detect ionizable VOCs and a 4-gas meter to measure hydrogen sulfide concentrations in ambient air during work activities.

Examination of vibracores took place all day on October 30th and 31st and for the first half of the day on November 1st. Direct read measurements indicate that during examination of the vibracores the concentration of VOCs in the examination shed did not exceed 0.5 parts per million (ppm) and that concentration was only measured for a few seconds before the meter returned to a reading of zero ppm.

Although hydrogen sulfide odor ("rotten eggs") was noted by several core examiners, the instrument used to measure hydrogen sulfide concentrations indicated that concentrations remained less than one (1) ppm throughout the examination periods.

Some "petroleum-like" and/or "naphthalene-like" odors were noted during the examinations, especially in the lower portions of some of the cores. These odors were typically strongest when the cores were first opened. One core, SD-106, examined on October 30th, had a more notable naphthalene-like odor, than the other cores examined.

Results from worker exposure monitoring indicate that the monitored worker was not exposed to VOCs or naphthalene at concentrations at or approaching the applicable permissible exposure limits established by the US Occupational Safety and Health Administration (OSHA).

BACKGROUND

The investigation of Willamette River sediments collected off-shore of the US Government Moorings in Portland, Oregon, was conducted to determine the visual extent of contamination in the sediments from an historic gasification plant located in the vicinity. Past work identified the contaminants as petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), metals, cyanide and polychlorinated biphenyls (PCBs). Due to the possibility of examiners being exposed to elevated concentrations of airborne contaminants from the sediments EHSI was requested to provide testing services and the capability to enhance ventilation to reduce exposures in the work area, if necessary.

SITE DESCRIPTION

The examination of the vibracores was conducted in a wooden work shed attached to a larger, two-story wood building on the US Government Moorings Site. The shed was approximately 25 feet by 15 feet with an open ceiling and a sloped roof, peaking at about 15 feet. During examination of the cores a bay garage door on the south was always in the open position and operable single pane windows on the north wall were also always open. The shed had a supplemental ventilation fan that exhausted air from a vent near the ceiling on the east wall.

Prior to EHSI's arrival the shed had been prepared so that the central work area was covered in polyethylene sheeting (poly) and designated as an exclusion zone with caution tape delineating boundaries. One side of the core examination table had an area so that the cores could be closely viewed by observers without having the observers enter the exclusion zone.

APPROACH

EHSI used a calibrated Multiple Gas Monitor (MultiRAE Plus), a combination 4-gas meter and PID, to measure the concentration of airborne contaminants in the work area. In addition, 3M 3520 organic passive vapor diffusion monitors (OVM) were used to collect samples for analysis by an accredited laboratory.

Monitoring was conducted by Mr. Clinton Holzhauer, EHSI Manager of Industrial Hygiene and Indoor Air Quality Services.

MEASUREMENT & SAMPLING METHODOLOGIES

MultiRAE Plus

The MultiRAE Plus was used to measure ambient VOC and hydrogen sulfide concentrations at the core seams after cutting but prior to opening the core as well as measuring those vapors in ambient air immediately after opening the cores. Additional ambient air readings were taken intermittently.

The 4-gas meter had sensors for oxygen content, lower explosive limits (LEL), hydrogen sulfide and carbon monoxide. The PID had a 10.6eV lamp. The meter was calibrated or bump tested before use each day. A copy of the daily calibration/bump test forms is included as Appendix B. The meter is capable of measuring as low as one (1) ppm of hydrogen sulfide and 0.1 ppm of VOCs.

Organic Passive Vapor Diffusion Monitoring Badges

The 3M 3520 OVM badges were attached to the worker's lapel so that they measured contaminant concentrations in the worker's breathing zone. At the completion of sample collection the badges were capped and sealed in accordance with the manufacturer's directives and transported to an accredited laboratory under chain-of-custody control. Samples were collected on October 30th and 31st.

The OVM were analyzed for thirty-one (31) VOCs and naphthalene by Galson Laboratory in East Syracuse, New York. Samples were sent for analysis under chain-of-custody control. Galson is accredited by the AIHA under the Industrial Hygiene Laboratory Accreditation Program, LLC (Laboratory ID 100324). A copy of Galson's accreditation is available upon request. Laboratory analytical results are presented in Appendix A.

AMBIENT AIR RESULTS DURING EXAMINATION

VOCs & Odors

At no time during the examination of sediment cores did the airborne concentration of VOCs in the shed exceed one (1) ppm. On a few occasions the PID "spiked" to 0.5 ppm but only for a second or two.

Despite the PID not identifying elevated VOCs during examination of cores, several of the cores did generate a petroleum-like and/or naphthalene-like odor, especially core SD-106. The shed's supplemental ventilation system was operated during examination of core SD-106.

Hydrogen Sulfide

The odor of hydrogen sulfide was noted by several examiners, especially in newly opened cores. It should be noted that the odor threshold (the concentration at which 50% of adults report being able to distinguish the odor) for hydrogen sulfide is 0.47 parts per billion, many orders of magnitude less than the 4-gas meter hydrogen sulfide's sensor sensitivity.

Potential Exposure

While all measurements indicate that VOC concentrations in the shed were very low to non-existent during the examination of cores it should be noted that some examiners chose to use olfactory senses to characterize the sediments. To do so, small spoonfuls of soil were brought to a position directly below the examiners' noses and sniffed. While it is believed that all exposures were very low, this professional practice is likely to create a larger exposure than just breathing ambient air.

Additional information regarding onsite activities are provided in the Daily Logs presented in Appendix C.

WORKER EXPOSURE MONITORING RESULTS

Laboratory analytical results indicate that the monitored worker was not exposed to VOCs or naphthalene at concentrations above the laboratory's analytical method detection limits. These detection limits are all well below the permissible exposure limits (PELs) established by the U.S. Occupational Safety and Health Administration (OSHA) for regulated airborne contaminants. Table 1 below provides the results from testing and the applicable PELs. Note: Most of the OSHA PELs and American Conference of Government Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) are based on an 8-hour time weighted average exposure. Occasionally, OSHA establishes a "Ceiling PEL" meaning that at no time should the concentration of that

chemical exceed the OSHA Ceiling. Both OSHA and ACGIH occasionally assign "short term excursion limits" (STELs), to insure that short term (usually 15-minute) "worst case" exposures are not exceeded.

Table 1
Worker Exposure Monitoring Results
U.S. Government Moorings – Sediment Core Evaluation
Reported at Parts per Million (ppm)

Analyte	10576-103001	10576-103101	OSHA PELs	ACGIH TLVs
	Paul Van Horne	Paul Van Horne		
Methyl Chloroform	<0.05	<0.06	350	350
1,1,2-Trichloroethane	<0.06	<0.06	10	10
1,1-Dichloroethane	<0.07	<0.08	100	100
1,2-Dichloroethane	<0.07	<0.07	50	10
Acetone	<0.20	<0.22	1,000	500
Benzene	<0.03	<0.04	1	0.5
Chlorobenzene	<0.07	<0.08	75	10
Chloroform	<0.06	<0.06	50 ^a	10
Cumene	<0.08	<0.08	50	50
Cyclohexane	<0.08	<0.09	300	100
Cyclohexanone	<0.08	<0.09	50	20
Cyclohexene	<0.09	<0.1	300	300
Ethyl Alcohol	<0.1	<0.1	1,000	---
Ethylbenzene	<0.08	<0.08	100	20
Isopropyl Alcohol	<0.1	<0.1	400	---
m-Dichlorobenzene	<0.06	<0.06	--	---
Methyl Ethyl Ketone	<0.09	<0.1	200	200
Methyl Isobutyl Ketone	<0.07	<0.08	100	20
Methyl n-Propyl Ketone	<0.08	<0.09	200	150 ^b
Methylene Chloride	<0.07	<0.08	25	50
n-Butyl Acetate	<0.06	<0.07	150	150
n-Hexane	<0.08	<0.09	500	50
n-Propyl Acetate	<0.07	<0.08	200	200
o-Dichlorobenzene	<0.06	<0.06	50 ^a	25
p-Dichlorobenzene	<0.06	<0.07	75	10
Pentane	<0.09	<0.1	1,000	600
Tetrachloroethylene	<0.05	<0.05	100	25
Tetrahydrofuran	<0.08	<0.09	200	50
Toluene	<0.08	<0.08	200	20
Trichloroethylene	<0.05	<0.06	100	10
Naphthalene	<0.33	<0.36	10	10
Xylenes	<0.24	<0.27	100	100

TLV – Threshold Limit Value

--- = Not Established

^a – Ceiling Exposure Limit

^b – Short Term Exposure Limit (STEL) (15-minute)

EHS INTERNATIONAL, INC.

Shannon & Wilson

US Government Moorings – Sediment Investigation – Air Monitoring

EHSI Project #10567-01

November 15, 2013

CONCLUSIONS

Based on the results from onsite monitoring using direct-read instruments, as well as worker exposure monitoring, the workers and visitors within the core examination shed at the Portland U.S. Government Moorings property on October 30 through November 1 were not exposed to airborne contaminants at or approaching the applicable regulatory permissible exposure limits.

LIMITATIONS AND STANDARD OF CARE

This air quality monitoring was conducted by EHSI in accordance with the Scope of Work defined by EHSI proposal 13-167. EHSI followed currently accepted industrial hygiene practices and has provided professional opinions based on observations. The assessment and recommendations contained in this report are in accordance with currently accepted industrial hygiene practices. Other than this, **no warranty is implied or intended.**

APPENDIX A

LABORATORY ANALYTICAL RESULTS

GALSON LABORATORY



Mr. Clinton Holzhauser
EHS-International, Inc.
13228 NE 20th Street
Suite 100
Bellevue, WA 98005

November 14, 2013

DOH ELAP# 11626
AIHA # 100324

Account# 13697

Login# L304358

Dear Mr. Holzhauser:

Enclosed are the analytical results for the samples received by our laboratory on November 07, 2013. All test results meet the quality control requirements of AIHA and NELAC unless otherwise stated in this report. All samples on the chain of custody were received in good condition unless otherwise noted.

Results in this report are based on the sampling data provided by the client and refer only to the samples as they were received at the laboratory. Unless otherwise requested, all samples will be discarded 14 days from the date of this report, with the exception of IOMs, which will be cleaned and disposed of after seven calendar days.

Current Scopes of Accreditation can be viewed at www.galsonlabs.com in the accreditations section under the "about Galson" tab.

Please contact Heidi Fruhlinger at (888) 432-5227, if you would like any additional information regarding this report.

Thank you for using Galson Laboratories.

Sincerely,

Galson Laboratories

Mary G. Unangst
Laboratory Director

Enclosure(s)



LABORATORY ANALYSIS REPORT

6601 Kirkville Road
 East Syracuse, NY 13057
 (315) 432-5227
 FAX: (315) 437-0571
 www.galsonlabs.com

Client : EHS-International, Inc.
 Site : US Gov't Mooring-Portland
 Project No. : 10576-01
 Date Sampled : 30-OCT-13 - 31-OCT-13 Account No.: 13697
 Date Received : 07-NOV-13 Login No. : L304358
 Date Analyzed : 09-NOV-13 - 11-NOV-13
 Report ID : 806902

Client ID : 10576-103001
 Date Sampled : 10/30/13

Lab ID : L304358-1
 Date Analyzed : 11/11/13

Time : 539 Minutes

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3	ppm
Methyl Chloroform	5	<5	<5	<5	<0.3	<0.05
1,1,2-Trichloroethane	5	<5	<5	<5	<0.3	<0.06
1,1-Dichloroethane	5	<5	<5	<5	<0.3	<0.07
1,2-Dichloroethane	5	<5	<5	<5	<0.3	<0.07
Acetone	10.	<10	<10	<10	<0.47	<0.20
Benzene	2	<2	<2	<2	<0.1	<0.03
Chlorobenzene	5	<5	<5	<5	<0.3	<0.07
Chloroform	5	<5	<5	<5	<0.3	<0.06
Cumene	5	<5	<5	<5	<0.4	<0.08
Cyclohexane	5	<5	<5	<5	<0.3	<0.08
Cyclohexanone	5	<5	<5	<5	<0.3	<0.08
Cyclohexene	5	<5	<5	<5	<0.3	<0.09
Ethyl Alcohol	5	<5	<5	<6	<0.3	<0.1
Ethylbenzene	5	<5	<5	<5	<0.3	<0.08
Isopropyl Alcohol	5	<5	<5	<5	<0.2	<0.1
m-Dichlorobenzene	5	<5	<5	<5	<0.3	<0.06
Methyl Ethyl Ketone	5	<5	<5	<5	<0.3	<0.09
Methyl Isobutyl Ketone	5	<5	<5	<5	<0.3	<0.07
Methyl n-Propyl Ketone	5	<5	<5	<5	<0.3	<0.08
Methylene Chloride	5	<5	<5	<5	<0.2	<0.07
n-Butyl Acetate	5	<5	<5	<5	<0.3	<0.06
n-Hexane	5	<5	<5	<5	<0.3	<0.08

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media : M3M-3520

Submitted by: KAG
 Approved by : dnf
 Date : 14-NOV-13 NYS DOH # : 11626
 QC by: Karen Becker

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms
 > -Greater Than ug -Micrograms l -Liters NS -Not Specified
 NA -Not Applicable ND -Not Detected ppm -Parts per Million LOQ-Limit of Quantitation

Field sampling was not performed by Galson. Galson presents results based on sampling data provided by clients.



LABORATORY ANALYSIS REPORT

6601 Kirkville Road
 East Syracuse, NY 13057
 (315) 432-5227
 FAX: (315) 437-0571
 www.galsonlabs.com

Client : EHS-International, Inc.
 Site : US Gov't Mooring-Portland
 Project No. : 10576-01
 Date Sampled : 30-OCT-13 - 31-OCT-13 Account No.: 13697
 Date Received : 07-NOV-13 Login No. : L304358
 Date Analyzed : 09-NOV-13 - 11-NOV-13
 Report ID : 806902

Client ID : 10576-103001
 Date Sampled : 10/30/13

Lab ID : L304358-1
 Date Analyzed : 11/11/13

Time : 539 Minutes

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3	ppm
n-Propyl Acetate	5	<5	<5	<5	<0.3	<0.07
Naphthalene	10.	<10	<10	<23	<1.7	<0.33
o-Dichlorobenzene	5	<5	<5	<5	<0.4	<0.06
p-Dichlorobenzene	5	<5	<5	<5	<0.4	<0.06
Pentane	5	<5	<5	<5	<0.3	<0.09
Tetrachloroethylene	5	<5	<5	<5	<0.3	<0.05
Tetrahydrofuran	5	<5	<5	<5	<0.2	<0.08
Toluene	5	<5	<5	<5	<0.3	<0.08
Trichloroethylene	5	<5	<5	<5	<0.3	<0.05
Xylene	15	<15	<15	<15	<1.1	<0.24

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media : M3M-3520

Submitted by: KAG
 Approved by : dnf
 Date : 14-NOV-13 NYS DOH # : 11626
 QC by: Karen Becker

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms
 > -Greater Than ug -Micrograms l -Liters NS -Not Specified
 NA -Not Applicable ND -Not Detected ppm -Parts per Million LOQ-Limit of Quantitation

Field sampling was not performed by Galson. Galson presents results based on sampling data provided by clients.



LABORATORY ANALYSIS REPORT

6601 Kirkville Road
 East Syracuse, NY 13057
 (315) 432-5227
 FAX: (315) 437-0571
 www.galsonlabs.com

Client : EHS-International, Inc.
 Site : US Gov't Mooring-Portland
 Project No. : 10576-01
 Date Sampled : 30-OCT-13 - 31-OCT-13 Account No.: 13697
 Date Received : 07-NOV-13 Login No. : L304358
 Date Analyzed : 09-NOV-13 - 11-NOV-13
 Report ID : 806902

Client ID : 10576-103101
 Date Sampled : 10/31/13

Lab ID : L304358-2
 Date Analyzed : 11/11/13

Time : 490 Minutes

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3	ppm
Methyl Chloroform	5	<5	<5	<5	<0.3	<0.06
1,1,2-Trichloroethane	5	<5	<5	<5	<0.3	<0.06
1,1-Dichloroethane	5	<5	<5	<5	<0.3	<0.08
1,2-Dichloroethane	5	<5	<5	<5	<0.3	<0.07
Acetone	10.	<10	<10	<10	<0.51	<0.22
Benzene	2	<2	<2	<2	<0.1	<0.04
Chlorobenzene	5	<5	<5	<5	<0.4	<0.08
Chloroform	5	<5	<5	<5	<0.3	<0.06
Cumene	5	<5	<5	<5	<0.4	<0.08
Cyclohexane	5	<5	<5	<5	<0.3	<0.09
Cyclohexanone	5	<5	<5	<5	<0.4	<0.09
Cyclohexene	5	<5	<5	<5	<0.3	<0.1
Ethyl Alcohol	5	<5	<5	<6	<0.3	<0.1
Ethylbenzene	5	<5	<5	<5	<0.4	<0.08
Isopropyl Alcohol	5	<5	<5	<5	<0.3	<0.1
m-Dichlorobenzene	5	<5	<5	<5	<0.4	<0.06
Methyl Ethyl Ketone	5	<5	<5	<5	<0.3	<0.1
Methyl Isobutyl Ketone	5	<5	<5	<5	<0.3	<0.08
Methyl n-Propyl Ketone	5	<5	<5	<5	<0.3	<0.09
Methylene Chloride	5	<5	<5	<5	<0.3	<0.08
n-Butyl Acetate	5	<5	<5	<5	<0.3	<0.07
n-Hexane	5	<5	<5	<5	<0.3	<0.09

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media : M3M-3520

Submitted by: KAG
 Approved by : dnf
 Date : 14-NOV-13 NYS DOH # : 11626
 QC by: Karen Becker

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms
 > -Greater Than ug -Micrograms l -Liters NS -Not Specified
 NA -Not Applicable ND -Not Detected ppm -Parts per Million LOQ-Limit of Quantitation

Field sampling was not performed by Galson. Galson presents results based on sampling data provided by clients.



LABORATORY ANALYSIS REPORT

6601 Kirkville Road
 East Syracuse, NY 13057
 (315) 432-5227
 FAX: (315) 437-0571
 www.galsonlabs.com

Client : EHS-International, Inc.
 Site : US Gov't Mooring-Portland
 Project No. : 10576-01
 Date Sampled : 30-OCT-13 - 31-OCT-13 Account No.: 13697
 Date Received : 07-NOV-13 Login No. : L304358
 Date Analyzed : 09-NOV-13 - 11-NOV-13
 Report ID : 806902

Client ID : 10576-103101
 Date Sampled : 10/31/13

Lab ID : L304358-2
 Date Analyzed : 11/11/13

Time : 490 Minutes

Parameter	LOQ ug	Front ug	Back ug	Total ug	Conc mg/m3	ppm
n-Propyl Acetate	5	<5	<5	<5	<0.3	<0.08
Naphthalene	10.	<10	<10	<23	<1.9	<0.36
o-Dichlorobenzene	5	<5	<5	<5	<0.4	<0.06
p-Dichlorobenzene	5	<5	<5	<5	<0.4	<0.07
Pentane	5	<5	<5	<5	<0.3	<0.1
Tetrachloroethylene	5	<5	<5	<5	<0.4	<0.05
Tetrahydrofuran	5	<5	<5	<5	<0.3	<0.09
Toluene	5	<5	<5	<5	<0.3	<0.08
Trichloroethylene	5	<5	<5	<5	<0.3	<0.06
Xylene	15	<15	<15	<15	<1.2	<0.27

COMMENTS: Please see attached lab footnote report for any applicable footnotes.

Collection Media : M3M-3520

Submitted by: KAG
 Approved by : dnf
 Date : 14-NOV-13 NYS DOH # : 11626
 QC by: Karen Becker

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms
 > -Greater Than ug -Micrograms l -Liters NS -Not Specified
 NA -Not Applicable ND -Not Detected ppm -Parts per Million LOQ-Limit of Quantitation

Field sampling was not performed by Galson. Galson presents results based on sampling data provided by clients.



LABORATORY ANALYSIS REPORT

Client Name : EHS-International, Inc.
Site : US Gov't Mooring-Portland
Project No. : 10576-01
Date Sampled : 30-OCT-13 - 31-OCT-13 Account No.: 13697
Date Received: 07-NOV-13 Login No. : L304358
Date Analyzed: 09-NOV-13 - 11-NOV-13
6601 Kirkville Road
East Syracuse, NY 13057
(315) 432-5227
FAX: (315) 437-0571
www.galsonlabs.com

Unless otherwise noted below, all quality control results associated with the samples were within established control limits.

Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method.

The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).

Unless otherwise noted below, reported results have not been blank corrected for any field blank or method blank.

L304358 (Report ID: 806902):

1,1,2-Trichloroethane - Total ug corrected for a desorption efficiency of 101%.
1,1-Dichloroethane - Total ug corrected for a desorption efficiency of 100%.
1,2-Dichloroethane - Total ug corrected for a desorption efficiency of 104%.
Acetone - Total ug corrected for a desorption efficiency of 99%.
Benzene - Total ug corrected for a desorption efficiency of 100%.
Chlorobenzene - Total ug corrected for a desorption efficiency of 99%.
Chloroform - Total ug corrected for a desorption efficiency of 97%.
Cumene - Total ug corrected for a desorption efficiency of 101%.
Cyclohexane - Total ug corrected for a desorption efficiency of 104%.
Cyclohexanone - Total ug corrected for a desorption efficiency of 99%.
Cyclohexene - Total ug corrected for a desorption efficiency of 96%.
Ethyl Alcohol - Total ug corrected for a desorption efficiency of 84%.
Ethylbenzene - Total ug corrected for a desorption efficiency of 103%.
Isopropyl Alcohol - Total ug corrected for a desorption efficiency of 98%.
Methyl Chloroform - Total ug corrected for a desorption efficiency of 102%.
Methyl Ethyl Ketone - Total ug corrected for a desorption efficiency of 100%.
Methyl Isobutyl Ketone - Total ug corrected for a desorption efficiency of 102%.
Methyl n-Propyl Ketone - Total ug corrected for a desorption efficiency of 99%.
Methylene Chloride - Total ug corrected for a desorption efficiency of 99%.
Naphthalene - Total ug corrected for a desorption efficiency of 44%.
Pentane - Total ug corrected for a desorption efficiency of 103%.
Tetrachloroethylene - Total ug corrected for a desorption efficiency of 99%.
Tetrahydrofuran - Total ug corrected for a desorption efficiency of 100%.
Toluene - Total ug corrected for a desorption efficiency of 102%.
Trichloroethylene - Total ug corrected for a desorption efficiency of 101%.
Xylene - Total ug corrected for a desorption efficiency of 97%.
m-Dichlorobenzene - Total ug corrected for a desorption efficiency of 96%.
n-Butyl Acetate - Total ug corrected for a desorption efficiency of 103%.
n-Hexane - Total ug corrected for a desorption efficiency of 103%.
n-Propyl Acetate - Total ug corrected for a desorption efficiency of 101%.
o-Dichlorobenzene - Total ug corrected for a desorption efficiency of 95%.
p-Dichlorobenzene - Total ug corrected for a desorption efficiency of 92%.
Please note that back media results above the LOQ have been multiplied by a factor of 2.2 in all "total ug" calculations (as specified in the 3M method).
SOPs: GC-SOP-12(6), GC-SOP-16(11), GC-SOP-9(9)
Results calculated with a desorption efficiency (DE) below 75% are considered semi-quantitative.

Table with 3 columns: Parameter, Method, PEL. Row 1: 1,1,2-Trichloroethane, mod. NIOSH 1003; GC/FID BADGE, 10 ppm

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms
> -Greater Than ug -Micrograms l -Liters NS -Not Specified
NA -Not Applicable ND -Not Detected ppm -Parts per Million



LABORATORY ANALYSIS REPORT

6601 Kirkville Road
 East Syracuse, NY 13057
 (315) 432-5227
 FAX: (315) 437-0571
 www.galsonlabs.com

Client Name : EHS-International, Inc.
 Site : US Gov't Mooring-Portland
 Project No. : 10576-01

Date Sampled : 30-OCT-13 - 31-OCT-13 Account No.: 13697
 Date Received: 07-NOV-13 Login No. : L304358
 Date Analyzed: 09-NOV-13 - 11-NOV-13

Unless otherwise noted below, all quality control results associated with the samples were within established control limits.

Unrounded results are carried through the calculations that yield the final result and the final result is rounded to the number of significant figures appropriate to the accuracy of the analytical method. Please note that results appearing in the columns preceding the final result column may have been rounded in order to fit the report format and therefore, if carried through the calculations, may not yield an identical final result to the one reported.

The stated LOQs for each analyte represent the demonstrated LOQ concentrations prior to correction for desorption efficiency (if applicable).

Unless otherwise noted below, reported results have not been blank corrected for any field blank or method blank.

L304358 (Report ID: 806902):

Parameter	Method	PEL
1,1-Dichloroethane	mod. NIOSH 1003; GC/FID BADGE	100 ppm
1,2-Dichloroethane	mod. NIOSH 1003; GC/FID BADGE	50 ppm
Acetone	mod. NIOSH 1300; GC/FID BADGE	1000 ppm
Benzene	mod. NIOSH 1501; GC/FID BADGE	1 ppm
Chlorobenzene	mod. NIOSH 1003; GC/FID BADGE	75 ppm
Chloroform	mod. NIOSH 1003; GC/FID BADGE	50 ppm CEIL
Cumene	mod. NIOSH 1501; GC/FID BADGE	50 ppm
Cyclohexane	mod. NIOSH 1500; GC/FID BADGE	300 ppm
Cyclohexanone	mod. NIOSH 1300; GC/FID BADGE	50 ppm
Cyclohexene	mod. NIOSH 1500; GC/FID BADGE	300 ppm
Ethyl Alcohol	mod. NIOSH 1400; GC/FID BADGE	1000 ppm
Ethylbenzene	mod. NIOSH 1501; GC/FID BADGE	100 ppm
Isopropyl Alcohol	mod. NIOSH 1400; GC/FID BADGE	400 ppm
Methyl Chloroform	mod. NIOSH 1003; GC/FID BADGE	350 ppm
Methyl Ethyl Ketone	mod. NIOSH 1300; GC/FID BADGE	200 ppm
Methyl Isobutyl Ketone	mod. NIOSH 1300; GC/FID BADGE	100 ppm
Methyl n-Propyl Ketone	mod. NIOSH 1300; GC/FID BADGE	200 ppm
Methylene Chloride	mod. NIOSH 1005; GC/FID BADGE	25 ppm
Naphthalene	mod. NIOSH 1501; GC/FID BADGE	10 ppm
Pentane	mod. NIOSH 1500; GC/FID BADGE	1000 ppm
Tetrachloroethylene	mod. NIOSH 1003; GC/FID BADGE	100 ppm
Tetrahydrofuran	mod. NIOSH 1609; GC/FID BADGE	200 ppm
Toluene	mod. NIOSH 1501/OSHA 111; GC/FID BADGE	200 ppm
Trichloroethylene	mod. NIOSH 1022; GC/FID BADGE	100 ppm
Xylene	mod. NIOSH 1501; GC/FID BADGE	100 ppm
m-Dichlorobenzene	mod. NIOSH 1003; GC/FID BADGE	NA
n-Butyl Acetate	mod. NIOSH 1450; GC/FID BADGE	150 ppm
n-Hexane	mod. NIOSH 1500; GC/FID BADGE	500 ppm
n-Propyl Acetate	mod. NIOSH 1450; GC/FID BADGE	200 ppm
o-Dichlorobenzene	mod. NIOSH 1003; GC/FID BADGE	50 ppm CEIL
p-Dichlorobenzene	mod. NIOSH 1003; GC/FID BADGE	75 ppm

< -Less Than mg -Milligrams m3 -Cubic Meters kg -Kilograms
 > -Greater Than ug -Micrograms l -Liters NS -Not Specified
 NA -Not Applicable ND -Not Detected ppm -Parts per Million

APPENDIX B

CALIBRATION/BUMP TEST SHEET

APPENDIX C

DAILY FIELD LOGS

OCTOBER 30TH – NOVEMBER 1ST, 2013

Date: 10/30/13 Onsite Activities: examining sediment cores in enclosed shed
EHSI Onsite 1012 HAUER

PID Readings				
Time	Location	Activity	Reading	Comments
9:15	Shed	prepping area	0	bag down & 2 windows open
9:56	Shed	cutting 1st core opening in bunch	0.5	peak of 0.5 ppm
10:14	Shed	opened 2nd 3' section of core 101	max 0.2	minor "odor"
10:34	"	opened 3rd 3' section of 101	0	no PID hits - very minor in terms of odor
11:09	Shed	all SD-101 cores open	0	some PAH-like odor at core
12:02	Shed	still looking at core SD-101	0	"lower" end of core greatest PAH-like odor
13:12	Shed	Cutting 2nd core 102	0	
14:10	Shed	Core 102 exposed & examined	(12')	0
15:18	Shed	opening 3rd core SD106	up to 0.2	momentarily - more odor than other 2 cores today
15:30	Shed	fans turned on -	no VOC (0)	but odor
15:40	Shed	examining cores	up to 0.2	even w/ fan on the odor of PAH's noticeable
16:18	Shed	examining SD106	0	smells like motorballs. (odor open) smells like motorballs
17:09	Shed	examining SD106 (only parts left)	0	

See separate page for additional info

1 Note: others describe PAH-like odor at wood preservation odor

2 Note: Geologists spend a lot of time examining for presence of small bits of seeds.

Date: 10-31-13 Onsite Activities: Latex open & examining Willamette River Sediment cores at US-Govt Moorings - Portland
EHSI Onsite HAZHAUER

PID Readings

Time	Location	Activity	Reading	Comments
8:06	Shed	Prepping for day	Ø	about to cut 1 st core open (bag down)
9:15	Shed	Examining 1 st core of day SD-103	Ø	
9:35	Shed	dumping SD-103 into partially filled 55-gal drum		naphthalene-like odor PID =
10:01	Shed	opened 2 nd core of day SD-104	0-0.2	some odor near bottom spikes to 0.3 ppm naphthalene-like
10:10	Shed	open 2 windows on N end	Ø	
12:01	Shed	cutting 3 rd core of day SD-107	Ø	
12:14	Shed	opening & examining SD-107	Ø-0.2	odor - oil or preservative-like
13:43	Shed	examining SD-107	Ø	some odor when close to core
14:37	Shed	opening SD-104 for examination		
14:48	Shed	Examining SD-104	Ø	very sandy core
15:55	Shed	Examining SD-104	Ø	

NOTE: @ 14:24 indoor PID readings became variable 0-1.0 ppm for ~1 minute since no odor-generating activities were occurring in the shed I went upwind w/ the PID and found several carpenters in an alley (behind building) & PID in their vicinity was ~0-1.0 variable outdoors. No solvents were seen. Returning to shed PID readings back to Ø in shed.

See separate page for additional info

Date: 11/1/13 Onsite Activities: cutting open & examining final core from
 EHSI Onsite: HOLZHAUSEN Willamette River sediments SD-108
Paul Van Hanne - Shannon Wilson (Saw)

Time	Location	Activity	PID Readings Mike (Saw) Several ACE reps	Reading	Comments several industry Geologists
8:15	Shed	cutting cores		Ø	
9:05	Shed	just opened core SD-108		Ø	no odors
10:01	Shed	examining SD-108		Ø	
11:01	Shed	shut logging SD-108		Ø	only Paul, Bill & I left
11:31	leaving site	examination complete - Paul & Bill doing clean-up			

notes both Cody (Saw 10/30) & Bill (Saw) are Environmental Engineers

See separate page for additional info

APPENDIX C

**ANALYTICAL DATA AND INVESTIGATION-DERIVED WASTE
DISPOSAL DOCUMENTS**

APPENDIX C

**ANALYTICAL DATA AND INVESTIGATION-DERIVED WASTE
DISPOSAL DOCUMENTS**

TABLE OF CONTENTS

SUB-APPENDICES

- C.1 Analytical Data
- C.2 Investigation-derived Waste Disposal Documents

SUB-APPENDIX C.1
ANALYTICAL DATA

SUB-APPENDIX C.1

ANALYTICAL DATA

TABLE OF CONTENTS

TABLES

C.1-1	Diesel/Oil Range Hydrocarbons Analyte Summary
C.1-2	RCRA 8 Metals Analyte Summary
C.1-3	Organochlorine Pesticides Analyte Summary
C.1-4	Volatile Organic Compounds Analyte Summary
C.1-5	Semivolatile Organic Compounds Analyte Summary (2 pages)
C.1-6	Semivolatile Organic Compounds Analyte Summary

REPORT

OnSite Environmental, Inc., prepared for Shannon & Wilson, Inc., entitled, "Analytical Data for Project 21-1-21880-007, Laboratory Reference No. 1311-013," November 13, 2013 (34 pages).

**TABLE C.1-1
DIESEL/OIL-RANGE HYDROCARBONS ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample ID	Result Reported Value¹ (mg/kg)	Hazardous Waste Characterization Trigger² (mg/kg)	Oregon Clean Fill Criteria³ (mg/kg)
Diesel Range Organics	NWTPH-DX	10-29-CORES	680	not listed	1,100
Lube Oil	NWTPH-DX	10-29-CORES	970	not listed	2,800
Diesel Range Organics	NWTPH-DX	10-30-CORES	240	not listed	1,100
Lube Oil	NWTPH-DX	10-30-CORES	490	not listed	2,800

Notes:

¹ Only detected results are presented in this summary table.

² U.S. Environmental Protection Agency's (EPA's) Toxicity Characteristic Trigger Trigger is based on 20 times the EPA - Resource Conservation and Recovery Act Hazardous Waste Maximum Concentration for Toxicity Characteristic results based on conservative assumption 100 percent of sample is leachable.

³ 2012 Oregon Draft Clean Fill Value = Oregon Draft Clean Fill Table for Uplands.

ID = Identification

mg/kg = milligrams per kilogram or parts per million

NWTPH-Dx = Northwest Total Petroleum Hydrocarbons-Diesel Extended

**TABLE C.1-2
RCRA 8 METALS ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample ID	Result Reported Value¹ (mg/kg)	Hazardous Waste Characterization Trigger² (mg/kg)	Oregon Clean Fill Criteria³ (mg/kg)	Portland Basin Background⁴ (mg/kg)
Barium	SW6010C	10-29-CORES	190	2,000	686.1	790
Chromium	SW6010C	10-29-CORES	52	100	73	76
Lead	SW6010C	10-29-CORES	66	100	37.43	79
Barium	SW6010C	10-30-CORES	160	2,000	686.1	790
Chromium	SW6010C	10-30-CORES	38	100	73	76
Lead	SW6010C	10-30-CORES	38	100	37.43	79

Notes:

¹ Only detected results are presented in this summary table.

² U.S. Environmental Protection Agency's (EPA's) Toxicity Characteristic Trigger Trigger is based on 20 times the U.S. EPA - RCRA Hazardous Waste Maximum Concentration for Toxicity Characteristic results based on conservative assumption 100 percent of sample is leachable.

³ 2012 Oregon Draft Clean Fill Value = Oregon Draft Clean Fill Table for Uplands.

⁴ Background Levels of Metals in Soils for Cleanups, Oregon Department of Environmental Quality, March 20, 2013.

ID = Identification

mg/kg = milligrams per kilogram or parts per million

RCRA = Resource Conservation and Recovery Act

**TABLE C.1-3
ORGANOCHLORINE PESTICIDES ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample ID	Result Reported Value¹ (µg/kg)	Hazardous Waste Characterization Trigger² (µg/kg)	Oregon Clean Fill Criteria³ (µg/kg)
4,4'-DDD	SW8081B	10-29-CORES	29	not listed	21
4,4'-DDD	SW8081B	10-30-CORES	36	not listed	21
alpha-Chlordane	SW8081B	10-30-CORES	22	600	1,600

Notes:

¹ Only detected results are presented in this summary table.

² U.S. Environmental Protection Agency's (EPA's) Toxicity Characteristic Trigger Trigger is based on 20 times the U.S. EPA - Resource Conservation and Recovery Act Hazardous Waste Maximum Concentration for Toxicity Characteristic results based on conservative assumption 100 percent of sample is leachable.

³ 2012 Oregon Draft Clean Fill Value = Oregon Draft Clean Fill Table for Uplands.

ID = Identification

µg/kg = micrograms per kilogram or parts per billion

**TABLE C.1-4
VOLATILE ORGANIC COMPOUNDS ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample ID	Result Reported Value¹ (mg/kg)	Hazardous Waste Characterization Trigger² (mg/kg)	Oregon Clean Fill Criteria³ (mg/kg)
1,2,4-Trimethylbenzene	SW8260C	10-29-CORES	0.23	not listed	82
Ethylbenzene	SW8260C	10-29-CORES	0.35	not listed	0.82
Naphthalene	SW8260C	10-29-CORES	14	not listed	1.1
2-Butanone	SW8260C	10-30-CORES	0.017	4,000	28,000
Acetone	SW8260C	10-30-CORES	0.076	not listed	1,250
Benzene	SW8260C	10-30-CORES	0.0051	10	0.08
Carbon Disulfide	SW8260C	10-30-CORES	0.021	not listed	820
Ethylbenzene	SW8260C	10-30-CORES	0.027	not listed	0.82
Isopropylbenzene	SW8260C	10-30-CORES	0.011	not listed	not listed
m, p-Xylene	SW8260C	10-30-CORES	0.0042	not listed	100
Naphthalene	SW8260C	10-30-CORES	1.3	not listed	1.1
o-Xylene	SW8260C	10-30-CORES	0.0045	not listed	1

Notes:

¹ Only detected results are presented in this summary table.

² U.S. Environmental Protection Agency's (EPA's) Toxicity Characteristic Trigger Trigger is based on 20 times the U.S. EPA - Resource Conservation and Recovery Act Hazardous Waste Maximum Concentration for Toxicity Characteristic results based on conservative assumption 100 percent of sample is leachable.

³ 2012 Oregon Draft Clean Fill Value = Oregon Draft Clean Fill Table for Uplands.

ID = Identification

mg/kg = milligrams per kilogram or parts per million

**TABLE C.1-5
SEMIVOLATILE ORGANIC COMPOUNDS ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample ID	Result Reported Value¹ (mg/kg)	Hazardous Waste Characterization Trigger² (mg/kg)	Oregon Clean Fill Criteria³ (mg/kg)
1-Methylnaphthalene	SW8270D	10-29-CORES	11	not listed	22
2-Methylnaphthalene	SW8270D	10-29-CORES	12	not listed	310
Acenaphthene	SW8270D	10-29-CORES	17	not listed	29
Acenaphthylene	SW8270D	10-29-CORES	1.4	not listed	not listed
Anthracene	SW8270D	10-29-CORES	16	not listed	29
Benz[a]anthracene	SW8270D	10-29-CORES	14	not listed	0.15
Benzo(a)pyrene	SW8270D	10-29-CORES	16	not listed	0.015
Benzo(b)fluoranthene	SW8270D	10-29-CORES	16	not listed	0.15
Benzo(ghi)perylene	SW8270D	10-29-CORES	14	not listed	not listed
Benzo(j,k)fluoranthene	SW8270D	10-29-CORES	4.8	not listed	0.38
Carbazole	SW8270D	10-29-CORES	2.3	not listed	not listed
Chrysene	SW8270D	10-29-CORES	17	not listed	14
Dibenzo(a,h)anthracene	SW8270D	10-29-CORES	1.8	not listed	0.015
Dibenzofuran	SW8270D	10-29-CORES	2.1	not listed	0.002
Fluoranthene	SW8270D	10-29-CORES	46	not listed	29
Fluorene	SW8270D	10-29-CORES	12	not listed	29
Indeno(1,2,3-cd)pyrene	SW8270D	10-29-CORES	9.9	not listed	0.15
Naphthalene	SW8270D	10-29-CORES	15	not listed	1.1
Phenanthrene	SW8270D	10-29-CORES	62	not listed	not listed
Pyrene	SW8270D	10-29-CORES	50	not listed	1,700
1-Methylnaphthalene	SW8270D	10-30-CORES	1.3	not listed	22
2-Methylnaphthalene	SW8270D	10-30-CORES	1.2	not listed	310
Acenaphthene	SW8270D	10-30-CORES	2.1	not listed	29
Acenaphthylene	SW8270D	10-30-CORES	0.43	not listed	not listed
Anthracene	SW8270D	10-30-CORES	2.6	not listed	29
Benz[a]anthracene	SW8270D	10-30-CORES	2.9	not listed	0.15
Benzo(a)pyrene	SW8270D	10-30-CORES	2.9	not listed	0.015
Benzo(b)fluoranthene	SW8270D	10-30-CORES	3.6	not listed	0.15
Benzo(ghi)perylene	SW8270D	10-30-CORES	3.2	not listed	not listed
Benzo(j,k)fluoranthene	SW8270D	10-30-CORES	1.0	not listed	0.38
Carbazole	SW8270D	10-30-CORES	0.30	not listed	not listed
Chrysene	SW8270D	10-30-CORES	3.7	not listed	14
Dibenzo(a,h)anthracene	SW8270D	10-30-CORES	0.41	not listed	0.015
Dibenzofuran	SW8270D	10-30-CORES	0.43	not listed	0.002

**TABLE C.1-5
SEMIVOLATILE ORGANIC COMPOUNDS ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample ID	Result Reported Value¹ (mg/kg)	Hazardous Waste Characterization Trigger² (mg/kg)	Oregon Clean Fill Criteria³ (mg/kg)
Fluoranthene	SW8270D	10-30-CORES	8.7	not listed	29
Fluorene	SW8270D	10-30-CORES	1.8	not listed	29
Indeno(1,2,3-cd)pyrene	SW8270D	10-30-CORES	2.3	not listed	0.15
Naphthalene	SW8270D	10-30-CORES	2.3	not listed	1.1
Phenanthrene	SW8270D	10-30-CORES	9.9	not listed	not listed
Pyrene	SW8270D	10-30-CORES	8.9	not listed	1,700

Notes:

¹ Only detected results are presented in this summary table.

² U.S. Environmental Protection Agency's (EPA's) Toxicity Characteristic Trigger Trigger is based on 20 times the U.S. EPA - Resource Conservation and Recovery Act Hazardous Waste Maximum Concentration for Toxicity Characteristic results based on conservative assumption 100 percent of sample is leachable.

³ 2012 Oregon Draft Clean Fill Value = Oregon Draft Clean Fill Table for Uplands.

ID = Identification

mg/kg = milligrams per kilogram or parts per million (ppm)

**TABLE C.1-6
CYANIDE ANALYTE SUMMARY**

Result Parameter Name	Result Method Code	Sample_ID	Result Reported Value¹ (µg/g)	Hazardous Waste Characterization Trigger² (µg/g)	Oregon Clean Fill Criteria³ (µg/g)
Total Cyanide	SW846 9012	10-29-CORES	19	not listed	47
Total Cyanide	SW846 9012	10-30-CORES	5.7	not listed	47

Notes:

¹ Only detected results are presented in this summary table.

² U.S. Environmental Protection Agency's (EPA's) Toxicity Characteristic Trigger Trigger is based on 20 times the U.S. EPA - Resource Conservation and Recovery Act Hazardous Waste Maximum Concentration for Toxicity Characteristic results based on conservative assumption 100 percent of sample is leachable.

³ 2012 Oregon Draft Clean Fill Value = Oregon Draft Clean Fill Table for Uplands.

ID = Identification

µg/g = micrograms per gram or parts per million



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 13, 2013

Agnes Tirao
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, WA 98103

Re: Analytical Data for Project 21-1-21880-007
Laboratory Reference No. 1311-013

Dear Agnes:

Enclosed are the analytical results and associated quality control data for samples submitted on November 2, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal stroke extending to the right.

David Baumeister
Project Manager

Enclosures

Date of Report: November 13, 2013
Samples Submitted: November 2, 2013
Laboratory Reference: 1311-013
Project: 21-1-21880-007

Case Narrative

Samples were collected on October 31 and November 1, 2013 and received by the laboratory on November 2, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Volatiles EPA 8260C Analysis

Per EPA method 5035A, samples were received by the laboratory in pre-weighed 40 ml VOA vials preserved with either Methanol or Sodium Bisulfate.

Some MTCA Method A cleanup levels are non-achievable for sample 10-29-CORES due to the necessary dilution of the sample.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Organochlorine Pesticides by EPA 8081B Analysis

Associated sample 11-039-08 was used as the MS/MSD. The percent recovery value (%R) for the compound Heptachlor in the MSD (56%) was below the quality control limits of 57-101%. All other quality control recoveries were within quality control limits, no further action was performed.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

NWTPH-Dx

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
Diesel Range Organics	680	46	NWTPH-Dx	11-5-13	11-6-13	
Lube Oil Range Organics	970	93	NWTPH-Dx	11-5-13	11-6-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	75	50-150				
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
Diesel Range Organics	240	41	NWTPH-Dx	11-5-13	11-6-13	
Lube Oil Range Organics	490	82	NWTPH-Dx	11-5-13	11-6-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	69	50-150				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**NWTPH-Dx
 QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1105S1					
Diesel Range Organics	ND	25	NWTPH-Dx	11-5-13	11-5-13	
Lube Oil Range Organics	ND	50	NWTPH-Dx	11-5-13	11-5-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	91	50-150				

Analyte	Result		Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE							
Laboratory ID:	11-028-01						
	ORIG	DUP					
Diesel Range Organics	161	135			18	NA	M
Lube Oil	58.8	72.5			21	NA	
<i>Surrogate:</i>							
<i>o-Terphenyl</i>			84	79	50-150		

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

VOLATILES EPA 8260C
 Page 1 of 2

Matrix: Soil
 Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
CFC-12	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Chloromethane	ND	0.93	EPA 8260C	11-4-13	11-4-13	
Vinyl Chloride	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Bromomethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Chloroethane	ND	0.72	EPA 8260C	11-4-13	11-4-13	
CFC-11	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloroethene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Acetone	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Methyl Iodide	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Carbon Disulfide	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Methylene Chloride	ND	0.90	EPA 8260C	11-4-13	11-4-13	
Trans-1,2-Dichloroethene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Methyl t-Butyl Ether	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloroethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Vinyl Acetate	ND	0.72	EPA 8260C	11-4-13	11-4-13	
2,2-Dichloropropane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Cis-1,2-Dichloroethene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
2-Butanone	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Bromochloromethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Chloroform	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,1,1-Trichloroethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Carbon Tetrachloride	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloropropene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Benzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,2-Dichloroethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Trichloroethene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,2-Dichloropropane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Dibromomethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Dichlorobromomethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
2-Chloroethylvinylether	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Cis-1,3-Dichloropropene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Methyl Isobutyl Ketone	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Toluene	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Trans-1,3-Dichloropropene	ND	0.14	EPA 8260C	11-4-13	11-4-13	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

VOLATILES EPA 8260C
 Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
1,1,2-Trichloroethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Tetrachloroethene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,3-Dichloropropane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
2-Hexanone	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Dibromochloromethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Ethylene dibromide	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Chlorobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,1,1,2-Tetrachloroethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Ethylbenzene	0.35	0.14	EPA 8260C	11-4-13	11-4-13	
m,p-Xylene	ND	0.29	EPA 8260C	11-4-13	11-4-13	
o-Xylene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Styrene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Bromoform	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Isopropylbenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Bromobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,1,2,2-Tetrachloroethane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,2,3-Trichloropropane	ND	0.14	EPA 8260C	11-4-13	11-4-13	
n-Propylbenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
2-Chlorotoluene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
4-Chlorotoluene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,3,5-Trimethylbenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
tert-Butylbenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,2,4-Trimethylbenzene	0.23	0.14	EPA 8260C	11-4-13	11-4-13	
sec-Butylbenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,3-Dichlorobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
p-Isopropyltoluene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,4-Dichlorobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,2-Dichlorobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
n-Butylbenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
1,2-Dibromo-3-chloropropane	ND	0.72	EPA 8260C	11-4-13	11-4-13	
1,2,4-Trichlorobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
Hexachlorobutadiene	ND	0.72	EPA 8260C	11-4-13	11-4-13	
Naphthalene	14	0.14	EPA 8260C	11-4-13	11-4-13	
1,2,3-Trichlorobenzene	ND	0.14	EPA 8260C	11-4-13	11-4-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>Dibromofluoromethane</i>	<i>91</i>	<i>65-129</i>				
<i>Toluene-d8</i>	<i>96</i>	<i>77-122</i>				
<i>Benzene, 1-bromo-4-fluoro-</i>	<i>104</i>	<i>73-124</i>				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

VOLATILES EPA 8260C
 Page 1 of 2

Matrix: Soil
 Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
CFC-12	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Chloromethane	ND	0.0091	EPA 8260C	11-4-13	11-4-13	
Vinyl Chloride	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Bromomethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Chloroethane	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
CFC-11	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloroethene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Acetone	0.076	0.0070	EPA 8260C	11-4-13	11-4-13	Y
Methyl Iodide	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
Carbon Disulfide	0.021	0.0014	EPA 8260C	11-4-13	11-4-13	
Methylene Chloride	ND	0.0089	EPA 8260C	11-4-13	11-4-13	
Trans-1,2-Dichloroethene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Methyl t-Butyl Ether	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloroethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Vinyl Acetate	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
2,2-Dichloropropane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Cis-1,2-Dichloroethene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
2-Butanone	0.017	0.0070	EPA 8260C	11-4-13	11-4-13	
Bromochloromethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Chloroform	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,1,1-Trichloroethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Carbon Tetrachloride	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloropropene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Benzene	0.0051	0.0014	EPA 8260C	11-4-13	11-4-13	
1,2-Dichloroethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Trichloroethene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,2-Dichloropropane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Dibromomethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Dichlorobromomethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
2-Chloroethylvinylether	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
Cis-1,3-Dichloropropene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Methyl Isobutyl Ketone	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
Toluene	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
Trans-1,3-Dichloropropene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

VOLATILES EPA 8260C
 Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
1,1,2-Trichloroethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Tetrachloroethene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,3-Dichloropropane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
2-Hexanone	ND	0.0070	EPA 8260C	11-4-13	11-4-13	
Dibromochloromethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Ethylene dibromide	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Chlorobenzene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
1,1,1,2-Tetrachloroethane	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Ethylbenzene	0.027	0.0014	EPA 8260C	11-4-13	11-4-13	
m,p-Xylene	0.0042	0.0028	EPA 8260C	11-4-13	11-4-13	
o-Xylene	0.0045	0.0014	EPA 8260C	11-4-13	11-4-13	
Styrene	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Bromoform	ND	0.0014	EPA 8260C	11-4-13	11-4-13	
Isopropylbenzene	0.011	0.0014	EPA 8260C	11-4-13	11-4-13	
Bromobenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,1,2,2-Tetrachloroethane	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,2,3-Trichloropropane	ND	0.11	EPA 8260C	11-4-13	11-4-13	
n-Propylbenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
2-Chlorotoluene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
4-Chlorotoluene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,3,5-Trimethylbenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
tert-Butylbenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,2,4-Trimethylbenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
sec-Butylbenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,3-Dichlorobenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
p-Isopropyltoluene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,4-Dichlorobenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,2-Dichlorobenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
n-Butylbenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
1,2-Dibromo-3-chloropropane	ND	0.57	EPA 8260C	11-4-13	11-4-13	
1,2,4-Trichlorobenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
Hexachlorobutadiene	ND	0.57	EPA 8260C	11-4-13	11-4-13	
Naphthalene	1.3	0.11	EPA 8260C	11-4-13	11-4-13	
1,2,3-Trichlorobenzene	ND	0.11	EPA 8260C	11-4-13	11-4-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>Dibromofluoromethane</i>	<i>112</i>	<i>65-129</i>				
<i>Toluene-d8</i>	<i>97</i>	<i>77-122</i>				
<i>Benzene, 1-bromo-4-fluoro-</i>	<i>91</i>	<i>73-124</i>				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**VOLATILES EPA 8260C
 METHOD BLANK QUALITY CONTROL**

Page 1 of 2

Matrix: Soil
 Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB1104S1					
CFC-12	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Chloromethane	ND	0.0065	EPA 8260C	11-4-13	11-4-13	
Vinyl Chloride	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Bromomethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Chloroethane	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
CFC-11	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Acetone	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Methyl Iodide	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Carbon Disulfide	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Methylene Chloride	ND	0.0063	EPA 8260C	11-4-13	11-4-13	
Trans-1,2-Dichloroethene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Vinyl Acetate	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Cis-1,2-Dichloroethene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
2-Butanone	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Bromochloromethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Chloroform	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Benzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Trichloroethene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Dibromomethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Dichlorobromomethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
2-Chloroethylvinylether	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Cis-1,3-Dichloropropene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Toluene	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Trans-1,3-Dichloropropene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
 Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB1104S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Tetrachloroethene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
2-Hexanone	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Dibromochloromethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Ethylene dibromide	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Chlorobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Ethylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
m,p-Xylene	ND	0.0020	EPA 8260C	11-4-13	11-4-13	
o-Xylene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Styrene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Bromoform	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Isopropylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Bromobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
n-Propylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
2-Chlorotoluene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
4-Chlorotoluene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
tert-Butylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
sec-Butylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
n-Butylbenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	11-4-13	11-4-13	
Naphthalene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	11-4-13	11-4-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>Dibromofluoromethane</i>	<i>100</i>	<i>65-129</i>				
<i>Toluene-d8</i>	<i>102</i>	<i>77-122</i>				
<i>Benzene, 1-bromo-4-fluoro-</i>	<i>108</i>	<i>73-124</i>				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**VOLATILES EPA 8260C
 SB/SBD QUALITY CONTROL**

Matrix: Soil
 Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery	RPD	RPD	Flags
					SB	SBD	Limits	RPD	Limit	
SPIKE BLANKS										
Laboratory ID:	SB1104S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	0.0543	0.0530	0.0500	0.0500	109	106	56-141	2	15	
Benzene	0.0458	0.0454	0.0500	0.0500	92	91	70-121	1	15	
Trichloroethene	0.0494	0.0478	0.0500	0.0500	99	96	74-118	3	15	
Toluene	0.0489	0.0479	0.0500	0.0500	98	96	75-120	2	15	
Chlorobenzene	0.0530	0.0513	0.0500	0.0500	106	103	75-120	3	15	
<i>Surrogate:</i>										
<i>Dibromofluoromethane</i>					99	96	65-129			
<i>Toluene-d8</i>					101	98	77-122			
<i>Benzene, 1-bromo-4-fluoro-</i>					105	102	73-124			

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

SEMIVOLATILES EPA 8270D/SIM
 page 1 of 2

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
n-Nitrosodimethylamine	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Pyridine	ND	3.1	EPA 8270D	11-5-13	11-6-13	
Phenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Aniline	ND	1.5	EPA 8270D	11-5-13	11-6-13	
bis(2-Chloroethyl)ether	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2-Chlorophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,3-Dichlorobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,4-Dichlorobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Benzyl alcohol	ND	1.5	EPA 8270D	11-5-13	11-6-13	
1,2-Dichlorobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2-Methylphenol (o-Cresol)	ND	0.31	EPA 8270D	11-5-13	11-6-13	
bis(2-Chloroisopropyl)ether	ND	0.31	EPA 8270D	11-5-13	11-6-13	
(3+4)-Methylphenol (m,p-Cresol)	ND	0.31	EPA 8270D	11-5-13	11-6-13	
n-Nitroso-di-n-propylamine	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Hexachloroethane	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Nitrobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Isophorone	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2-Nitrophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,4-Dimethylphenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
bis(2-Chloroethoxy)methane	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,4-Dichlorophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,2,4-Trichlorobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Naphthalene	15	0.31	EPA 8270D	11-5-13	11-6-13	
4-Chloroaniline	ND	1.5	EPA 8270D	11-5-13	11-6-13	
Hexachlorobutadiene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
4-Chloro-3-methylphenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2-Methylnaphthalene	12	0.31	EPA 8270D	11-5-13	11-6-13	
1-Methylnaphthalene	11	0.31	EPA 8270D	11-5-13	11-6-13	
Hexachlorocyclopentadiene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,4,6-Trichlorophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,3-Dichloroaniline	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,4,5-Trichlorophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2-Chloronaphthalene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2-Nitroaniline	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,4-Dinitrobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Dimethylphthalate	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,3-Dinitrobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,6-Dinitrotoluene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,2-Dinitrobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Acenaphthylene	1.4	0.31	EPA 8270D	11-5-13	11-6-13	
3-Nitroaniline	ND	0.31	EPA 8270D	11-5-13	11-6-13	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

SEMIVOLATILES EPA 8270D/SIM
 page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
2,4-Dinitrophenol	ND	1.5	EPA 8270D	11-5-13	11-6-13	
Acenaphthene	17	0.31	EPA 8270D	11-5-13	11-6-13	
4-Nitrophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,4-Dinitrotoluene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Dibenzofuran	2.1	0.31	EPA 8270D	11-5-13	11-6-13	
2,3,5,6-Tetrachlorophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
2,3,4,6-Tetrachlorophenol	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Diethylphthalate	ND	1.5	EPA 8270D	11-5-13	11-6-13	
4-Chlorophenyl-phenylether	ND	0.31	EPA 8270D	11-5-13	11-6-13	
4-Nitroaniline	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Fluorene	12	0.31	EPA 8270D	11-5-13	11-6-13	
4,6-Dinitro-2-methylphenol	ND	1.5	EPA 8270D	11-5-13	11-6-13	
n-Nitrosodiphenylamine	ND	0.31	EPA 8270D	11-5-13	11-6-13	
1,2-Diphenylhydrazine	ND	0.31	EPA 8270D	11-5-13	11-6-13	
4-Bromophenyl-phenylether	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Hexachlorobenzene	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Pentachlorophenol	ND	1.5	EPA 8270D	11-5-13	11-6-13	
Phenanthrene	62	1.2	EPA 8270D	11-5-13	11-7-13	
Anthracene	16	0.31	EPA 8270D	11-5-13	11-6-13	
Carbazole	2.3	0.31	EPA 8270D	11-5-13	11-6-13	
Di-n-butylphthalate	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Fluoranthene	46	1.2	EPA 8270D	11-5-13	11-7-13	
Benzidine	ND	3.1	EPA 8270D	11-5-13	11-6-13	
Pyrene	50	1.2	EPA 8270D	11-5-13	11-7-13	
Butylbenzylphthalate	ND	0.31	EPA 8270D	11-5-13	11-6-13	
bis-2-Ethylhexyladipate	ND	0.31	EPA 8270D	11-5-13	11-6-13	
3,3'-Dichlorobenzidine	ND	1.5	EPA 8270D	11-5-13	11-6-13	
Benz[a]anthracene	14	0.31	EPA 8270D	11-5-13	11-6-13	
Chrysene	17	0.31	EPA 8270D	11-5-13	11-6-13	
bis(2-Ethylhexyl)phthalate	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Di-n-octylphthalate	ND	0.31	EPA 8270D	11-5-13	11-6-13	
Benzo(b)fluoranthene	16	0.31	EPA 8270D	11-5-13	11-6-13	
Benzo(j,k)fluoranthene	4.8	0.31	EPA 8270D	11-5-13	11-6-13	
Benzo(a)pyrene	16	0.31	EPA 8270D	11-5-13	11-6-13	
Indeno[1,2,3-cd]pyrene	9.9	0.31	EPA 8270D	11-5-13	11-6-13	
Dibenzo(a,h)anthracene	1.8	0.31	EPA 8270D	11-5-13	11-6-13	
Benzo(ghi)perylene	14	0.31	EPA 8270D	11-5-13	11-6-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
2-Fluorophenol	32	24 - 95				
Phenol-d6	41	34 - 101				
D5-Nitrobenzene	45	32 - 102				
2-Fluorobiphenyl	59	44 - 97				
2,4,6-Tribromophenol	63	34 - 124				
D14-Terphenyl	66	47 - 114				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

SEMIVOLATILES EPA 8270D/SIM
 page 1 of 2

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
n-Nitrosodimethylamine	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Pyridine	ND	2.7	EPA 8270D	11-5-13	11-6-13	
Phenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Aniline	ND	1.4	EPA 8270D	11-5-13	11-6-13	
bis(2-Chloroethyl)ether	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2-Chlorophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,3-Dichlorobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,4-Dichlorobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Benzyl alcohol	ND	1.4	EPA 8270D	11-5-13	11-6-13	
1,2-Dichlorobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2-Methylphenol (o-Cresol)	ND	0.27	EPA 8270D	11-5-13	11-6-13	
bis(2-Chloroisopropyl)ether	ND	0.27	EPA 8270D	11-5-13	11-6-13	
(3+4)-Methylphenol (m,p-Cresol)	ND	0.27	EPA 8270D	11-5-13	11-6-13	
n-Nitroso-di-n-propylamine	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Hexachloroethane	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Nitrobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Isophorone	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2-Nitrophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,4-Dimethylphenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
bis(2-Chloroethoxy)methane	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,4-Dichlorophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,2,4-Trichlorobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Naphthalene	2.3	0.27	EPA 8270D	11-5-13	11-6-13	
4-Chloroaniline	ND	1.4	EPA 8270D	11-5-13	11-6-13	
Hexachlorobutadiene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
4-Chloro-3-methylphenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2-Methylnaphthalene	1.2	0.27	EPA 8270D	11-5-13	11-6-13	
1-Methylnaphthalene	1.3	0.27	EPA 8270D	11-5-13	11-6-13	
Hexachlorocyclopentadiene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,4,6-Trichlorophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,3-Dichloroaniline	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,4,5-Trichlorophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2-Chloronaphthalene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2-Nitroaniline	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,4-Dinitrobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Dimethylphthalate	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,3-Dinitrobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,6-Dinitrotoluene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,2-Dinitrobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Acenaphthylene	0.43	0.27	EPA 8270D	11-5-13	11-6-13	
3-Nitroaniline	ND	0.27	EPA 8270D	11-5-13	11-6-13	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

SEMIVOLATILES EPA 8270D/SIM
 page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
2,4-Dinitrophenol	ND	1.4	EPA 8270D	11-5-13	11-6-13	
Acenaphthene	2.1	0.27	EPA 8270D	11-5-13	11-6-13	
4-Nitrophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,4-Dinitrotoluene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Dibenzofuran	0.43	0.27	EPA 8270D	11-5-13	11-6-13	
2,3,5,6-Tetrachlorophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
2,3,4,6-Tetrachlorophenol	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Diethylphthalate	ND	1.4	EPA 8270D	11-5-13	11-6-13	
4-Chlorophenyl-phenylether	ND	0.27	EPA 8270D	11-5-13	11-6-13	
4-Nitroaniline	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Fluorene	1.8	0.27	EPA 8270D	11-5-13	11-6-13	
4,6-Dinitro-2-methylphenol	ND	1.4	EPA 8270D	11-5-13	11-6-13	
n-Nitrosodiphenylamine	ND	0.27	EPA 8270D	11-5-13	11-6-13	
1,2-Diphenylhydrazine	ND	0.27	EPA 8270D	11-5-13	11-6-13	
4-Bromophenyl-phenylether	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Hexachlorobenzene	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Pentachlorophenol	ND	1.4	EPA 8270D	11-5-13	11-6-13	
Phenanthrene	9.9	0.27	EPA 8270D	11-5-13	11-6-13	
Anthracene	2.6	0.27	EPA 8270D	11-5-13	11-6-13	
Carbazole	0.30	0.27	EPA 8270D	11-5-13	11-6-13	
Di-n-butylphthalate	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Fluoranthene	8.7	0.27	EPA 8270D	11-5-13	11-6-13	
Benzidine	ND	2.7	EPA 8270D	11-5-13	11-6-13	
Pyrene	8.9	0.27	EPA 8270D	11-5-13	11-6-13	
Butylbenzylphthalate	ND	0.27	EPA 8270D	11-5-13	11-6-13	
bis-2-Ethylhexyladipate	ND	0.27	EPA 8270D	11-5-13	11-6-13	
3,3'-Dichlorobenzidine	ND	1.4	EPA 8270D	11-5-13	11-6-13	
Benz[a]anthracene	2.9	0.27	EPA 8270D	11-5-13	11-6-13	
Chrysene	3.7	0.27	EPA 8270D	11-5-13	11-6-13	
bis(2-Ethylhexyl)phthalate	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Di-n-octylphthalate	ND	0.27	EPA 8270D	11-5-13	11-6-13	
Benzo(b)fluoranthene	3.6	0.27	EPA 8270D	11-5-13	11-6-13	
Benzo(j,k)fluoranthene	1.0	0.27	EPA 8270D	11-5-13	11-6-13	
Benzo(a)pyrene	2.9	0.27	EPA 8270D	11-5-13	11-6-13	
Indeno[1,2,3-cd]pyrene	2.3	0.27	EPA 8270D	11-5-13	11-6-13	
Dibenzo(a,h)anthracene	0.41	0.27	EPA 8270D	11-5-13	11-6-13	
Benzo(ghi)perylene	3.2	0.27	EPA 8270D	11-5-13	11-6-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
2-Fluorophenol	38	24 - 95				
Phenol-d6	44	34 - 101				
D5-Nitrobenzene	44	32 - 102				
2-Fluorobiphenyl	57	44 - 97				
2,4,6-Tribromophenol	58	34 - 124				
D14-Terphenyl	60	47 - 114				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**SEMIVOLATILES EPA 8270D/SIM
 METHOD BLANK QUALITY CONTROL**

page 1 of 2

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB1105S1					
n-Nitrosodimethylamine	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Pyridine	ND	0.33	EPA 8270D	11-5-13	11-5-13	
Phenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Aniline	ND	0.17	EPA 8270D	11-5-13	11-5-13	
bis(2-Chloroethyl)ether	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2-Chlorophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,3-Dichlorobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,4-Dichlorobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Benzyl alcohol	ND	0.17	EPA 8270D	11-5-13	11-5-13	
1,2-Dichlorobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2-Methylphenol (o-Cresol)	ND	0.033	EPA 8270D	11-5-13	11-5-13	
bis(2-Chloroisopropyl)ether	ND	0.033	EPA 8270D	11-5-13	11-5-13	
(3+4)-Methylphenol (m,p-Cresol)	ND	0.033	EPA 8270D	11-5-13	11-5-13	
n-Nitroso-di-n-propylamine	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Hexachloroethane	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Nitrobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Isophorone	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2-Nitrophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,4-Dimethylphenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
bis(2-Chloroethoxy)methane	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,4-Dichlorophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,2,4-Trichlorobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Naphthalene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
4-Chloroaniline	ND	0.17	EPA 8270D	11-5-13	11-5-13	
Hexachlorobutadiene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
4-Chloro-3-methylphenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2-Methylnaphthalene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
1-Methylnaphthalene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Hexachlorocyclopentadiene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,4,6-Trichlorophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,3-Dichloroaniline	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,4,5-Trichlorophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2-Chloronaphthalene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2-Nitroaniline	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,4-Dinitrobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Dimethylphthalate	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,3-Dinitrobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,6-Dinitrotoluene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,2-Dinitrobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Acenaphthylene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
3-Nitroaniline	ND	0.033	EPA 8270D	11-5-13	11-5-13	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

SEMIVOLATILES EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL
 page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB1105S1					
2,4-Dinitrophenol	ND	0.17	EPA 8270D	11-5-13	11-5-13	
Acenaphthene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
4-Nitrophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,4-Dinitrotoluene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Dibenzofuran	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,3,5,6-Tetrachlorophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
2,3,4,6-Tetrachlorophenol	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Diethylphthalate	ND	0.17	EPA 8270D	11-5-13	11-5-13	
4-Chlorophenyl-phenylether	ND	0.033	EPA 8270D	11-5-13	11-5-13	
4-Nitroaniline	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Fluorene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
4,6-Dinitro-2-methylphenol	ND	0.17	EPA 8270D	11-5-13	11-5-13	
n-Nitrosodiphenylamine	ND	0.033	EPA 8270D	11-5-13	11-5-13	
1,2-Diphenylhydrazine	ND	0.033	EPA 8270D	11-5-13	11-5-13	
4-Bromophenyl-phenylether	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Hexachlorobenzene	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Pentachlorophenol	ND	0.17	EPA 8270D	11-5-13	11-5-13	
Phenanthrene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Anthracene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Carbazole	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Di-n-butylphthalate	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Fluoranthene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Benzidine	ND	0.33	EPA 8270D	11-5-13	11-5-13	
Pyrene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Butylbenzylphthalate	ND	0.033	EPA 8270D	11-5-13	11-5-13	
bis-2-Ethylhexyladipate	ND	0.033	EPA 8270D	11-5-13	11-5-13	
3,3'-Dichlorobenzidine	ND	0.17	EPA 8270D	11-5-13	11-5-13	
Benz[a]anthracene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Chrysene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
bis(2-Ethylhexyl)phthalate	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Di-n-octylphthalate	ND	0.033	EPA 8270D	11-5-13	11-5-13	
Benzo(b)fluoranthene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Benzo(j,k)fluoranthene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Benzo(a)pyrene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Indeno[1,2,3-cd]pyrene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Dibenzo(a,h)anthracene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
Benzo(ghi)perylene	ND	0.0067	EPA 8270D/SIM	11-5-13	11-5-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
2-Fluorophenol	79	24 - 95				
Phenol-d6	82	34 - 101				
D5-Nitrobenzene	86	32 - 102				
2-Fluorobiphenyl	73	44 - 97				
2,4,6-Tribromophenol	72	34 - 124				
D14-Terphenyl	81	47 - 114				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**SEMIVOLATILES EPA 8270D/SIM
 MS/MSD QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	10-324-09										
	MS	MSD	MS	MSD		MS	MSD				
Phenol	0.831	1.01	1.33	1.33	ND	62	76	43 - 104	19	25	
2-Chlorophenol	0.713	0.907	1.33	1.33	ND	54	68	41 - 104	24	32	
1,4-Dichlorobenzene	0.301	0.424	0.667	0.667	ND	45	64	23 - 95	34	42	
n-Nitroso-di-n-propylamine	0.361	0.453	0.667	0.667	ND	54	68	34 - 105	23	27	
1,2,4-Trichlorobenzene	0.375	0.480	0.667	0.667	ND	56	72	26 - 106	25	32	
4-Chloro-3-methylphenol	1.01	1.12	1.33	1.33	ND	76	84	52 - 109	10	20	
Acenaphthene	0.452	0.506	0.667	0.667	ND	68	76	51 - 104	11	21	
4-Nitrophenol	0.896	0.969	1.33	1.33	ND	67	73	52 - 121	8	22	
2,4-Dinitrotoluene	0.512	0.531	0.667	0.667	ND	77	80	53 - 115	4	22	
Pentachlorophenol	0.833	0.848	1.33	1.33	ND	63	64	29 - 131	2	28	
Pyrene	0.515	0.584	0.667	0.667	ND	77	88	41 - 123	13	35	
<i>Surrogate:</i>											
2-Fluorophenol						44	60	24 - 95			
Phenol-d6						53	64	34 - 101			
D5-Nitrobenzene						52	66	32 - 102			
2-Fluorobiphenyl						59	67	44 - 97			
2,4,6-Tribromophenol						60	68	34 - 124			
D14-Terphenyl						68	74	47 - 114			

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**PCBs
 EPA 8082A**

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
PCB-aroclor 1016	ND	0.092	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1221	ND	0.092	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1232	ND	0.092	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1242	ND	0.092	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1248	ND	0.092	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1254	ND	0.092	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1260	ND	0.092	EPA 8082A	11-5-13	11-5-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCB	52	51-138				
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
PCB-aroclor 1016	ND	0.081	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1221	ND	0.081	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1232	ND	0.081	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1242	ND	0.081	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1248	ND	0.081	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1254	ND	0.081	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1260	ND	0.081	EPA 8082A	11-5-13	11-5-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCB	61	51-138				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**PCBs EPA 8082A
 QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1105S1					
PCB-aroclor 1016	ND	0.050	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1221	ND	0.050	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1232	ND	0.050	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1242	ND	0.050	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1248	ND	0.050	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1254	ND	0.050	EPA 8082A	11-5-13	11-5-13	
PCB-aroclor 1260	ND	0.050	EPA 8082A	11-5-13	11-5-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCB	94	51-138				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	11-013-01										
	MS	MSD	MS	MSD		MS	MSD				
PCB-aroclor 1260	0.400	0.358	0.500	0.500	ND	80	72	49-136	11	14	
<i>Surrogate:</i>											
DCB						64	60	51-138			

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**ORGANOCHLORINE
 PESTICIDES EPA 8081B**

Matrix: Soil
 Units: ug/Kg (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-29-CORES					
Laboratory ID:	11-013-01					
alpha-BHC	ND	9.2	EPA 8081B	11-11-13	11-12-13	
gamma-BHC	ND	9.2	EPA 8081B	11-11-13	11-12-13	
beta-BHC	ND	9.2	EPA 8081B	11-11-13	11-12-13	
delta-BHC	ND	9.2	EPA 8081B	11-11-13	11-12-13	
Heptachlor	ND	9.2	EPA 8081B	11-11-13	11-12-13	
Aldrin	ND	9.2	EPA 8081B	11-11-13	11-12-13	
Heptachlor Epoxide	ND	9.2	EPA 8081B	11-11-13	11-12-13	
gamma-Chlordane	ND	18	EPA 8081B	11-11-13	11-12-13	
alpha-Chlordane	ND	18	EPA 8081B	11-11-13	11-12-13	
4,4'-DDE	ND	18	EPA 8081B	11-11-13	11-12-13	
Endosulfan I	ND	9.2	EPA 8081B	11-11-13	11-12-13	
Dieldrin	ND	18	EPA 8081B	11-11-13	11-12-13	
Endrin	ND	18	EPA 8081B	11-11-13	11-12-13	
4,4'-DDD	29	18	EPA 8081B	11-11-13	11-12-13	
Endosulfan II	ND	18	EPA 8081B	11-11-13	11-12-13	
4,4'-DDT	ND	18	EPA 8081B	11-11-13	11-12-13	
Endrin Aldehyde	ND	18	EPA 8081B	11-11-13	11-12-13	
Methoxychlor	ND	18	EPA 8081B	11-11-13	11-12-13	
Endosulfan Sulfate	ND	18	EPA 8081B	11-11-13	11-12-13	
Endrin Ketone	ND	18	EPA 8081B	11-11-13	11-12-13	
Toxaphene	ND	92	EPA 8081B	11-11-13	11-12-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
TCMX	49	37-110				
DCB	79	42-114				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**ORGANOCHLORINE
 PESTICIDES EPA 8081B**

Matrix: Soil
 Units: ug/Kg (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	10-30-CORES					
Laboratory ID:	11-013-02					
alpha-BHC	ND	8.1	EPA 8081B	11-11-13	11-12-13	
gamma-BHC	ND	8.1	EPA 8081B	11-11-13	11-12-13	
beta-BHC	ND	8.1	EPA 8081B	11-11-13	11-12-13	
delta-BHC	ND	8.1	EPA 8081B	11-11-13	11-12-13	
Heptachlor	ND	8.1	EPA 8081B	11-11-13	11-12-13	
Aldrin	ND	8.1	EPA 8081B	11-11-13	11-12-13	
Heptachlor Epoxide	ND	8.1	EPA 8081B	11-11-13	11-12-13	
gamma-Chlordane	ND	16	EPA 8081B	11-11-13	11-12-13	
alpha-Chlordane	22	16	EPA 8081B	11-11-13	11-12-13	
4,4'-DDE	ND	16	EPA 8081B	11-11-13	11-12-13	
Endosulfan I	ND	8.1	EPA 8081B	11-11-13	11-12-13	
Dieldrin	ND	16	EPA 8081B	11-11-13	11-12-13	
Endrin	ND	16	EPA 8081B	11-11-13	11-12-13	
4,4'-DDD	36	16	EPA 8081B	11-11-13	11-12-13	
Endosulfan II	ND	16	EPA 8081B	11-11-13	11-12-13	
4,4'-DDT	ND	16	EPA 8081B	11-11-13	11-12-13	
Endrin Aldehyde	ND	16	EPA 8081B	11-11-13	11-12-13	
Methoxychlor	ND	16	EPA 8081B	11-11-13	11-12-13	
Endosulfan Sulfate	ND	16	EPA 8081B	11-11-13	11-12-13	
Endrin Ketone	ND	16	EPA 8081B	11-11-13	11-12-13	
Toxaphene	ND	81	EPA 8081B	11-11-13	11-12-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
TCMX	54	37-110				
DCB	65	42-114				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**ORGANOCHLORINE
 PESTICIDES EPA 8081B
 METHOD BLANK QUALITY CONTROL**

Matrix: Soil
 Units: ug/Kg (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1111S1					
alpha-BHC	ND	5.0	EPA 8081B	11-11-13	11-11-13	
gamma-BHC	ND	5.0	EPA 8081B	11-11-13	11-11-13	
beta-BHC	ND	5.0	EPA 8081B	11-11-13	11-11-13	
delta-BHC	ND	5.0	EPA 8081B	11-11-13	11-11-13	
Heptachlor	ND	5.0	EPA 8081B	11-11-13	11-11-13	
Aldrin	ND	5.0	EPA 8081B	11-11-13	11-11-13	
Heptachlor Epoxide	ND	5.0	EPA 8081B	11-11-13	11-11-13	
gamma-Chlordane	ND	10	EPA 8081B	11-11-13	11-11-13	
alpha-Chlordane	ND	10	EPA 8081B	11-11-13	11-11-13	
4,4'-DDE	ND	10	EPA 8081B	11-11-13	11-11-13	
Endosulfan I	ND	5.0	EPA 8081B	11-11-13	11-11-13	
Dieldrin	ND	10	EPA 8081B	11-11-13	11-11-13	
Endrin	ND	10	EPA 8081B	11-11-13	11-11-13	
4,4'-DDD	ND	10	EPA 8081B	11-11-13	11-11-13	
Endosulfan II	ND	10	EPA 8081B	11-11-13	11-11-13	
4,4'-DDT	ND	10	EPA 8081B	11-11-13	11-11-13	
Endrin Aldehyde	ND	10	EPA 8081B	11-11-13	11-11-13	
Methoxychlor	ND	10	EPA 8081B	11-11-13	11-11-13	
Endosulfan Sulfate	ND	10	EPA 8081B	11-11-13	11-11-13	
Endrin Ketone	ND	10	EPA 8081B	11-11-13	11-11-13	
Toxaphene	ND	50	EPA 8081B	11-11-13	11-11-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
TCMX	72	37-110				
DCB	67	42-114				

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**ORGANOCHLORINE
 PESTICIDES EPA 8081B
 MS/MSD QUALITY CONTROL**

Matrix: Soil
 Units: ug/Kg (ppb)

Analyte	Result		Spike Level		Source	Percent		Recovery	RPD	RPD	Flags
	MS	MSD	MS	MSD	Result	Recovery	Limits	RPD	Limit		
MATRIX SPIKES											
Laboratory ID:	11-039-08										
	MS	MSD	MS	MSD		MS	MSD				
gamma-BHC	35.3	31.0	50.0	50.0	ND	71	62	45-117	13	15	
Heptachlor	31.7	27.8	50.0	50.0	ND	63	56	57-101	13	16	I
Aldrin	35.0	30.8	50.0	50.0	ND	70	62	50-119	13	16	
Dieldrin	82.8	73.1	125	125	ND	66	59	45-110	12	17	
Endrin	84.7	74.1	125	125	ND	68	59	56-117	13	18	
4,4'-DDT	78.7	69.5	125	125	ND	63	56	46-110	12	21	
Surrogate:											
TCMX						61	56	37-110			
DCB						61	56	42-114			

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	11-013-01					
Client ID:	10-29-CORES					
Arsenic	ND	18	6010C	11-6-13	11-6-13	
Barium	190	4.6	6010C	11-6-13	11-6-13	
Cadmium	ND	0.92	6010C	11-6-13	11-6-13	
Chromium	52	0.92	6010C	11-6-13	11-6-13	
Lead	66	9.2	6010C	11-6-13	11-6-13	
Mercury	ND	0.46	7471B	11-7-13	11-7-13	
Selenium	ND	18	6010C	11-6-13	11-6-13	
Silver	ND	1.8	6010C	11-6-13	11-6-13	

Lab ID:	11-013-02					
Client ID:	10-30-CORES					
Arsenic	ND	16	6010C	11-6-13	11-6-13	
Barium	160	4.1	6010C	11-6-13	11-6-13	
Cadmium	ND	0.81	6010C	11-6-13	11-6-13	
Chromium	38	0.81	6010C	11-6-13	11-6-13	
Lead	38	8.1	6010C	11-6-13	11-6-13	
Mercury	ND	0.41	7471B	11-7-13	11-7-13	
Selenium	ND	16	6010C	11-6-13	11-6-13	
Silver	ND	1.6	6010C	11-6-13	11-6-13	

Date of Report: November 13, 2013
Samples Submitted: November 2, 2013
Laboratory Reference: 1311-013
Project: 21-1-21880-007

**TOTAL METALS
EPA 6010C
METHOD BLANK QUALITY CONTROL**

Date Extracted: 11-6-13
Date Analyzed: 11-6-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB1106SM3

Analyte	Method	Result	PQL
Arsenic	6010C	ND	10
Barium	6010C	ND	2.5
Cadmium	6010C	ND	0.50
Chromium	6010C	ND	0.50
Lead	6010C	ND	5.0
Selenium	6010C	ND	10
Silver	6010C	ND	1.0

Date of Report: November 13, 2013
Samples Submitted: November 2, 2013
Laboratory Reference: 1311-013
Project: 21-1-21880-007

**TOTAL MERCURY
EPA 7471B
METHOD BLANK QUALITY CONTROL**

Date Extracted: 11-7-13
Date Analyzed: 11-7-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB1107S1

Analyte	Method	Result	PQL
Mercury	7471B	ND	0.25

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**TOTAL METALS
 EPA 6010C
 DUPLICATE QUALITY CONTROL**

Date Extracted: 11-6-13

Date Analyzed: 11-6-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: 11-026-07

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	11.0	11.6	5	10	
Barium	104	110	6	2.5	
Cadmium	ND	ND	NA	0.50	
Chromium	39.9	46.5	15	0.50	
Lead	54.2	55.1	2	5.0	
Selenium	ND	ND	NA	10	
Silver	ND	ND	NA	1.0	

Date of Report: November 13, 2013
Samples Submitted: November 2, 2013
Laboratory Reference: 1311-013
Project: 21-1-21880-007

**TOTAL MERCURY
EPA 7471B
DUPLICATE QUALITY CONTROL**

Date Extracted: 11-7-13

Date Analyzed: 11-7-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: 11-058-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Mercury	ND	ND	NA	0.25	

Date of Report: November 13, 2013
 Samples Submitted: November 2, 2013
 Laboratory Reference: 1311-013
 Project: 21-1-21880-007

**TOTAL METALS
 EPA 6010C
 MS/MSD QUALITY CONTROL**

Date Extracted: 11-6-13

Date Analyzed: 11-6-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: 11-026-07

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	108	97	105	94	3	
Barium	100	205	102	203	99	1	
Cadmium	50.0	47.3	95	46.7	93	1	
Chromium	100	165	125	143	103	15	
Lead	250	290	94	287	93	1	
Selenium	100	97.6	98	96.6	97	1	
Silver	25.0	22.8	91	22.1	88	3	

Date of Report: November 13, 2013
Samples Submitted: November 2, 2013
Laboratory Reference: 1311-013
Project: 21-1-21880-007

**TOTAL MERCURY
EPA 7471B
MS/MSD QUALITY CONTROL**

Date Extracted: 11-7-13

Date Analyzed: 11-7-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: 11-058-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Mercury	0.500	0.510	102	0.498	100	3	

Date of Report: November 13, 2013
Samples Submitted: November 2, 2013
Laboratory Reference: 1311-013
Project: 21-1-21880-007

% MOISTURE

Date Analyzed: 11-4-13

Client ID	Lab ID	% Moisture
10-29-CORES	11-013-01	46
10-30-CORES	11-013-02	39



Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference

Chain of Custody

Company: Shannon & Wilson, Inc.
 Project Number: 21-1-21880-007
 Project Name: U.S. Government Moorings
 Project Manager: Agnes Tirao
 Sampled by: Paul Van Horne

Turnaround Request (in working days)
 (Check One)
 Same Day 1 Day
 2 Days 3 Days
 Standard (7 Days) (TPH analysis 5 Days)
 _____ (other)

Laboratory Number: 11-013

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers *	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx <u>Extended</u>	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	<u>Total RCRA Metals</u> (circle one) MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	<u>Chlorinated Phenols</u>	<u>Cyanide</u>	% Moisture	
<u>1</u>	<u>10-29-CORES</u>	<u>10/31/13</u>	<u>1240</u>	<u>Soil</u>	<u>6</u>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
<u>2</u>	<u>10-30-CORES</u>	<u>11/1/13</u>	<u>1130</u>	<u>Soil</u>	<u>6</u>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished	<u>Paul Van Horne</u>	<u>Shannon & Wilson</u>	<u>11/2/13</u>	<u>0910</u>	Call with verbals, since some TCLP testing may be considered. *Each sample includes 1-40ML solidcap GV w/ methanol, 2-40ML septa cap GV w/ sobi, 1-4oz GJ, and 2-8oz GJ. (Excluded 1 methanol & 2 sobi spare vials (leftovers)). Chromatograms with final report <input type="checkbox"/>
Received	<u>[Signature]</u>	<u>OSI</u>	<u>11.2.13</u>	<u>9:10A</u>	
Relinquished					
Received					
Relinquished					
Received					
Reviewed/Date		Reviewed/Date			

SUB-APPENDIX C.2

INVESTIGATION-DERIVED WASTE DISPOSAL DOCUMENTS

SUB-APPENDIX C.2

INVESTIGATION-DERIVED WASTE DISPOSAL DOCUMENTS

TABLE OF CONTENTS

REPORTS

Non-hazardous Waste Manifest, Document No. 18658, for 1 drum (55 gallons) of non-regulated material, liquids.

Non-hazardous Waste Manifest, Document No. 18658, for 4 drums (220 gallons) of non-regulated material, solid.

Certificate of Treatment/Disposal Recycling (Water Disposal), from Waste Xpress Environmental Services, for USACE, 8010 NW St. Helens Road, Portland, OR, November 27, 2013.

Certificate of Treatment/Disposal Recycling (Soil Disposal), from Waste Xpress Environmental Services, for USACE, 8010 NW St. Helens Road, Portland, OR, December 18, 2013.

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. <i>CFSQH</i>	Manifest Document No. <i>18658</i>	2. Page 1 of 1
3. Generator's Name and Mailing Address <i>USACE c/o Shannon + Wilson 8010 NW St. Helens Rd. Portland, OR</i>				
4. Generator's Phone <i>(503) 224-3206</i>				
5. Transporter 1 Company Name <i>Wastexpress</i>	6. US EPA ID Number <i>OR000023156</i>	A. State Transporter's ID <i>881002</i>		
7. Transporter 2 Company Name	8. US EPA ID Number	B. Transporter 1 Phone <i>(503) 224-3206</i>		
9. Designated Facility Name and Site Address <i>Pacific Power Vac LLC 4927 NW Front Ave. Portland, OR 97210</i>		C. State Transporter's ID		
		D. Transporter 2 Phone		
		E. State Facility's ID		
		F. Facility's Phone <i>(503) 261-9800</i>		
10. US EPA ID Number <i>OR0027704816</i>				
11. WASTE DESCRIPTION		12. Containers	13. Total Quantity	14. Unit Wt./Vol.
a. <i>Non Regulated Material, Liquids, N.O.S., (Decon Water)</i>		No. <i>01</i>	Type <i>Drum</i>	<i>55</i>
b.				
c.				
d.				
G. Additional Descriptions for Materials Listed Above <i>a) 1ks5</i>		H. Handling Codes for Wastes Listed Above		
15. Special Handling Instructions and Additional Information				
16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.				
Printed/Typed Name <i>David Earl King as Agent for U.S. Army Corps of Engineers as Agent for U.S. Army Corps of Engineers</i>		Signature <i>[Signature]</i>	Date <i>11 27 13</i>	
17. Transporter 1 Acknowledgement of Receipt of Materials		Date		
Printed/Typed Name <i>Jeremy Lomer</i>		Signature <i>[Signature]</i>	Month Day Year <i>11 22 13</i>	
18. Transporter 2 Acknowledgement of Receipt of Materials		Date		
Printed/Typed Name		Signature	Month Day Year	
19. Discrepancy Indication Space				
20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.				
Printed/Typed Name		Signature	Date Month Day Year	

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. <i>LESQ6</i>		Manifest Document No. <i>18658</i>	2. Page 1 of 1	
3. Generator's Name and Mailing Address <i>USACE 76 Shannon + Wilson 8010 NW St. Helens Rd. Portland, OR</i>						
4. Generator's Phone (503) <i>224-3206</i>						
6. Transporter 1 Company Name <i>Wastexpress</i>		6. US EPA ID Number <i>ORQ000023150</i>		A. State Transporter's ID <i>881002</i>		
7. Transporter 2 Company Name		8. US EPA ID Number		B. Transporter 1 Phone (503) <i>224-3206</i>		
9. Designated Facility Name and Site Address <i>WM - Hillsboro Landfill 3205 SE Minter Bridge Hillsboro, OR 97123</i>		10. US EPA ID Number <i>N/A</i>		C. State Transporter's ID		
				D. Transporter 2 Phone		
				E. State Facility's ID		
				F. Facility's Phone <i>(503) 640-9427</i>		
11. WASTE DESCRIPTION			12. Containers		13. Total Quantity	14. Unit Wt./Vol.
			No.	Type		
a. <i>Non Regulated Material, Solid, N.O.S., (PPE, mud)</i>			<i>04</i>	<i>Dm</i>	<i>220</i>	<i>6</i>
b.						
c.						
d.						
G. Additional Descriptions for Materials Listed Above <i>a) 4x55</i>			H. Handling Codes for Wastes Listed Above			
15. Special Handling Instructions and Additional Information						
16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.						
Printed/Typed Name <i>DAVID EARL KING, as Agent for U.S. Army Corps of Engineers</i>			Signature <i>[Signature]</i>		Date <i>11/27/13</i>	
17. Transporter 1 Acknowledgement of Receipt of Materials			Signature <i>[Signature]</i>		Date <i>11/22/13</i>	
Printed/Typed Name <i>Jeremy Lomer</i>			Signature		Date	
18. Transporter 2 Acknowledgement of Receipt of Materials			Signature		Date	
Printed/Typed Name			Signature		Date	
19. Discrepancy Indication Space						
20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19.						
Printed/Typed Name			Signature		Date	

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

Certificate of Treatment/Disposal/Recycling

WasteXpress certifies that the items received from

USACE
8010 NW St Helens Road
Portland, OR

On a Non-Hazardous Manifest dated **November 27, 2013** have been properly treated/disposed/recycled at WasteXpress' affiliated facilities in compliance with all applicable regulatory standards as set forth by the Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ)

Dated: *December 11, 2013*

Sworn and attested by

WasteXpress Environmental Services

By **B. Lengel**

This is for the Water Disposal

Certificate of Treatment/Disposal/Recycling

WasteXpress certifies that the items received from

USACE
8010 NW St Helens Road
Portland, OR

On a Non-Hazardous Manifest dated **December 18, 2013** have been properly treated/disposed/recycled at WasteXpress' affiliated facilities in compliance with all applicable regulatory standards as set forth by the Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ)

Dated: *December 23, 2013*
Sworn and attested by
WasteXpress Environmental Services
By **B. Lengel**

This is for the Soil Disposal



Hillsboro Landfill, Inc
 3200 SE Minter Bridge
 Hillsboro, OR, 97123
 Ph: (503)-640-9427

Original
 Ticket# 1335944

Customer Name	WASTEXPRESS WASTE XPRESS	Carrier	WASTE XPRESS
Ticket Date	12/18/2013	Vehicle#	010
Payment Type	Credit Account	Container	
Manual Ticket#		Driver	Jeremy
Hauling Ticket#		Check#	
Route		Billing #	0001576
State Waste Code		Gen EPA ID	
Manifest	na		
Destination		Grid	
PG			
Profile	114373OR (SOIL~WASTEXPRESS~US GOVERNMENT MOORINGS~114373OR)		
Generator	OR-US GOVERNMENT MOORINGS US GOVERNMENT MOORINGS 8010 NW ST HELENS RD		

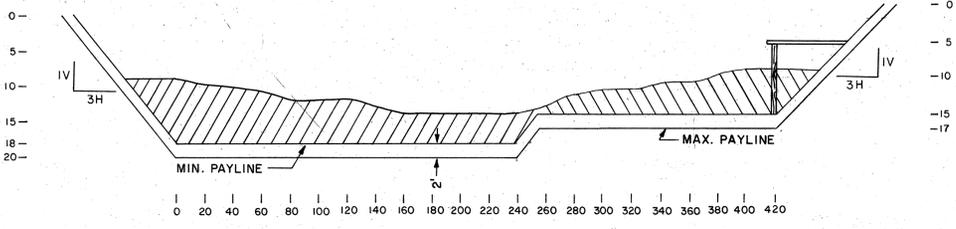
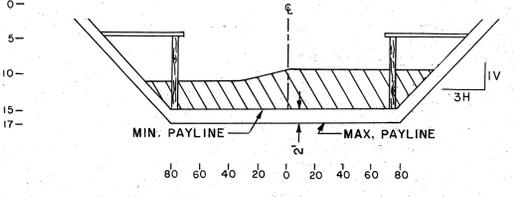
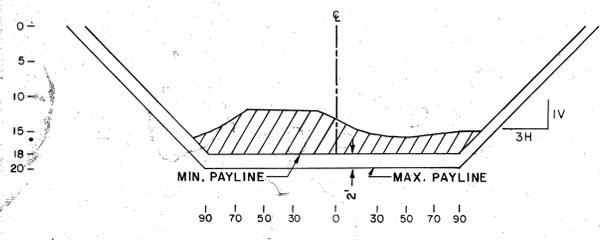
	Time	Scale	Operator	Inbound	Gross	
In	12/18/2013 09:59:27	Inbound 2	sdm			14720 lb
Out	12/18/2013 10:20:11	Outbound	jdb			13880 lb
					Net	840 lb
					Tons	0.42

Comments

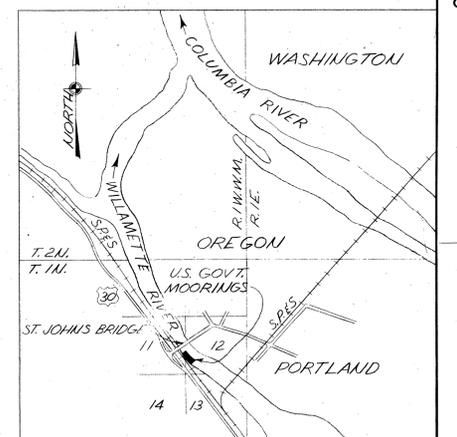
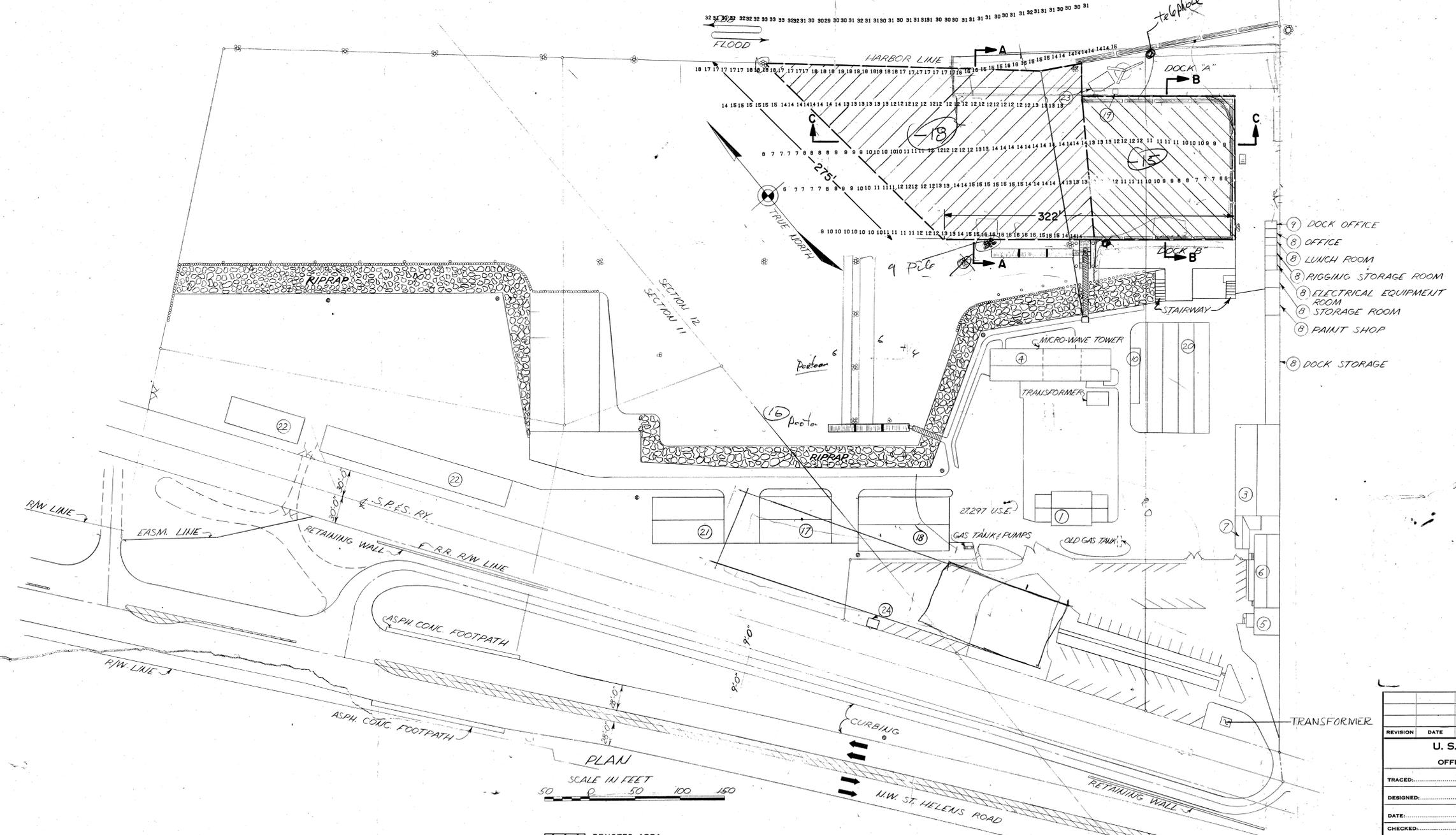
Consumer Comments? We want to know. Please call.

APPENDIX D
1981 MAINTENANCE DREDGING PLAN

MOOR ROCK X 1,422,119
Y 707,241



WILLAMETTE RIVER



- ⑨ DOCK OFFICE
- ⑧ OFFICE
- ⑧ LUNCH ROOM
- ⑧ RIGGING STORAGE ROOM
- ⑧ ELECTRICAL EQUIPMENT ROOM
- ⑧ STORAGE ROOM
- ⑧ PAINT SHOP
- ⑧ DOCK STORAGE

REVISION	DATE	DESCRIPTION	BY
U. S. ARMY ENGINEER DISTRICT, PORTLAND CORPS OF ENGINEERS OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON			
U. S. GOVERNMENT MOORINGS PORTLAND, OREGON MAINTENANCE DREDGING 1981			
TRACED: _____ DESIGNED: _____ DATE: _____ CHECKED: _____		APPROVED: _____ DATE: _____ COLONEL C. E. DISTRICT ENGINEER	
SUPERVISED: _____ CHIEF ENGR. SUBJECT: _____ SUBMITTED: _____ CHIEF PLANT SECTION: _____ RECOMMENDED: _____ CHIEF NAVIGATION BRANCH: _____		SCALE AS SHOWN SPEC. NO. _____ SHEET OF WR-4-51	

APPENDIX E

**DRAFT SEDIMENT INVESTIGATION REPORT
COMMENTS AND RESPONSES**

Date: 05 December 2013 and 10 December 2013

Project Location: U.S. Moorings, Portland, OR

Reviewer: Sharon Gelinias, Hydrogeologist

Document Name: Draft Sediment Investigation Report, U.S. Government Moorings, Portland, Oregon, dated November 26, 2013.

S&W RESPONSES: Provided in Appendix E to Final Sediment Investigation Report, dated December 20, 2013

Provided on 05 December 2013:

1. Sections 3.5.2 and 3.6.3, Air Monitoring. Please state that none of the air monitoring criteria was exceeded.

S&W Response: Text regarding air monitoring added.

2. Section 3.7, Evaluation of Substantial Product. I am including a table Mike Gross from the USACE Portland District put together that includes the elevation of the dredge prism exposed face. The future dredge depth contingency for the substantial product definition applies to all borings except SD-106, which is outside the dredge prism. I also included the 1981 dredge maintenance figure that you can use for reference (and to include as an Appendix). As you can see from Mike's calculations, we didn't get the full five feet below the future dredge depth at all locations due to sampling limitations. Please verify Mike's calculation using the figure and discuss the results in this section. Also modify Table 2 to include the dredge depth information and substantial product conclusions.

S&W Response: Section 3.7 replaced in its entirety to discuss observations relative to dredge prism. The 1981 dredge maintenance figure has been referenced in the section and is contained in Appendix D. Table 2 replaced in its entirety with a modified version of the table originated by M. Gross (USACE-Portland) and provided by S. Gelinias (USACE-Seattle).

3. Section 4.2, IDW Disposal. Update with recent disposal information.

S&W Response: Updated disposal information added to Section 4.3.

4. Table 2.

- a. Please remove reference to potential substantial product at SB-106. All overseeing parties did not agree that these intervals contained substantial product.

S&W Response: Reference deleted.

- b. Remove the word "possibly" from the substantial product description at SD-109. With the dredge depth information we can now confirm that it meets the definition.

S&W Response: "Possibly" deleted.

- c. Include dredge depth information described in comment 2.

S&W Response: Table replaced with modified version of USACE-provided table (Summary of Substantial Product Relationship to Dredge Prism).

5. Appendix A, Exploration Logs. Soil Classification and Log Key not included in the report.

S&W Response: Soil Classification and Log Key added.

6. Log SD-102. 8.8 feet. Log states “Black layer at 8.8 to 8.0 feet”. This appears to be a typo, should it be 8.8 to 9.0 feet? Also verify if there were interbeds in this layer since there should not be any black layer in this core greater than 2 inches.

S&W Response: Text revised to “8.8 to 8.9 feet”.

7. Log SD-106.

- a. 2 feet. Please state the thickness of the black interbeds within the 2.0 to 2.2 interval.

S&W Response: Text revised.

- b. 10.9 to 11.1 feet. The log uses the words “product ooze spots”, indicating there could be mobile product (i.e. substantial product). All parties overseeing the logging did not agree that these spots contained NAPL that was mobile. Please modify the terminology used to describe these spots.

S&W Response: Text revised, reference to “ooze spots” revisited and removed.

- c. 11.7 feet. Please include the observed mobility of the DNAPL mentioned in the log. I think it was saturated, but not necessarily mobile. None of the parties overseeing the logging observed any pooling of NAPL that would be indicative of mobile product.

S&W Response: Text revised, reference to “DNAPL” revisited and removed.

8. Log SD-107. 7.4 feet. Typo: “trace fine sand” stated twice.

S&W Response: Duplicate text deleted.

9. Log SD-108.

- a. 3.2 feet. Spell out “H C”.

S&W Response: HC spelled out.

- b. 7.4 to 7.6 feet. States “numerous 1/16 to 2-1/8 inch black bands.” Please verify that there was a 2-1/8 inch band as there should not be any black band greater than 2 inches in this log.

S&W Response: Text revised to “1/16- to 1/8-inch black laminations”.

Provided on 10 December 2013:

1. 4.2.1 Analytical Testing, 1st paragraph: How were composites put together? How many subsamples? How much material did each composite represent? What was the rationale for locations of subsamples?

S&W Response: Section 4.0 re-organized. Revisions included:

- 4.1 – drum count/contents added
- 4.2.1 – new paragraph outlining compositing methods added
- 4.2.2 – references to tables C.1-1 through C.1-6 added
- 4.2.3 – paragraph re-named “Sample Handling”
- 4.3 – disposal information updated

2. 4.3 Disposal: Include a table summarizing IDW characterization results. Include regulatory levels and references that help the reader follow the call to consider the IDW non-hazardous for disposal.

S&W Response: Tables C.1-1 through C.1-6 added to Appendix C. Tables include hazardous waste characterization trigger and Oregon clean fill criteria.

APPENDIX F

**IMPORTANT INFORMATION ABOUT YOUR
GEOTECHNICAL/ENVIRONMENTAL REPORT**



Date: January 24, 2014
To: Ms. Sharon Gelinis
Department of the Army
Seattle District, Corps of Engineers

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland